ORNL/TM-2023/2948

Oak Ridge Reservation Meteorological Overview Report, Oak Ridge, Tennessee

Kevin Birdwell, PhD.

September 2023

OAK RIDGE National Laboratory

ORNL IS MANAGED BY UT-BATTELLE LLC FOR THE US DEPARTMENT OF ENERGY

Oak Ridge Reservation Meteorological Overview Report
Oak Ridge, Tennessee

Date Issued – September 2023

Prepared by
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, TN 37831
managed by
UT-BATTELLE LLC
for the
US DEPARTMENT OF ENERGY
under contract DE-AC05-00OR22725

APPROVALS

Kevin Birdwell, Ph.D., Atmospheric Scientist Originator (printed)	Kevin R. Birdwell Digitally signed by Kevin R. Birdwell Date: 2023.10.05 08:21:13 -04'00' Signature and Date
Steven M. Trotter, PhD., ESH&Q Manager, Second Target Station Project Reviewer (printed)	Steven M. Trotter Digitally signed by Steven M. Trotter Date: 2023.10.05 14:31:07 -04'00' Signature and Date
Eugene Adams, RRD Structural Engineer Reviewer (printed)	Michael E. Adams Digitally signed by Michael E. Adams Date: 2023.10.05 17:04:14 -04'00' Signature and Date
Sara Martinez, NNFD Structural Engineer Reviewer (printed)	Sara Martinez Digitally signed by Sara Martinez Date: 2023.10.06 08:10:11 -04'00' Signature and Date
Brian Bailey, Facility Safety Engineer Reviewer (printed)	Brian Bailey 2023.10.06 08:18:18 -04'00' Signature and Date
Natasha Blair, Nuclear Safety Program Approver (printed)	Natasha Blair Digitally signed by Natasha Blair Date: 2023.10.06 08:42:06 -04'00' Signature and Date

REVISION LOG

Revision	Date of Issue	Reason for Revision
0	9.29.23	Initial Issue of ORNL Document, based on UCOR-4445 but updated to represent current standards and the latest meteorological data

Table of Contents

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

AGL	Above Ground Level
AMO	Atlantic Multidecadal Oscillation
ANS	American Nuclear Society
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
DOE	U.S. Department of Energy
EF	Enhanced Fujita (Scale)
ENSO	El Niño – Southern Oscillation
ETTP	East Tennessee Technology Park
HFIR	High Flux Isotope Reactor
IBC	International Building Code
NPH	Natural Phenomena Hazards
NOAA	National Oceanographic and Atmospheric Administration
NWS	National Weather Service
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PDO	Pacific Decadal Oscillation
SODAR	Sonic Detection and Ranging
SST	Sea Surface Temperature
STD	Standard
WDC	Wind Design Criteria
Y-12	Y-12 National Security Complex

1.0 INTRODUCTION

This report is purposed to provide a summary of the local climate and data from meteorological (Met) towers and wind profilers at the East Tennessee Technology Park (ETTP), the Y-12 National Security Complex Site (Y-12), the Oak Ridge National Laboratory (ORNL), as well as other federal, state, or local agencies as necessary to support the natural phenomena hazards (NPH) analysis 10-year update required by Department of Energy (DOE)-STD-1020-2016, *Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities*. The data from this report will be used to support high wind analyses, precipitation analysis, flood analysis, lightning analysis, and other severe weather phenomena for the ETTP, the ORNL, and Y-12.

2.0 DATA COLLECTED

2.1 WINDS

Wind data were collected and processed by UT-Battelle to characterize two types of wind-related hazards: 1) straight-line winds; and 2) tornadic winds. Data sets of historical extreme winds were obtained from weather stations that are within or close enough to Oak Ridge Reservation (ORR) sites to spatially represent site conditions.

Most data consist of ten or more continuous years of annual extreme wind speed records. Longer periods of data were included where existing and quality assured records have permitted. Some newer meteorological sites have been in operation for only 5 or 6 years (i.e., ORNL Tower “F” and Y-12 Tower “S”).

- Elevations above ground at which wind speeds were recorded vary with respect to the individual site but typically include 10 to 15 meter above ground level (AGL) data to support evaluation consistency. Local vegetative and topographical features of ORR’s complex terrain sometimes require that lowest near-surface wind measurement exceed 10 meters (typically 15 meters AGL), but the measurement height of wind speeds, if not 10 meters AGL, may be adjusted using acceptable logarithmic wind height conversion methods (typically logarithmic wind profiling).
- The type of wind speed parameter recorded during the period of record included fastest hourly average wind speed as well as peak 1- to 3-second gust speeds.

Meteorological data from on-site stations were supplemented by historical records from nearby National Oceanic and Atmospheric Administration (NOAA) stations in or near Oak Ridge, Tennessee.

DOE-STD-1020-2016, Section 4.2.3.2(d) requires that tornado data be collected for tornadoes striking within 500 km (310 miles) from the ORR. However, the standard allows for data collection at shorter distances (e.g., 50 – 80 km from the ORR) if it can be demonstrated that a striking distance of 500 km is overly conservative and not representative of the tornadic frequency in the ORR area, which was the case in this evaluation:

- Tornado track, including latitude and longitude;
- Tornado intensity, using the Enhanced Fujita, or EF, scale;
- Tornado length and width; and
- Data and information necessary for characterizing potential tornado wind-borne missiles (e.g., weight, size, and shape).

Shorter distances for tornado tracking are more appropriate for Oak Ridge. It is postulated that significant terrain effects of the East Tennessee Valley have an impact on tornado frequency, distribution, and intensity. Counties representing the ORR region (Campbell, Anderson, Meigs, Roane, Rhea, Union) have recorded less than 25% of the number of tornadoes compared to counties west of the ORR region inclusive of those on the Cumberland Plateau (Cumberland, Fentress) since 1950[1].

2.2 PRECIPITATION

Monthly and annual summaries, including averages and periodical extremes, of precipitation and equivalent melted water contents at, or near, the ORR were collected.

2.3 LIGHTNING

Lightning data for the ORR are provided for use in evaluating risks and for determining the adequacy of lightning protection systems for existing facilities. Tables of thunderstorm days were developed for ORNL and Knoxville and frequency maps of lightning strikes were compiled by Y-12 for ETTP, ORNL, and Y-12 from 2011-2022.

2.4 OTHER WEATHER PHENOMENA

Average temperature data are provided by the network of ORR meteorological towers; extreme temperature data have been sourced from both the ORR towers and local NOAA tower information. These data, along with moisture statistics, play a role in the evaluation of risks for high heat index levels and extreme wind chill data. Additional data collected for mixing height, inversion depth, vertical atmospheric stability, and air stagnation factors are important for determination of high pollutant levels.

3.0 METEOROLOGICAL DATA

3.1 REGIONAL CLIMATOLOGY

3.1.1 Overview[42]

The climate of the area surrounding the ORR consisting of the ETTP, ORNL, and Y-12 sites may be broadly classified as humid subtropical (Koëppen Climate Classification). The term “humid” indicates that the region receives an overall surplus of precipitation compared to evapotranspiration. The designation “subtropical” indicates that the region experiences warm to hot summers and cool winters. Humid subtropical climates typically undergo significant changes in temperatures between summer and winter but have relatively uniform precipitation throughout the annual cycle.

Local winters are typified by synoptic weather systems that typically produce significant precipitation events every 3 to 7 days. Low pressure systems occasionally usher in Arctic air outbreaks. Although snow and ice are not associated with most such systems, frozen precipitation occasionally affects the ORR area. Regional terrain may enhance winter cloud cover in association with cold air wedging and other topographic factors.

Severe thunderstorms occur most frequently during spring but may develop during any season. The Cumberland Mountains, Crab Orchard Mountains, and Cumberland Plateau often inhibit the intensity of west-to-east-moving severe systems traversing the Great Valley of Eastern Tennessee (including the ORR) due to the downward momentum created as storms move off of high terrain windward of the ORR (see terrain map – Figure 3-1). Because summers are characterized by very warm, humid conditions, approaching frontal systems occasionally produce organized lines of strong thunderstorms. More frequently, however, summer precipitation results from “air mass” thundershowers that form as a consequence of daytime heating, rising humid air, and local terrain. September and October represent the driest months of the annual cycle, characterized by less frequent and less diurnal precipitation. Occasionally, late summer and early fall precipitation is enhanced by decaying tropical systems moving across the region from the Gulf of Mexico. During November, winter-type cyclones again begin to dominate weather patterns, continuing to do so until May.

Decadal-scale climate fluctuations influence the Eastern Tennessee region. Most of the resulting changes are associated with ocean-basin and hemispheric scale oscillations resulting from the El Niño – Southern Oscillation (ENSO), the Pacific Decadal Oscillation (PDO), and the Atlantic Multidecadal Oscillation (AMO). The first pattern, ENSO, exhibits cycles of 3 to 7 years, while the PDO and AMO generally accomplish complete cycles on time-scales of 40 to 80 years. Both ENSO and the PDO directly affect Pacific Ocean sea surface temperatures (SSTs) that subsequently influence global climate patterns including Eastern Tennessee. The AMO primarily affects Atlantic SSTs. All of these oceanic patterns may collectively modulate regional temperature and precipitation trends in Eastern Tennessee. The AMO shifted from a cold to warm SST phase during the mid-1990's and continues its positive warm phase as of 2023. The PDO entered a predominantly cool sea surface temperature phase after 2000 but briefly trended warm during the mid-2010s before returned to a "cool-ish" state. The ENSO pattern produced very strong warm phase ENSO conditions in 1997-1998 and 2015-2016 (frequently warmer Eastern Pacific SSTs but has been dominated by a cool phase since 2016. Decadal-averaged Oak Ridge average temperatures have increased by about +1.6^{o}C from the 1970s to the 2010s – See Table 3-1 and Table 3-2[2]. The decadal-scale temperature increases have been associated with a lengthened growing season (i.e., period with temperatures above 0^{o}C) by 3 weeks or more over the last 30 years. Since the 1990s, decadal-scale temperatures have changed little (+0.1^{o}C). Table 3-5 provides monthly-daily climate normals for Oak Ridge, Tennessee (temperature and precipitation) for 1991-2020 as well as climate extremes (maximum/minimum temperatures and maximum 24-hour precipitation) for 1947-2022.

3.1.2 Terrain and Winds

Terrain exhibits a significant influence on the regional and local climate. These effects primarily result in daily to multi-day scale modifications in cloud cover, precipitation, air mass, and wind flow regimes. These effects vary with season and the ambient synoptic weather regime. Numerous terrain-related wind regimes regularly influence the climate of the Great Valley of Eastern Tennessee, and specifically the ORR. These include forced channeling, downward-momentum transport or vertically coupled flow, pressure-driven channeling, along-valley thermal circulations, and mountain-valley circulations. Pressure-driven channeling and vertically coupled flow typically affect air flow at spatial scales of hundreds of kilometers. Forced channeling exhibits influence at similar spatial scales but is also quite important over short distances involving small terrain features such as the ridge-and-valley corrugations that characterize much of the ORR[3]. Thermally-driven, along-valley as well as mountain-valley circulations are observed at a large range of spatial scales. Thermal flows are more prevalent under conditions of clear skies, low humidity, and light synoptic wind forcing. Beyond just winds, the complex topography of the ORR frequently influences radionuclide and hazardous chemical transport and diffusion, maximum/minimum surface temperature distribution, humidity/radiation fog effects, snowfall/black ice distribution, and wind direction and speed (Table 3-6).

Forced channeled flow is defined as wind directly deflected by terrain features, and thus represents a form of channeling that necessitates a degree of vertical motion transfer, implying that the flow mechanism is less pronounced during strong surface temperature inversions. Although forced channeling may result from interactions between large valleys and mountain ranges (such as the Great Valley and the Cumberland Plateau), the mechanism is especially important for narrow, long valleys such as those on the ORR[4].

Large-scale forced channeling represents the most prevalent type of wind flow mechanism in the Central Great Valley of Eastern Tennessee (including the ORR). As overlying winds shift from west to northwest over the Great Valley, forced channeled winds reverse direction from up-valley (from west-southwest) to down-valley (east-northeast). The phenomenon sometimes results in a split flow pattern (winds southwest of Knoxville moving down-valley and those to the east of Knoxville moving up-valley). This flow pattern results partially from the shape characteristics of the Great Valley[5] but also show relationship to the location of the Cumberland and Smoky Mountains relative to upper level wind flow and the ORR[5]. The convex shape of the Great Valley with respect to a northwest wind flow may lead to a divergent wind flow pattern in the Knoxville area, resulting in downward air

motion (4% of winds flowing over the Central Great Valley result in this pattern). Horizontal flows crossing the Central Great Valley are also reduced by the windward mountain ranges (Crab Orchard and Cumberland Mountains), which increase buoyancy and Coriolis effects (Froude and Rossby ratios). Consequently, the leeward mountain range (Smoky Mountains) becomes more effective at blocking or redirecting air flow. About 50 to 60% of observed winds over the Central Great Valley tend to be dominated by a forced channeled mechanism. Changes in forced channeled flows are often associated with major wind shifts (turning greater than 90°) but tend to be less associated with wind reversals (turning greater than 135°) than do pressure-driven winds.

Vertically coupled winds may occur when the atmosphere is moderately well mixed (i.e., during weak or absent temperature inversions). When a strong horizontal wind component is also present (such as in the wake of a cold front), wind may override the terrain, flowing over it in roughly the same direction as the wind aloft, a consequence of the transfer of horizontal momentum to the surface. However, Coriolis effects may turn such winds up to 30° to the left[3]. Buoyance effects from upwind mountain ranges also continue to affect vertical momentum[39]. In the Central Great Valley, Birdwell[3] found that vertical coupled flow represented between 25 and 37% of observed winds. During seasons dominated by synoptic-scale low pressure systems, vertically coupled winds tend to be associated with significant air mass transitions, especially cold air advection. In summer, vertically coupled flow frequently occurs when the near-surface atmosphere becomes deeply mixed by strong surface heating, transferring the momentum of upper-level wind flows toward the surface.

Pressure-driven channeling, in its simplest essence, is the redirection of synoptically induced wind flow through a valley channel. The direction of the valley wind flow is determined by the portion of the pressure gradient that is superimposed on the along-valley axis[4]. This process is affected by Coriolis forces, a leftward deflection of winds (in the Northern Hemisphere). Birdwell[3] showed that pressure- driven channeling plays a significant role within the ORR with regard to sudden wind reversals, (turning greater than 135°) during all seasons except summer. The pattern is often associated with the passage of strong synoptic low-pressure systems. Winds driven by such processes usually shift from down-valley (from east-northeast) to up-valley (from west-southwest) or conversely as synoptic- induced flow shifts across the axis of the Great Valley of Eastern Tennessee. Because the processes involved in pressure-driven flow primarily affect horizontal air motion, the presence of a near-surface or moderately deep temperature inversion enhances this flow pattern. Weak vertical air motion and momentum associated with such inversions allow air layers to easily slide over each other[5]. Pressure-driven dominated winds represent up to 20% of all winds over the Oak Ridge Reversion during fall, winter, and spring. Most pressure-driven wind events are associated with wind blockage created by the Great Smoky Mountains (60 km to the southeast of the ORR).

Thermally driven winds are common in areas of significant complex terrain, occurring as a result of pressure and temperature differences caused by varied surface-air energy exchange at similar altitudes along a valley's axis, sidewalls, and slopes. Thermal flows operate most effectively when synoptic winds are light and when thermal differences are exacerbated by clear skies and/or relatively low humidity[4]. Oak Ridge's ridge-and-valley terrain may enhance or inhibit such air flow, depending on the ambient stability, mixing depth, and synoptic weather. Eckman[5] suggested that the presence of daytime up-valley winds and night-time down-valley (drainage) flows within the Oak Ridge area tended to reverse at about 9:00 to 11:00 a.m. and from about 5:00 to 7:00 p.m. local time. The terrain-following nature of drainage winds suggests greater impact from ridge-and-valley corrugations than for their daytime counterparts, which tend to be accompanied by upward air motions, weaker stability, and deep mixing depth. Birdwell[3] identified both up- and down-valley thermally dominated winds for the Central Great Valley including the ORR in all seasons. However, thermally-driven winds strongly favor summer and fall (19% and 12% seasonal frequencies for 2009/2010), with somewhat less frequent occurrence during winter and spring. Rare occurrence of mountain-valley breezes was also identified during fall (Cumberland Mountains Breeze), usually represented by a daytime "up-mountain" flow from the southeast.

Wind speeds tend to be lower in local valley bottoms due to the wind blockage created by the local ridge corrugations (about 80-150 m high). However, temperature inversions that frequently form within local valleys between the ridges occasionally create conditions that result in wind speed accelerations during inversion breakup. These accelerations typically occur during late morning hours as near-surface atmospheric instability increases. Wind accelerations may also occur as strong synoptic low-pressure systems abruptly change the vertical stability of the Great Valley atmosphere. This latter type of wind acceleration occurs more frequently during cool months (November-April) when cold air drainage is prevalent, and the frequency of synoptic systems is greatest. During periods of low wind speed, a significant terrain effect is the reduction of the dispersion of emissions into the atmosphere. However, the effect is partially mitigated by tall stacks, terrain complexity, temperature, and moisture.

Topographic variation also influences patterns of temperature and precipitation over the region. Cooler temperatures and greater precipitation generally occur over the nearby Cumberland Mountains and Plateau. Severe storms that cross the region are significantly affected by the Crab Orchard and Cumberland Mountains as well as the Cumberland Plateau as the storms cross the ORR and Great Valley of Eastern Tennessee. Storms that cross from west-to-east typically weaken upon descent from these topographic barriers before reaching the ORR. However, when upper-level winds are from the northwest with respect to Oak Ridge, topographic enhancement of local storms, resulting from mountain wave enhancement by the Cumberland Mountains occasionally occurs. This effect has been observed to slightly increase thunderstorm incidence over the ORR during fall.

Local topography (ridge-and-valley) generally induces a slightly enhanced diurnal temperature range (by 1 to 3°C) within local valleys compared to nearby ridge tops. The effects are more pronounced during clear weather under light winds. Such conditions allow cold air to more efficiently drain into and through local valleys. Stronger temperature inversions may result, sometimes accompanied by fog or high humidity. These conditions may be exacerbated after major precipitation events. During daytime hours, relatively higher wind speed at ridge top locations efficiently mixes the near-surface atmosphere, resulting in slightly lower maximum temperatures (by 1-2°C), especially on sunny days[8].

3.1.3 Meteorological Data Sources

Data from ORNL Meteorological Tower “A” (High Flux Isotope Reactor [HFIR] area), ORNL Meteorological Tower “B” (6500 Area), ORNL Meteorological Tower “D (1000 Area)”, ORNL Meteorological Tower “F” (SNS 8500 Area), former ETTP Meteorological Tower “K” (1208), former ETTP Meteorological Tower “L” (1209), Y-12 Tower “J” (Y12 EOC at ETTP), Y-12 Tower “S” (South Ridge), Y-12 Meteorological Tower “W” (West), and Y-12 Meteorological Tower “Y” (Plant Shift Supervisor [PSS] Office) are used for primary site meteorology/climatology. Additionally, wind profilers are operated by ORNL (Lidar “Q” near ETTP and Y-12 Sodar near the Y-12 water plant). Some data are supplemented with ancillary data (where needed) from National Weather Service sites available for Knoxville McGhee-Tyson Airport (KTYS) and the Oak Ridge Laboratory Road area (KOQT). The location of ORR meteorological towers and wind profilers is shown in Figure 3-2. Tower “A” is located in the ORNL HFIR complex. Tower “B” is situated near the east end of the main ORNL campus. Tower “D” is located at the southwest end of the main ORNL campus. Tower “F” is located near the water tower on the SNS campus section of ORNL. Tower “K” (removed August 2017) was located at the ETTP burial ground and Tower “L” was located (removed May 2021) near the front of the ETTP campus near the Clinch River and Tennessee Highway 58. Tower “J” is located adjacent to the Y-12 EOC at ETTP. Tower “S” is located on Chestnut Ridge south of the main Y-12 campus. Tower “W” is located at the southwest end of the main Y-12 campus, and Tower “Y” is collocated with the Y-12 PSS Office. Both ORNL and Y-12 operate identical sodar wind profilers (sonic detection and ranging instruments). The ORNL unit is used primarily for inversion depth and mixing height data collection while the Y-12 unit is used for similar purposes but also provides real-time wind direction and speed. ORNL also operates a lidar (light detection and ranging) unit which profiles wind direction, wind speed, and stability about 1 km south of ETTP. All meteorological tower sites maintain

instrumentation to measure temperature, wind speed, wind direction, at 10 or 15 m AGL. In addition, several of the sites make measurements at 30, 33, or 60 meters AGL. Relative humidity and precipitation are measured at Towers "A", "B", "D", "F", "W", and "Y". Dew point temperatures are calculated directly at Towers "D" and "F". Solar radiation and barometric pressure near ground level are measured at Towers "D", "F", "W", and "Y". All of these parameters are useful for analysis of site climatology. Data measurement specifics for the DOE-managed ORR meteorological towers are summarized in Table 3-7. Y-12's sodar wind profiler regularly reports winds from about 40 to 400 m AGL and ORNL's lidar at ETTP similarly reports wind conditions from 40 to 380 m AGL.

The National Oceanic and Atmosphere Administration National Weather Service (NOAA-NWS) operates meteorological stations in Oak Ridge (near the DOE Oak Ridge Operations Office – about 16 km northeast of ORNL) and at Knoxville's McGhee-Tyson Airport (about 35 km east-southeast of ORNL). While some information available from these sites is useful, data must be used with caution due to changes caused by regional terrain effects. This is particularly the case for the Knoxville McGhee-Tyson site as it is situated in an area that frequently experiences terrain-related wind flows that differ from those of the ORR[8].

3.2 LOCAL/REGIONAL METEOROLOGICAL CONDITIONS FOR DESIGN AND OPERATING BASES

3.2.1 Lightning and Thunderstorms

On average, lightning/thunderstorms occur on the ORR and Oak Ridge area at a rate of 47 days/year, with a monthly maximum near 11 occurring in July. About 39 of these lightning/thunderstorm days occur during a 6-month period from April through September, with most of the remainder spread broadly throughout the fall and winter. Monthly and annual average numbers of lightning/thunderstorm days are given in Table 3-3 for the ORR (ORNL) and Table 3-4 for Knoxville McGhee-Tyson Airport during 2001-2022. The highest number of annual lightning/thunderstorm days at ORNL was observed during 2012 (65) and the lowest during 2007 and 2022 (34). The *Climate Atlas of the United States* provides a map showing average annual frequency of lightning/thunderstorm days over the United States[9]. Additionally, annual lightning strike locations from 2011-2022 are shown for ETTP, ORNL, and Y-12 in Figure 3-4 through Figure 3-39.

3.2.2 Hail

A 23-year radar-based study for large hail fall (2.5 cm or greater) was conducted for the US during the period 1995-2017[12]. It reveals that slightly more than 2 large hail (>2.5 cm) days occur within about 40 km of the ORR per year. Some hail events have been known to occur in association with non- thunder rain showers in association with low freezing levels (particularly during winter or spring). Most hailstorm occurrences (77%) do not result in hailstones larger than 2 cm. During the 1961-1990 period, approximately six hail events have been documented (having hailstones larger than about 2 cm) that occurred at locations within 40 km of ORR[9]. Virtually all of these events occurred during the summer and fall seasons. During the 2011 significant tornado outbreak in East Tennessee, large hail greater than 2 cm was observed in Farragut, TN about 15 km southeast of the ORR. In May 2013, approximately 2 cm large hail was associated with a severe thunderstorm that passed through the ORR (Y-12 area and east ORNL guard portal) and West Knoxville. In May 2022, large hail was reported in several spots within 75 km of the ORR, and in May 2023, hail greater than 2 cm was reported in nearby Knoxville in association with a severe thunderstorm. A map of US hail events since 1955 is shown in Figure 3-40[10]. The number of large hail events documented for Eastern Tennessee by county is shown in Figure 3-41 for 1955-2006.

For comparison with extreme values in the United States, an average of less than 0.5 hail days per year occurs near the Gulf of Mexico coast and about eight hail days per year occur near Cheyenne, Wyoming[11]. A calculated hail index of potential hail damage to residential property was calculated for 1° squares of latitude and longitude.

On that scale, eastern Tennessee averages about five, which is a relatively low value. Values of this index are as high as 50 in northwestern Kansas and as low as one or less in the Florida peninsula and in a broad area centered roughly where the Arizona-Utah border meets the Nevada state line[12]. Therefore, on a geographical basis, the ORR is located on a site of low to moderate potential risk from hail damage.

3.2.3 Tornadoes and Down Bursts

Although greater tornado frequencies occur in Middle and West Tennessee, Eastern Tennessee experiences moderately frequent tornado outbreaks (every 3 to 6 years on average). Tornado indices from the National Weather Service in Morristown show that since 1950, there have been 3 documented tornadoes within 10 km of ORNL, represented by two F0 (Fujita Scale) tornadoes, and one F3 tornado. The Fujita tornado intensity scale was modified in recent years and became the Enhanced Fujita (EF) scale. The two scales are compared in Table 3-8. Broadly speaking, EF0 and EF1 tornadoes roughly approximate F0 and F1 tornadoes. EF2 and EF3 tornadoes approximate the lower and upper portions of the F2 range on the original Fujita scale. EF4 tornadoes correspond approximately to F3 tornadoes, while EF5 corresponds roughly to F4 tornadoes. The largest differences between the original Fujita scale and the Enhanced Fujita scale occur for F3 to F5 vs. EF3 to EF5 tornadoes. EF3 tornado ¼ mile wind speed thresholds are over 20 mph lower than for F3 tornadoes (136 vs. 158 mph). For EF4 tornadoes, the threshold is over 40 mph slower (166 vs. 208 mph); and EF5 tornadoes begin at wind speeds above 200 mph compared to F5 tornadoes that needed to reach 261 mph. Documented tornadoes by distance from the ORR are shown by category in Table 3-9 through Table 3-11.

Specific documented tornadoes that occurred in Anderson, Knox, Loudon, and Roane County are shown in Table 3-12 through Table 3-15. A moderately strong F3 tornado occurred in February 1993 and moved through Bear Creek Valley near the Y-12 Site with winds damaging the roofs of several buildings along Union Valley Road. To date, the February 1993 tornado has been the only documented tornado to occur within the ORR. During the 1993 tornado, the NOAA-ATDD office in Oak Ridge measured a 1-second wind gust of 79 mph (35.3 m/s). A tornado-like event also occurred on May 19, 2013, damaging some facilities near the landfill area of Y-12; approximately 150 acres of timber were damaged in this event. This event involved wind gusts to at least 75 mph (Y-12 Tower "W") and was documented by the National Weather Service (NWS) as a downburst event. The NWS estimated maximum 3-second wind gusts at 80-85 mph based on observed tree damage. Figure 3-42: shows tracks of documented tornadoes in the United States during 1950-2021 (NOAA Storm Prediction Center). From this map, it is obvious that the ORR is located at the southwestern edge of a zone of infrequent tornado frequency centered on the Southern and Central Appalachians. Consequently, much higher frequencies to the southwest (Western Tennessee, Alabama, Georgia) are not representative of tornado frequencies in Central Eastern Tennessee (see also Reference 1).

An additional 8 tornadoes have been documented since 1950 at distances within 20 km of the ORR, ranging in intensity from F0/EF0 to F2/EF2 in intensity. The most recent of these were 3 EF0-EF1 tornadoes that occurred during the April 27, 2011 tornado outbreak. These tornadoes affected eastern Roane Co. to the south, the Edgemoor Rd. area to the northeast of the ORR, and the Farragut area. Another 10 to 12 tornadoes, ranging from F0/EF0 to F3/EF3 in intensity have occurred with 35 km of the ORR since 1950. Most of these occurred to the east and south of the ORR in Knox and Roane Counties; however, a few of these occurred in the Rocky Top and Norris area.

Although local terrain may have significant influence on tornado track and intensity, nearly two dozen tornadoes have been documented within 35 km of ORR since 1950[13]. No tornadoes stronger than F3/EF3 (about 200 mph) have been documented within 35 km of the ORR since records have been available (about 100 years). Table 3-12 through Table 3-15 show all tornadoes documented by the National Weather Service for Anderson, Knox, Loudon, and Roane Counties. For the East Tennessee Morristown, TN forecast area (covering the Chattanooga, Knoxville, and Tri-Cities areas), an average of about 2 tornadoes per year have been documented. Approximately

70% of East Tennessee tornadoes occur during the months of March, April, and May. About 64% of all observed tornadoes in East Tennessee also occur between 2 and 8 pm local time.

3.2.4 Maximum Straight-Line Winds

Average maximum 1-hour wind speeds in miles per hour for meteorological towers on the ORR are shown in Table 3-16 to Table 3-26 and Table 3-28 to Table 3-33. Average maximum 5-minute wind speed in miles per hour for Lidar "Q" are provided in Table 3-27.

At ORNL, the maximum 1-hour wind speed for Tower "A" (HFIR) during 1998-2012 was 18.5 mph and 26.7 mph at 10/15 and 30 meters AGL respectively. For Tower "B" (6500 Area) during 2001-2022, maximum 1-hour wind speeds were 18.3 and 22.4 mph at 10/15 and 30 meters AGL. At Tower "D" (1000 Area), maximum 1-hour wind speeds were 20.8, 24.6, and 39.8 mph at 10/15, 30/35, and 60/100 meters AGL during 1998-2022. At Tower "F" (SNS), maximum 1-hour winds were 25.7 mph at 10 meters AGL during 2018-2022.

At ETTP, the maximum 1-hour wind speeds for Tower "J" (Y-12 EOC) were 28.3 mph at 20 meters AGL (2017-2022) while maximum 1-hour winds at Tower "L" were 21.4 and 24.9 mph (2000-2021) at 10/15 and 30 meters AGL. The wind profiler (Lidar "Q") near ETTP has operated since August 2021. From 40 to 100 meters AGL, maximum 5-min wind speeds were 57.9 mph. From 120-200 m AGL, 220-300 m AGL, and >300 m AGL these values were 78.8, 86.1, and 96.4 mph, respectively.

At Y-12, the maximum 1-hour wind speed for Tower "S" (South Ridge) was 37.1 mph at 20 m AGL (2012-2022). For Tower "W" (Y-12 West) were 19.6, 25.9, and 30.8 mph at 10, 30, and 60 meters respectively (2004-2021 for 10 and 60 m and 2006-2021 for 30 m). For Tower "Y" (PSS Office), maximum 1-hour wind speeds were 22.5 and 28.6 mph for 15 and 33 meters AGL respectively (2007-2022).

Maximum 1-second peak wind gusts in miles per hour for meteorological towers on the ORR are shown in Table 3-34 to Table 3-43 and Table 3-45 to Table 3-50. Maximum 1-second peak wind gusts in miles per hour for Lidar "Q" are provided in Table 3-44.

At ORNL, the maximum 1-second peak wind gusts for Tower "A" (HFIR) during 1998-2012 were 83.7 mph and 83.4 mph at 10/15 and 30 meters AGL, respectively. For Tower "B" (6500 Area) during 2008-2022, maximum 1-second peak wind gusts were 58.2 and 60.9 mph at 10/15 and 30 meters AGL. At Tower "D" (1000 Area), maximum 1-second peak wind gusts were 109.9, 109.2, and 111.7 mph at 10/15, 30/35, and 60/100 meters AGL during 1998-2022. At Tower "F" (SNS), maximum 1-second peak wind gusts were 66.7 mph at 10 meters AGL during 2018-2022.

At ETTP, the maximum 1-second peak wind gusts at Tower "L" were 68.9 and 89.7 mph (2000-2021) at 10/15 and 30 meters AGL. The wind profiler (Lidar "Q") near ETTP has operated since August 2021. From 40 to 100 meters AGL, maximum 1-second wind gusts were 87.5 mph. From 120-200 m AGL, 220-300 m AGL, and >300 m AGL these values were 86.0, 99.5, and 102.8 mph respectively.

At Y-12, the maximum 1-second peak wind gust for Tower "S" (South Ridge) was 74.2 mph at 25 m AGL (2012-2022). For Tower "W" (Y-12 West), these values were 74.9, 73.8, and 75.6 mph at 10, 30, and 60 meters respectively (1998-2021 for 10 m, 2006-2021 for 30 m, and 2001-2021 for 60m). For Tower "Y" (PSS Office), maximum 1-second peak wind gusts were 60.0 and 66.7 mph for 15 and 33 meters AGL respectively (2007-2022).

For reference, updated wind hazard criteria for the DOE ORR are documented in DOE-STD-1020-2016[14] which refers the reader to ANSI/ANS-2.3[27]. For a Wind Design Criteria (WDC)-3 facility, the recommended design

basis extreme straight line wind has a mean return period of 2,500 years and the design basis tornado has a return period of 50,000 years. These correspond to a controlling wind speed of 152 mph.

3.2.5 Snow/Ice Fall

Snowfall records for Oak Ridge and for Knoxville are given in Table 3-51. The winter of 1959–1960 was the snowiest year on record in both Knoxville and Oak Ridge. No other winter on record has had as much as three-quarters of the amount of snow that fell that winter. Monthly and annual snowfall for Oak Ridge since 1985 is provided in Table 3-52.

Although data for the maximum 100-year return period snowfall in the Oak Ridge area is not yet available, the maximum 24-hour snowfall of 12 in. occurred during March 1960 and March 1993. These data are part of a 75-year record for Oak Ridge (1948-Spring 2023) and compare well to a 100-year record for the Nashville area where 17 in. (in 1892) represents that maximum 24-hour snowfall. Thus, 17 in. is assumed as a reasonable upper bound for expected 100-year snowfall in the Oak Ridge area.

It should be noted that there has been a notable decrease in local annual snowfall during the full decades from the 1980s to the 2010s (10.1 to 2.6) inches. This trend has reversed somewhat during the 2010s with a rebound to an annual average snowfall of 5.2 inches. However, there has been only one snowfall event greater than 4 in. (100 mm) since 2000 (4.1 inches fell on 02/25-26/2015). The recent decadal decline in snowfall shows a correlation with a reduction of the average number of hours with freezing temperatures during winter.

An estimate of maximum snowpack existing at any time during the winter may be made as follows: Assuming the maximum snowfall retained is 20 in. and the water equivalent is 10%, then the 2 in. of water equivalent depth will produce a pressure of 10.4 psf. This value is close to the 10-psf value given by the International Building Code (IBC)[30] and a 50-year return period. A factor of 1.22 is applied to the 50-yr snow loads to convert to a 100-yr return period in accordance with ASCE 7-10[38] Section C7.3.3.

Freezing rain occurs occasionally during winter months, especially when cold air is trapped in the local ORR valleys or the Great Valley of Eastern Tennessee, and when relatively light (warmer and moist) air from outside the region “overruns” the cold air mass in place at the surface. Under such conditions, rain falls into the locally cold air and freezes upon impact. Freezing rain, sometimes called glaze, is super-cooled liquid rain that freezes upon contact with solid surfaces having a temperature at or below the freezing point. The result is a layer of ice (glaze) on highways, trees, suspended wires, as well as other manmade and natural structures. Driving becomes dangerous and suspended cables and wires may snap under the increased weight.

Conditions most favor freezing rain in the Oak Ridge area from December through February. Specific freezing rain events are typically limited to a few hours and occur on average on just over 1 day per winter (since 1999). However, an icing event in February 2015, which was followed by several days of subfreezing temperatures, lasted much longer. Table 3-53 shows the number of freezing rain days for each year from 1999-2022. None of these freezing rain episodes constituted a major icing event (>0.50 inch thickness). Affected surfaces may, on occasion, remain frozen over a longer period, depending on time of day and related factors such as temperature, precipitation, wind, terrain, and traffic trends. Freezing rain events are about as frequent as snow events but have been on the decline over the last few decades. The number of hours that temperatures were at or below freezing in Oak Ridge since 1985 is shown in Table 3-54.

From a safety viewpoint, ice storms have two main effects. The first is to cause electric transmission wires to break; the second is to cause a driving hazard on roads. Thicknesses of ice during ice storms in eastern Tennessee are not as great as in the northeastern states and are not as likely to break wires.

3.2.6 Heavy Precipitation/Flooding

General precipitation features are described in the discussion of regional climatology in Section 3.1.1. A 75-year record of precipitation exists for official NOAA data in Oak Ridge. No records of similar length exist closer to the ORR but quality records for Y-12, ORNL, and ETTP are available since 2001. The greatest annual amount recorded at the NOAA station in Oak Ridge was 76.33 inches in 1973, and the lowest annual total was 35.87 inches during 2007. The highest monthly total was 19.27 inches during July 1967, and the greatest amount recorded in a 24-hour period was 7.48 inches during August 1960. The last statistic reflects the potential intensity of summer thunderstorm activity. During the most recent decade (2013-2022), maximum 24-hour precipitation in Oak Ridge was 4.18 inches in November 2016. Rainfall events exceeding 3 in. within 24-hours have occasionally caused flooding events in the Oak Ridge area. However, these problems tend to be limited to the lowest lying areas or areas within a major drainage route (for example, the Clinch River flood plain at ETTP). Table 3-5 provides maximum 24-hour precipitation for each day of the calendar year for the Oak Ridge area (data from NOAA-ATDD 1947-2001, KOQT ASOS 2002-2014, ORNL 2015-2022).

Local geology, topography, and catchment basin size complicate efforts to correlate a given amount of measured precipitation at a specific point to specific level of flooding. However, ORR areas with or 1% annual flood zone potential can be observed at https://www.fema.gov/flood-maps/national-flood-hazard-layer). The lowest lying areas on the ORR associated with major facilities include the majority of ETTP and a small area of ORNL south of White Oak Avenue and southwest of 4500S (altitudes < 240 m MSL). For comparison, the normal level of the Clinch River at ETTP is about 227 m MSL.

3.2.6. Tropical Cyclones

The ORR is more than 300 miles from the Atlantic Ocean and is separated from it by the Appalachian Mountains to the southeast. The Gulf of Mexico is more than 400 miles to the south. Consequently, tropical cyclones at hurricane-strength have not been observed in the Oak Ridge area. However, weakening tropical cyclones occasionally cross the region, especially during the months of August through October. These systems typically result in heavy rainfall and occasionally gusty winds, though typically below tropical storm force (40 mph). During the relatively dry August to October season, tropical cyclones frequently represent a significant fraction of monthly precipitation (for example, two remnant tropical cyclones provided nearly all of the area's monthly precipitation during September 2004). During the 30-year period from 1983-2012, only eight tropical cyclone centers passed through Eastern Tennessee while still in tropical depression (<39 mph wind speeds) or tropical storm (39-74 mph wind speeds) status. A significantly larger number of remnant tropical cyclones affected Eastern Tennessee with rainfall after having decayed from tropical depression or tropical storm status. Hurricane Hugo, for example, was a strong hurricane that made landfall near Charleston, South Carolina, on September 22, 1989. Charleston is approximately the nearest coastal point to Oak Ridge. The Oak Ridge area received heavy rain caused by the hurricane's remnants. The weather station at NOAA's Atmospheric Turbulence and Diffusion Division in Oak Ridge reported 1.77 in. of rain on September 22 and 0.82 in. on September 23. This is far from the record 24-hour precipitation amounts for Oak Ridge (as high as 7.48 in.), most of which has not been associated with tropical cyclones. However, the remnants of Tropical Storm Lee produced 6.30 inches in a 24-hour period on September 5, 2011. Recent active years for decaying tropical cyclones that crossed Tennessee were 2017-2018 and 2020-2021.

3.2.7 Dust Storms

Dust storms are of very limited concern in Eastern Tennessee since the region receives ample precipitation (1991-2020 average is about 55.80 in. annually) and is well vegetated. Additionally, the rugged topography serves to reduce wind speeds, which inhibit soil drying and dust transport.

3.2.8 Air Quality

Days of high air pollution potential, or stagnation days, over the eastern United States have been studied by Wang and Angell (1999)[15]. Stagnation days for a particular area or location were defined by Wang and Angell as 4-day periods in which the surface geostrophic wind is less than 8 m/s (18 mph), the 500 mb wind (about 3.5 miles altitude) does not exceed 13 m/s (30 mph), and no precipitation occurred. The National Climate Data Center modified this index slightly by defining stagnation days in terms of percent of monthly days and defining smaller spatial grids (0.25° x 0.25° grids of latitude and longitude).

The pattern of stagnation episodes in the United States associated with heat waves is shown in Figure 3-44: for 1950-2007[17]. The figure suggests that the ORR is located in a zone of high air stagnation relative to most of the northern United States. From the 1980s to the 2000s, air stagnation percentage at the ORR has increased by about 5 to 10%[17]. Since 2005, there have been 26.2 potential air stagnation days on average but 2007-2008 and 2015-2016 were well above those averages with more than 40 days. For the last 18 years (2005-2022), air stagnation conditions have been present about 7.2% of the time. Stagnation periods are at maximum during July to September, peaking in August. During winter, stagnation conditions represent well below 5% of the cases. Annual air stagnation days for Oak Ridge during 2005-2022 are shown in Figure 3-44: and air stagnation days by month and year are provided in Table 3-55.

3.3 METEOROLOGICAL DATA USED FOR HEAT SINK

Temperature, humidity, and wind conditions affect the ability of the secondary coolant system to reject heat via the cooling towers during normal operation. Temperature influences the rate at which water can be cooled by radiation, conduction, and evaporation. Humidity also influences the rate of evaporation. Wind speed influences cooling and evaporation rates. These parameters are also useful in estimating the loss of cooling water by evaporation or by drift loss (in which small circulating drops of liquid water escape from a cooling tower).

Several parameters can be useful in evaluating maximum evaporation and drift loss. These parameters usually provide (directly or indirectly) measures of net radiation, water vapor content of the atmosphere, and wind speed. Commonly measured parameters include maximum temperature, wet-bulb or dew-point temperature, and wind speed. Data on each of those variables (except wet-bulb temperature, which is largely interchangeable with dew point information) are provided in sections of this chapter that follow, thus, presentation and discussion of these data are not duplicated here.

Monthly and annual average and extreme temperatures for Oak Ridge are presented in Table 3-1. Decadal changes are provided in Table 3-2. The number of hours of freezing and sub-freezing temperatures for Oak Ridge can be found in Table 3-54. Temperatures can be quite high in the summer, which typically leads to increased evaporation. However, these effects may be compensated to some extent by the effect of the high night-time humidity that often accompanies summer temperatures. High humidity thus may reduce evaporative loss.

From approximately 2014-2020, temperature, wet bulb, and pressure values were collected on the roof of Building 5600 at ORNL. These data were collected for the purpose of identifying periods when HVAC efficiency could be significantly inhibited due to excessively high wet bulb values (above 25°C). Daily reports are available at https://metweb.ornl.gov/~krbirdwell/met/Data/hour/ORNL/TOWE_Daily/. In general, these data showed that hourly wet bulb values occasionally exceed the 25°C threshold during summer; however, these circumstances were limited to about 30% of observed summers. When the 25°C threshold did occur, high values were typically confined to brief periods that affecting no more than 7 days during a given summer. Table 3-84 shows maximum dewpoint in degrees C measured at ORNL Tower “C/D” from 1998 to 2022. It is notable that the maximum dewpoint exceeded 25°C during only two summers of the decade from 2013-2022 but in eight of the summers

from 2003-2022. Maximum dew point values were several degrees C lower at Tower “F” at the ridge top Spallation Neutron Source location from 2018-2022 than for values measured at Tower “D” for the same period.

3.4 ON-SITE METEOROLOGICAL MEASUREMENTS PROGRAM

A network of 9 meteorological observation towers and 3 wind profilers currently provide ORR weather condition data that influence transport and diffusion of atmospheric contaminants. These data are used in calculating ambient air concentrations of contaminants and resulting doses to the public or to workers at the site. For normal operations, long-term and short-term calculations are both applicable because long-term and/or short-term doses of a particular contaminant may be of concern. For potential emergencies, applicable monitoring and modeling considerations relate mainly to the short time scales (minutes to days). Additional information on the meteorological and ambient air monitoring networks is given in References 2 and 20.

The network of relevant meteorological towers on the ORR is shown in Figure 3-2: . Towers “K” and “L” (MT1 and MT7) were located at the ETTP site and were decommissioned in 2017 and 2021, respectively. Tower “K” was a 60-meter (197-ft) tower with instrumentation for measuring wind speed and direction at 10 and 60 meters above ground level. Tower “L” was a 30-meter (98-ft) tower with instrumentation for measuring wind speed and direction at 10/15m and 30 meters. A lidar (laser device measuring winds), Lidar “Q” was installed by ORNL in August 2021 about 1 km south of ETTP to compensate for the mandated shutdown of Towers “K” and “L”. On-site towers at ORNL continue operation and include Towers “A” (MT4), “B” (MT3), and “D” (MT2). The 30-meter-tall Tower “A” is a part of the HFIR complex and has been in operation since 1984. Tower “B” is also 30-meters tall and located in the 6500 Area of ORNL and has also been in operation since the mid-1980s. Tower “C” was 100 meters tall and was established in 1982. The tower was removed in April 2014 and immediately replaced by the 60-meter-tall Tower “D” located 38 meters northwest of Tower “C”’s base. ORNL’s fourth meteorological tower, Tower “F” is 10 meters tall and was established near the 8500 Area water tower to service the Spallation Neutron Source site and provide ridge top meteorological measurements for ORNL. Y-12 maintains four meteorological sites. Towers “Y”, 33 meters tall, located near the Y-12 PSS Office was established in the mid-2000s. Tower “W” (MT6) is located near the southwest end of the Y-12 main campus area and is 60 meters tall. It was taken offline near the beginning of 2022 and is currently being replaced as of July 2023. Y-12 also maintains a ridge top site south of the main Y-12 site on Chestnut Ridge, Tower ‘S”, which is 25 meters tall.

All towers are used during accident dispersion analysis (via a three-dimensional wind field model). Quarterly and/or bi- annual calibrations and prompt repair of instruments are performed by a certified contractor on all of the ORR meteorological towers[23]. The ORR network of meteorological towers and wind profilers, with supporting activity status, measurement heights, and measurement complement are described in Table 3-7.

Information obtained by these instruments is transferred, stored, edited, and formatted using a central base station computer running Agilaire AirVision software (located at ORNL Building 4500N, Room C012) from remote data loggers located at each tower site (loggers used are Agilaire 8832 and 8872 models). Meteorological parameters are collected and stored for 1, 15, and 60-minute averages. All of the 15- and 60-minute data are permanently archived and quality assured by on-site meteorologists. The hourly wind data are also used to obtain the wind roses in the annual environmental reports for the DOE facilities at Oak Ridge[22]. In addition to regular calibrations performed for all of the sites, the on-site meteorologists perform preliminary quality assurance on the tower data on a daily basis. Daily meteorological reports are compiled for ORNL sites.

Precipitation data are recorded at several of the aforementioned meteorological stations on the ORR (specifically Towers “A”, “B”, “D”, “F”, “J”, “W”, “Y”). The ORNL on-site meteorologist daily checks these data and sends out precipitation reports. The rain gauges are all tipping-bucket instruments that record to the nearest 0.01 in. (or 0.1 mm in the case of Tower “A”). Heating units are installed and maintained to melt snow and ice as it falls at

the Y-12 sites. These data are automatically recorded by data loggers and transferred back to the central computers via Ethernet at least once per 15-minute period.

Two sodar units are maintained on the ORR. One is maintained at the Y-12 plant and is located near the Y-12 water plant on Pine Ridge. The Y-12 unit automatically provides information on wind direction, wind speed, and turbulence at 15-meter intervals up to an altitude of about 800 meters. Y-12 transfers this data to ORNL Building 4500N Room C012 every 15 minutes via a network connection. The other sodar unit maintained by ORNL is collocated with Tower "D". It measures wind direction, wind speed, and turbulence parameters at 30-meter intervals up to an altitude of 400 to 600 meters. Data are currently provided in near-real-time once every 15 minutes. The unit is currently used for mixing height and inversion height data but is not used for reliable wind data collection.

First-order meteorological stations are maintained by NOAA's NWS in the city of Oak Ridge, about 11 km north-northeast of ORNL, and at the McGhee-Tyson Airport, about 35 km east-southeast of ORNL. Temperature, precipitation, wind direction, wind speed, solar radiation, air pressure, visibility, and cloud cover are recorded at these sites.

3.4.1 Local Site Conditions Overview

The sections that follow address local site conditions with respect to temperature, precipitation, winds, humidity, fog, vertical stability, and mixing depth. Since data for these various phenomena come from a variety of sources, a brief discussion of data sources precedes the data presentation. Data from Knoxville (officially at the McGhee-Tyson airport about 20 miles to the southeast of the ORR) are avoided as much as possible since many of the meteorological parameters described below can be affected by terrain-related phenomena that differ significantly between the ORR and McGhee-Tyson Airport where Knoxville data are collected. The site locations for data collected on the ORR are shown in Figure 3-2.

Well-documented records of temperature and precipitation are available for the local area from the NOAA-ATDD and KOQT weather stations near the Oak Ridge town center (1948-2022). These sites are about 10 km and 12 km north-northeast of the center of the ORR, at almost the same elevation, and are representative of temperature and precipitation conditions on the ORR except for summer precipitation on short time scales (often the result of the geographical distribution of air mass thundershowers). High quality precipitation data are also available from several of the ORR meteorological towers since 1998 (ORNL's Tower C/D is used here). These data are used to supplement the Oak Ridge town site records during the period 1998-2022.

Winds in the Oak Ridge area are quite spatially variable due to the presence of varied terrain and the weather phenomena associated with them (see discussion in Section 3.1.2). As a result, the wind data presented here uses data from meteorological towers collocated with the Y-12, ORNL, and ETTP sites. Wind data presented here rely on data from the period 1998-2022 for ORNL, 2000-2022 for ETTP, and 2004-2022 at Y-12.

Relative humidity data can vary significantly within the ORR as well. Consequently, the available data at Y-12, ORNL, and ETTP. Comprehensive fog data is primarily available from the Oak Ridge KOQT site for 1999-2022 although fog data have been collected at ORNL Tower "D" since 2019 with the addition of the ceilometer instrument.

Vertical stability and mixing height data have been estimated and archived for the ORR (at a combination of sites including the Oak Ridge town center, Y-12, and ORNL) for most of the periods coinciding with the aforementioned temperature, precipitation, and wind records. Mixing height is affected by a complex interaction of parameters including terrain features, time of day, synoptic or large-scale weather systems, local elevation, wind direction, wind speed, temperature inversions, and humidity. These factors necessitate the use of local

mixing height data (i.e., Knoxville and Nashville mixing height data are not considered sufficiently representative of the ORR). Mixing height data were estimated using NOAA Forecast Systems Laboratory (FSL) weather model analysis data, sodars, lidar, and ceilometer data. For daytime values, FSL data were primarily used when the mixing depth was higher than 400 meters. Beginning in 2019, available ceilometer data were used preferentially for daytime values. At night, or during other inversion conditions, sodar and lidar measurements were primarily used to estimate mixing depth. When a temperature inversion was present, the inversion depth was reported in preference to a very low mixing depth in order to provide conservative estimates for pollutant modeling purposes.

3.4.2 Air Temperature

Monthly, annual, and decadal summaries of temperature data for Oak Ridge are presented in Table 3-1 (1947-2022) and Table 3-2 (1970-2022). Maximum, minimum, average, record maximum, and record minimum temperatures are provided. The record maximum temperature for Oak Ridge of 105F (41°C) was recorded in 1952 and again in 2012. The record minimum temperature in Oak Ridge during the period of record (1948-2012) of -17°F (-22°C) occurred in January 1985. Based on Table 3-1, the current average annual range of average maximum temperature in Oak Ridge is 40.8° degrees F (22.7°C). The lowest average maximum of 47.8°F occurs during January and the highest average maximum temperature occurs in July at 88.6°F. Average minimum temperatures are lowest in January (29.4°F) and highest in July (68.2°F) which yields an annual range of 38.8°F (21.6°C). The annual range in the monthly average temperature is 39.6°F (22°C) based on the average of 38.5°F in January to 78.1°F in July.

Table 3-2 presents a decadal analysis of temperature patterns over the last 40+ years. In general, temperatures in Oak Ridge rose during the 1980s and 1990s but have leveled off during the 2000s. Based on average decadal temperatures, temperatures have risen 2.1°F or 1.2°C between the decade of 1980s compared to the decade of the 2010s (from 57.0°F to 59.2°F). All of that temperature rise occurred from the 1980s to 2000s. There has actually been a decline of 0.1°C between the 2000s and 2010s. Furthermore, analysis reveals that the temperature increases have not been equally distributed throughout the seasons or months of the year (see Figure 3-45: and Figure 3-46:).

Since the 1980s, minimum temperatures have seen the greatest increase during winter (Dec-Mar), averaging an increase of more than 2°C. Although maximum temperatures have seen an increase of about 0.8°C annually, most of these increases have occurred in seasons outside of summer. For the 1990s compared to the 2010s, minimum temperature increases averaged 0.8°C with most increases occurring in Fall and Winter (except January where minimum temperatures declined by 1°C. Since the 1990s, maximum temperatures changes have been more subdued with increases of 0.5C or more occurring in Spring but with changes otherwise being mostly negative especially in winter (1°C or more decline in January and February).

Although wintertime increases since the 1980s were possibly correlated with increases in Arctic source region temperatures during the last few decades, this trend seems to have partially reversed in the 2010s. The fact that rising temperatures in Oak Ridge have been mostly a result of minimum temperature increases suggests that a significant portion of the temperature increase has been due to the local effects of weakening temperature inversions. Higher carbon dioxide levels may induce local feedbacks at night as the ground radiates energy to space[40]. Some of the energy is redirected toward the surface resulted in warmer night-time minimum temperatures. This phenomenon could explain why the ORR temperature data in general shows a warming trend focused mostly on night-time temperature increases (when inversions are typically present).

The average temperature in Oak Ridge during 2022 was 57.1°F (14.0°C) which represents a significantly below normal temperature year for Oak Ridge (1991-2020 average is 59.1°F (15.1°C)). This is the coolest annual average since 1982, although values like 2022 were more typical in the 1970s. Table 3-1 shows average monthly temperatures (1991-2020) for Oak Ridge compared to 2022 average monthly temperatures. Figure 3-47: plots

the average monthly maximum, minimum, and average temperature for Oak Ridge over the 1991-2020 period along with these values for the most recent calendar year (2022).

Hourly values of subfreezing temperatures in Oak Ridge are presented in Table 3-54 for the period 1985- 2022. During the 1980s, a typical year experienced about 900-1000 hours of subfreezing temperatures. In recent years, this value has fallen to approximately 600 hours; however, 2022 was an exception, experiencing 947 sub-freezing hours (the highest since 2010).

Table 3-56 through Table 3-74 show average monthly temperatures at ORNL sites Towers "A", "B", "C/D", "F", Lidar "Q", ETTP Sites "L", and Y-12 Sites "J", "S", "W", "Y". The longest periods of record are for ORNL Towers "A" and "C/D" (1998-2022). ETTP Tower "L" records start in the Year 2000, and Y-12 site data begins in 2004-2006.

3.4.3 Atmospheric Moisture

Dew point temperature has become the most common humidity measure within the field of meteorology. Relative humidity, which has the drawback of not providing an absolute value of humidity, is also in common public use. Average monthly relative humidity is provided in Table 3-75 through Table 3-82 for ORNL sites Towers "A", "C/D", "F", Lidar "Q", ETTP Sites "L", and Y-12 Sites "W", and "Y". The longest periods of record are for ORNL Towers "A" and "C/D" (1998-2022). ETTP Tower "L" records start in the Year 2000, and Y-12 site data begins in 2004-2006. Average dewpoint values are provided for Towers "D", "F", "W", and "Y" in Table 3-83, Table 3-85, and Table 3-87. The aforementioned Table 3-83 provides maximum hourly dewpoint readings for ORNL Tower "D". Average monthly values of absolute humidity in grams per cubic meter and vapor pressure in millibars are also provided for ORNL Tower "C/D" from 2009-2022 and for ORNL Tower "F" from 2018-2022 in Table 3-88 and Table 3-89.

For ORNL Tower "C/D", the absolute maximum dew point temperature from 1998 through 2022 was 26.6°C (79.9°F) in August 2010 and the absolute minimum was -24.1C (-11.4°F) in December 2022. Direct calculation of absolute humidity, based on temperature, dew point, and pressure has been calculated at ORNL Tower "C/D" since 2009. Very little annual variation in absolute humidity is observed from year to year but values are about 5% lower on average at the SNS site on Chestnut Ridge (Tower "F") as compared to the ORNL 1000 Area (Tower "D"). Year to year variation for individual months is much more significant. However, seasonal humidity follows a clear pattern with values typically 3 to 8 g/m^3 during winter and 15 to 20 g/m^3 during summer.

Relative humidity can reach 100% at any time during the year. Relative humidity can get as low as 10% on rare occasions, with the lowest percentages more likely to occur in winter in association with Arctic air masses. Lowest daily values of relative humidity generally occur during mid-afternoon, when the temperature is highest near the surface and moisture is dispersed into a large vertical column due to buoyancy and turbulence factors. Relative humidity tends to be highest during the early morning hours, when surface temperature is lowest, and moisture often becomes trapped within a surface temperature inversion.

3.4.4 Fog and Mist

Heavy fog (associated with visibilities less than 0.25 miles) occurs in the region around the ORR on about 51 days per calendar year. Fog frequency varies significantly from year to year but is not always correlated with annual precipitation. During the 1999 to 2022 period, the Oak Ridge observing station (KOQT) recorded annual fog days totaling as low as 39 days and as high as 101 days. The number of fog days in Oak Ridge by month and year are shown in Table 3-92. Fog in the area is usually associated with cold air drainage and moisture trapping that frequently occurs in the local valleys of the Oak Ridge area. The frequency of heavy fog is lowest during the winter, usually less than two days per month, when dew point values are depressed due to frequent invasions of

Arctic and Canadian air masses. From May to October, elevated humidity levels result in a significantly higher occurrence of heavy fog, typically greater than five days per month. Significant precipitation events may enhance the likelihood of heavy fog during or within one or two days after precipitation occurrence.

3.4.5 Precipitation

Monthly, annual, and decadal summaries of precipitation for Oak Ridge are presented in Table 3-1 and Table 3-2. Precipitation is a spatially heterogeneous phenomenon in Eastern Tennessee (largely a result of the varied topographic features). The most viable long-term precipitation data (longer than three decades) relevant to the ORR site is that measured near the Oak Ridge town center. Figure 3-48 displays average monthly precipitation and snowfall amounts for Oak Ridge during 1991-2020.

Oak Ridge experiences an average of eight to twelve days per month with measurable precipitation (0.01 in. or greater). Extended droughts are rare but tend to favor August, September, and October. Average annual precipitation based on the 1991-2020 climate base period is currently 55.80 in (1417.8 mm). These and other data can be found in Table 3-1. This table also indicates maximum 24-hour precipitation observed for Oak Ridge. The maximum 24-hour precipitation recorded in Oak Ridge was 7.48 inches. Table 3-93 shows return periods for various precipitation rates in Anderson and Knox Counties. Table 3-94, Table 3-95 and Table 3-96 show monthly and annual precipitation, maximum 1-hour and maximum 24-hour precipitation, respectively, for ORNL Tower "D". Table 3-97, Table 3-98 and Table 3-99 show the same set of data for Y-12 Tower "Y".

During the 1998-2022 period, maximum 1-hour precipitation (as recorded by ORNL Tower "C") was 3.53 in. This occurred on June 29, 1999, in association with "squall line" thunderstorms that accompanied an approaching cold front. The next highest 1-hour precipitation amount was 2.23 in. and is somewhat more typical of a maximum 1-hour value (occurred on August 28, 2019, at 0100 hrs). All other maximum 1-hour precipitation values during the last 25 years were below 2 inches.

Decadal precipitation averages suggest some important changes in precipitation patterns in Oak Ridge from the 1980s to the 2010s. Monthly comparisons for the 1980s vs. 2010s and 1990s vs. 2010s are shown in Figure 3-49: . With the exception of the month of May and the fall months, precipitation during the 2010s reveals a 10 to 20% increase in general vs. the 1980s. However, for the 1990s vs. the 2010s, summer and fall months show a generally more modest 5 to 15% increase since the 1990s. On an annual basis, total precipitation during the 2010s was 19.3% higher than during the 1980s but only 3.4% higher than the 1990s. The 2010s were also 11.1% wetter than the 2000s; however, the 1970s were even wetter than the 2010s (2.6% more).

The year 2007 was the driest on record for Oak Ridge (35.87 in.) encompassing the period 1948-2022. The second driest year on record occurred in 1958 (37.43 in.)

As similarly noted previously, annual snowfall has declined steadily from the 1980s to the 2000s (10.1 to 2.6 inches) but recovered in the 2010s to 5.2 inches per year.

Precipitation wind roses for light, moderate, heavy and all classes of precipitation are compiled annually for most ORR meteorological sites. The precipitation classes are defined by the NWS as follows: light - trace to 0.10 in./hr.; moderate - 0.11 to 0.30 in./hr.; and heavy - more than 0.30 in./hr. Some data are presented seasonally rather than monthly in order to preserve statistical robustness of the data sets.

Overall, wind roses for light precipitation are similar to the overall wind roses. For moderate and heavy precipitation events, there is an increase in the frequency of northwest or northerly winds. These could be associated with the mountain-wave induced thunderstorm precipitation discussed previously but are likely also associated with cold frontal passages. During the summer and fall, northwesterly winds aloft sometimes bring an

increased frequency of thunderstorms over the ORR. For all precipitation wind roses, there is also tendency for more frequent "up-valley" or west-southwest winds during the early summer months. Annual precipitation wind roses for the most recently available calendar year are available from the annual ORNL ASER report[22].

3.4.6 Stability

Section 3.6 of ANSI/ANS-3.11-2015 (R2020)[24] states that "A qualified meteorologist shall develop and document the approach to measure atmospheric turbulence at a nuclear facility [14]...". Stability classification options include use of vertical change in temperature (ΔT) method, Monin-Obukhov Length, wind speed, cloud cover, ceiling height, standard deviation of the horizontal wind (sigma theta), and the standard deviation of vertical wind speed (sigma phi).

Over relatively flat terrain, fluctuations in horizontal wind direction (sigma-theta) typically yield a more robust means of determining stability. However, existing site limitations render the sigma-theta method inconsistent over the ORR's complex terrain. Delta vertical temperature data from towers that have vertical temperature data separated by at least 50 meters are preferred. Delta temperature values for the ORR derived from separations less than 50 meters tend to yield stability data that slightly exaggerates very stable and very unstable measurements. Consequently, only ORNL Tower "D" and Y-12 Tower "W" are ideally suited to provide stability measurements based on delta temperature measurements.

Stability calculations using the standard "SRDT" (Solar Radiation – Delta Temperature) method have been traditionally used for the ORR from 2001 to the mid-2010s. On-site ORR comparison with other methods has yielded a more realistic measure of stability variation using SRDT within the corrugated terrain of the ORR compared to the sigma theta and most other stability classification methods. However, beginning in the mid-2010s, most ORR meteorological towers began using 3-dimensional sonic wind monitors that allow for calculation of vertical wind speed and standard deviation. Also, stability research at Savannah River Site (SRNL) in South Carolina has shown promise for the use of sigma phi classification based on such measurements[41]. Consequently, vertical wind speed values are now routinely measured along with their associated standard deviations for most ORR meteorological sites, allowing for the estimation of stability from the sigma phi method (which seems somewhat less influenced by local terrain relative to the sigma theta method). Since then, the SRDT and sigma phi methods have both been used to calculate stability on the ORR. The Sigma Phi measurements have been standardized by the historical SRDT measurements for each meteorological site to help account for site specific terrain influences.

Average hourly seasonal and annual stability data for ORNL Tower "C/D" and Tower "F", ETTP Tower "L", and Y-12 Tower "W" are provided in Table 3-100 through Table 3-119. Stability wind roses for all available ORR wind roses are updated annually and archived at reference[22]. Note that Tables 3-94 through 3-113 use numerical values of stability ranging from "1" to "7" where Stability "A" = "1" and Stability "G" = "7". Stability A (unstable) conditions at many of the sites show a strong preference for winds from the south half of the compass. Stability D conditions (neutral) which also tend to correspond to higher wind speeds show a significant preference for winds from the west and west-northwest. During very stable conditions (F and G stability), winds show a preference for light winds from north and northeasterly directions (likely down valley "cold air" drainage flow).

3.4.7 Mixing Heights

Average monthly and annual mixing depth for ORNL Tower "C/D" is shown in Table 3-121. Hourly mixing / inversion depth with respect to time of day is provided for both seasonal and annual values in Table 3-121 through Table 3-140 for ORNL Tower "C/D" and Tower "F", ETTP Tower "L", and Y-12 Tower "W". When mixing depth was greater than 350-400 meters, NOAA Forecast System Laboratory weather model initialization values were used from 1998 to mid-2019 (https://rucsoundings.noaa.gov/). Since 2019, a ceilometer instrument at

ORNL was used to directly measure these values (with the Forecast System Laboratory data used as a backup). At night, or when temperature inversions dominated the surface layer profile, sodar data (sonic ranging and detection) was preferentially used and indicates an inversion depth value if that value was greater than the mixing depth (which was usually the case under such circumstances). Two sodar units (one near the east end of Y-12 and one in the 1000 Area at ORNL) are used for these latter measurements. Since ceilometer measurements became available in 2019, it has been observed that the daytime estimates using NOAA model initializations tend to be biased high vs. the actual ceilometer values.

Inversions less than 200 to 350 meters are the typical condition during thermal-radiation-cooled nighttime conditions in the valleys on the ORR including the valley containing HFIR (Melton Valley). Inversions usually break up between 9:00 and 11:00 a.m. and reform each evening near sunset. However, inversions occasionally form and persist during the daytime during sustained precipitation, fog, and/or pressure- driven channeling events (especially from November through March).

3.4.8 Solar Radiation

Visible solar radiation does not vary significantly over the time frames of this report (<=25 years); however, variations in annual and seasonal cloud cover result in annual solar radiation changes by as much as 10%. Figure 3-50: shows average January, April, July, September and annual solar radiation for ORNL from 1998-2022. Table 3-141 provides the same information but for all months and years in tabular format.

3.4.9 Winds

Monthly and annual wind roses are available from the ORR Meteorology site for all ORNL meteorological towers at https://metweb.ornl.gov/~krbirdwell/met/Data/winds/ORNL/. Those for ETTP are located at: https://metweb.ornl.gov/~krbirdwell/met/Data/winds/ETTP/ and those for Y-12 are https://metweb.ornl.gov/~krbirdwell/met/Data/winds/Y12/. Long-term wind roses are provided in Figures 3.17 to 3.35 for ORNL Towers “A”, “B”, “C/D”, and Y-12 Towers “S”, “W”, “Y”. A five-year wind rose is provided for ORNL Tower “F” and a six-year wind rose is provided for Y-12 Tower “J”. A 1.6-year set of wind roses is provided for ORNL Lidar “Q” at 40, 100, 200, and 300 meters AGL.

Prevailing winds follow the orientation of the local valleys and the Great Valley of Eastern Tennessee (about a 55 to 235 degree axis for the ORNL area). Sustained wind speeds of greater than 15 mph are rare at most sites; however, high wind gusts occasionally occur during frontal passages and thunderstorms. For example, one-second wind gusts of 75 mph were recorded at Tower “W” near the southwest end of the main Y-12 area on May 19, 2013, in association with a microburst. A 111 mph 1-second gust related to thunderstorm activity was recorded at ORNL Tower “C” in 2008.

Winds on the ORR were analyzed for consistency of flow duration with respect to physical wind mechanism[2]. Although the resulting values varied significantly with respect to season and specific synoptic weather circumstances, forced channeled flows were generally the longest-lived wind patterns (8-12 hours and 6-9 hours for up- and down-valley forced channeling, respectively). Westerly to northerly vertically coupled winds were moderately persistent with average durations of 4 to 8 hours; however, most other wind patterns, including other infrequent vertically coupled wind classes, pressure-driven winds, and thermally-driven patterns, exhibited average durations ranging from 1 to 6 hours. Tables of maximum persistence of wind flow patterns can be found in Appendix C-2 of Reference 3. For the purposes of wind shift criteria, major wind shifts were defined as >90°.

The average wind speeds over the ORR are low. At ORNL Tower C/D, average decadal wind speeds were 3.1, 4.2, and 7.0 mph at 10, 30, and 100 meters above the ground respectively (based on the 1998-2007 period). At Tower A (HFIR tower), average wind speed during the same period were 3.2 and 4.6 mph, respectively. When

synoptic winds (upper air winds – here defined as those around 3000 ft) are less than about 7 mph, light and variable winds usually develop from the influences of local terrain features although this value is affected by stability, pressure gradient, and other factors[3].

3.4.10 Synoptic Weather Conditions

As mentioned in Section 3.4.9, the synoptic (background weather) pressure gradient as well as upper level winds have a significant influence on whether local winds on the ORR are influenced more by background weather or local terrain (sometimes both). Table 3-142 and Table 3-143 show the average magnitude of the surface synoptic pressure gradient and the average magnitude of the 850-mb (5000 ft. AGL) winds respectively. Surface synoptic pressure gradient was defined as the strength of the horizontal pressure gradient from high pressure to low pressure across the Oak Ridge Reservation in millibars/km.

4.0 REFERENCES

1 *Tennessee Tornado Stats*, National Oceanic and Atmospheric Administration, Nashville, TN Weather Forecast Office. (https://www.weather.gov/ohx/tntornadostats)
2 K.R. Birdwell, *Oak Ridge Reservation Meteorology*, 2013. https://metweb.ornl.gov/page55.htm
3 K.R. Birdwell, "Wind regimes in complex terrain of the Great Valley of Eastern Tennessee", Doctoral Dissertation, Department of Geography, University of Tennessee, Knoxville, 2011. http://www.ornl.gov/~das/met/MT/KRB_ORNL.pdf
4 C.D. Whiteman, *Mountain Meteorology: Fundamentals and Applications*, Oxford University Press, 355 pp, 2000. http://www.amazon.com/Mountain-Meteorology-Fundamentals-David-Whiteman/dp/0195132718#_
5 R.M. Eckman, "Observations and numerical simulations of winds within a broad forested valley," *Journal of Applied Meteorology*, Volume 37, pp 206-219, February 1998. https://journals.ametsoc.org/view/journals/apme/37/2/1520-0450_1998_037_0206_oansow_2.0.co_2.xml
6 P. Monti, et al., "Observations of Flow and Turbulence in the Nocturnal Boundary Layer over a Slope" *Journal of the Atmospheric Sciences*, Volume 59, 2513-2534, September 2002. https://journals.ametsoc.org/view/journals/atsc/59/17/1520-0469_2002_059_2513_oofati_2.0.co_2.xml
7 M. Kossman and A.P. Sturman, "Pressure Driven Channeling Effects in Bent Valleys," *Journal of Applied Meteorology*, Volume 42: 151-158, January 2003. https://journals.ametsoc.org/view/journals/apme/42/1/1520-0450_2003_042_0151_pdceib_2.0.co_2.xml
8 R.M. Eckman, R.J. Dobosy, and W.R. Pendergrass, "Preliminary Analysis of Wind Data from the Oak Ridge Site Survey," *NOAA Technical Memorandum* ERL ARL 193, 1992. https://www.noaa.inl.gov/docs/NOAA%20Tech%20Memos/NOAA%20Tech%20ERL%20ARL-193.pdf
9 *Climate Atlas of the United States*, Version 2.0, National Oceanic and Atmospheric Administration - National Climatic Data Center, 2003. https://www.ncei.noaa.gov/nespls/olstore.prodspecific?prodnum=C00519-CDR-A0001
10 *NOAA:* National Weather Service – Morristown Office, 2007.
11 J. R. Eagleman, *Meteorology: The Atmosphere in Action*, 2nd edition, 1985, Wadsworth Publishing Co., Belmont, California. https://www.amazon.com/Meteorology-Atmosphere-Joe-R-Eagleman/dp/0534033520
12 Elisa M. Murillo, Cameron R. Homeyer and John T. Allen, "A 23-Year Severe Hail Climatology Using GridRad MESH Observations", *Monthly Weather Review*, Volume 149, Issue 4, April 2021. https://journals.ametsoc.org/view/journals/mwre/149/4/MWR-D-20-0178.1.xml
13 J. V. Vaiksnoras, "Tornado Occurrences in Tennessee, 1916-1970; Tennessee Tornadoes—1971; and Tennessee Tornado—1972," National Weather Service, Nashville, Tennessee. (Available at University of Tennessee Hodges Library stacks, QC955.V25)

14 *Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities*, DOE-STD-1020-2016, U. S. Department of Energy, December 2016. https://www.standards.doe.gov/standards-documents/1000/1020-astd-2016
15 Wang., X.L., and J.K. Angell, *Air Stagnation Climatology for the United States (1948-1998)*, NOAA Air Resources Laboratory Atlas No. 1, US Dept. of Commerce, April 1999. https://www.arl.noaa.gov/documents/reports/atlas.pdf
16 "Global Change Impacts in the United States 2009 Report", U.S. Global Change Research Program nca2009.globalchange.gov.
17 "Nationwide Trends in Air Stagnation since 1973", Climate Central, One Palmer Square, Suite 402, Princeton, NJ. https://legacy.climatecentral.org/gallery/maps/nationwide-trends-in-air-stagnation-since-1973
18 *Industrial Source Complex (ISC) Dispersion Model User's Guide, 2nd Edition, EPA-450/4-88-002a and b (Volumes 1 and 2),* U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, December 1987 https://nepis.epa.gov/
19 D. W. Coats and R. C. Murray, *Natural Phenomena Hazards Modeling Project: Extreme Wind/Tornado Hazard Models for Department of Energy Sites*, UCRL-53526, Lawrence Livermore National Laboratory, Livermore, California, November 1984. https://www.osti.gov/servlets/purl/5331368
20 K. Woodard, et. al., "Dose Assessment for HFIR Safety Analysis Report (SAR)," PLG-0888, November 1992. http://home.rrd.ornl.gov/records/CLUES/Documents/calc/uploads/PLG-0888_0.pdf
21 "Analysis of HFIR Accident Doses with Reevaluated Dispersion Parameters (*X/Q*) and Methyl Iodine Source Term," C-HFIR-2002-004, Rev. 0, June 27, 2002. http://home.rrd.ornl.gov/records/clues/documents/calc/uploads/C-HFIR-2002-004_0.pdf
22 Oak Ridge Reservation Meteorology – ASER wind roses https://metweb.ornl.gov/page7.htm
23 R. E. Hale to Document Control, "1989 and 1990 Monthly and Annual Joint Frequency Distributions of Wind Speed and Direction," October 14, 1992. https://home.rrd.ornl.gov/records/Correspondence/Letter92/HALE
24 *Determining Meteorological Information at Nuclear Facilities*, ANSI/ANS-3.11-2015 (R2020), American Nuclear Society, LaGrange Park, IL, May 2020. https://ewb.ihs.com/#/document/XIOWMGAAAAAAAAAA?qid=63821319873988 3984&sr=re-1-100&kbid=4%7C20027&docid=944219206#h9399d990
25 "A Meteorological Survey of the Oak Ridge Area," ORO-99, U.S. Weather Bureau, Oak Ridge, Tennessee, November 1953. https://metweb.ornl.gov/~krbirdwell/web/ORO99.pdf
26 "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants," USNRC RG 1.145, February 1983. https://www.nrc.gov/docs/ML0037/ML003740205.pdf
27 *Estimating Tornado, Hurricane and Extreme Straight Line Wind Characteristics at Nuclear Facility Sites,* ANSI/ANS-2.3-2011(R2016), American Nuclear Society, LaGrange Park IL https://webstore.ansi.org/standards/ansi/ansians2011r2016
28 "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," USNRC RG 1.111, July 1977 https://www.nrc.gov/docs/ML0037/ML003740354.pdf
29 "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors," USNRC RG 1.4, Revision 2, June 1974 https://www.nrc.gov/docs/ML0037/ML003739614.pdf
30 *International Building Code 2015*, IBC 2015, International Code Council, May 2014 https://codes.iccsafe.org/content/IBC2015
31 J. F. Sagendorf, "A Program for Evaluating Atmospheric Dispersion From A Nuclear Power Station," NOAA Tech Memo, ERL ARL-42, 1974. https://www.arl.noaa.gov/wp_arl/wp-content/uploads/2017/08/arl-42.pdf
32 "Software Quality Assurance Plan for ISCST3 Model in Nuclear Facility Safety Dispersion Calculations", NCSS-FS-03, R0, Nuclear and Criticality Safety Services, Oak Ridge National Laboratory, May 2007. http://home.rrd.ornl.gov/records/reports/miscellaneous/NCSS-FS-03-R0.pdf

33 "Revised HFIR SAR Dose Consequence Analysis, Volume 1, C-HFIR-96-025, September 1997. http://home.rrd.ornl.gov/records/clues/documents/calc/uploads/C-HFIR-1996-025_0.pdf
34 Regulatory Guide 1.4, Rev. 2, Directorate of Regulatory Standards, U.S. Atomic Energy Commission, June 1974. http://home.rrd.ornl.gov/records/reports/NUREG/NRC%20RG%201.4.pdf
35 Letter from Linn to Document Control, "Halitsky Report – HFIR Onsite X/Q Analysis with Halitsky Wake Factors" October 2005. http://home.rrd.ornl.gov/records/reports/miscellaneous/Linn%20Halitsky%20Letter%2010-6-05.pdf
36 *Extreme Wind Hazard Analysis for the High Flux Isotope Reactor at Oak Ridge National Laboratory,* EQE Engineering for the Oak Ridge National Laboratory, June 1991. http://home.rrd.ornl.gov/records/clues/documents/eqe/EQE%2087257.03-R-003_1.pdf
37 B. E. Willis, *Analysis of ORNL Site Temperature and Humidity Data*, ORNL/M-915, Oak Ridge National Laboratory, August 1989. http://home.rrd.ornl.gov/records/reports/Miscellaneous/ORNL-M-915.pdf
38 *Minimum Design Loads for Buildings and other Structures*, ASCE 7-10, American Society of Civil Engineers, Reston, VA, 2010. https://www.waterboards.ca.gov.pdf
39 Kevin R. Birdwell, Hyun-Gyu Kang, Wei Zhang, Katherine J. Evans, and James H. Rogers, "Improvements in Meteorological Forecasts from WRF with Respect to Synoptic and Complex Terrain Forcing," 2023.
40 David R. Easterling, Bruce C. Douglas, Paul R. Waylen, "Weakening of Surface Temperature Inversions with Increased Atmospheric CO2," *Nature,* Vol. 343, No. 6259, pp. 709-714 1990.
41 C. Hunter, *A Recommended Pasquill-Gifford Stability Classification Method for Safety Basis Atmospheric Dispersion Modeling at SRS,* March 2012 (https://www.osti.gov/biblio/1037732/)
42 Oak Ridge Reservation Annual Site Environmental Report, 2017 – 2022 https://doeic.science.energy.gov/aser/

FIGURES

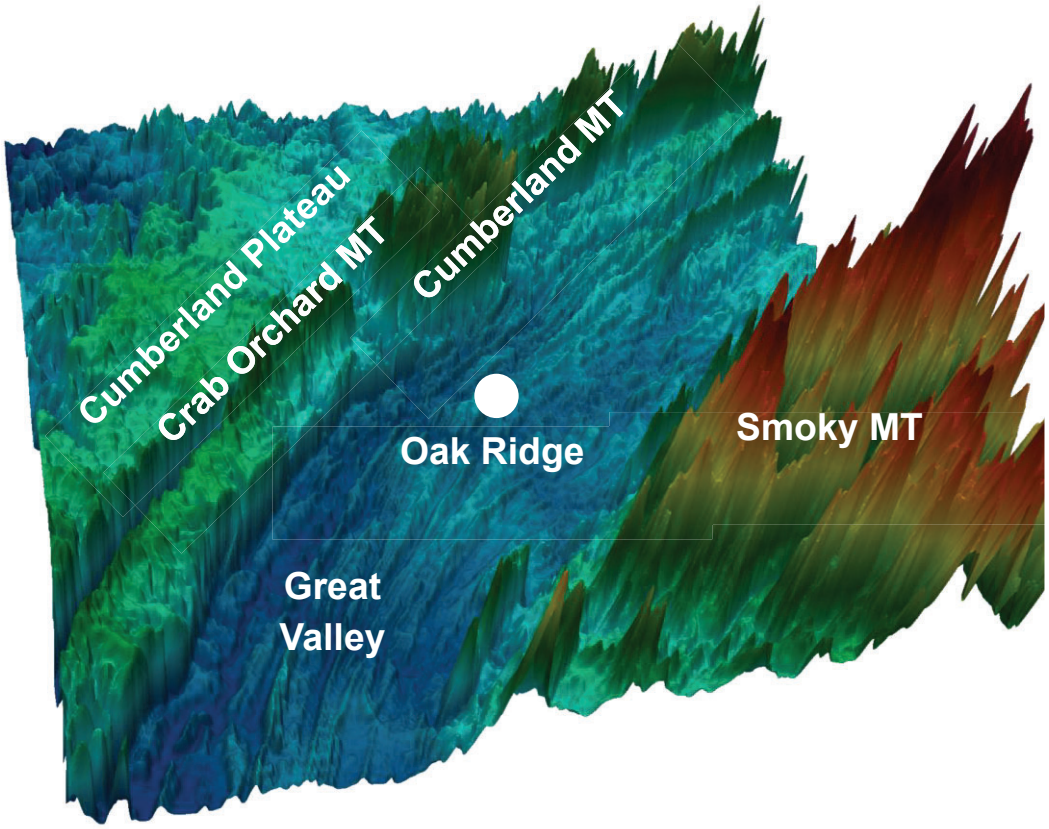


Figure 3-1: General topography of the region surrounding Oak Ridge and the ORR.

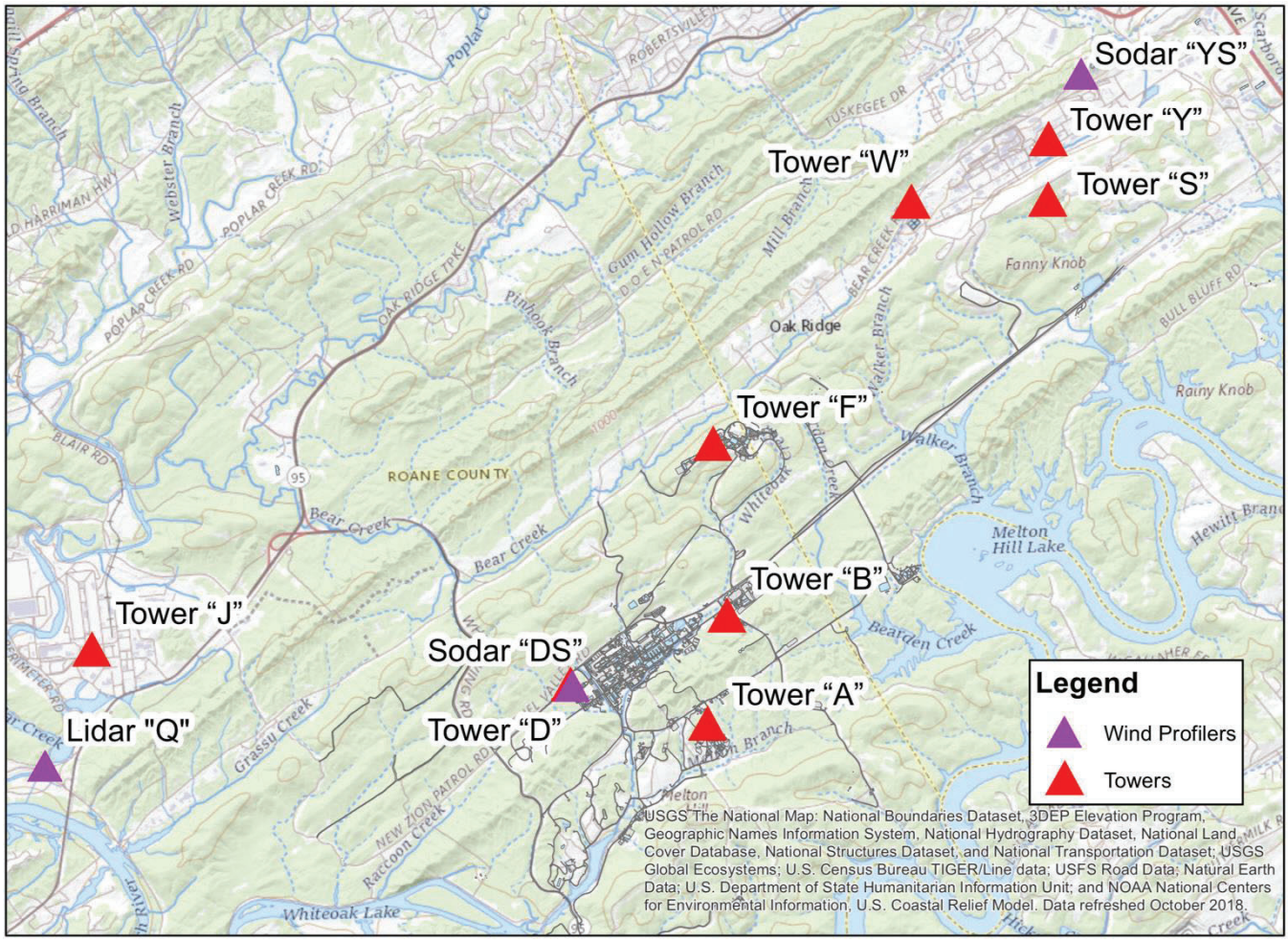
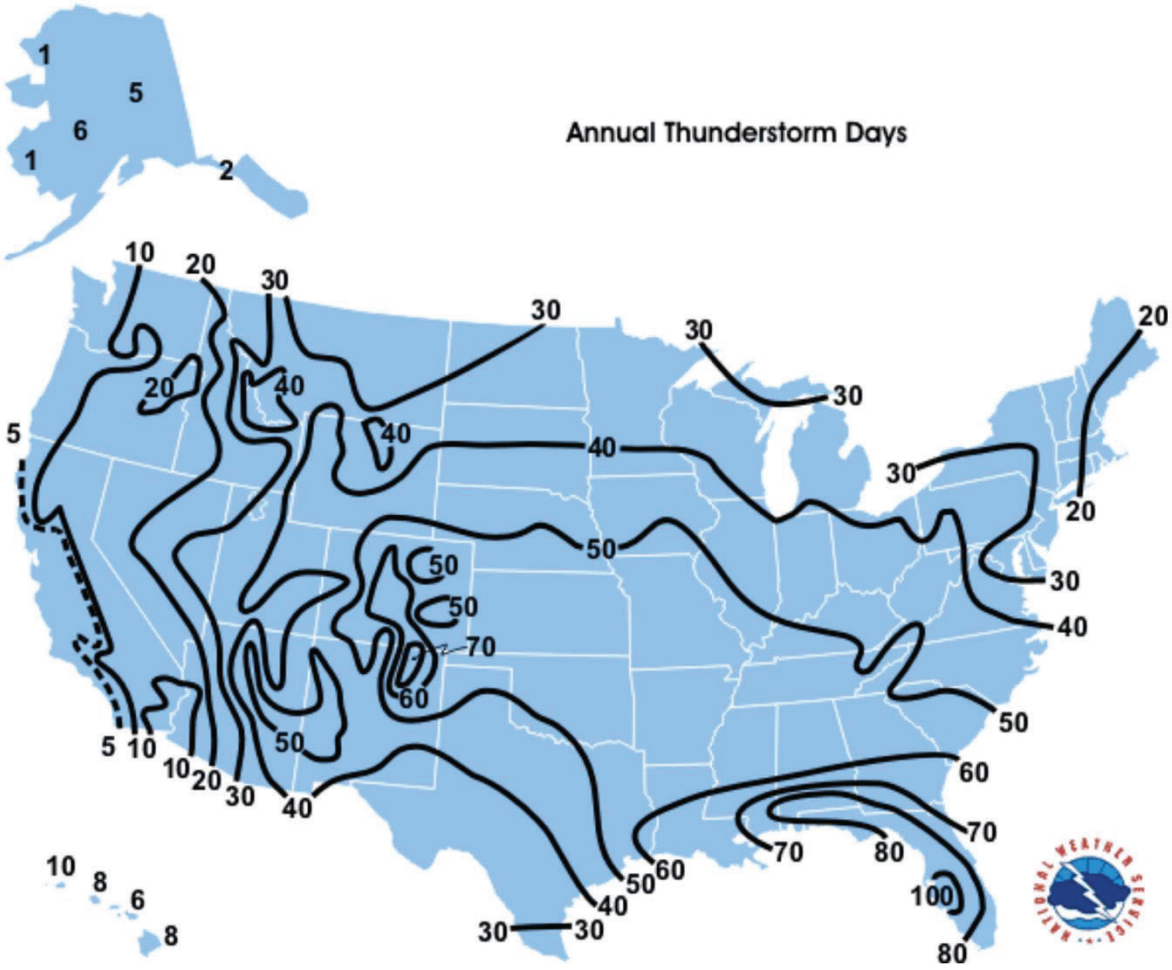


Figure 3-2: Locations of meteorological towers and wind profilers at ETTP, ORNL, and Y-12



Source: Climate Atlas of the United States, Version 2.0, 2003. National Oceanic and Atmospheric Administration - National Climatic Data Center.

Figure 3-3: Average annual lightning/thunderstorm days across the United States

Figure 3-4: Lightning strikes recorded at or near ETTP during 2011

Figure 3-5: Lightning strikes recorded at or near ETTP during 2012

Figure 3-6: Lightning strikes recorded at or near ETTP during 2013

Figure 3-7: Lightning strikes recorded at or near ETTP during 2014

Figure 3-8: Lightning strikes recorded at or near ETTP during 2015

Figure 3-9: Lightning strikes recorded at or near ETTP during 2016

Figure 3-10: Lightning strikes recorded at or near ETTP during 2017

Figure 3-11: Lightning strikes recorded at or near ETTP during 2018

Figure 3-12: Lightning strikes recorded at or near ETTP during 2019

Figure 3-13: Lightning strikes recorded at or near ETTP during 2020

Figure 3-14: Lightning strikes recorded at or near ETTP during 2021

Figure 3-15: Lightning strikes recorded at or near ETTP during 2022

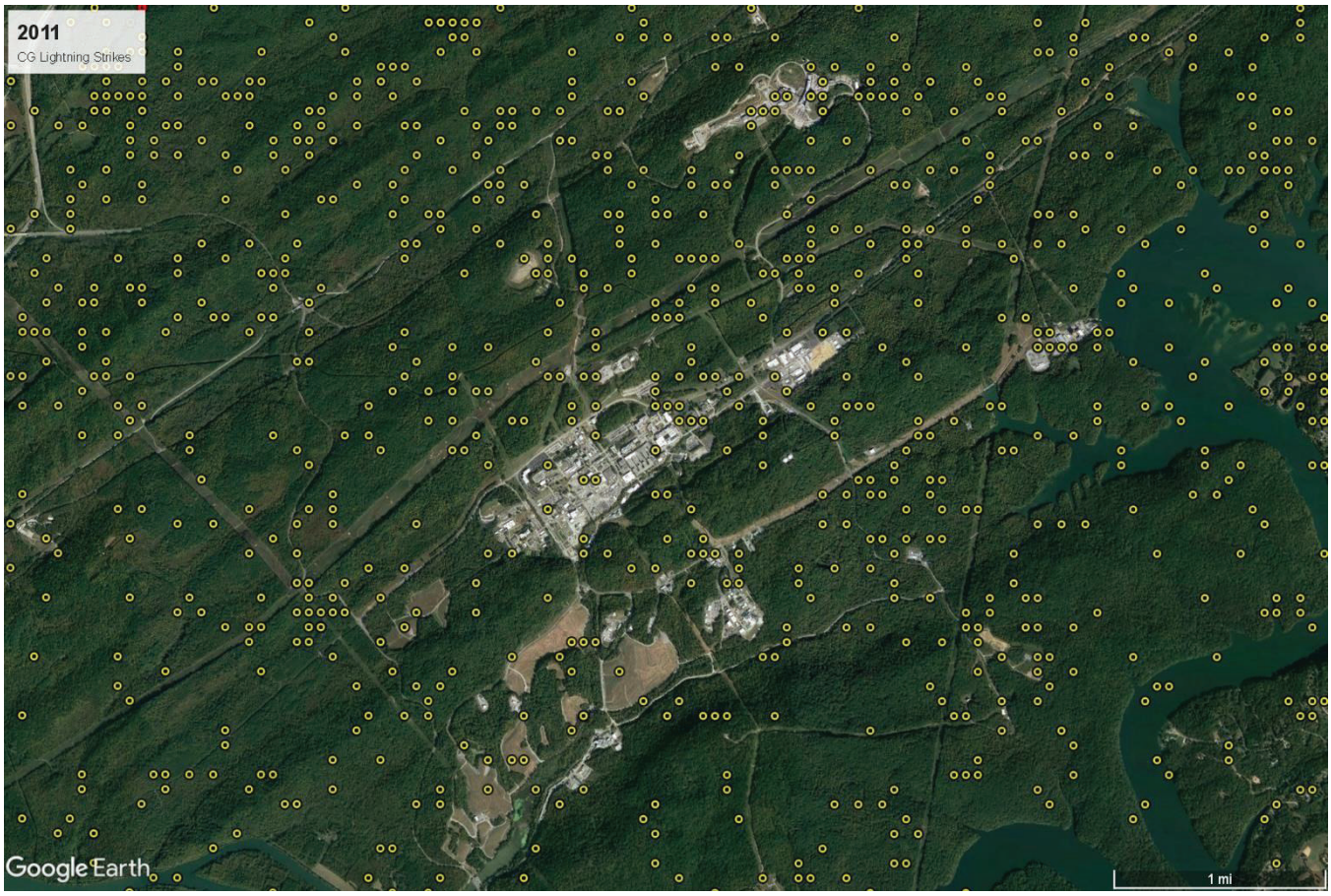


Figure 3-16: : Lightning strikes recorded at or near ORNL during 2011

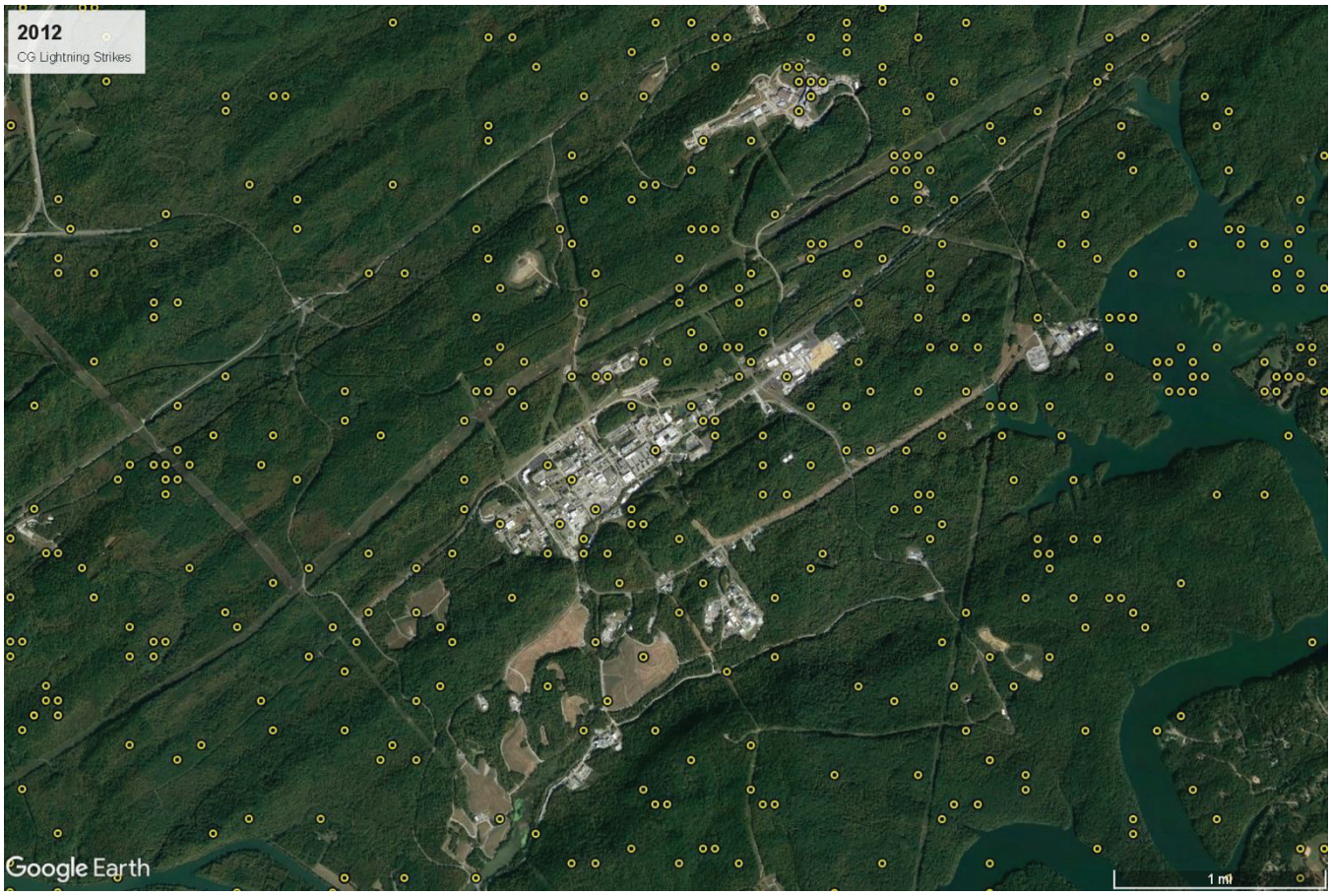


Figure 3-17: : Lightning strikes recorded at or near ORNL during 2012

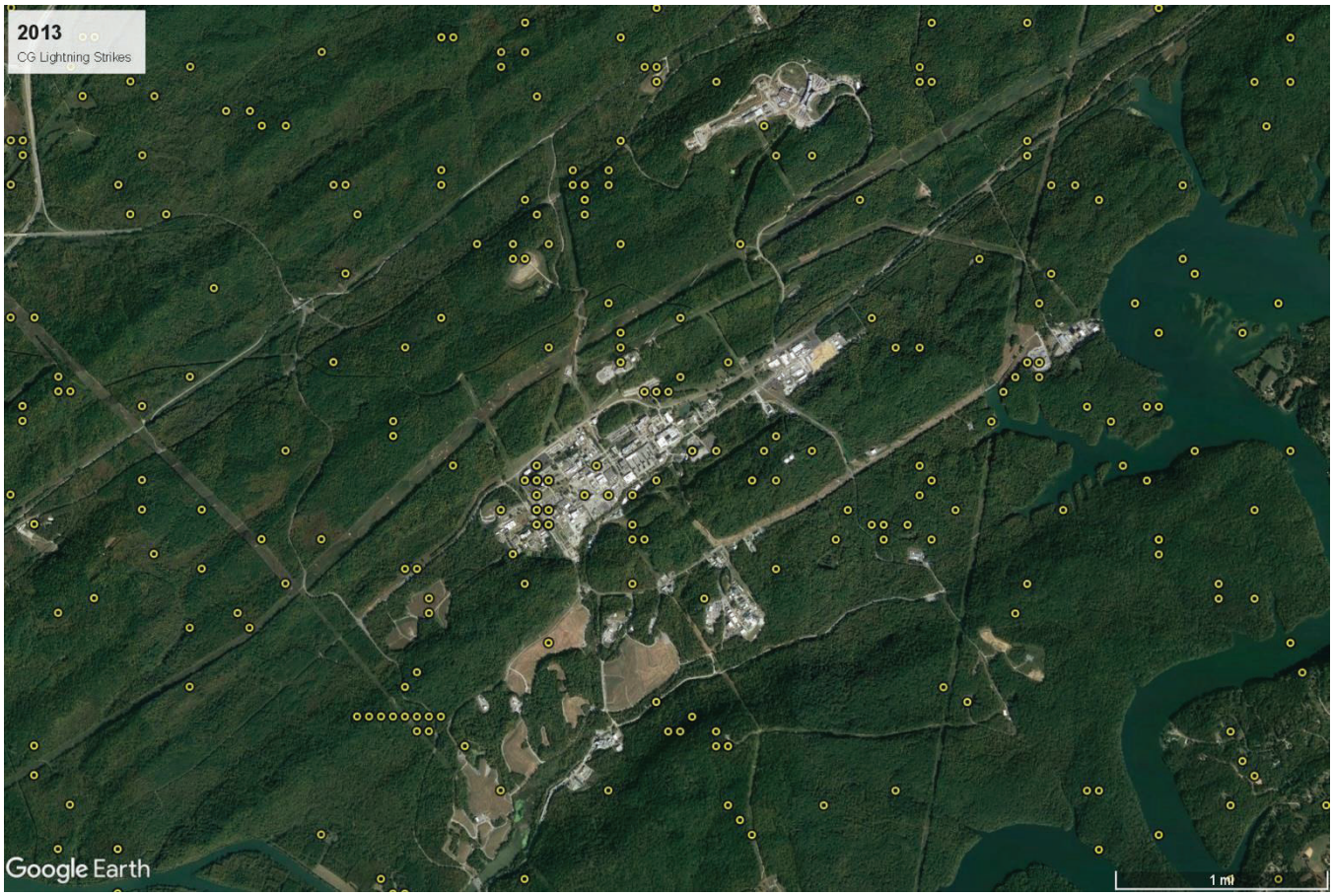


Figure 3-18: Lightning strikes recorded at or near ORNL during 2013

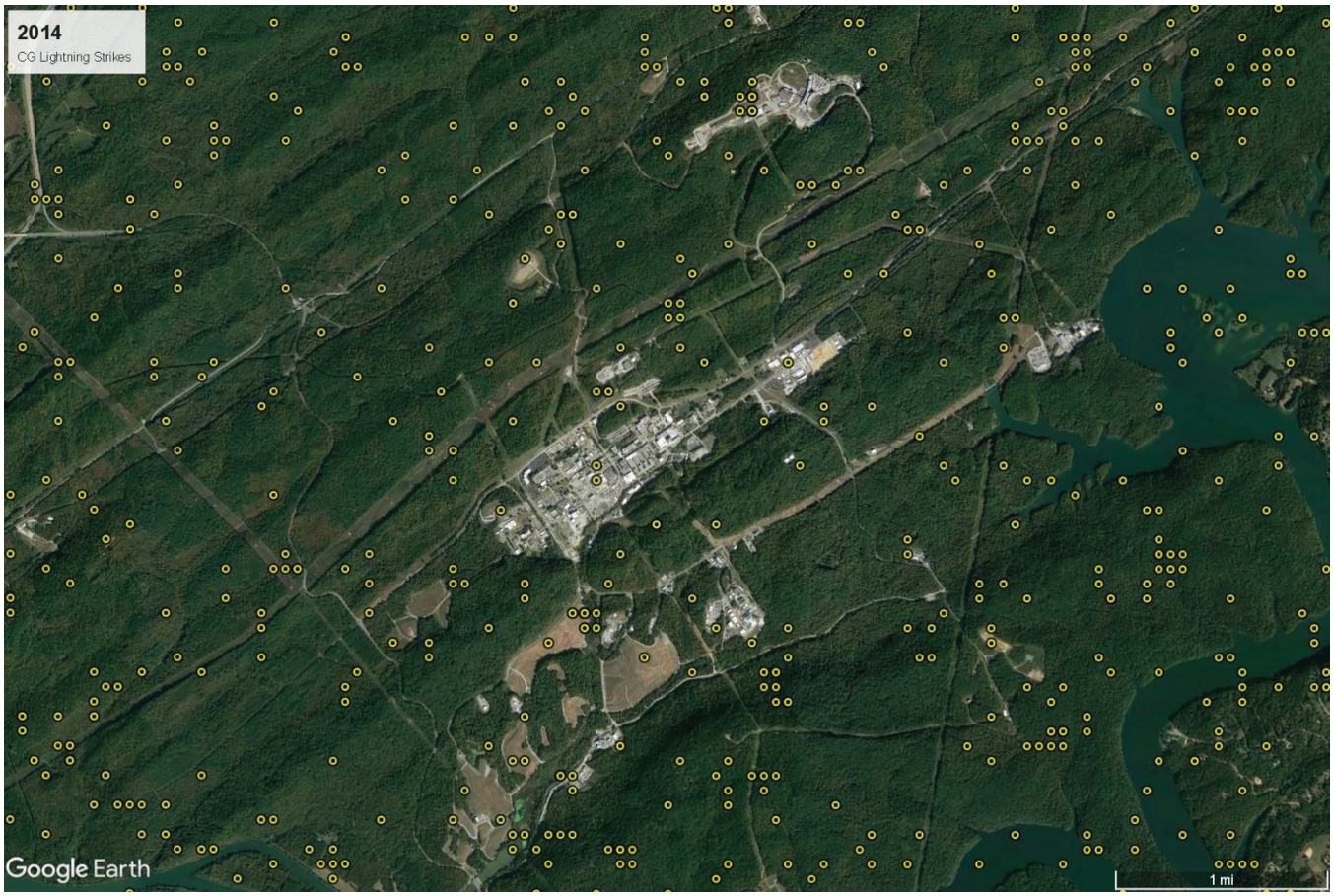


Figure 3-19: Lightning strikes recorded at or near ORNL during 2014

Figure 3-20: Lightning strikes recorded at or near ORNL during 2015

Figure 3-21: Lightning strikes recorded at or near ORNL during 2016

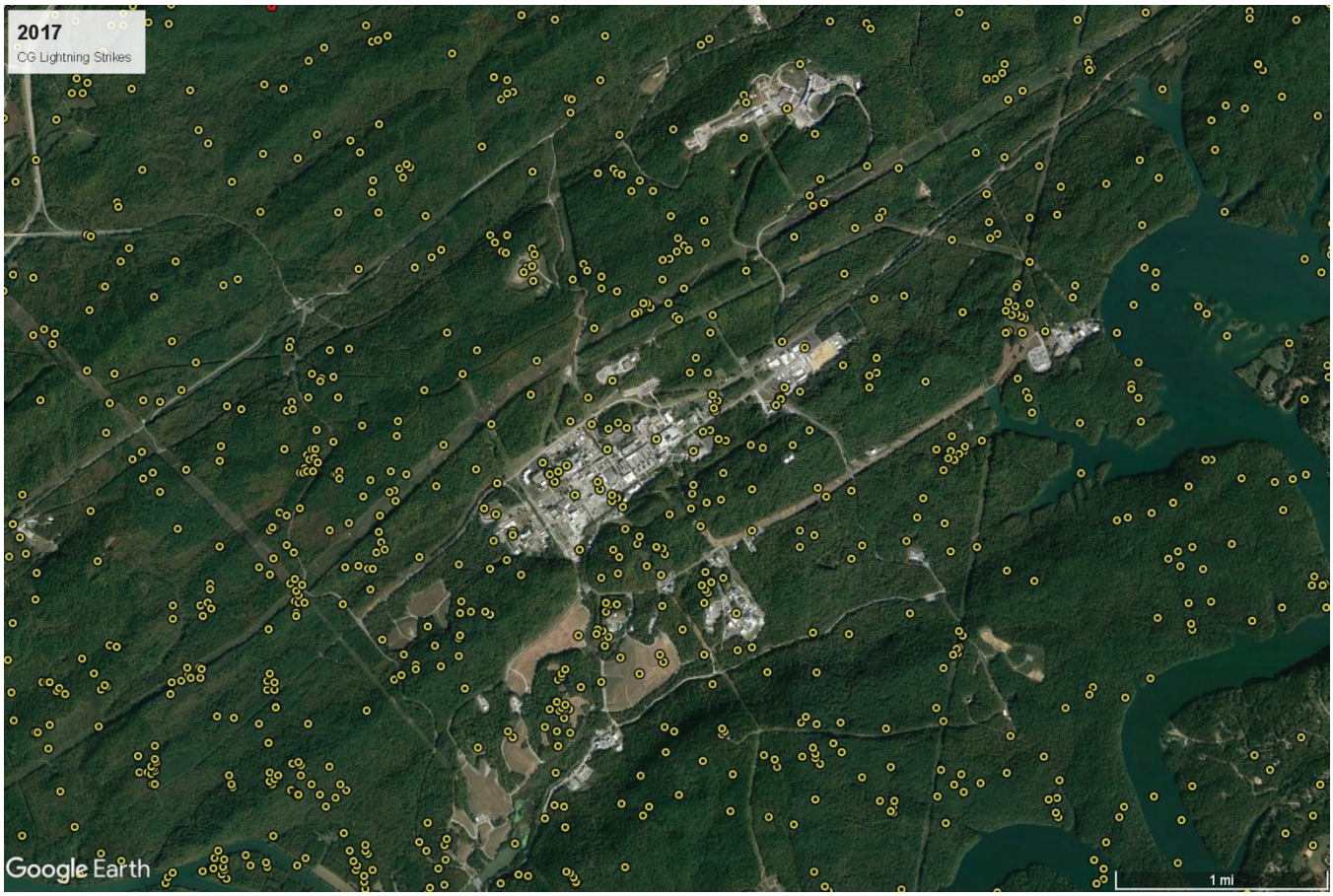


Figure 3-22: Lightning strikes recorded at or near ORNL during 2017

Figure 3-23: Lightning strikes recorded at or near ORNL during 2018

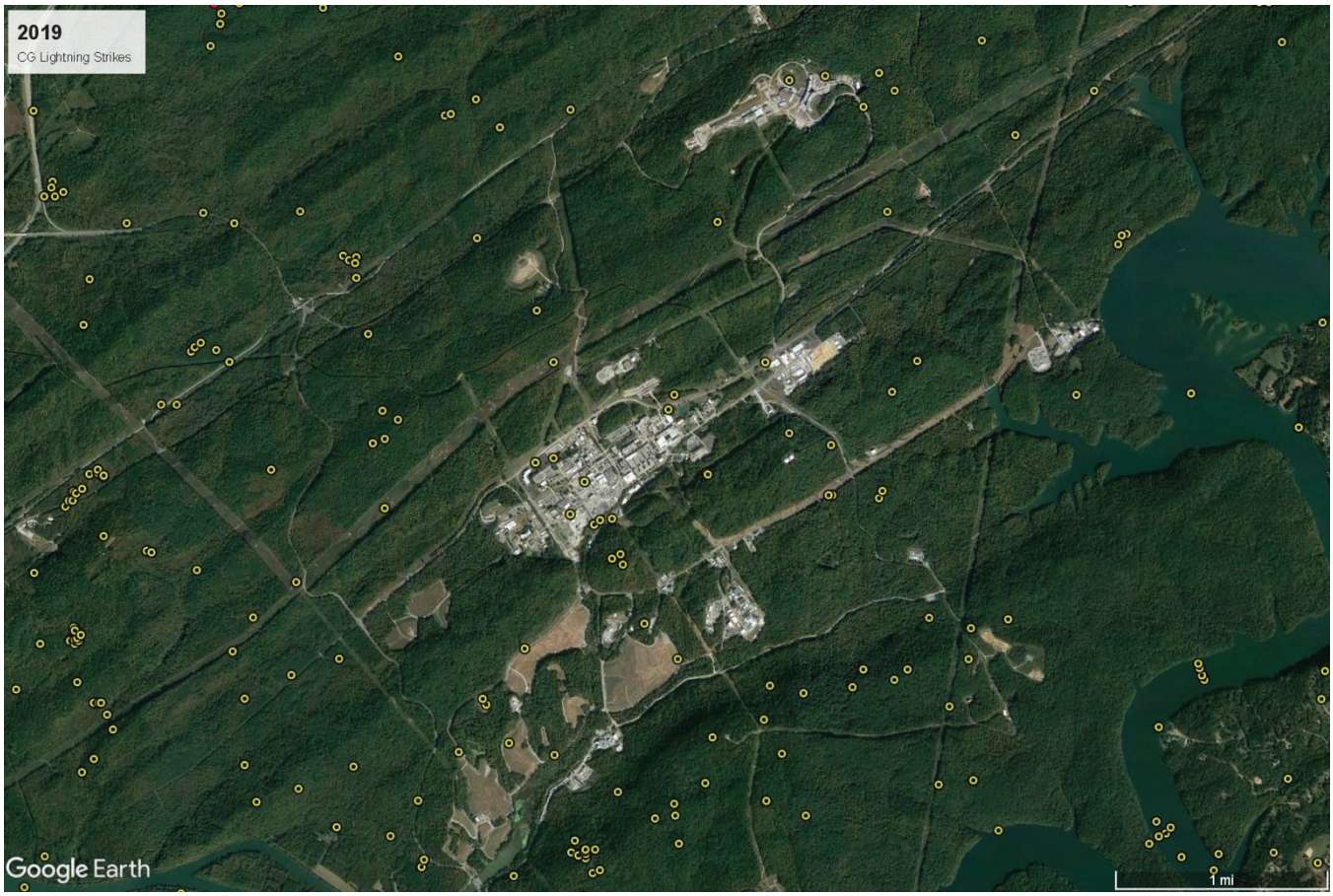


Figure 3-24: Lightning strikes recorded at or near ORNL during 2019

Figure 3-25: Lightning strikes recorded at or near ORNL during 2020

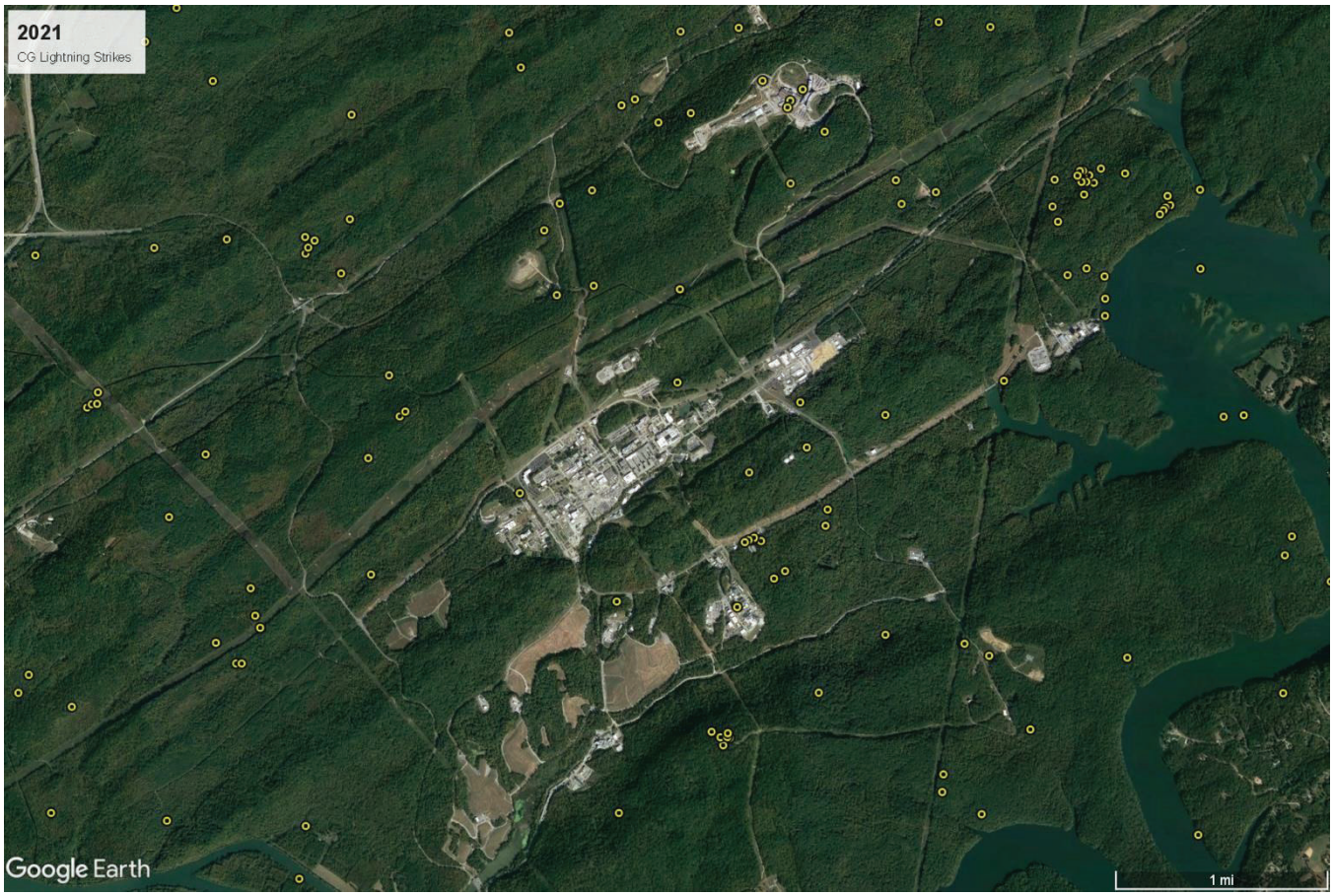


Figure 3-26: Lightning strikes recorded at or near ORNL during 2021

Figure 3-27: Lightning strikes recorded at or near ORNL during 2022

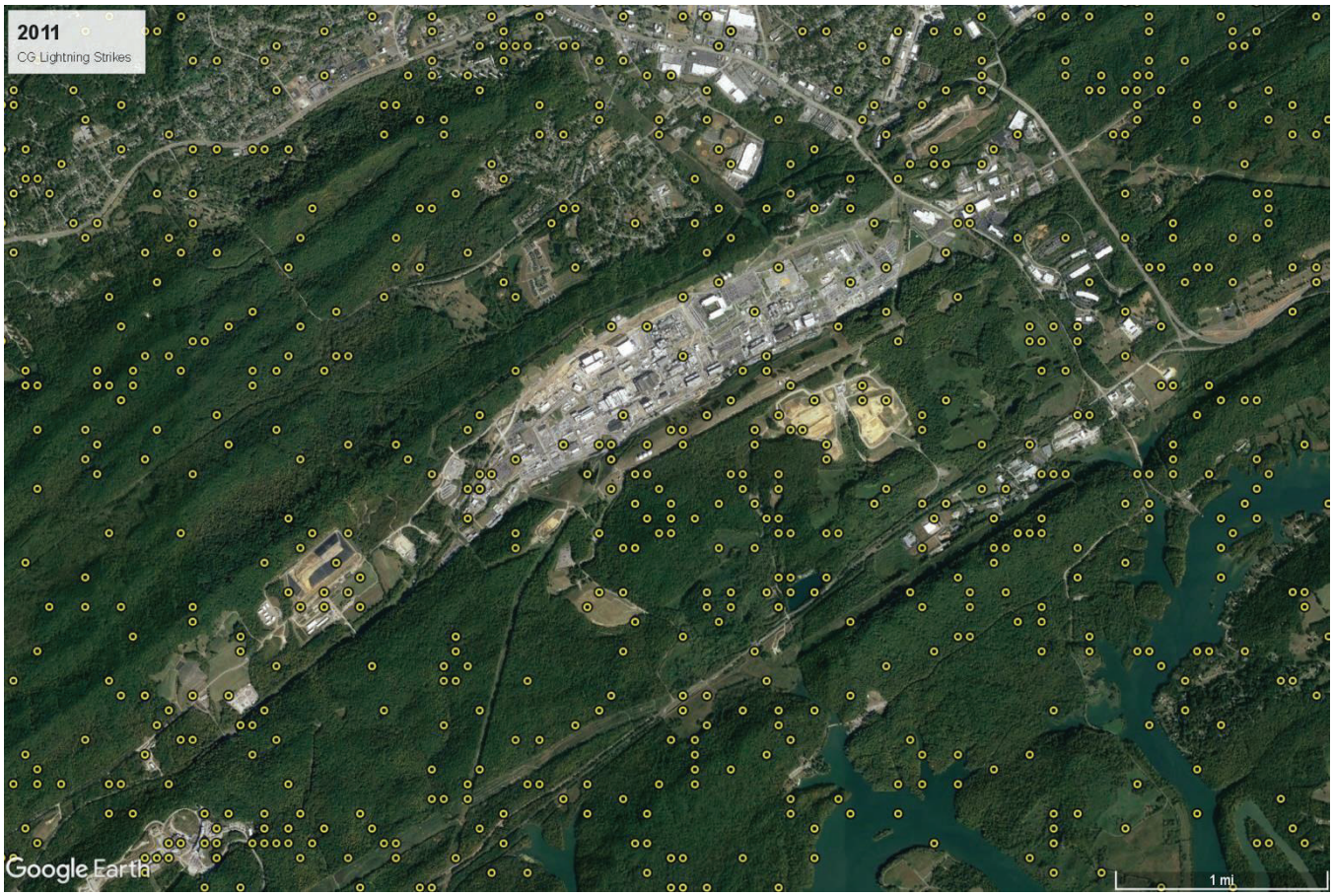


Figure 3-28: Lightning strikes recorded at or near Y-12 during 2011

Figure 3-29: Lightning strikes recorded at or near Y-12 during 2012

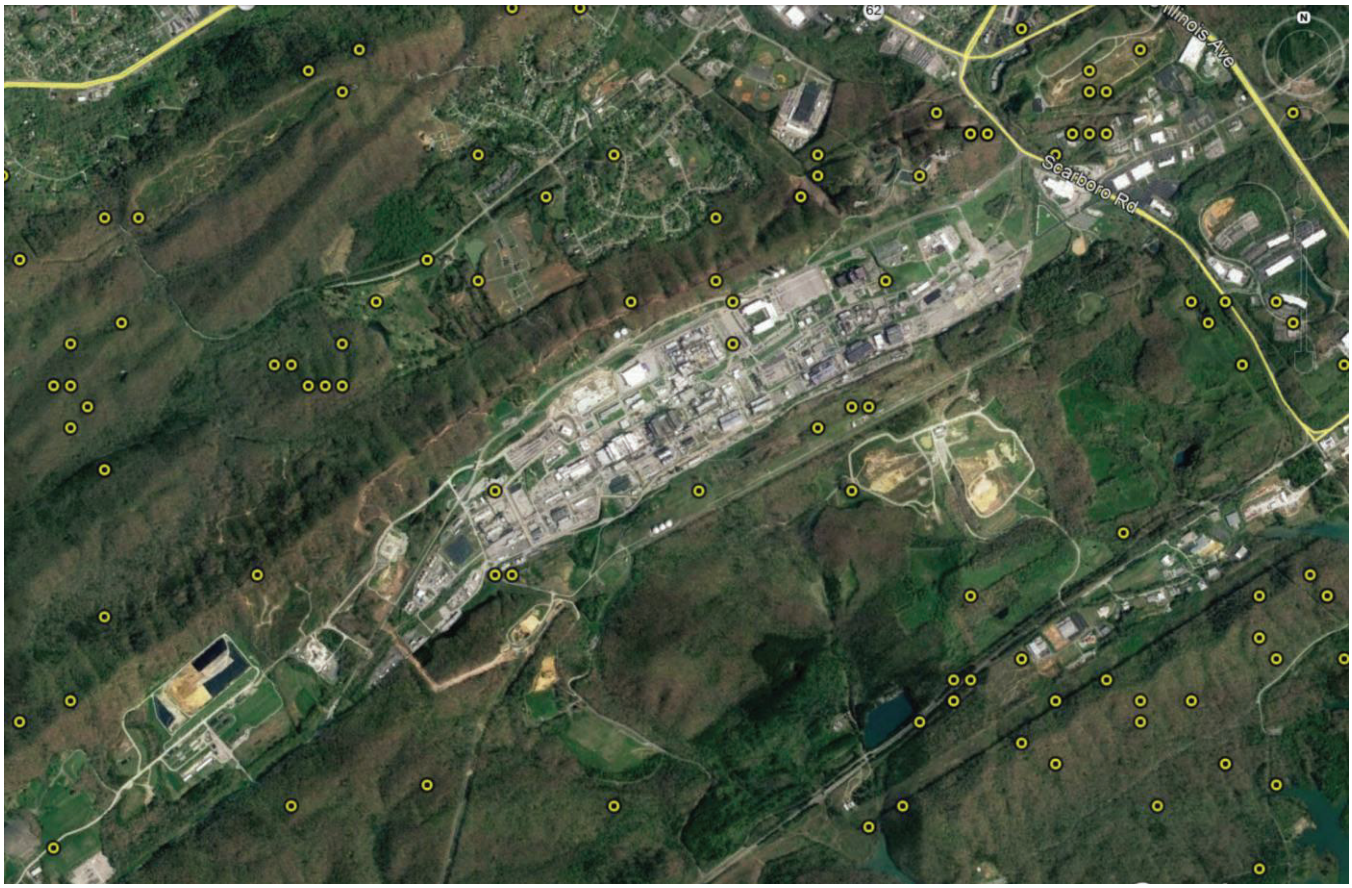


Figure 3-30: Lightning strikes recorded at or near Y-12 during 2013

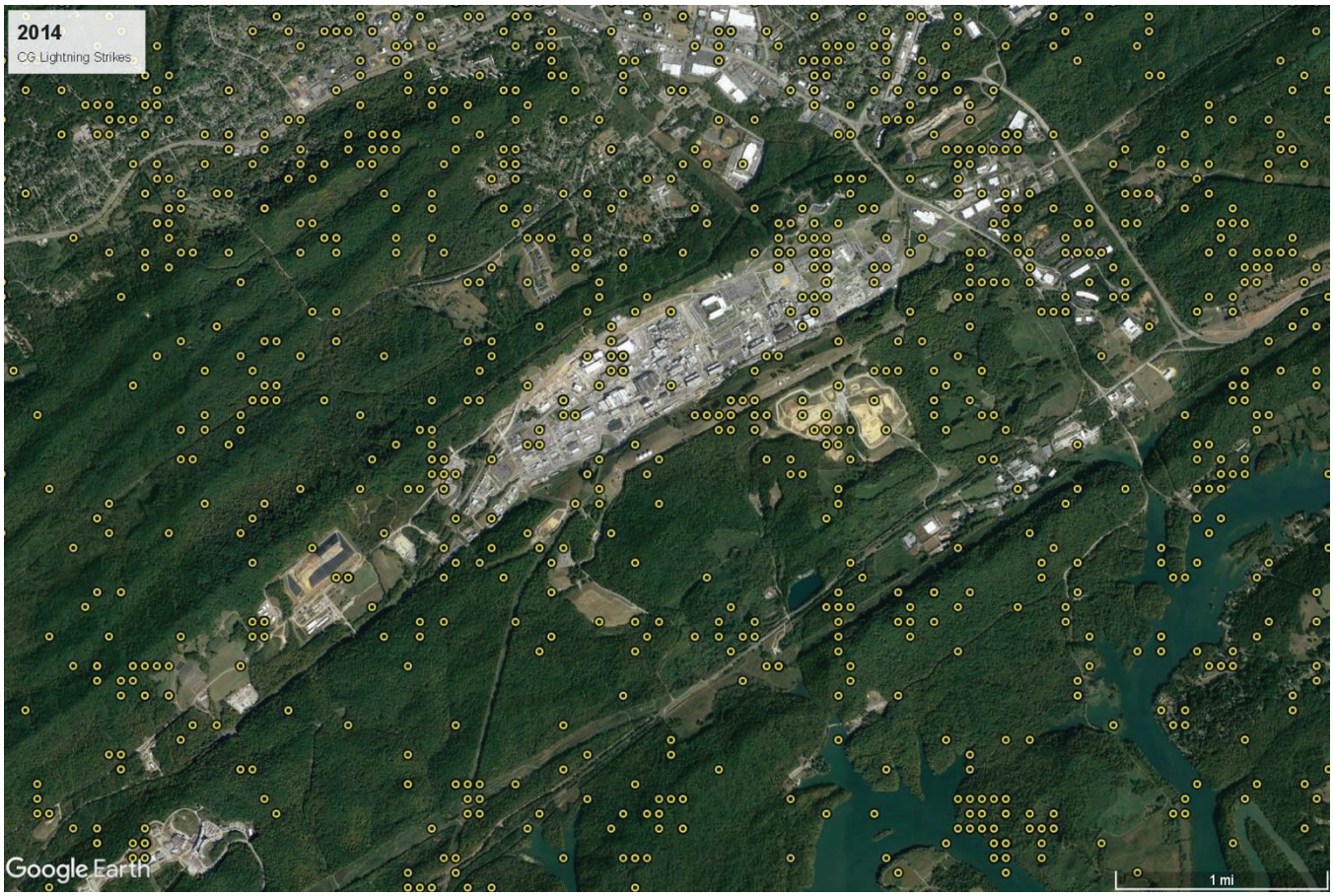


Figure 3-31: Lightning strikes recorded at or near Y-12 during 2014

Figure 3-32: Lightning strikes recorded at or near Y-12 during 2015

Figure 3-33: Lightning strikes recorded at or near Y-12 during 2016

Figure 3-34: Lightning strikes recorded at or near Y-12 during 2017

Figure 3-35: Lightning strikes recorded at or near Y-12 during 2018

Figure 3-36: Lightning strikes recorded at or near Y-12 during 2019

Figure 3-37: Lightning strikes recorded at or near Y-12 during 2020

Figure 3-38: Lightning strikes recorded at or near Y-12 during 2021

Figure 3-39: Lightning strikes recorded at or near Y-12 during 2022

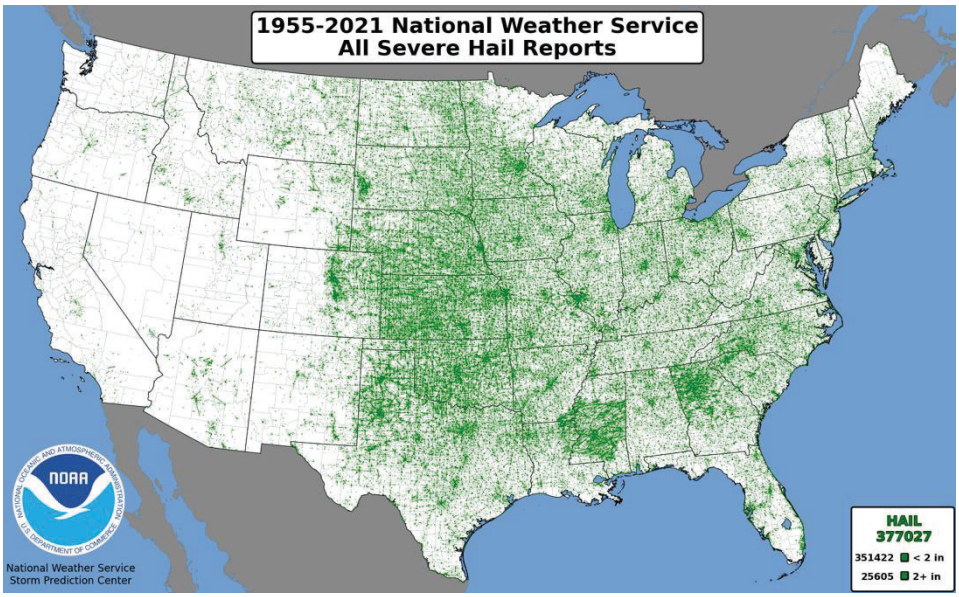
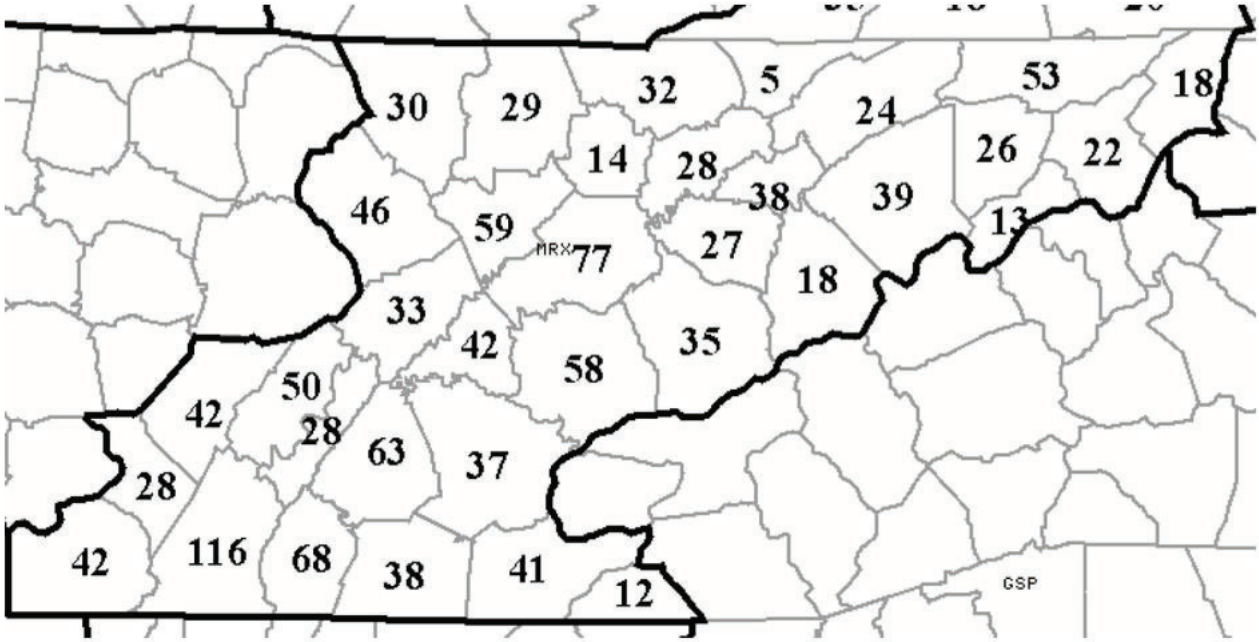


Figure 3-40: All severe hail (>2.5 cm) reports in the contiguous United States from 1955-2021



Source: National Oceanic and Atmospheric Administration, National Weather Service Morristiown, 2007

Figure 3-41: Number of large hail episodes by county in Eastern Tennessee > 2 cm (1955-2006)

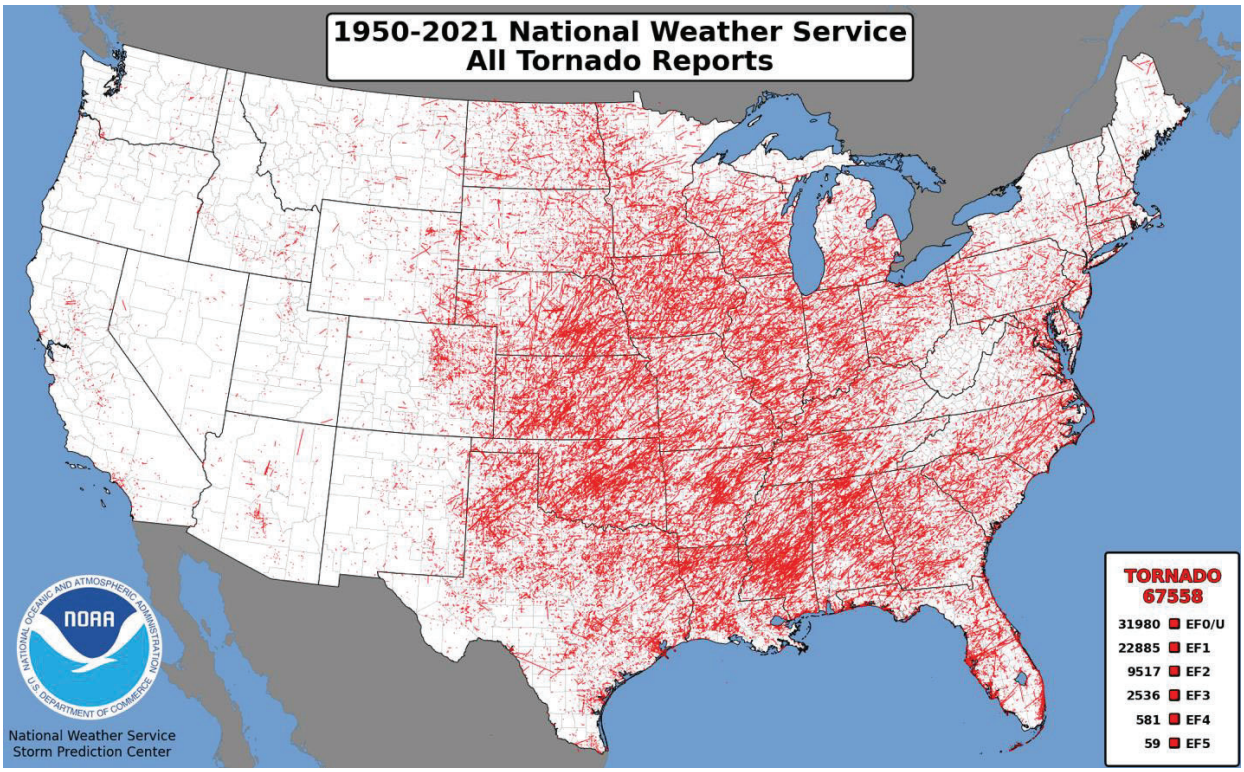


Figure 3-42: Number of tornado reports in the contiguous United States from 1950-2021

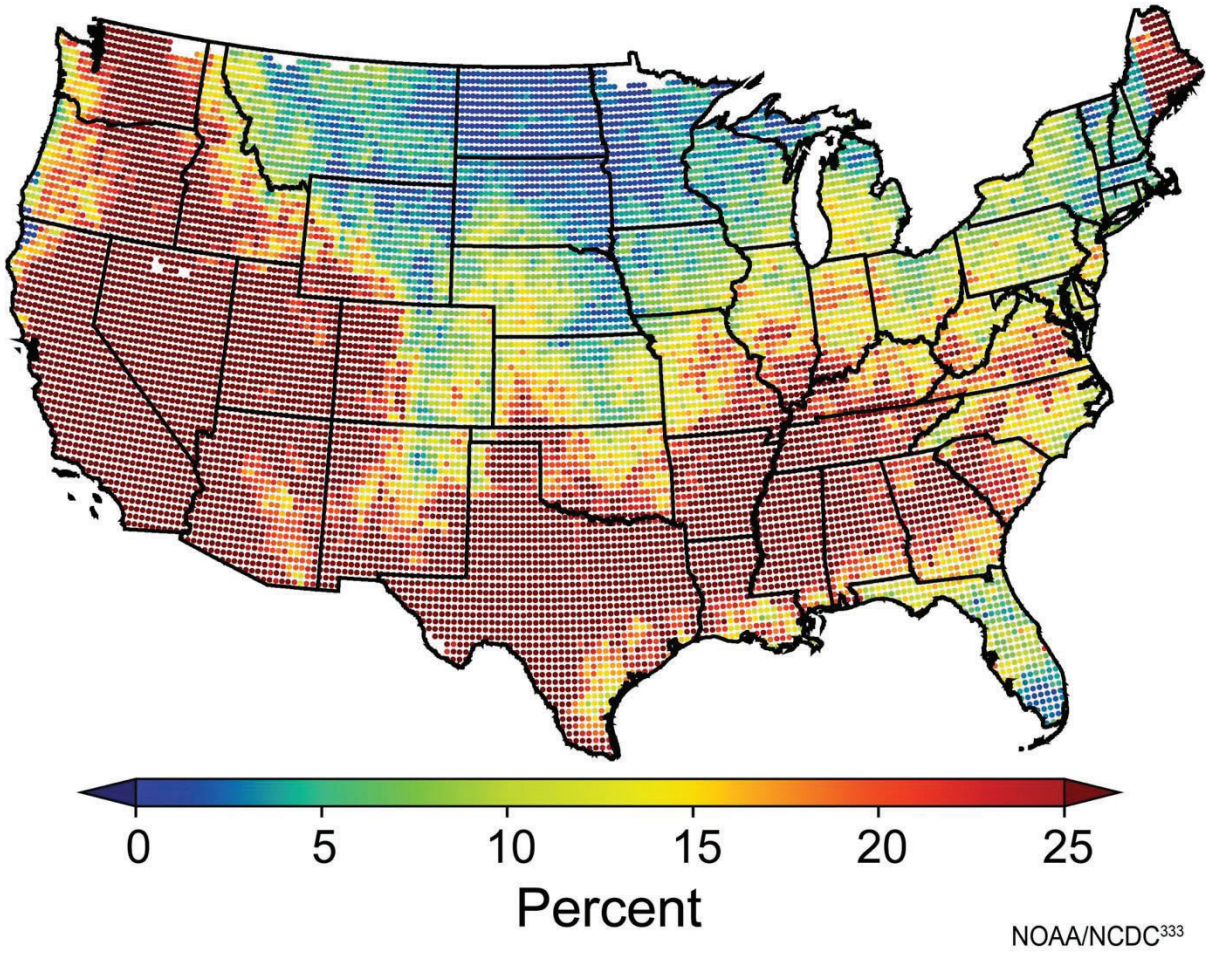


Figure 3-43: Frequency in percent of stagnant air conditions during heat waves in the in the contiguous United States from 1950-2007

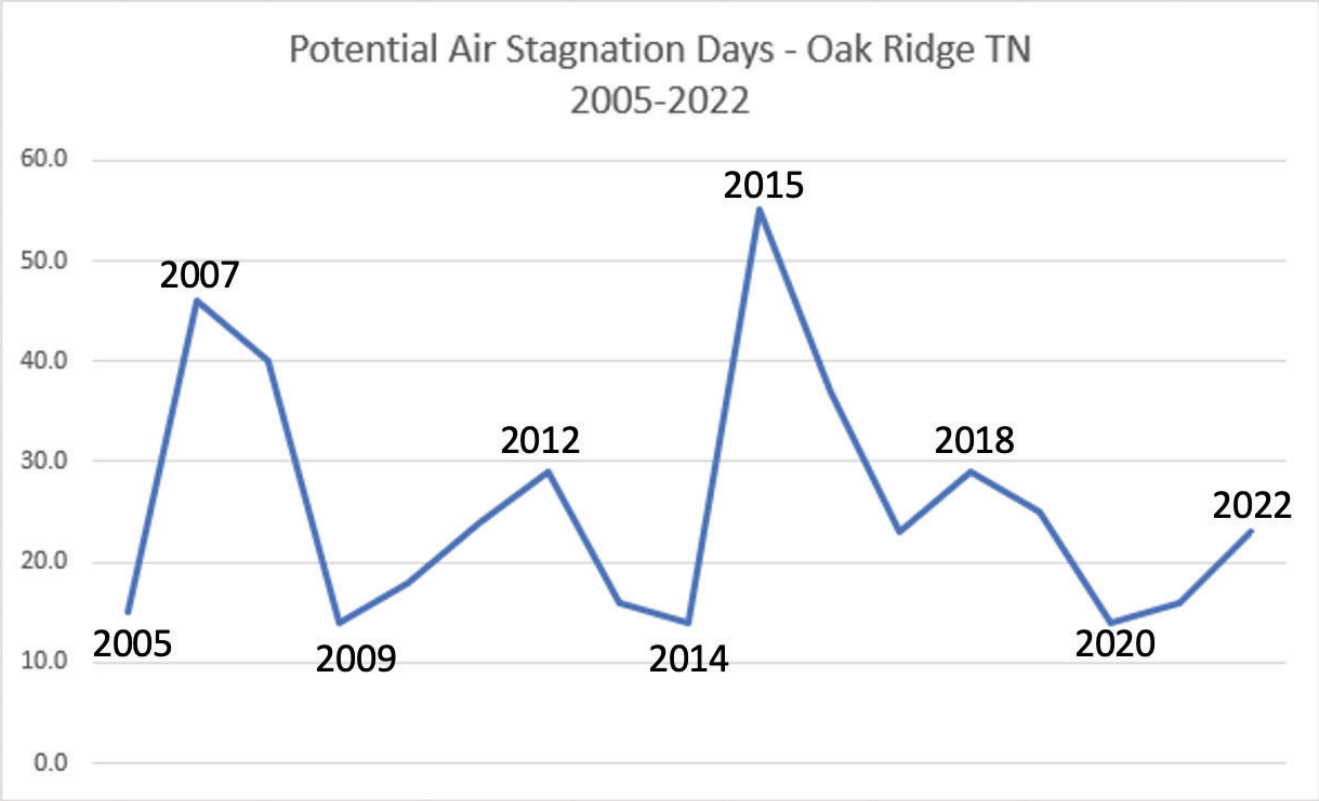


Figure 3-44: Number of annual potential air stagnation days for Oak Ridge, Tennessee from 2005 through 2022

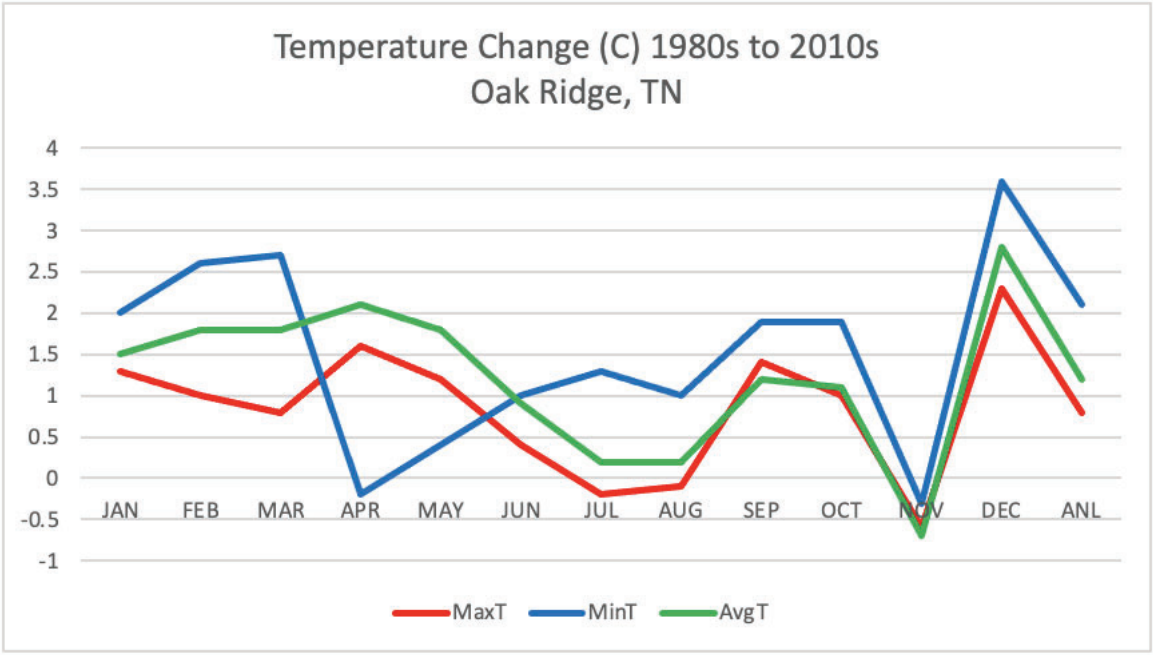


Figure 3-45: Monthly and annual temperature change in Deg C for Oak Ridge, Tennessee: 1980s vs. 2010s

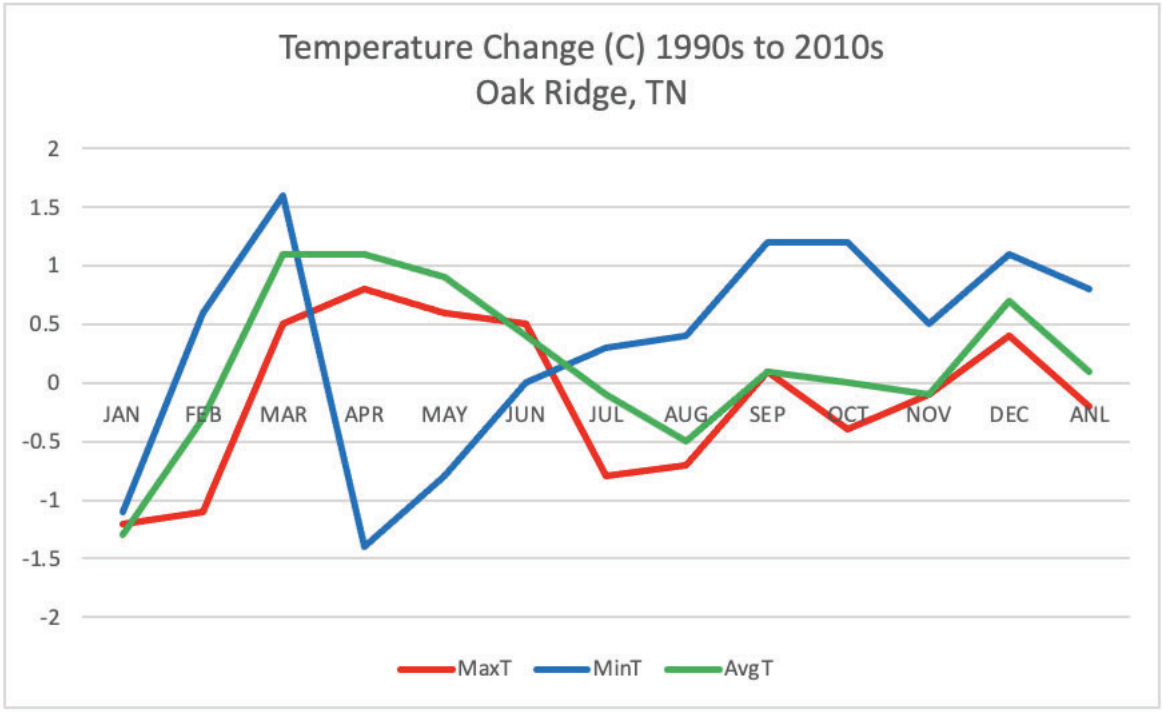


Figure 3-46: Monthly and annual temperature change in Deg C for Oak Ridge, Tennessee: 1990s vs. 2010s

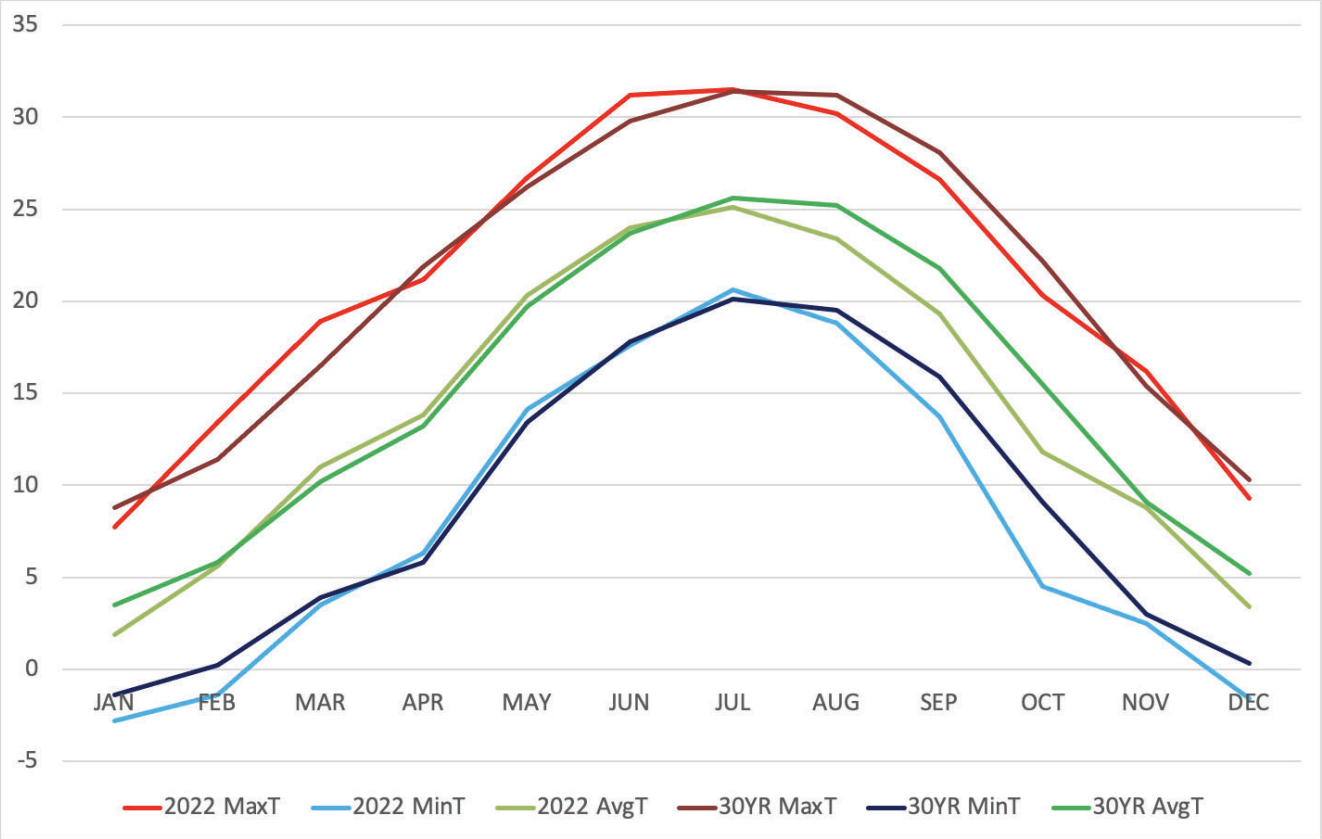


Figure 3-47: Monthly average maximum, minimum, and average temperature in Deg C for Oak Ridge, Tennessee from 1991-2020 plotted against monthly average maximum, minimum, and average temperature in Deg C for Oak Ridge, Tennessee in 2022

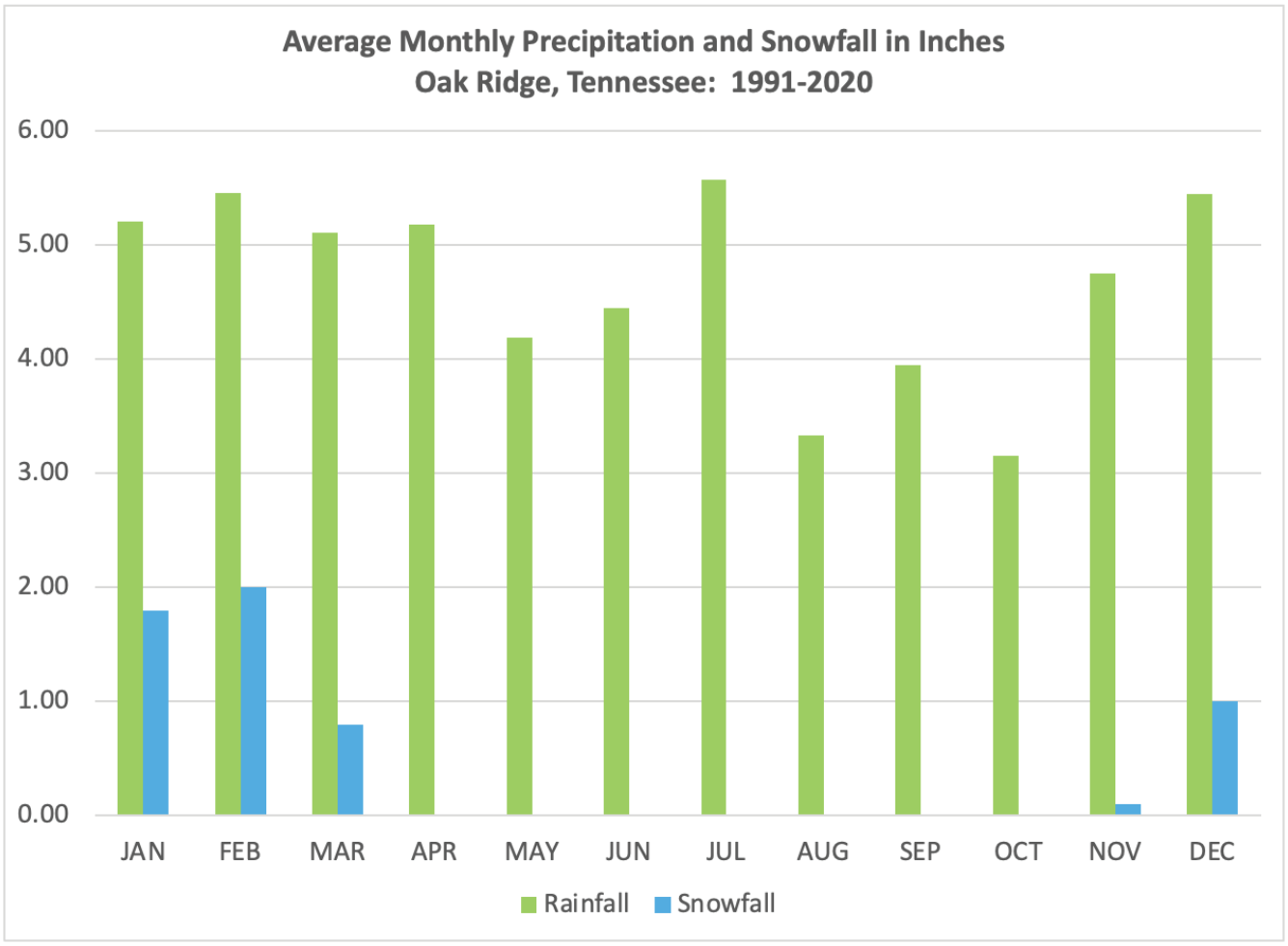


Figure 3-48: Monthly average precipitation and snowfall for Oak Ridge, Tennessee in inches for 1991-2020

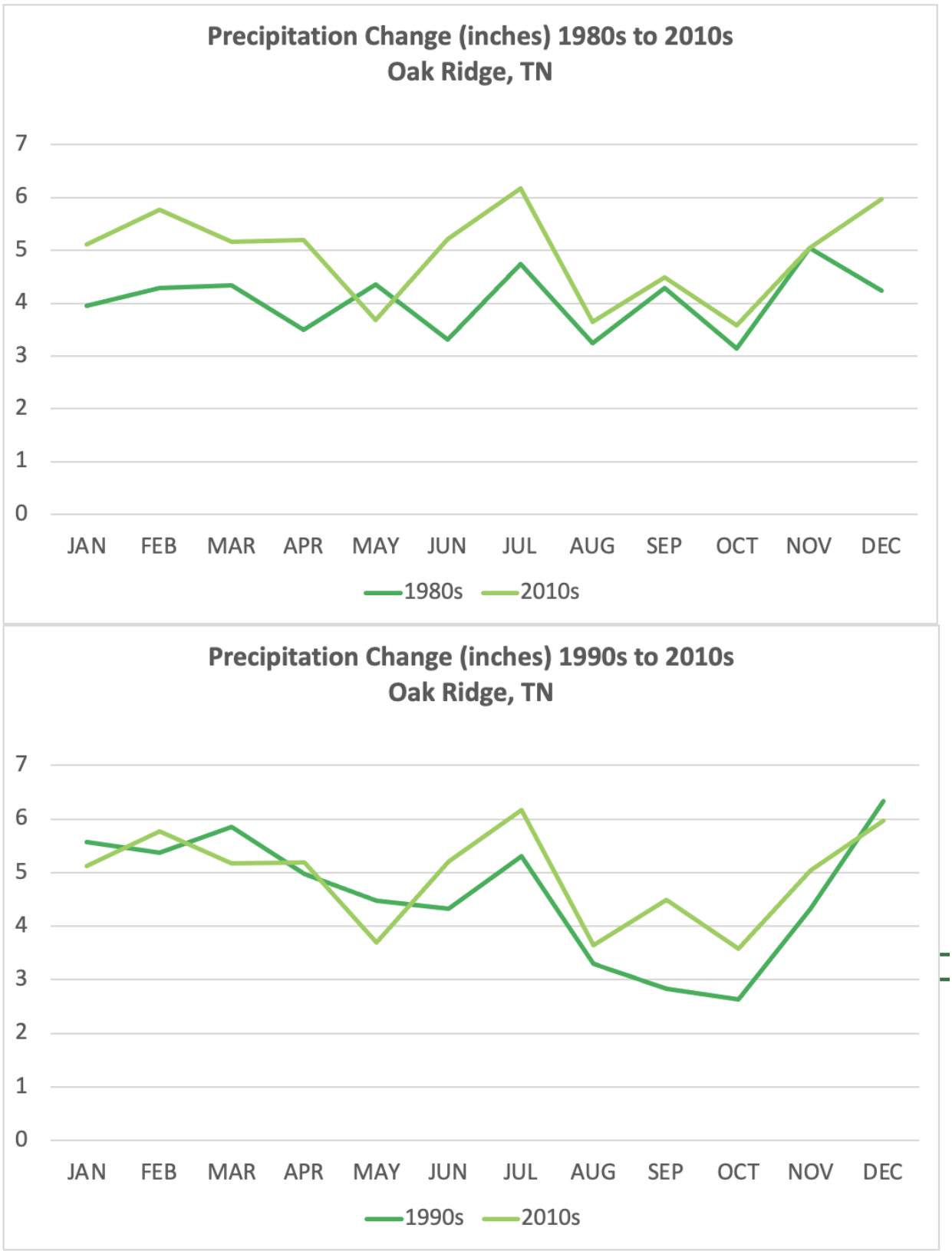


Figure 3-49: Decadal monthly average precipitation changes for Oak Ridge, Tennessee in inches
Upper Graph – 1980s vs. 2010s / Lower Graph – 1990s vs. 2010s

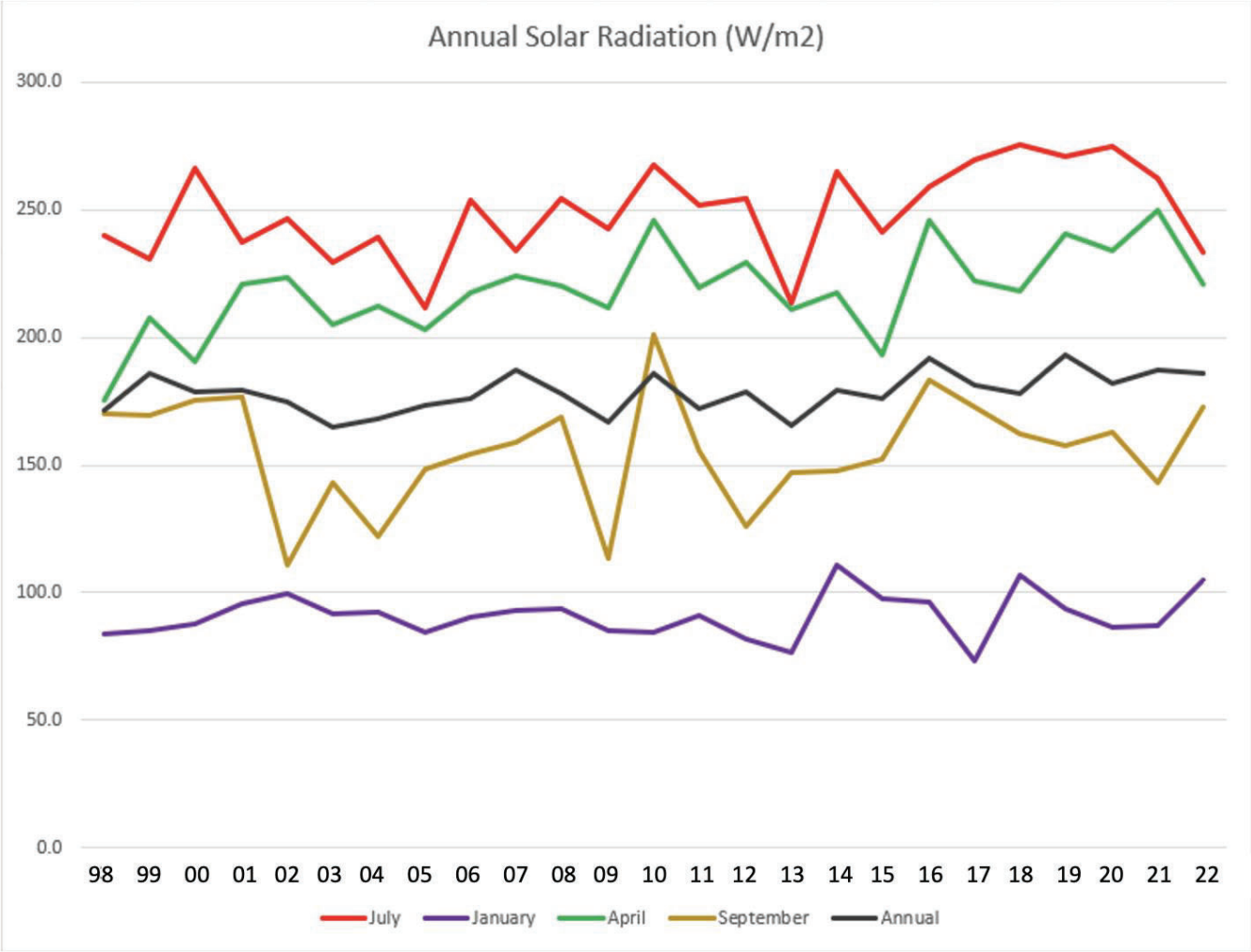


Figure 3-50: Average January, April, July, September and annual solar radiation in Watts per square meter from 1998-2022

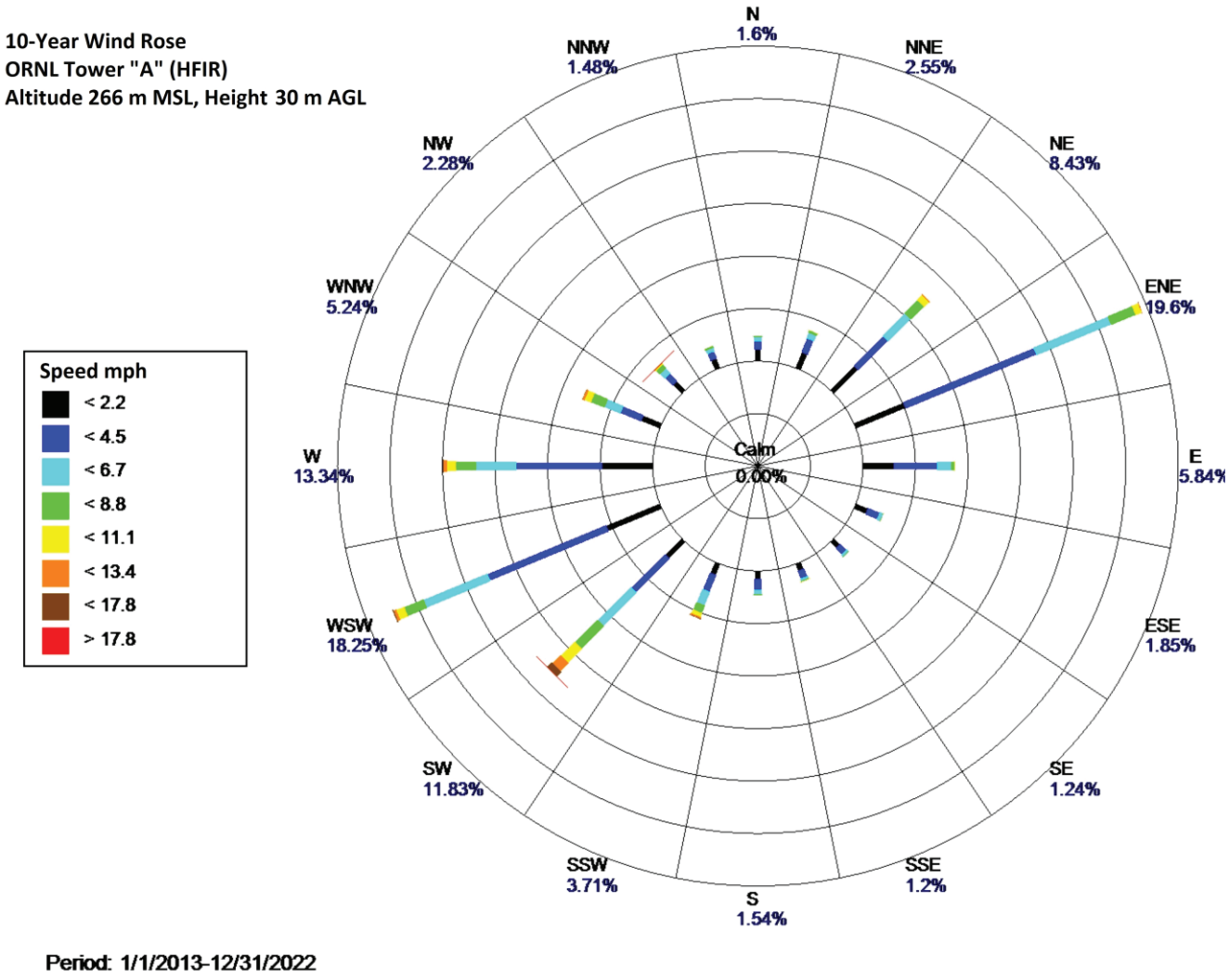


Figure 3-51: 10-year wind rose for 2013-2022 for ORNL Tower "A" at 10 meters AGL

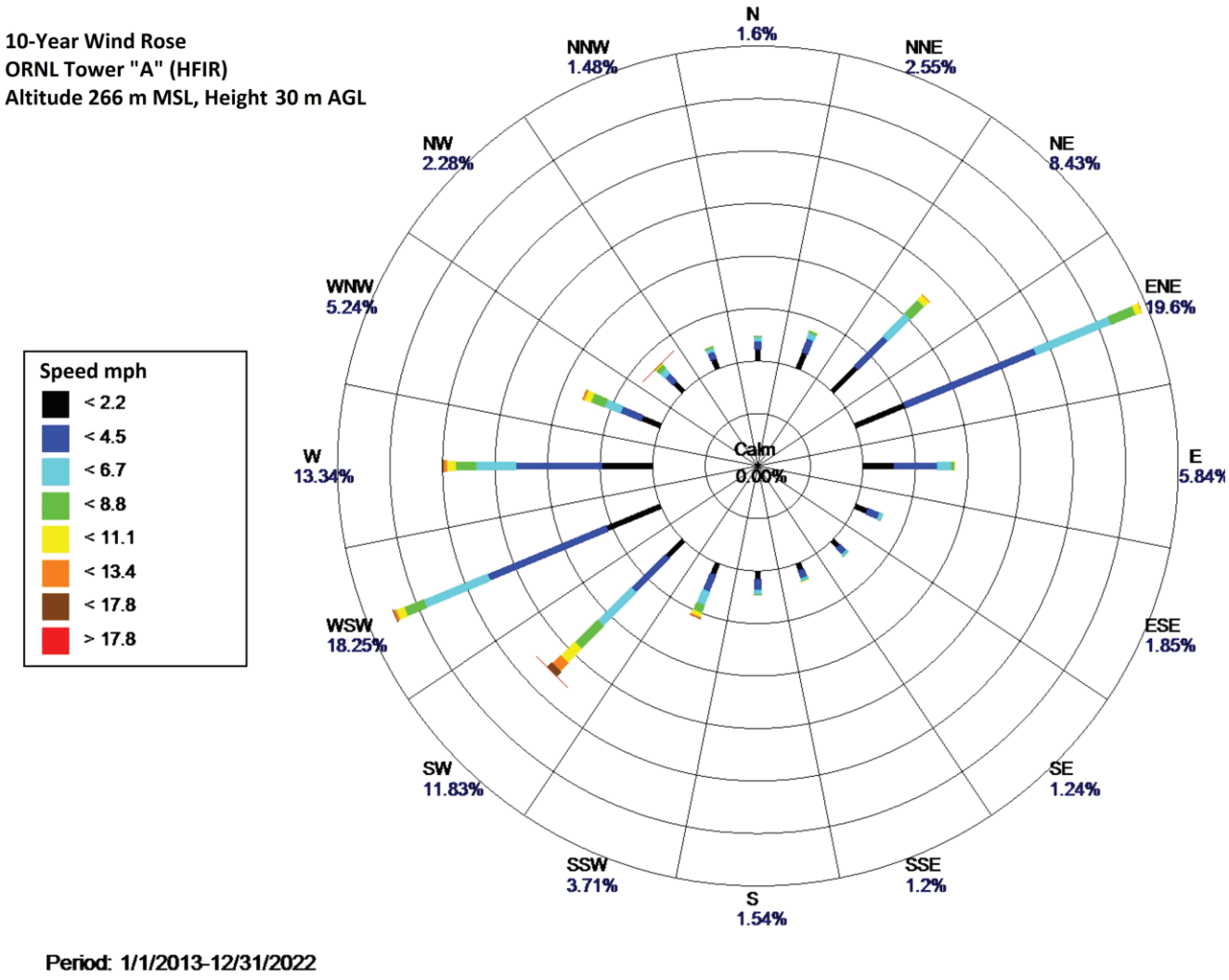


Figure 3-52: 10-year wind rose for 2013-2022 for ORNL Tower "A" at 30 meters AGL

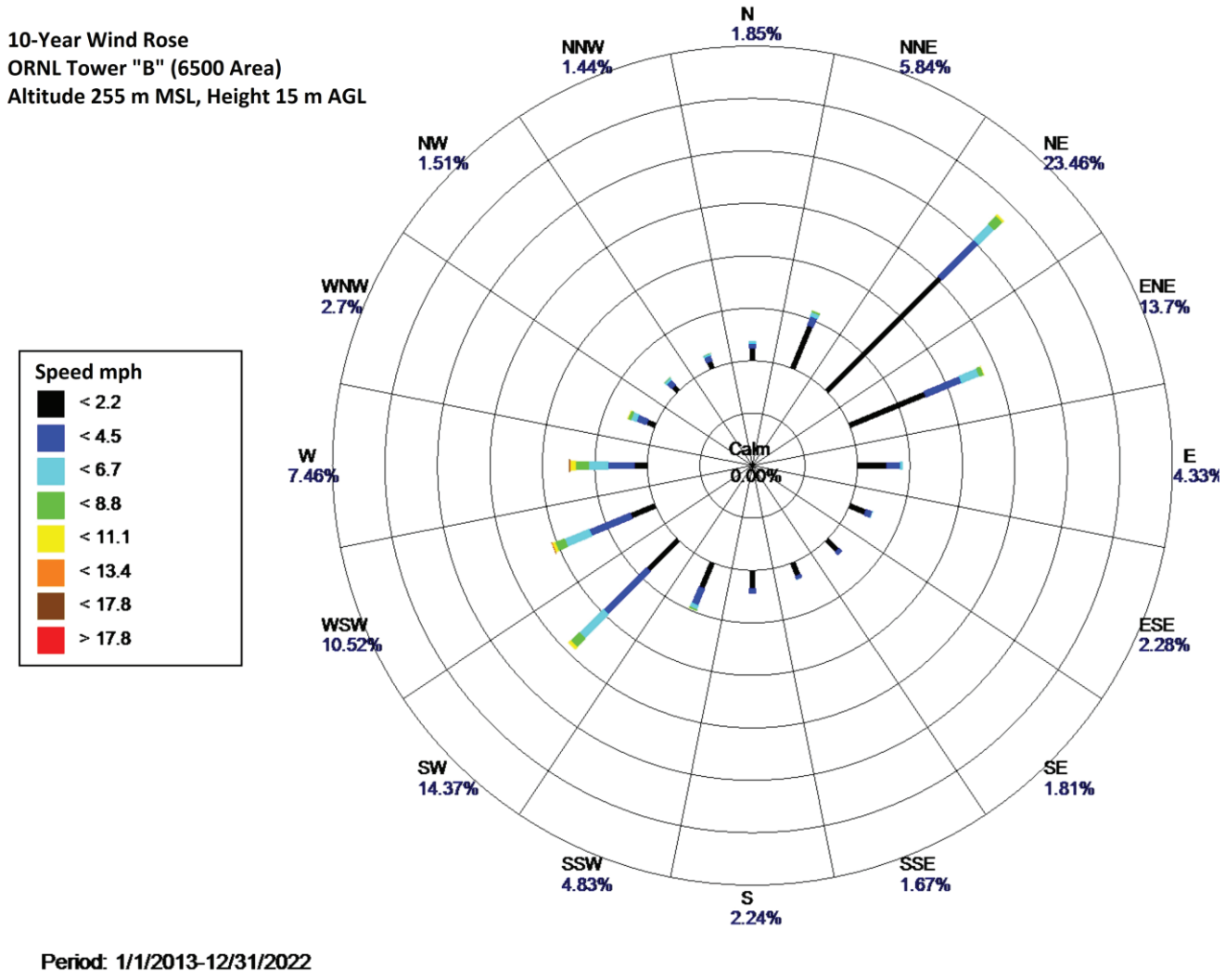


Figure 3-53: 10-year wind rose for 2013-2022 for ORNL Tower "B" at 15 meters AGL

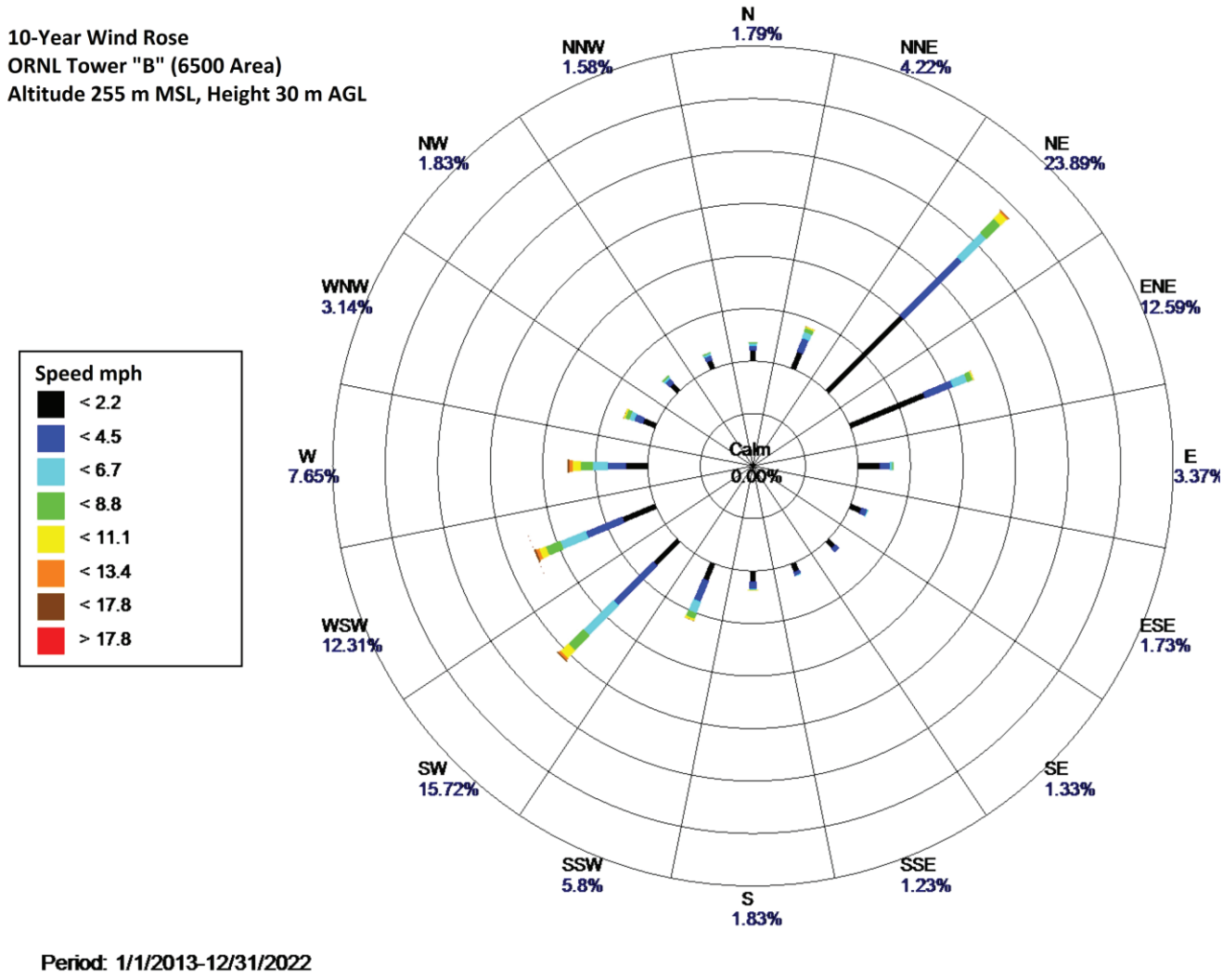


Figure 3-54: 10-year wind rose for 2013-2022 for ORNL Tower "B" at 30 meters AGL

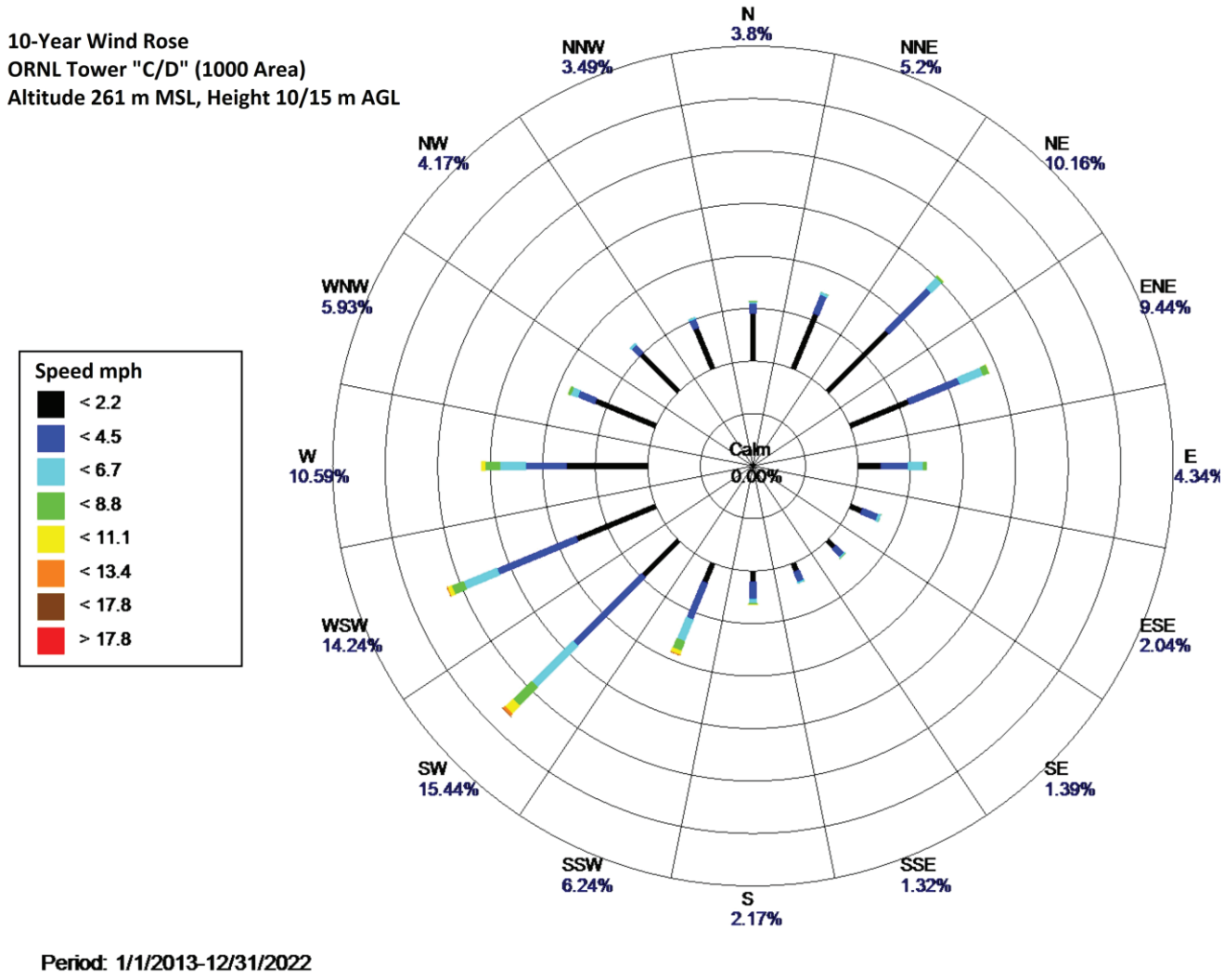


Figure 3-55: 10-year wind rose for 2013-2022 for ORNL Tower "D" at 10/15 meters AGL

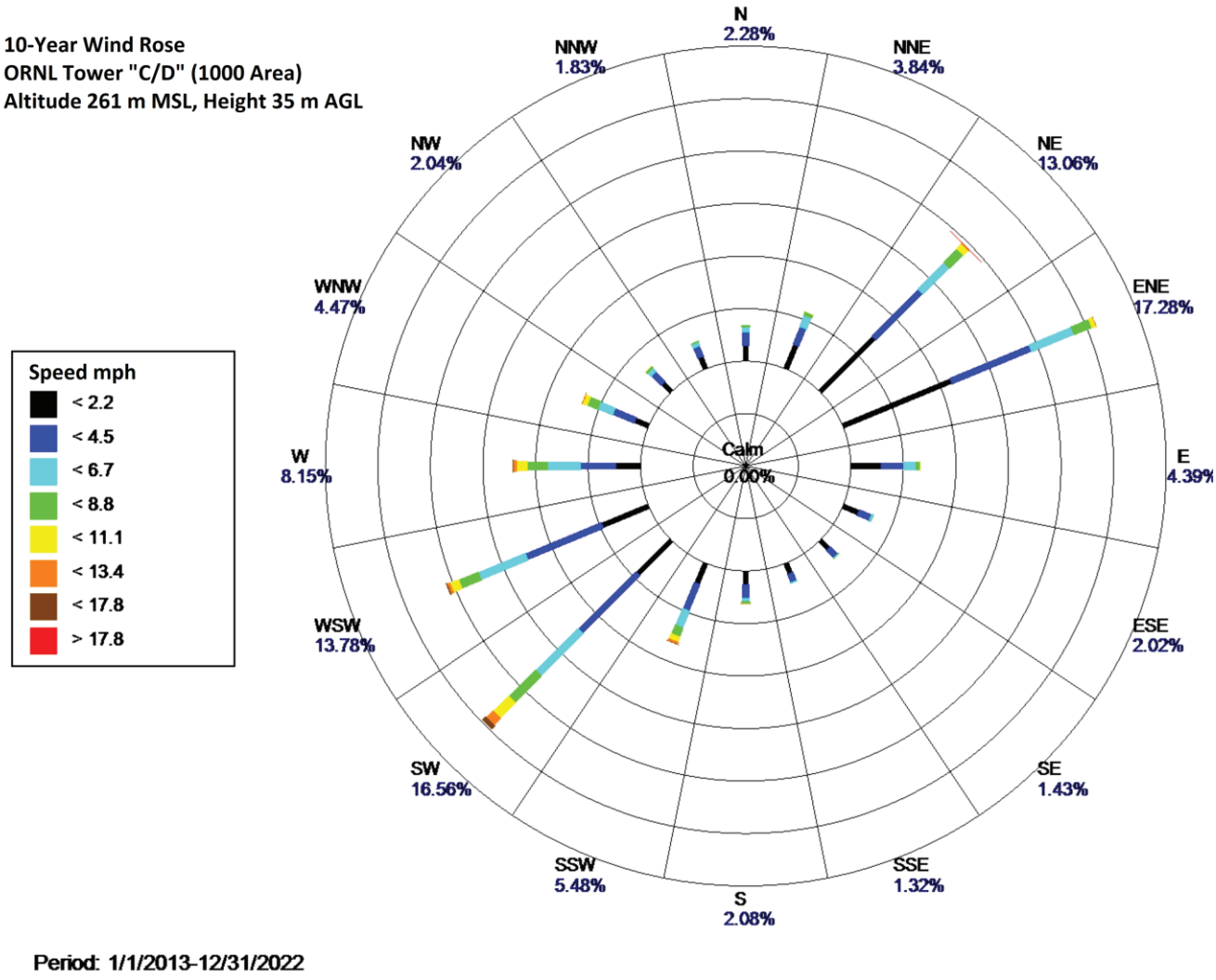


Figure 3-56: 10-year wind rose for 2013-2022 for ORNL Tower "D" at 30/35 meters AGL

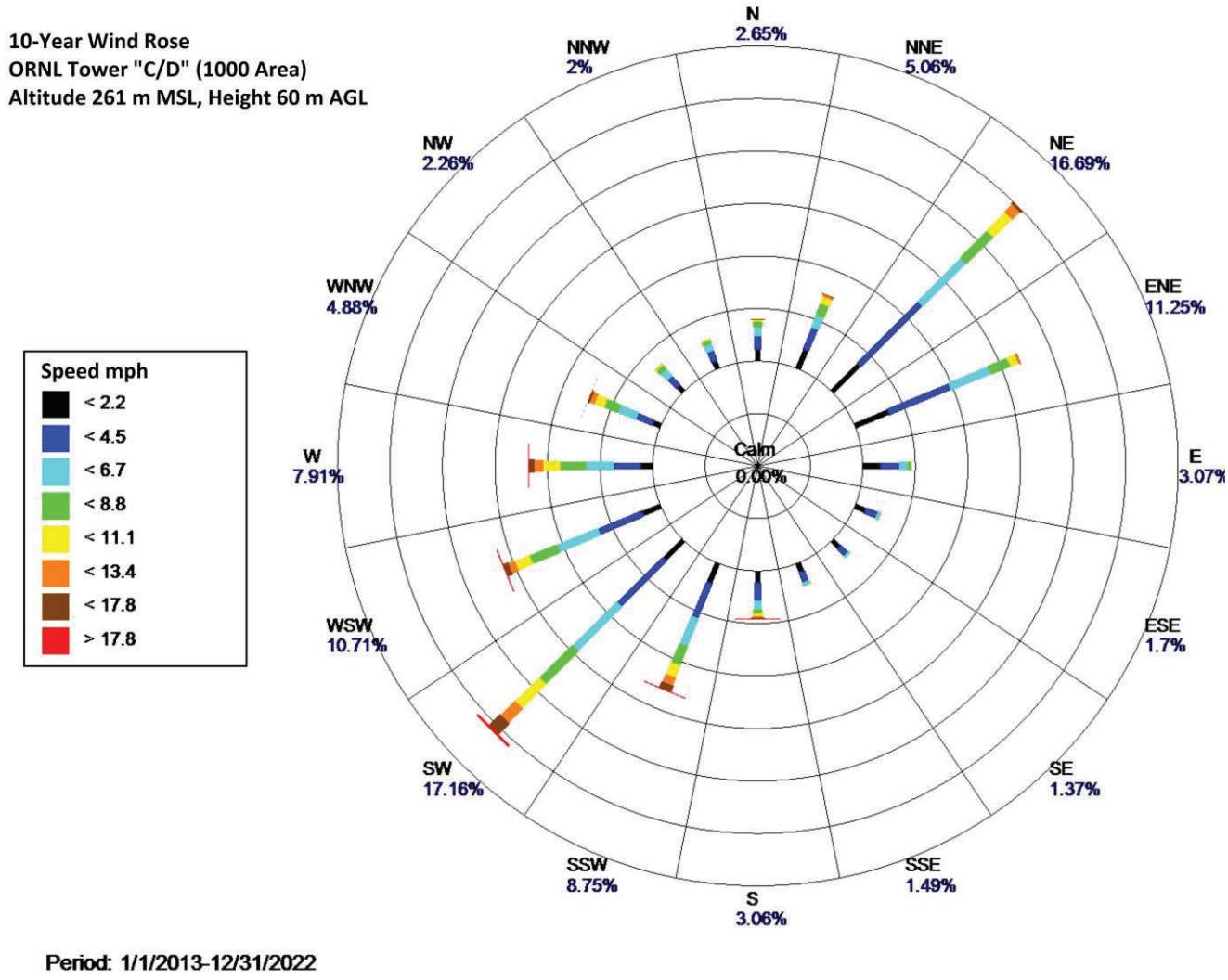


Figure 3-57: 10-year wind rose for 2013-2022 for ORNL Tower "D" at 60/100 meters AGL

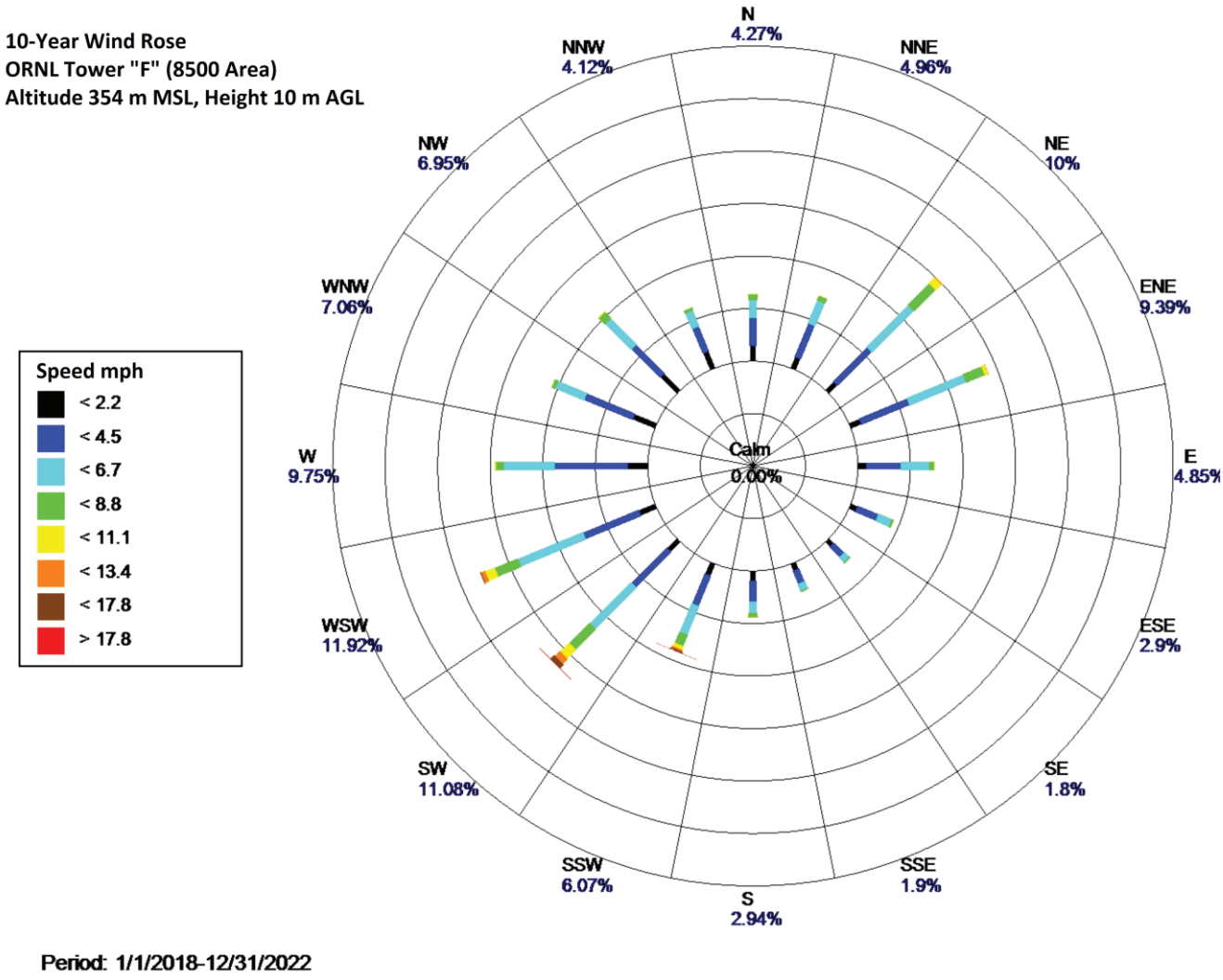


Figure 3-58: 10-year wind rose for 2013-2022 for ORNL Tower "F" at 10 meters AGL

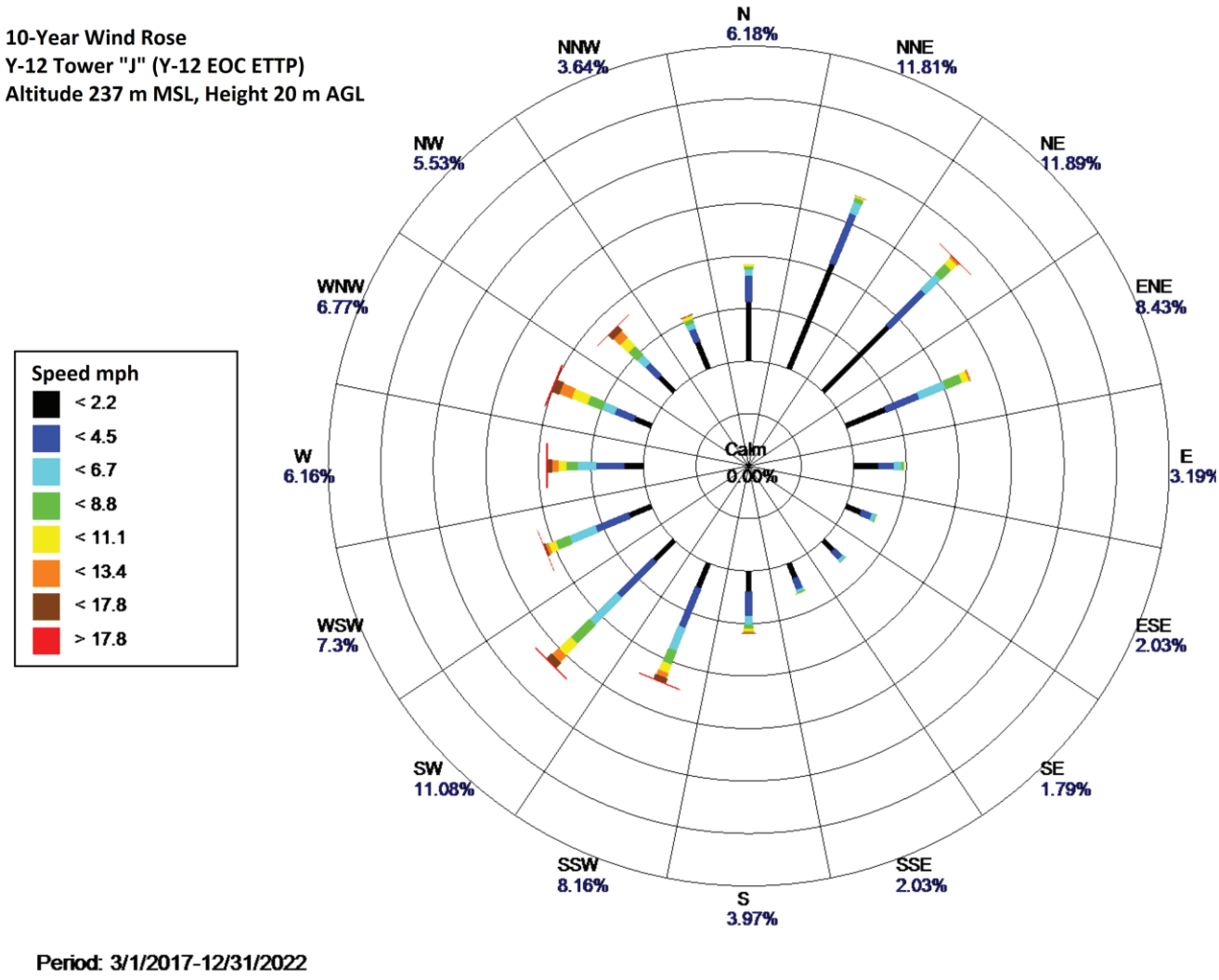


Figure 3-59: 10-year wind rose for 2013-2022 for ORNL Tower "J" at 20 meters AGL

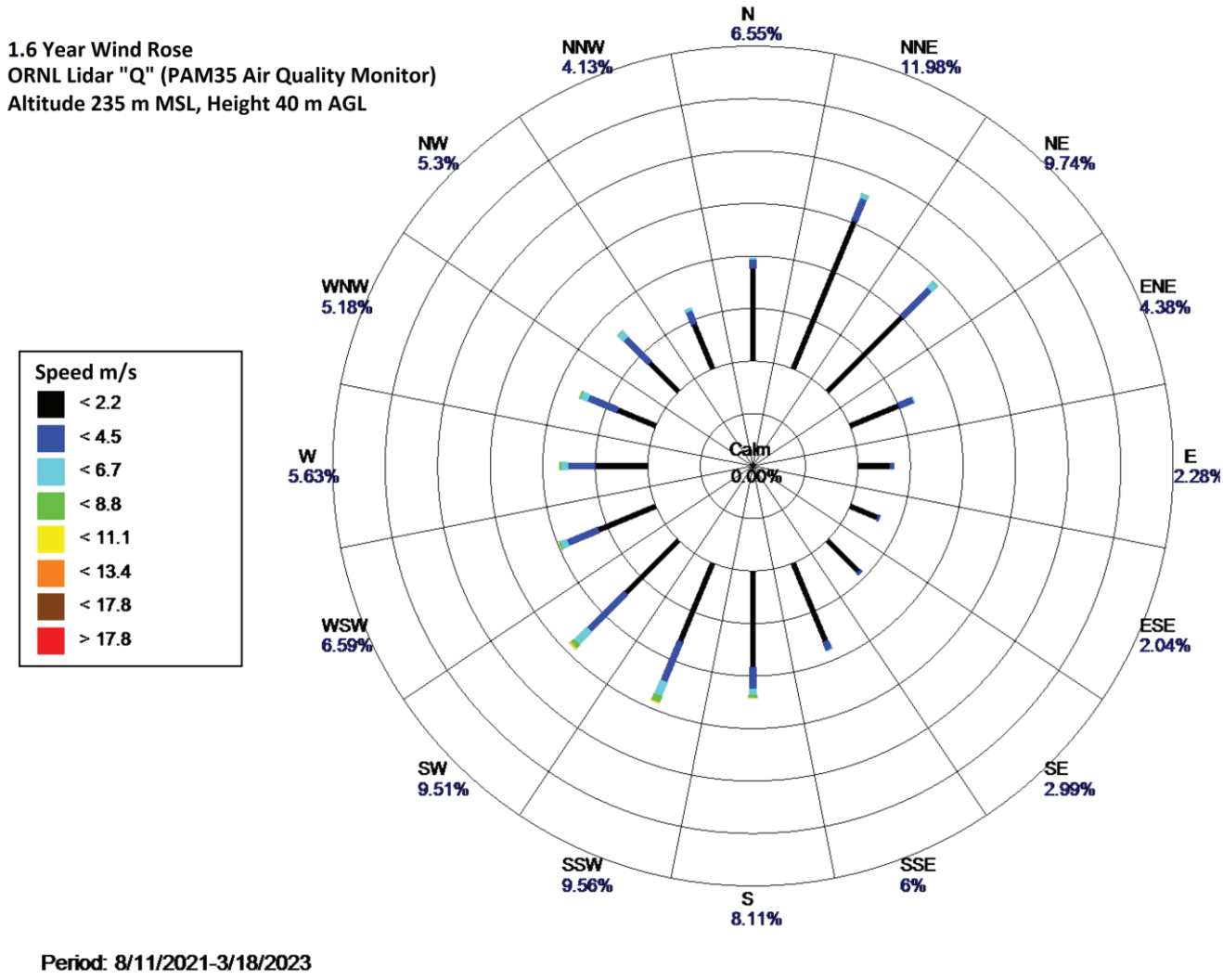


Figure 3-60: 1.6-year wind rose for August 2021 – March 2023 for ORNL Lidar "Q" at 40 meters AGL

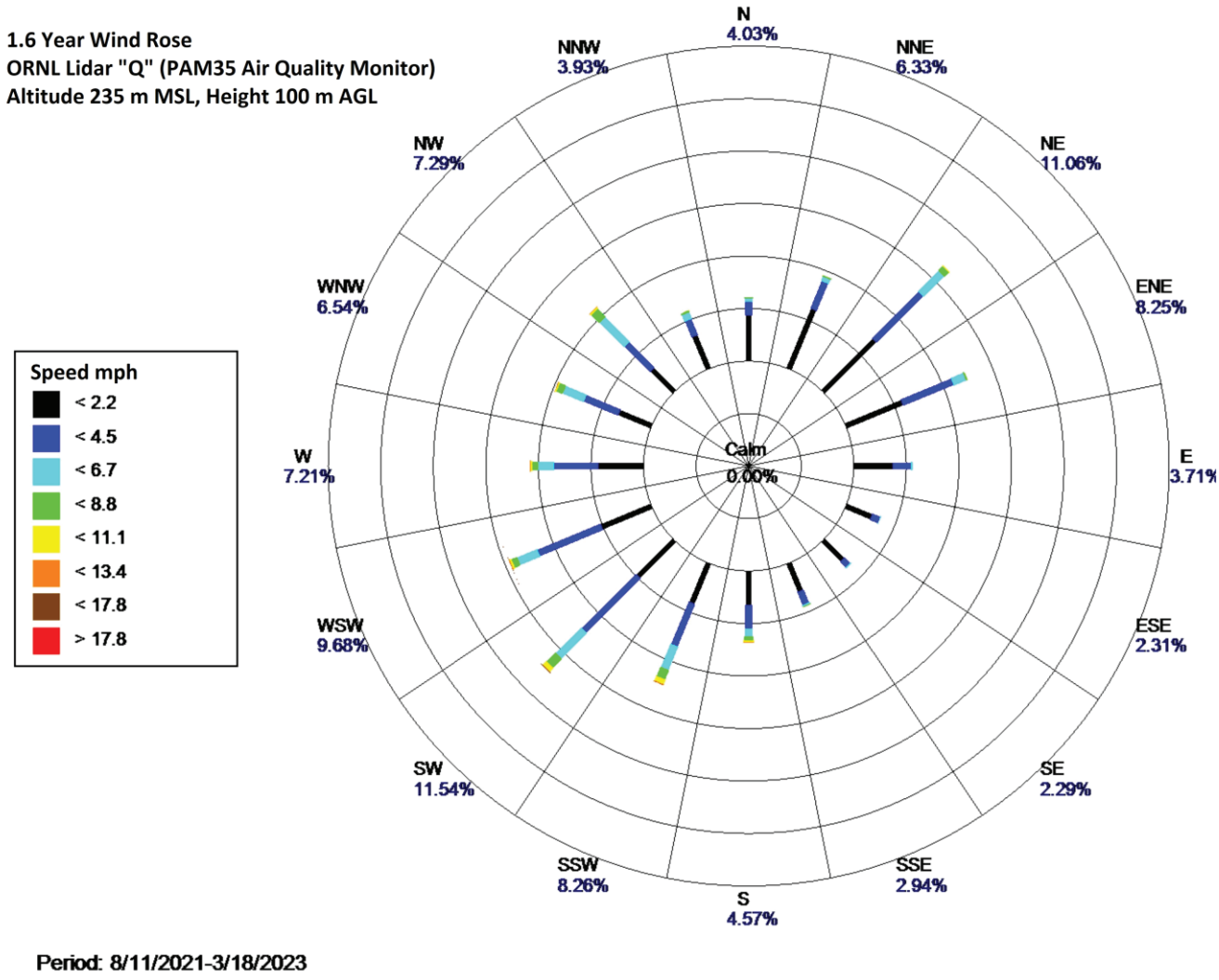


Figure 3-61: 1.6-year wind rose for August 2021 – March 2023 for ORNL Lidar "Q" at 100 meters AGL

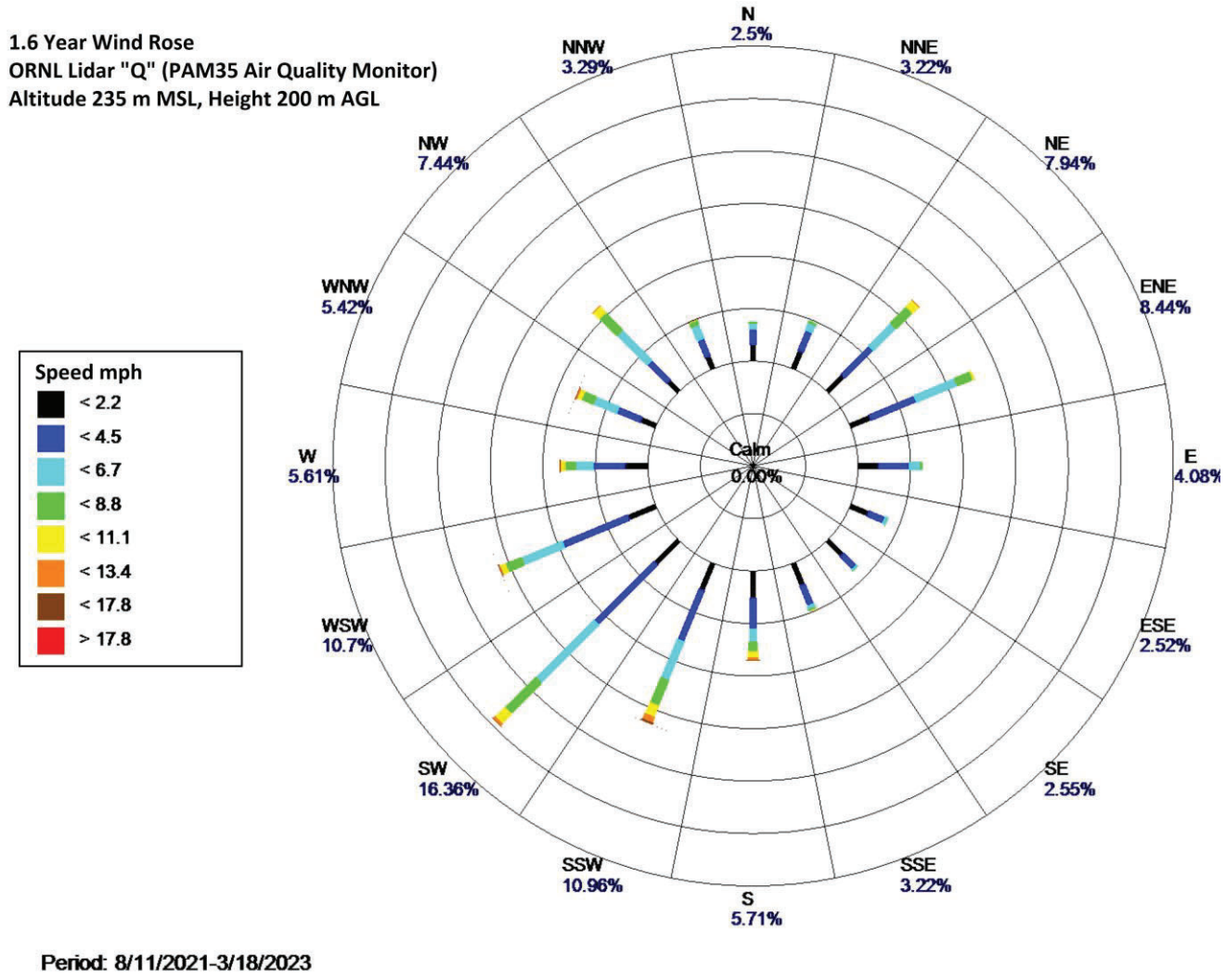


Figure 3-62: 1.6-year wind rose for August 2021 – March 2023 for ORNL Lidar "Q" at 200 meters AGL

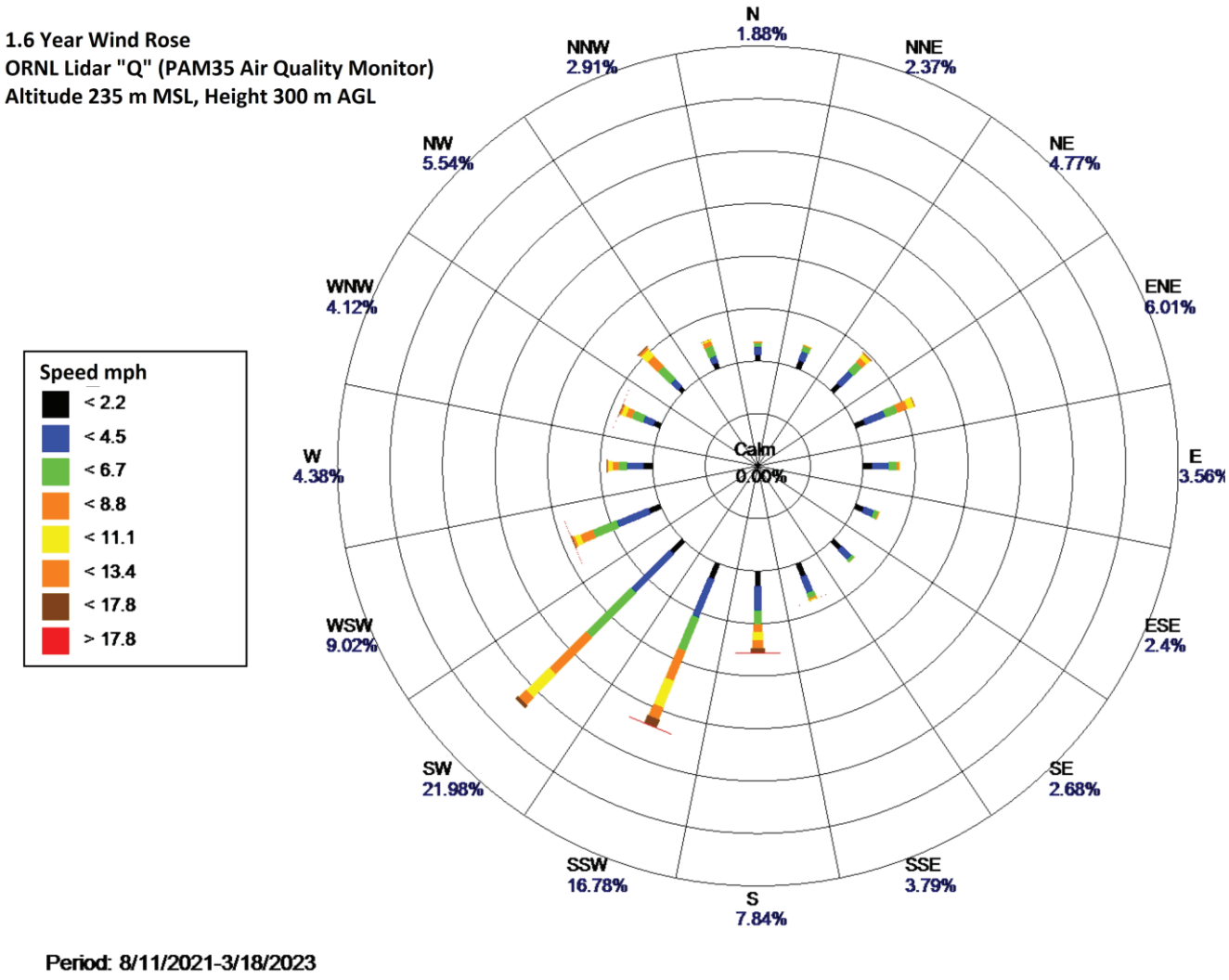


Figure 3-63: 1.6-year wind rose for August 2021 – March 2023 for ORNL Lidar "Q" at 300 meters AGL

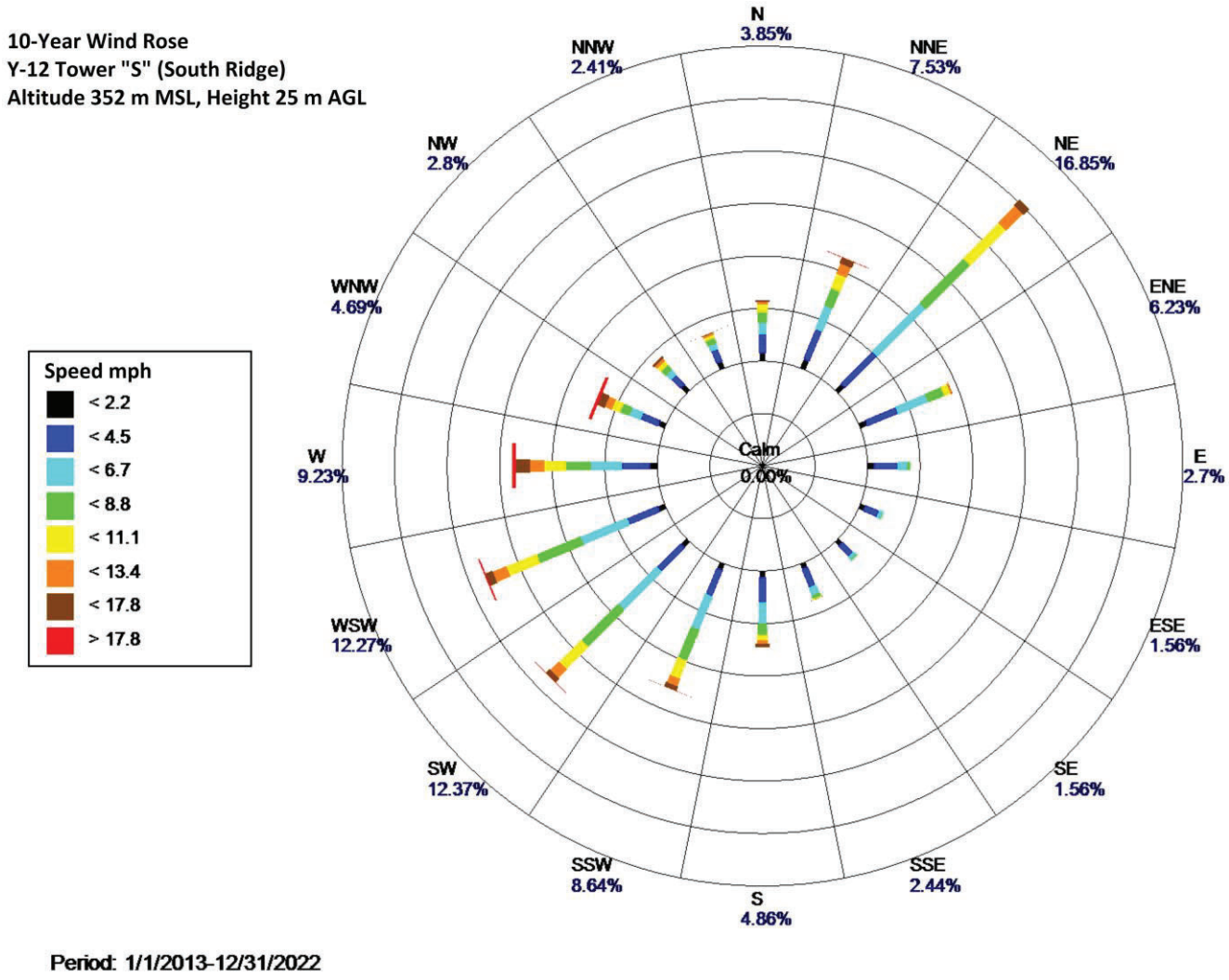


Figure 3-64: 10-year wind rose for 2013-2022 for Y-12 Tower "S" at 25 meters AGL

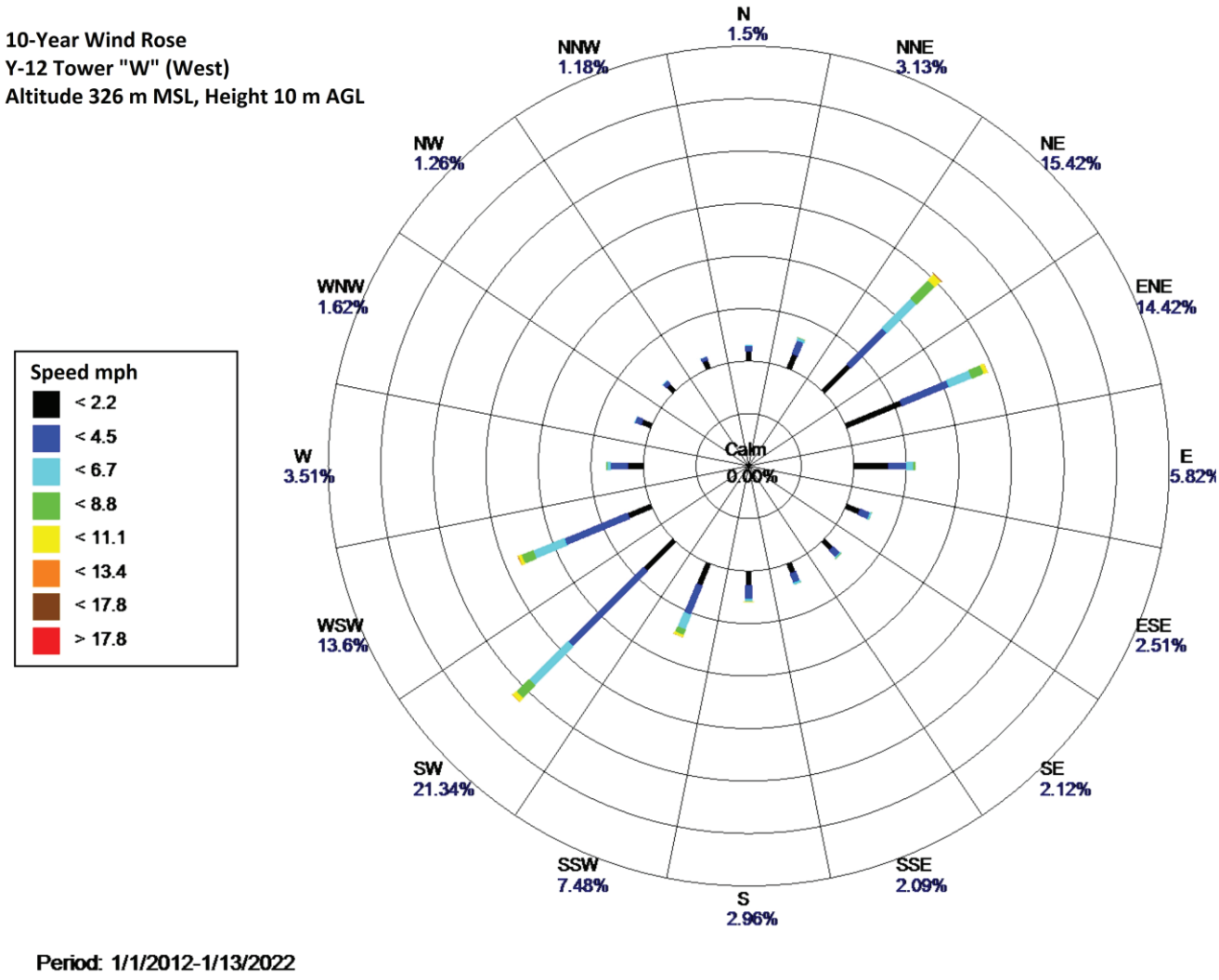


Figure 3-65: 10-year wind rose for 2012-2021 for Y-12 Tower "W" at 10 meters AGL

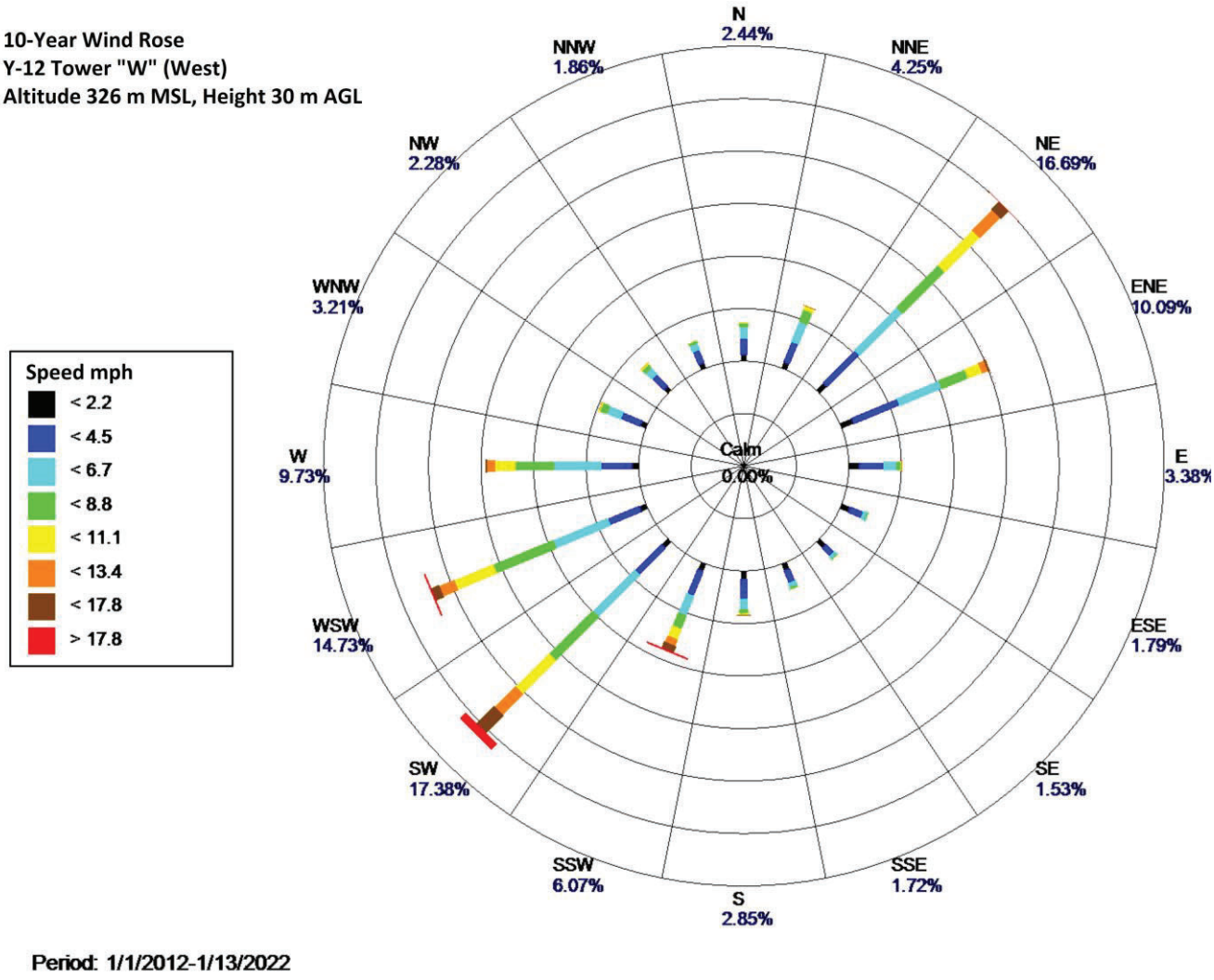


Figure 3-66: 10-year wind rose for 2012-2021 for Y-12 Tower "W" at 30 meters AGL

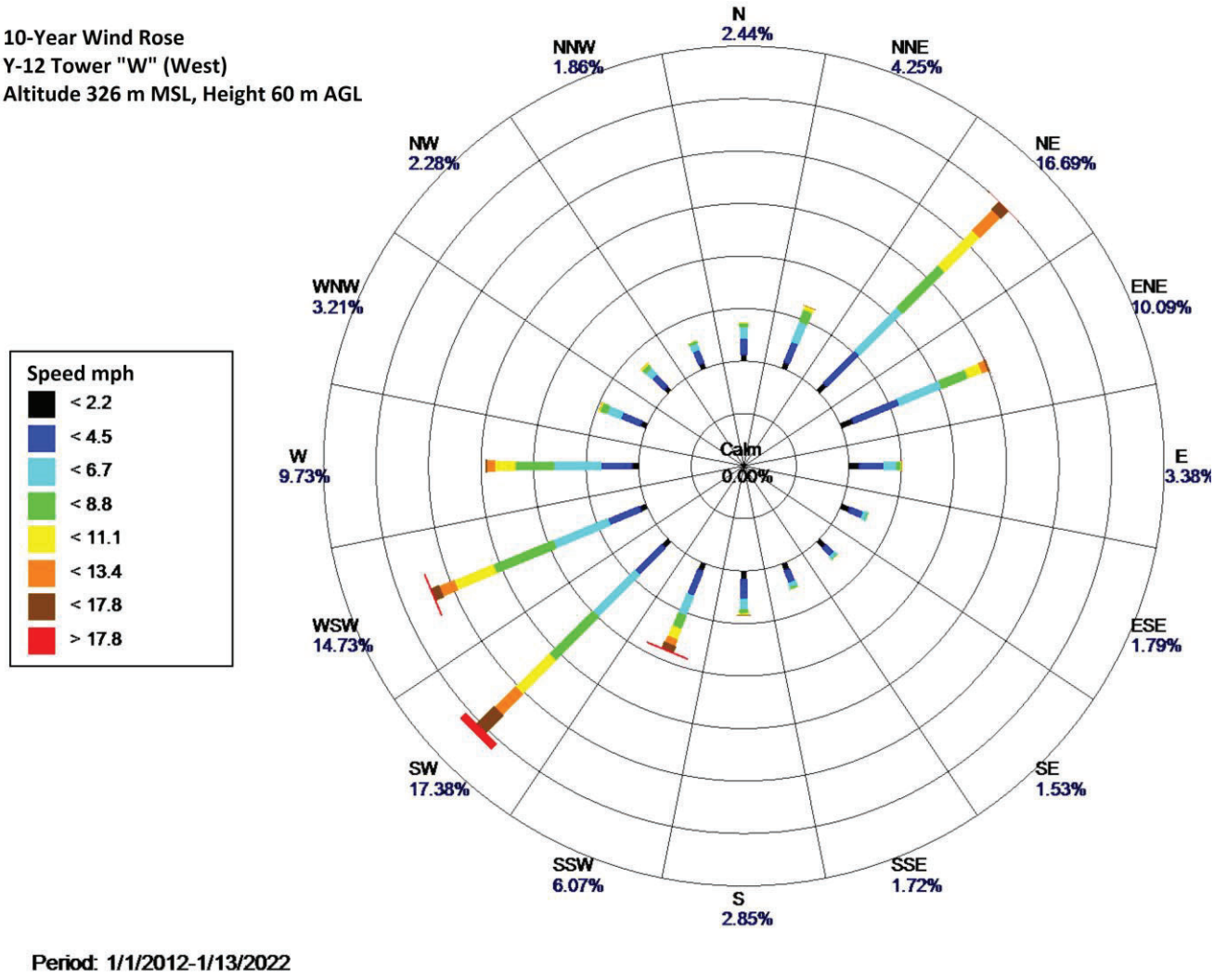


Figure 3-67: 10-year wind rose for 2012-2021 for Y-12 Tower "W" at 60 meters AGL

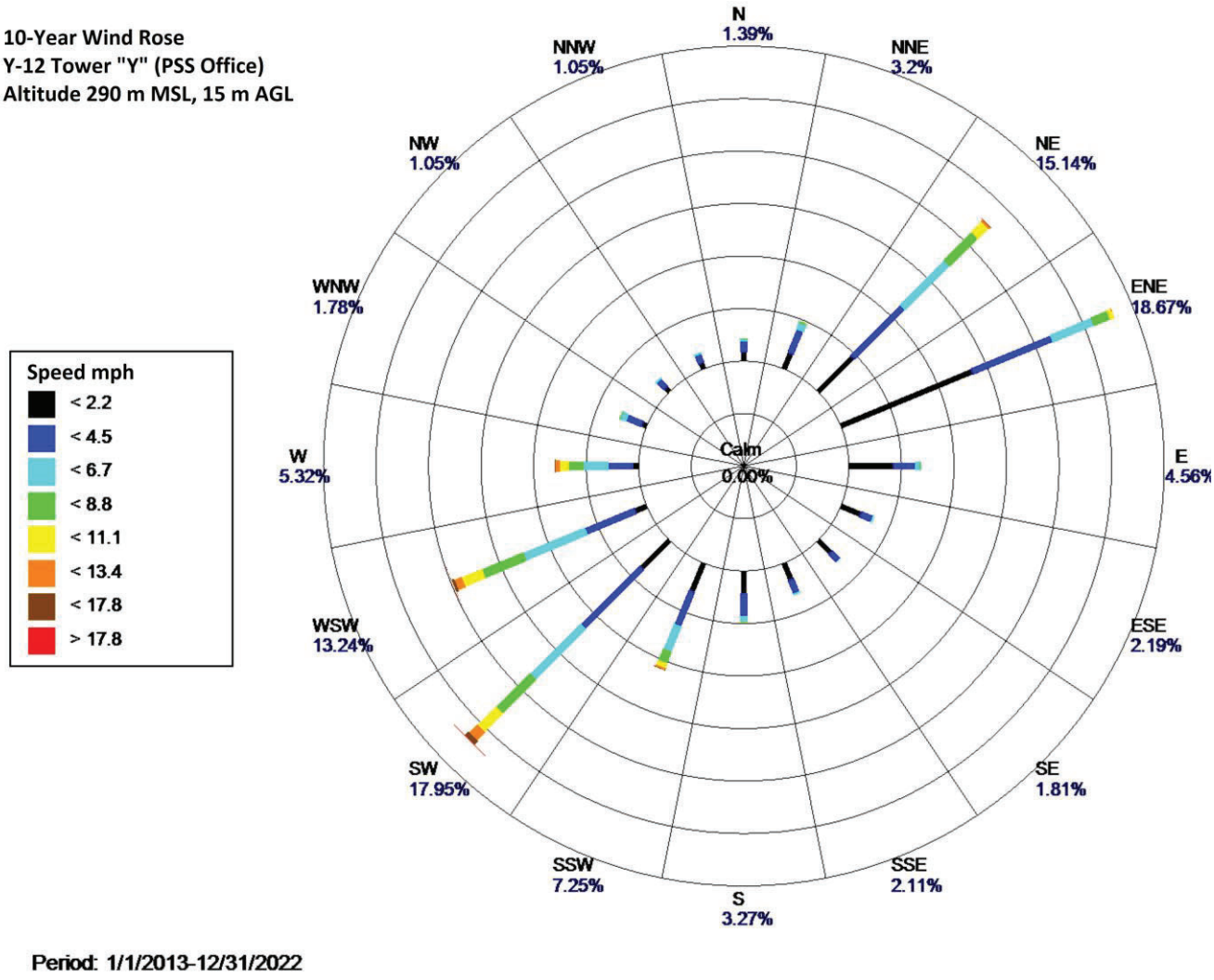


Figure 3-68: 10-year wind rose for 2013-2022 for Y-12 Tower "Y" at 15 meters AGL

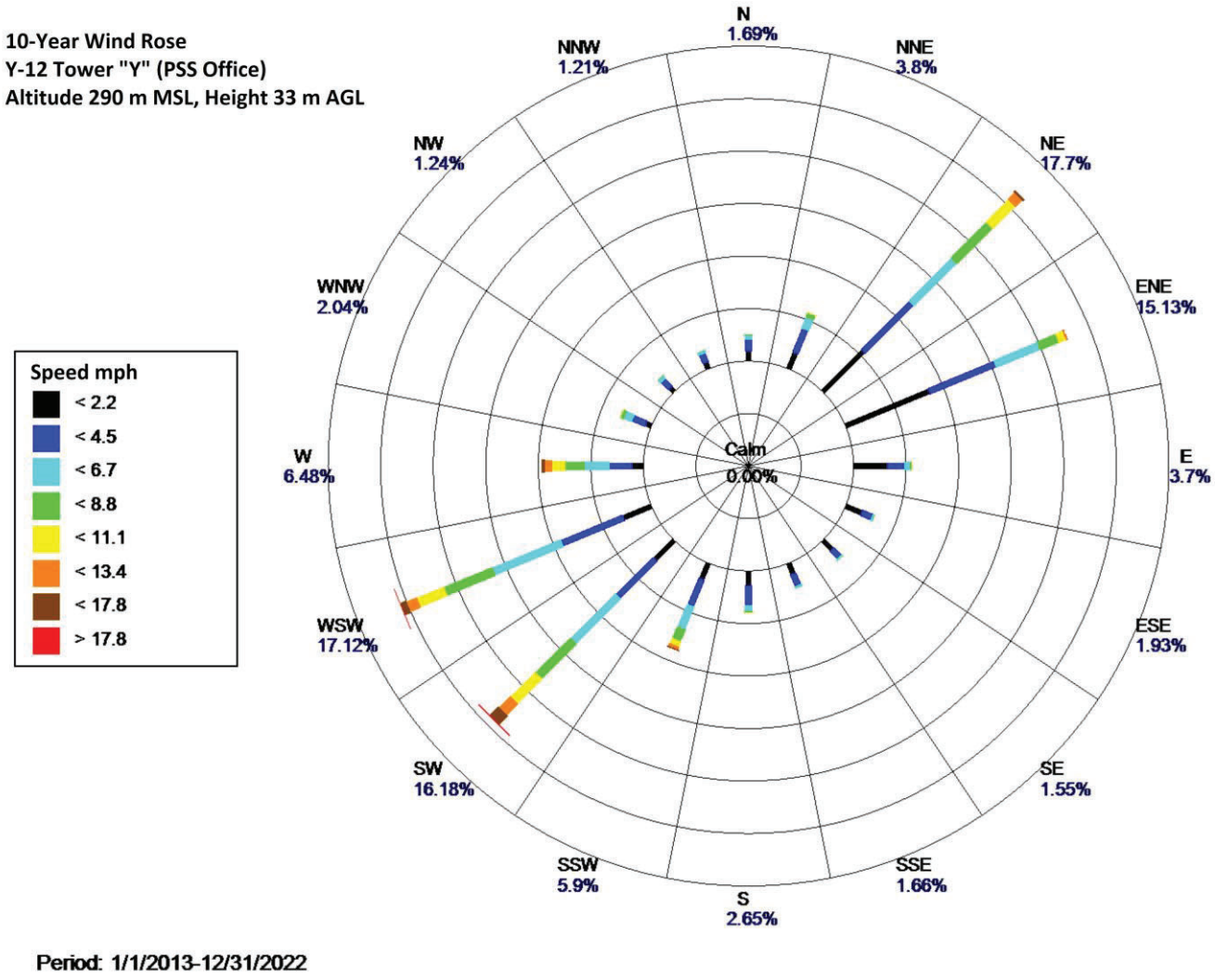


Figure 3-69: 10-year wind rose for 2013-2022 for Y-12 Tower "Y" at 33 meters AGL

TABLES

Climate Normals (1991-2020) and Extremes (1948-2022) for Oak Ridge National Laboratory, Oak Ridge, Tennessee with 2022 ORNL Comparisons

	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		ANNUAL	
Monthly Variables	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F
30-Yr Avg. Max. Temperature	8.8	47.8	11.4	52.6	16.5	61.7	21.9	71.4	26.2	79.2	29.8	85.7	31.4	88.6	31.2	88.1	28.1	82.6	22.2	72.0	15.4	59.7	10.3	50.5	21.1	70.0
2022 Avg. Max. Temperature	7.7	45.8	13.4	56.2	18.9	66.0	21.2	70.2	26.7	80.0	31.2	88.2	31.5	88.8	30.2	86.4	26.6	79.9	20.3	68.6	16.2	61.2	9.3	48.8	21.1	70.0
75-Yr Record Max. Temperature	25	77	27	80	30	86	33	92	35	95	41	105	41	105	39	103	39	102	35	96	28	83	26	78	41	105
30-Yr Avg. Min. Temperature	-1.4	29.4	0.2	32.3	3.9	39.0	5.8	42.5	13.4	56.1	17.8	64.1	20.1	68.2	19.5	67.1	15.9	60.6	9.1	48.4	3.0	37.4	0.3	32.5	9.0	48.1
2022 Avg. Min. Temperature	-2.8	27.0	-1.4	30.9	3.5	38.4	6.3	43.4	14.1	57.4	17.6	63.6	20.6	69.0	18.8	65.9	13.7	56.8	4.5	41.9	2.5	36.6	-1.6	29.2	8.0	46.7
75-Yr Record Min. Temperature	-27	-17	-25	-13	-17	1	-7	20	-1	30	4	39	9	49	10	50	1	33	-6	21	-16	3	-22	-7	-27	-17
30-Yr Avg. Temperature	3.5	38.5	5.8	42.4	10.2	50.4	13.2	55.7	19.7	67.5	23.7	74.7	25.6	78.1	25.2	77.3	21.8	71.3	15.5	59.9	9.1	48.4	5.2	41.4	14.9	58.8
2022 Avg. Temperature	1.9	35.4	5.6	40.8	11.0	51.8	13.8	56.8	20.3	68.6	24.0	75.2	25.1	77.2	23.4	73.2	19.3	66.8	11.8	53.2	8.8	47.8	3.4	38.2	14.0	57.1
2022 Departure from Avg. Temp.	-1.6	-3.1	-0.2	-1.6	0.8	1.4	0.6	1.1	0.6	1.1	0.3	0.5	-0.5	-0.9	-1.8	-4.1	-2.5	-4.5	-3.7	-6.7	-0.3	-0.6	-1.8	-3.2	-0.8	-1.7
30-Yr Avg. Heating Degree Days	451	811	351	631	252	453	110	198	31	54.9	1	2	0	0	0	0	9	16	101	181	270	487	399	718	1974	3552
2022 Heating Degree Days	491	883	338	608	214	386	143	257	7	13	0	0	0	0	0	0	22	40	178	320	282	508	454	817	2129	3832
30-Yr Avg. Cooling Degree Days	0	0	0	1	7	12	18	32	80	144	170	306	235	423	221	398	120	215	22	39.9	1	2	0	0	874	1573
2022 Cooling Degree Days	1	1	0	0	1	1	11	19	78	141	188	338	247	445	197	354	81	146	0	0	2	3	0	0	805	1448
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
30-Yr Avg. Precipitation	132.4	5.21	138.7	5.46	129.8	5.11	131.6	5.18	106.5	4.19	113.1	4.45	141.5	5.57	84.6	3.33	100.4	3.95	80.0	3.15	120.7	4.75	138.5	5.45	1417.8	55.80
2022 Precipitation	158.0	6.22	205.6	8.09	81.6	3.21	109.5	4.31	109.3	4.3	40.9	1.61	281.3	11.07	103.7	4.08	73.9	2.91	28.5	1.12	106.5	4.19	193.9	7.63	1492.5	58.74
2022 Departure from Avg. Precip.	25.7	1.01	66.8	2.63	-48.3	-1.90	-22.1	-0.87	2.8	0.11	-72.2	-2.84	139.7	5.50	19.1	0.75	-26.4	-1.04	-51.6	-2.03	-14.2	-0.56	55.4	2.18	74.7	2.94
75-Yr Record Max. Precip.	337.2	13.27	384.7	15.14	311.0	12.24	356.5	14.03	271.9	10.70	283.0	11.14	489.6	19.27	265.8	10.46	257.6	10.14	203.8	8.02	310.5	12.22	321.2	12.64	1939.4	76.33
75-Yr Record Max. 24-hour Precip.	108.0	4.25	131.6	5.18	120.4	4.74	158.5	6.24	112.0	4.41	94.0	3.70	124.8	4.91	190.1	7.48	160.1	6.30	67.6	2.66	130.1	5.12	130.1	5.12	190.1	7.48
75-Yr Record Min. Precip.	45.2	1.78	21.3	0.84	54.1	2.13	46.2	1.82	20.3	0.80	13.5	0.53	31.3	1.23	13.7	0.54	Trace	Trace	Trace	Trace	34.8	1.37	17.0	0.67	911.4	35.87
30-Yr Avg. Snowfall	45.7	1.8	50.8	2.0	20.3	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.1	25.4	1.0	144.8	5.7
2022 Snowfall	25.4	3.4	Trace	Trace	96.6	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.9	0.9	144.8	8.1
75-Yr Record Snowfall	243.9	9.6	437.0	17.2	533.6	21.0	149.9	5.9	Trace	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	Trace	165.2	6.5	533.6	21.0	1051.9	41.4
75-Yr Record 24-hour Snowfall	210.9	8.3	287.1	11.3	304.9	12.0	137.2	5.4	Trace	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	Trace	165.2	6.5	304.9	12.0	304.9	12.0
	Days		Days		Days		Days		Days		Days		Days		Days		Days		Days		Days		Days		Days	
30-Yr Avg. Days Max. Temp. >= 90F	0.0		0.0		0.0		0.1		1.5		7.7		14.4		12.7		4.9		0.1		0.0		0.0		41.4	
2022 No. Days Max. Temp. >= 90F	0		0		0		0		0		12		14		5		1		0		0		0		32	
30-Yr Avg. Days Min. Temp <= 32F	19.8		15.4		8.7		1.8		0.1		0.0		0.0		0.0		0.0		0.9		10.3		16.5		73.5	
2022 Days Min. Temp <= 32F	27		19		7		2		0		0		0		0		0		5		13		18		91	
30-Yr Avg. Days Max. Temp <= 32F	2.6		0.8		0.1		0		0		0.0		0.0		0.0		0.0		0.0		0.0		0.8		4.3	
2022 Days Max. Temp <= 32F	4		0		0		0		0		0		0		0		0		0		0		3		7	
30-Yr Avg. Days Precip. >= 0.01 in.	11.8		11.6		12.4		11.1		11.5		11.4		12.3		9.8		8.1		8.3		9.2		12.2		129.7	
2022 Days Precip. >= 0.01 in.	8		10		10		9		11		6		16		11		7		7		8		14		117	
30-Yr Avg. Days Precip. >= 1.00 in.	1.7		1.4		1.4		1.5		1.1		1.2		1.6		0.9		1.2		1.0		1.7		1.7		16.4	
2022 Days Precip. >= 1.00 in.	3		3		0		1		2		2		5		1		1		0		2		2		22	

1948-1964 CHEYENNE HALL Area; 1965-1999 NOAA-ATDD; 1999-2014 KOQT ASOS; 2015-2022 ORNL

Table 3-1: Oak Ridge, Tennessee Climate Normals and Extremes

Decadal Climate Change (1970-2022) for Oak Ridge, Tennessee (Town Site) with 2022 Comparisons

	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		ANNU
Monthly Variables	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C
1970-1979 Avg. Max. Temperature	6.6	43.8	9.7	49.5	15.6	60.1	21.4	70.6	24.8	76.7	28.5	83.3	29.9	85.9	29.7	85.5	26.8	80.2	20.8	69.4	14.6	58.2	9.9	49.9	19.8
1980-1989 Avg. Max. Temperature	6.9	44.4	10.2	50.3	15.9	60.7	21.0	69.8	25.6	78.1	29.8	85.7	31.6	88.8	30.7	87.3	27.1	80.8	21.3	70.3	15.7	60.2	8.6	47.5	20.3
1990-1999 Avg. Max. Temperature	9.3	48.8	12.3	54.1	16.2	61.2	21.8	71.3	26.2	79.1	29.7	85.5	32.1	89.8	31.4	88.6	28.4	83.2	22.7	72.8	15.2	59.4	10.4	50.8	21.3
2000-2009 Avg. Max. Temperature	8.8	47.9	11.2	52.1	17.1	62.7	21.4	70.6	25.8	78.4	29.8	85.6	30.8	87.5	31.4	88.5	27.7	81.8	21.8	71.2	15.9	60.6	9.8	49.6	20.9
2010-2019 Avg. Max Temperature	8.2	46.7	11.2	52.1	16.7	62.1	22.6	72.7	26.8	80.2	30.2	86.4	31.3	88.4	30.8	87.4	28.5	83.3	22.3	72.1	15.1	59.2	10.9	51.6	21.2
2020-2022 Avg. Max Temperature	9.0	48.2	11.7	53.0	18.3	65.0	20.6	69.0	24.8	76.7	29.6	85.2	31.6	88.9	30.2	86.3	26.6	79.9	21.6	70.8	16.0	60.8	11.7	53.1	21.0
Temperature Change (1980s vs. 2010s)	1.3	2.3	1.0	1.8	0.8	1.4	1.6	2.9	1.2	2.1	0.4	0.7	-0.2	-0.4	0.1	0.1	1.4	2.5	1.0	1.8	-0.6	-1.0	2.3	4.1	0.8
Temperature Change (1990s vs. 2010s)	-1.2	-2.1	-1.1	-2.0	0.5	0.9	0.8	1.4	0.6	1.1	0.5	0.9	-0.8	-1.4	-0.7	-1.2	0.1	0.1	-0.4	-0.7	-0.1	-0.2	0.4	0.8	-0.2
2022 Avg. Max. Temperature	7.7	45.8	13.4	56.2	18.9	66.0	21.2	70.2	26.7	80.0	31.2	88.2	29.2	88.8	30.2	86.4	26.6	79.9	20.3	68.6	15.9	60.6	9.9	49.9	20.3
1970-1979 Avg. Min. Temperature	-3.4	25.8	-2.4	27.6	3.0	37.4	6.7	44.1	11.6	52.8	15.7	60.2	18.3	64.9	18.1	64.6	15.5	59.9	7.5	45.5	2.7	36.8	-0.8	30.5	7.7
1980-1989 Avg. Min. Temperature	-4.1	24.7	-2.1	28.3	1.7	35.0	6.1	42.9	11.3	52.4	16.2	61.2	19.0	66.2	18.4	65.1	14.4	57.9	7.4	45.4	3.1	37.5	-2.3	27.8	7.4
1990-1999 Avg. Min. Temperature	-0.9	30.3	0.0	32.0	2.8	37.1	7.2	45.0	12.5	54.5	17.2	63.0	19.9	67.9	18.9	66.1	15.1	59.2	8.2	46.8	2.2	36.0	0.1	32.2	8.7
2000-2009 Avg. Min. Temperature	-1.4	29.5	0.0	32.0	4.4	39.9	8.6	47.5	13.6	56.4	17.9	64.3	19.9	67.9	20.0	68.0	16.1	61.0	9.4	49.0	3.9	39.0	-0.3	31.4	9.4
2010-2019 Avg. Min Temperature	-2.1	28.3	0.6	33.0	4.4	39.9	5.8	42.5	11.7	53.1	17.2	63.0	20.3	68.5	19.4	66.9	16.3	61.4	9.4	48.9	2.7	36.9	1.2	34.2	9.5
2020-2022 Avg. Min Temperature	-0.8	30.6	-0.1	31.8	5.2	41.4	6.3	43.4	13.4	56.1	17.6	63.6	19.8	67.6	18.8	65.9	14.8	58.7	8.7	47.7	1.9	35.5	0.8	33.4	8.8
Temperature Change (1980s vs. 2010s)	2.0	3.6	2.6	4.7	2.7	4.9	-0.2	-0.4	0.4	0.7	1.0	1.8	1.3	2.3	1.0	1.8	1.9	3.5	1.9	3.5	-0.3	-0.6	3.6	6.4	2.1
Temperature Change (1990s vs. 2010s)	-1.1	-2.0	0.6	1.0	1.6	2.8	-1.4	-2.5	-0.8	-1.4	0.0	0.0	0.3	0.6	0.4	0.8	1.2	2.2	1.2	2.1	0.5	0.9	1.1	2.0	0.8
2022 Avg. Min. Temperature	1.1	27.0	-0.6	30.9	3.6	38.4	6.3	43.4	14.1	57.4	17.6	63.6	15.0	59.0	18.8	65.9	13.8	56.8	5.5	41.9	2.6	36.6	-1.6	29.2	9.4
1970-1979 Avg. Temperature	1.6	34.9	3.7	38.6	9.3	48.8	14.1	57.4	18.2	64.7	22.1	71.8	24.1	75.4	23.9	75.0	21.1	70.0	14.2	57.5	8.6	47.5	4.6	40.3	13.8
1980-1989 Avg. Temperature	1.4	34.6	4.1	39.3	8.8	47.9	13.6	56.4	18.5	65.3	23.0	73.4	25.3	77.5	24.6	76.2	20.8	69.4	14.4	57.9	9.3	48.8	3.2	37.7	13.9
1990-1999 Avg. Temperature	4.2	39.6	6.2	43.1	9.6	49.2	14.6	58.2	19.3	66.8	23.5	74.3	25.6	78.0	25.2	77.4	21.9	71.4	15.4	59.8	8.8	47.8	5.3	41.5	15.0
2000-2009 Avg. Temperature	3.7	38.7	5.6	42.1	10.7	51.3	15.3	59.6	19.7	67.5	23.9	75.1	25.4	77.7	25.7	78.3	21.9	71.4	15.6	60.1	9.9	49.8	4.7	40.5	15.2
2010-2019 Avg. Avg Temperature	2.9	37.3	5.8	42.5	10.6	51.1	15.6	60.1	20.3	68.5	23.9	75.1	25.4	77.8	24.7	76.5	21.9	71.5	15.4	59.8	8.7	47.6	5.9	42.7	15.1
2020-2022 Avg. Avg Temperature	3.9	39.0	5.5	41.9	11.6	52.9	13.2	55.8	17.8	64.0	22.9	73.3	24.9	76.9	23.7	74.7	19.9	67.9	14.4	58.0	8.3	47.0	5.7	42.3	14.6
Temperature Change (1980s vs. 2010s)	1.5	2.7	1.8	3.2	1.8	3.2	2.1	3.7	1.8	3.2	0.9	1.7	0.2	0.3	0.2	0.3	1.2	2.1	1.1	1.9	-0.7	-1.2	2.8	5.0	1.2
Temperature Change (1990s vs. 2010s)	-1.3	-2.3	-0.3	-0.6	1.1	1.9	1.1	1.9	0.9	1.7	0.4	0.8	-0.1	-0.2	-0.5	-0.9	0.1	0.1	0.0	0.0	-0.1	-0.2	0.7	1.2	0.1
2022 Avg. Temperature	1.9	35.4	5.7	42.3	11.0	51.8	13.8	56.8	19.7	67.5	24.0	75.2	25.1	77.2	23.4	74.2	19.3	66.8	11.8	53.2	8.8	47.8	3.8	38.9	13.9
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1970-1979 Avg. Total Precipitation	143.6	5.65	94.5	3.72	169.5	6.67	118.4	4.66	149.7	5.89	120.4	4.74	130.3	5.13	109.8	4.32	107.2	4.22	99.9	3.93	129.6	5.10	145.3	5.72	1516.3
1980-1989 Avg. Total Precipitation	100.4	3.95	109.0	4.29	112.6	4.43	88.7	3.49	110.5	4.35	84.1	3.31	120.4	4.74	82.6	3.25	109.0	4.29	79.8	3.14	128.1	5.04	107.5	4.23	1238.9
1990-1999 Avg. Total Precipitation	141.5	5.57	136.4	5.37	148.9	5.86	126.3	4.97	113.6	4.47	110.0	4.33	134.9	5.31	83.6	3.29	71.9	2.83	67.3	2.65	109.8	4.32	161.1	6.34	1429.5
2000-2009 Avg. Total Precipitation	116.9	4.60	122.0	4.80	115.6	4.55	125.0	4.92	117.9	4.64	95.3	3.75	139.0	5.47	78.5	3.09	108.7	4.28	73.9	2.91	121.5	4.78	124.5	4.90	1331.4
2010-2019 Avg. Total Precipitation	130.1	5.12	146.6	5.77	131.4	5.17	131.9	5.19	93.8	3.69	132.4	5.21	156.8	6.17	92.5	3.64	114.1	4.49	91.0	3.58	128.1	5.04	151.7	5.97	1478.2
2020-2022 Avg. Total/Precipitation	148.1	5.83	213.9	8.42	178.4	7.02	110.0	4.33	112.8	4.44	78.3	3.08	144.3	5.68	171.2	6.74	75.2	2.96	120.7	4.75	74.4	2.93	137.7	5.42	1558.5
Precipitation Change (1980s vs. 2010s)	0.65	1.17	0.82	1.48	0.41	0.74	0.94	1.70	-0.37	-0.66	1.06	1.90	0.79	1.43	0.22	0.39	0.11	0.20	0.24	0.44	0.00	0.00	0.97	1.74	5.23
Precipitation Change (1990s vs. 2010s)	-0.25	-0.45	0.22	0.40	-0.38	-0.69	0.12	0.22	-0.43	-0.78	0.49	0.88	0.48	0.86	0.19	0.35	0.92	1.66	0.52	0.93	0.40	0.72	-0.21	-0.37	1.07
2022 Total Precipitation	158.0	6.22	205.6	8.09	81.6	3.21	109.5	4.31	109.3	4.30	29.5	1.16	144.3	5.68	171.2	6.74	75.2	2.96	120.7	4.75	74.4	2.93	137.7	5.42	1417.8
1970-1979 Avg. Total Snowfall	111.8	4.4	124.5	4.9	43.2	1.7	2.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	0.2	45.7	1.8	279.5
1980-1989 Avg. Total Snowfall	114.3	4.5	88.9	3.5	22.9	0.9	22.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76.2	3.0	256.6
1990-1999 Avg. Total Snowfall	68.6	2.7	78.8	3.1	81.3	3.2	Trace	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.1	30.5	1.2	195.6
2000-2009 Avg. Total Snowfall	20.3	0.8	45.7	1.8	Trace	Trace	Trace	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	Trace	17.8	0.7	66.1
2010-2019 Avg. Total Snowfall	53.4	2.1	63.5	2.5	12.7	0.5	Trace	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.1	15.2	0.6	132.1
2020-2022 Avg. Total Snowfall	7.6	0.3	22.9	0.9	10.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.9	0.9	99.1
Snowfall Change (1970s vs. 2010s)	-1.3	-2.4	-0.6	-1.0	-0.2	-0.4	-0.5	-0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	-1.3	-2.4	-2.7
Snowfall Change (2000s vs. 2010s)	-0.3	-0.6	-0.3	-0.6	-1.5	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	-0.6	-1.4
2022 Total Snowfall	86.4	3.4	Trace	Trace	96.6	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.9	0.9	4.5

Table 3-2: Decadal Climate Change (1970-2022) for Oak Ridge, Tennessee with 2022 Comparisons

Decadal Climate Change (1970-2022) for Oak Ridge, Tennessee (Town Site) with 2022 Comparisons (Continued)

	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		ANNUAL
	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C
1970-1979 Avg. Total Heating Degrees	516	928	412	741	276	497	133	239	46	82	2	3	0	0	0	0	13	24	134	241	289	520	411	740	2243
1980-1989 Avg. Total Heating Degrees	520	936	401	722	293	527	152	273	46	82	4	7	0	0	0	0	21	38	134	241	267	480	468	842	2318
1990-1999 Avg. Total Heating Degrees	434	781	340	613	271	488	125	225	36	64	5	9	0	0	0	0	11	19	102	183	286	515	401	722	2007
2000-2009 Avg. Total Heating Degrees	449	809	357	642	236	424	108	195	27	48	4	7	0	0	0	0	10	18	104	187	251	452	419	755	1962
2010-2019 Avg. Total Heating Degrees	470	845	348	627	240	433	96	172	26	47	0	1	0	0	0	0	5	9	100	180	277	498	370	666	1933
2020-2022 Avg. Total Heating Degrees	437	786	351	632	202	363	154	277	49	88	0	1	0	0	0	0	19	33	114	205	281	506	379	683	2023
Heating Degrees (1980s vs. 2010s)	-51	-91	-52	-94	-53	-95	-56	-101	-19	-35	-4	-7	0	0	0	0	-16	-30	-34	-61	10	18	-97	-175	-384
Heating Degrees (1990s vs. 2010s)	35	64	8	15	-31	-56	-29	-52	-10	-17	-4	-8	0	0	0	0	-6	-10	-2	-3	-9	-17	-31	-56	-74
2022 Total Heating Degrees	491	883	335	603	214	386	143	257	7	13	0	0	0	0	0	0	22	40	178	320	282	508	436	784	2111
1970-1979 Avg. Total Cooling Degrees	0	0	0	0	0	1	10	17	44	79	123	221	184	331	177	318	102	183	9	17	1	2	0	0	647
1980-1989 Avg. Total Cooling Degrees	0	0	0	0	1	2	11	20	54	97	152	274	219	395	197	354	97	174	14	26	1	1	0	0	741
1990-1999 Avg. Total Cooling Degrees	0	0	0	0	3	5	14	26	71	127	160	288	242	436	217	390	109	196	16	29	0	1	0	0	846
2000-2009 Avg. Total Cooling Degrees	0	0	0	0	3	6	21	37	73	131	171	309	222	400	233	419	120	216	24	43	2	3	0	0	869
2010-2019 Avg. Total Cooling Degrees	0	0	1	2	11	21	20	35	95	172	183	329	237	427	215	387	132	238	27	48	1	2	0	1	913
2020-2022 Avg. Total Cooling Degrees	0	0	0	0	3	6	7	12	64	115	151	271	236	425	203	366	94	169	19	34	1	1	0	0	789
Cooling Degrees (1980s vs. 2000s)	0	0	1	2	10	19	8	15	42	75	31	55	18	32	19	34	35	63	12	22	1	1	0	0	172
Cooling Degrees (1990s vs. 2000s)	0	0	1	2	9	16	5	9	25	44	23	41	-5	-9	-1	-2	23	41	11	19	1	2	0	1	67
2022 Total Cooling Degrees	1	1	0	0	1	1	11	19	78	141	188	338	247	445	197	354	81	146	0	0	2	3	0	0	832

1985-1999 NOAA-ATDD; 1999-2014 KOQT ASOS; 2015-2022 ORNL Tower D

Table 3-2, cont: Decadal Climate Change (1970-2022) for Oak Ridge, Tennessee with 2022 Comparisons

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2001	0	1	1	5	9	7	14	8	4	2	0	0	51
2002	1	0	5	4	9	7	11	5	4	3	3	1	53
2003	0	1	1	6	7	8	12	10	5	1	3	0	54
2004	0	0	3	3	10	11	12	7	2	3	4	1	56
2005	1	1	2	6	1	6	10	5	2	1	3	1	39
2006	1	1	1	10	2	6	8	9	3	3	0	0	44
2007	0	2	2	4	1	8	7	2	0	3	4	1	34
2008	1	3	6	3	4	10	11	2	5	0	0	2	47
2009	1	1	1	4	10	11	11	7	5	1	0	0	52
2010	2	0	3	4	8	7	16	8	5	3	0	0	56
2011	1	4	2	7	3	12	8	4	3	1	0	1	46
2012	5	2	10	6	8	4	15	8	3	1	0	3	65
2013	2	0	2	5	6	13	9	9	4	0	0	1	51
2014	1	0	1	5	5	11	5	4	3	4	0	1	40
2015	1	0	1	6	4	11	10	3	0	4	0	2	42
2016	0	1	1	3	5	4	13	8	1	0	2	2	40
2017	0	2	6	7	8	5	10	5	3	0	0	0	46
2018	0	1	3	2	10	13	11	6	5	1	1	0	53
2019	0	4	4	2	6	10	11	9	0	1	2	3	52
2020	2	3	2	4	6	7	13	5	2	0	0	0	44
2021	2	0	5	0	4	4	5	11	1	2	0	3	37
2022	1	1	1	2	2	4	12	9	1	0	1	0	34
Average	**1.0**	**1.3**	**2.9**	**4.5**	**5.8**	**8.1**	**10.6**	**6.5**	**2.8**	**1.5**	**1.0**	**1.0**	**47.1**

Table 3-3: Oak Ridge National Laboratory Thunderstorm Days 2001 - 2022

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2001	0	3	0	4	9	10	11	11	2	2	1	0	53
2002	0	1	5	3	9	10	16	10	4	3	2	0	63
2003	0	3	3	7	8	8	13	14	4	1	1	0	62
2004	0	0	3	3	11	12	14	7	0	1	1	2	54
2005	1	1	5	6	2	10	13	10	2	0	2	1	53
2006	2	2	3	8	5	8	8	9	3	1	0	0	49
2007	1	1	1	6	6	11	11	6	0	2	4	1	50
2008	1	3	4	2	5	10	7	2	3	0	0	1	38
2009	0	0	1	2	9	10	10	9	3	1	0	0	45
2010	1	0	2	3	8	6	9	7	4	2	0	0	42
2011	1	2	1	6	6	3	11	12	4	0	1	2	49
2012	2	2	14	6	5	3	13	7	2	0	1	1	56
2013	1	0	3	3	7	15	13	8	4	0	0	0	54
2014	1	2	1	6	4	13	5	8	3	4	0	2	49
2015	1	0	0	4	2	6	3	2	2	4	0	0	24
2016	0	0	2	5	7	10	13	11	2	1	1	2	54
2017	1	3	7	8	8	8	12	5	2	0	2	0	56
2018	0	0	3	2	9	11	15	8	10	2	1	1	62
2019	1	2	3	3	9	12	14	10	3	0	1	2	60
2020	3	2	3	5	7	9	16	12	4	0	0	0	61
2021	1	0	4	0	4	7	4	16	2	2	0	2	42
2022	1	2	0	3	6	9	17	10	3	1	1	0	53
Average	**0.9**	**1.3**	**3.1**	**4.3**	**6.6**	**9.1**	**11.3**	**8.8**	**3.0**	**1.2**	**0.9**	**0.8**	**51.3**

Table 3-4: Knoxville, Tennessee Thunderstorm Days 2001 - 2022

JANUARY - Table of Climate Normals (1991-2020) and Extremes (1947- 2022)

Oak Ridge National Laboratory, Oak Ridge, Tennessee

Day	Normal Temperatures						Record Temperatures														Record Precipitation		
	Max °F	Max °C	Min °F	Min °C	Avg °F	Avg °C	Precip (in)	Precip (mm)	Max °F	Max °C	Year	Min °F	Min °C	Year	Low Max °F	Low Max °C	Year	High Min °F	High Min °C	Year	Max (in)	Max (mm)	Year
01	48	8.9	30	-1.1	40	4.4	0.16	4.1	75	23.9	1952	6	-14.4	1977	22	-5.6	2018	59	15.0	1952	2.56	65.0	2011
02	48	8.9	30	-1.1	40	4.4	0.16	4.1	70	21.1	1952	6	-14.4	2018	26	-3.3	2008	57	13.9	1966	2.68	68.1	2020
03	48	8.9	30	-1.1	40	4.4	0.16	4.1	73	22.5	2000	7	-13.9	1979	25	-3.9	1979	56	13.6	2000	1.42	36.1	1968
04	48	8.9	30	-1.1	40	4.4	0.16	4.1	71	21.7	2004	10	-12.2	1979	25	-3.9	1969	60	15.6	2004	1.37	34.8	2000
05	48	8.9	30	-1.1	40	4.4	0.16	4.1	70	21.1	2004	3	-16.1	1959	22	-5.6	1959	59	15.0	2007	1.18	29.9	2004
06	48	8.9	30	-1.1	40	4.4	0.16	4.1	65	18.3	2007*	5	-15.0	2018*	23	-5.0	1988	57	13.9	2007	2.03	51.6	2009
07	48	8.9	29	-1.7	40	4.4	0.16	4.1	68	20.0	2019	2	-16.7	2014	18	-7.8	2014	54	12.3	1998	1.52	38.5	1998
08	47	8.3	29	-1.7	40	4.4	0.17	4.3	71	21.8	1998	3	-16.1	1970	11	-11.7	1970	50	10.0	1953	1.51	38.4	1978
09	47	8.3	29	-1.7	39	3.9	0.17	4.3	67	19.4	2006	0	-17.8	1970	14	-10.0	1970	51	10.6	2006	1.33	33.8	1999
10	47	8.3	29	-1.7	39	3.9	0.17	4.3	69	20.6	1975	-3	-19.4	1982	12	-11.1	1982	53	11.7	1974	2.32	58.9	2008
11	47	8.3	29	-1.7	39	3.9	0.17	4.3	72	22.2	2020	-8	-22.2	1982	14	-10.0	1982	53	11.7	2020*	1.78	45.2	2005
12	47	8.3	29	-1.7	39	3.9	0.18	4.6	70	21.1	2013	3	-16.1	1981	24	-4.4	1982	61	16.1	2013	1.88	47.8	1989
13	47	8.3	29	-1.7	39	3.9	0.18	4.6	72	22.2	1995	5	-15.0	1962	30	-1.1	2011	55	12.8	2007	1.44	36.6	1951
14	47	8.3	29	-1.7	38	3.3	0.18	4.6	71	21.7	2007	6	-14.4	1963	23	-5.0	1948	63	17.2	2007	1.96	49.8	1995
15	47	8.3	29	-1.7	38	3.3	0.18	4.6	68	20.0	1952	2	-16.7	1994	18	-7.8	1994	58	14.4	2020	4.10	104	1954
16	47	8.3	29	-1.7	38	3.3	0.18	4.6	69	20.6	1952	-2	-18.9	1972	20	-6.7	1972	49	9.4	1974	1.14	29.0	2022
17	47	8.3	29	-1.7	38	3.3	0.18	4.6	69	20.6	1974	-10	-23.3	1982	15	-9.4	1982	54	12.2	1974	1.96	49.8	2006
18	47	8.3	28	-2.2	38	3.3	0.18	4.6	71	21.5	1996	-1	-18.3	1994	21	-6.1	1994*	52	11.1	1974	1.46	37.1	1980
19	46	7.8	28	-2.2	38	3.3	0.18	4.6	67	19.4	1951	-5	-20.6	1994	15	-9.4	1994	52	11.1	1974	3.08	78.3	1988
20	46	7.8	28	-2.2	38	3.3	0.18	4.6	67	19.4	2017*	-15	-26.1	1985	20	-6.7	1985	52	11.1	1974	3.34	84.9	1954
21	46	7.8	28	-2.2	37	2.8	0.18	4.6	72	22.2	1959	-17	-27.2	1985	10	-12.2	1985	50	10.0	1999*	2.87	72.9	1959
22	47	8.3	28	-2.2	38	3.3	0.17	4.3	76	24.4	1999	3	-16.1	1970*	26	-3.3	1985	50	10.0	1972	1.93	49.0	1971
23	47	8.3	28	-2.2	38	3.3	0.17	4.3	72	22.3	1999	-2	-18.9	1963	22	-6.1	2003	54	12.3	1999	3.41	86.6	2002
24	47	8.3	28	-2.2	38	3.3	0.17	4.3	72	22.2	1950	-8	-22.2	1963	17	-8.3	1963	54	12.2	1972	2.81	71.4	2010
25	47	8.3	29	-1.7	38	3.3	0.17	4.3	77	25.0	1950	1	-17.2	1948	28	-2.2	1963	51	10.6	1962	1.47	37.3	1975
26	48	8.9	29	-1.7	39	3.9	0.17	4.3	70	21.1	1950	4	-15.6	1948	26	-3.3	1987*	56	13.3	1962	1.67	42.4	1976
27	48	8.9	29	-1.7	39	3.9	0.17	4.3	72	22.0	1999	1	-17.2	1986	20	-6.7	1986	53	11.7	1952	1.78	45.2	1957
28	49	9.4	29	-1.7	39	3.9	0.16	4.1	71	21.7	1975	-2	-18.9	1986	20	-6.7	2014	44	6.7	1999*	1.17	29.7	1995
29	49	9.4	29	-1.7	39	3.9	0.16	4.1	74	23.3	2002	1	-17.2	2014	23	-5.0	1977	55	12.8	2002	2.09	53.1	1956
30	49	9.4	29	-1.7	39	3.9	0.16	4.1	73	22.8	2002	-9	-22.8	1966	11	-11.7	1966	54	12.2	2002	2.75	69.9	2013
31	50	10.0	29	-1.7	39	3.9	0.16	4.1	73	22.8	2002	-7	-21.7	1966	22	-5.6	1966	52	11.1	2002	2.26	57.4	1951

Table 3-5: Monthly-Daily Climate Normals (1991-2020) and Extremes (1947-2022) for Oak Ridge, Tennessee

FEBRUARY - Table of Climate Normals (1991-2020) and Extremes (1947-2022)

Oak Ridge National Laboratory, Oak Ridge, Tennessee

Day	Normal Temperatures						Record Temperatures														Record Precipitation		
	Max °F	Max °C	Min °F	Min °C	Avg °F	Avg °C	Precip (in)	Precip (mm)	Max °F	Max °C	Year	Min °F	Min °C	Year	Low Max °F	Low Max °C	Year	High Min °F	High Min °C	Year	Max (in)	Max (mm)	Year
01	50	10.0	29	-1.7	39	3.9	0.17	4.3	72	22.2	1988	7	-13.9	1971	26	-3.3	1980*	50	10.0	2016*	2.11	53.6	1951
02	50	10.0	29	-1.7	40	4.4	0.17	4.3	74	23.3	2016*	3	-16.1	1965	23	-5.0	1965*	53	11.7	1974	1.23	31.3	1956
03	50	10.0	29	-1.7	40	4.4	0.17	4.3	71	21.7	1986	1	-17.2	1965	20	-6.4	1996	55	12.8	1990	2.29	58.2	1990
04	50	10.0	30	-1.1	40	4.4	0.17	4.3	68	20.0	1992*	-8	-22.1	1996	19	-7.1	1996	52	11.1	2020	1.66	42.2	2008
05	50	10.0	30	-1.1	40	4.4	0.17	4.3	71	21.7	1986	-13	-25.0	1996	22	-5.3	1996	57	13.9	2020	3.68	93.5	2020
06	50	10.0	30	-1.1	40	4.4	0.17	4.3	70	21.1	2008	1	-17.2	1996	23	-5.0	1978	53	11.7	2019	2.84	72.2	2004
07	50	10.0	30	-1.1	40	4.4	0.17	4.3	77	25.0	2019	4	-15.6	1984	25	-3.9	1978	60	15.6	2019	1.02	25.9	1957
08	50	10.0	30	-1.1	40	4.4	0.17	4.1	71	21.2	2001	8	-13.3	1977	24	-4.4	1995	56	13.3	1957	1.03	26.2	1957
09	51	10.6	31	-0.6	41	5.0	0.17	4.3	74	23.4	2001	6	-14.4	1995	22	-5.6	1971	58	14.4	1957	1.69	42.9	1950
10	51	10.6	31	-0.6	41	5.0	0.18	4.6	71	21.7	1954	4	-15.6	1979	31	-0.6	2010*	54	12.2	1959	2.88	73.2	1994
11	51	10.6	31	-0.6	41	5.0	0.18	4.6	73	22.8	1999	8	-13.3	1979	29	-1.7	1968	54	12.2	1965	2.13	54.1	1953
12	51	10.6	31	-0.6	41	5.0	0.18	4.6	72	22.2	1984*	4	-15.6	1981	24	-4.4	1955	45	7.2	1966	3.23	82.1	1948
13	51	10.6	31	-0.6	41	5.0	0.19	4.8	74	23.3	1962	5	-15.0	1955	32	0.0	1986	53	11.7	2017	2.44	62.0	1948
14	51	10.6	31	-0.6	42	5.6	0.19	4.8	72	22.2	1990	8	-13.3	1971	30	-1.1	2016	56	13.3	1989	1.94	49.0	2003
15	52	11.1	32	0.0	42	5.6	0.19	4.8	76	24.4	1989	7	-13.9	1960	30	-1.1	2015*	56	13.5	2001	3.11	79.0	2003
16	52	11.1	32	0.0	43	6.1	0.19	4.8	71	21.4	2000	5	-15.0	1991	21	-6.1	1958	52	11.1	2017	2.77	20.1	2003
17	53	11.7	32	0.0	43	6.1	0.20	5.1	71	21.7	2011*	1	-17.2	1958	18	-7.8	1958	61	16.1	1976	2.11	53.6	1986
18	53	11.7	33	0.6	43	6.1	0.20	5.1	73	22.8	1948	3	-16.1	1958	25	-3.9	1958	54	12.2	1961	2.09	53.1	1991
19	54	12.2	33	0.6	44	6.7	0.20	5.1	75	23.9	1994	4	-15.6	2015	18	-7.8	2018	51	9.4	2014	2.15	54.6	1991
20	54	12.2	33	0.6	44	6.7	0.20	5.1	78	25.6	2018	4	-15.6	2015	26	-3.3	2015	55	12.8	1951	1.76	44.7	1953
21	55	12.8	34	1.1	45	7.2	0.20	5.1	80	26.7	2018	7	-13.9	1963	33	0.6	1968	62	16.7	2018	2.13	54.1	1993
22	55	12.8	34	1.1	45	7.2	0.20	5.1	77	25.0	2018	2	-16.7	1963	25	-3.9	1963	57	13.9	2018	2.51	63.8	1961
23	56	13.3	34	1.1	45	7.2	0.20	5.1	80	26.7	2018	5	-15.0	1963	30	-1.1	1989	53	11.7	2018*	5.78	146.9	2019
24	56	13.3	35	1.7	45	7.2	0.20	5.1	74	23.3	1982	10	-12.2	1967	26	-3.3	1967	60	15.6	2018	1.13	28.7	2016
25	56	13.3	35	1.7	45	7.2	0.20	5.1	76	24.2	2000	3	-16.1	1967	23	-5.0	1967	52	11.1	2018	1.51	38.4	1961
26	56	13.3	35	1.7	45	7.2	0.20	5.1	79	26.1	1977	8	-13.3	1967	36	2.2	1990*	56	13.3	1957	0.91	23.1	1957
27	57	13.9	35	1.7	45	7.2	0.19	4.8	73	22.6	1996	7	-13.9	1963	28	-2.2	2002	55	12.8	1948	1.31	33.3	1984
28	57	13.9	35	1.7	45	7.2	0.19	4.8	77	25.0	1948	16	-8.9	2002	37	2.8	1978	62	16.7	1948	2.90	73.7	1954
29	57	13.9	35	1.7	46	7.8	0.19	4.8	76	24.4	1972	20	-6.7	1964	33	0.6	1984	56	13.3	2012	0.44	11.2	2012

Table 3-5, cont: Monthly-Daily Climate Normals (1991-2020) and Extremes (1947-2022) for Oak Ridge, Tennessee

MARCH - Table of Climate Normals (1991-2020) and Extremes (1947-2022)

Oak Ridge, Tennessee

Day	Normal Temperatures						Normal Precipitation		Record Temperatures												Record Precipitation		
	Max °F	Max °C	Min °F	Min °C	Avg °F	Avg °C	Precip (in)	Precip (mm)	Max °F	Max °C	Year	Min °F	Min °C	Year	Low Max °F	Low Max °C	Year	High Min °F	High Min °C	Year	Max (in)	Max (mm)	Year
01	57	13.9	35	1.7	46	7.8	0.18	4.6	80	26.9	1997	14	-10.0	1984	31	-0.6	1980	59	14.8	1997	1.47	37.3	2007
02	57	13.9	35	1.7	46	7.8	0.17	4.3	77	25.0	1976	9	-12.8	1980	28	-2.2	1980	58	14.2	1997	1.51	38.4	1960
03	58	14.4	35	1.7	46	7.8	0.17	4.3	78	25.6	2022*	1	-17.2	1980	34	1.1	1975	53	11.7	1951	1.61	40.9	1952
04	58	14.4	35	1.7	47	8.3	0.17	4.3	80	26.7	1976	13	-10.6	1975	28	-2.2	1960	56	13.3	1974	1.44	36.6	1979
05	58	14.4	35	1.7	47	8.3	0.17	4.3	78	25.6	1955	8	-13.3	1960	28	-2.2	1960	64	17.8	2004	3.11	79.0	1963
06	59	15.0	35	1.7	47	8.3	0.17	4.3	81	27.2	1956	12	-11.1	1960	33	0.6	1966	59	15.0	2017*	3.62	92.0	1967
07	59	15.0	36	2.2	48	8.9	0.17	4.3	80	26.7	1956	18	-7.8	1954	35	1.7	1960	59	15.0	2017	1.89	48.0	1961
08	60	15.6	36	2.2	48	8.9	0.17	4.3	79	26.1	1974	15	-9.5	1996	25	-3.9	1996	54	12.2	1973	1.83	46.5	1995
09	60	15.6	37	2.8	48	8.9	0.17	4.3	80	26.7	1974	12	-11.4	1996	34	1.1	1996	60	15.6	1964	1.26	32.0	2011
10	61	16.1	37	2.8	49	9.4	0.17	4.3	81	27.2	2016	18	-8.0	1996	33	0.6	1969	54	12.2	1974*	2.80	71.1	1952
11	61	16.1	37	2.8	49	9.4	0.17	4.3	80	26.7	1990	21	-6.0	1998*	35	1.7	1960	58	14.4	1955	2.94	74.7	1963
12	61	16.1	38	3.3	50	10.0	0.16	4.1	83	28.3	1967	17	-8.3	2022	35	1.7	1960	58	14.4	2006*	2.30	58.4	1977
13	61	16.1	38	3.3	50	10.0	0.16	4.1	83	28.3	1990	13	-10.6	2022	30	-1.1	1993	59	15.0	2006	2.67	67.8	1975
14	62	16.7	39	3.9	51	10.6	0.16	4.1	84	28.9	1990	13	-10.6	1993	34	1.1	1993*	59	15.0	1967	1.96	49.9	1964
15	62	16.7	39	3.9	51	10.6	0.16	4.1	83	28.2	2012	5	-15.0	1993	35	1.7	1988	58	14.4	2007*	3.03	77.0	1973
16	62	16.7	40	4.4	51	10.6	0.16	4.1	81	27.2	2015	18	-7.8	1970	41	5.0	1970	56	13.3	1990*	3.75	95.3	1973
17	63	17.2	40	4.4	52	11.1	0.16	4.1	79	26.1	2015	20	-6.7	1988*	41	5.0	1967*	56	13.3	1963	2.77	70.4	2002
18	63	17.2	40	4.4	52	11.1	0.16	4.1	82	27.8	1982	20	-6.7	1967	43	6.1	1960	59	15.0	2012	2.53	64.3	2002
19	63	17.2	41	5.0	52	11.1	0.16	4.1	85	29.4	1982	19	-7.2	1985	40	4.4	1981	59	15.0	2020	1.74	44.2	1974
20	64	17.8	41	5.0	52	11.1	0.16	4.1	86	30.0	2012	22	-5.6	1965	34	1.2	1996	60	15.6	2020	3.06	77.7	1980
21	64	17.8	41	5.0	52	11.1	0.16	4.1	84	28.9	2012	16	-8.9	1965	37	2.7	1996	59	15.0	2011	2.16	54.9	1974
22	64	17.8	41	5.0	53	11.7	0.15	3.8	83	28.3	2011	18	-7.8	1986	43	6.1	1970	61	16.1	1991	1.33	33.8	1952
23	64	17.8	42	5.6	53	11.7	0.15	3.8	80	26.7	1994	22	-5.6	1996*	40	4.4	1968	62	16.7	2012	2.37	60.2	1993
24	65	18.3	42	5.6	54	12.2	0.15	3.8	83	28.3	2007	24	-4.4	1992	44	6.7	2018	56	13.3	1994	1.61	40.9	2012
25	65	18.3	42	5.6	54	12.2	0.15	3.8	86	30.0	2007	23	-5.0	1983*	36	2.2	1979	60	15.6	2020	2.74	69.6	1965
26	65	18.3	43	6.1	54	12.2	0.15	3.8	84	28.9	2007	17	-8.3	1955	41	5.0	2013*	60	15.6	2020	1.88	47.8	1959
27	66	18.9	43	6.1	55	12.8	0.15	3.8	83	28.3	2020*	13	-10.6	1955	39	3.9	1955	62	16.7	2007	3.71	94.3	1994
28	66	18.9	43	6.1	55	12.8	0.15	3.8	84	28.9	1989	21	-6.1	1955	44	6.7	1955	62	16.7	2007	2.22	56.4	1951
29	66	18.9	43	6.1	55	12.8	0.15	3.8	85	29.4	1998	21	-6.1	1966	44	6.7	1959	60	15.6	2007	2.74	69.6	1975
30	67	19.4	43	6.1	55	12.8	0.15	3.8	86	30.0	1998	22	-5.6	1964	41	5.0	1964	60	15.6	1977	1.35	34.3	1989
31	67	19.4	43	6.1	55	12.8	0.15	3.8	85	29.4	1963	24	-4.4	1964	40	4.4	1993	63	17.1	1998	1.77	45.0	1954

Table 3-5, cont: Monthly-Daily Climate Normals (1991-2020) and Extremes (1947-2022) for Oak Ridge, Tennessee

APRIL - Table of Climate Normals (1991-2020) and Extremes (1947-2022)

Oak Ridge, Tennessee

Day	Normal Temperatures						Normal Precipitation		Record Temperatures												Record Precipitation		
	Max °F	Max °C	Min °F	Min °C	Avg °F	Avg °C	Precip (in)	Precip (mm)	Max °F	Max °C	Year	Min °F	Min °C	Year	Low Max °F	Low Max °C	Year	High Min °F	High Min °C	Year	Max (in)	Max (mm)	Year
01	67	19.4	43	6.1	56	13.3	0.14	3.6	84	28.9	1986	20	-6.7	1987	47	8.3	2021	62	16.7	2007	1.27	32.3	2005
02	68	20.0	44	6.7	56	13.3	0.14	3.6	87	30.6	2012	26	-3.3	1985	40	4.4	1993	59	15.0	2007	0.95	24.2	2000
03	68	20.0	44	6.7	56	13.3	0.14	3.6	87	30.6	1963	21	-6.1	1992	36	2.2	1987	60	15.6	2014*	3.55	90.1	2000
04	68	20.0	44	6.7	56	13.3	0.14	3.6	83	28.3	1986	26	-3.3	1975	38	3.3	1987	59	14.9	1999	5.43	138.0	1977
05	69	20.6	44	6.7	56	13.3	0.14	3.6	87	30.6	2010*	27	-2.8	1975	44	6.7	1987	58	14.4	1969*	3.33	84.6	1983
06	69	20.6	44	6.7	57	13.9	0.14	3.6	87	30.6	2010	29	-1.7	1982	43	6.1	1982	59	14.9	1999*	1.42	36.1	1956
07	70	21.1	44	6.7	57	13.9	0.14	3.6	84	28.8	2001	25	-3.9	1982	42	5.6	2007	66	18.9	2010	1.84	46.8	1964
08	70	21.1	45	7.2	57	13.9	0.14	3.6	86	30.0	2001	24	-4.4	2007*	44	6.5	1996*	60	15.6	1991	1.89	48.0	1957
09	71	21.7	45	7.2	58	14.4	0.14	3.6	86	30.0	2015	22	-5.6	1985	46	7.8	1982	64	17.8	1959	1.32	33.5	1961
10	71	21.7	45	7.2	58	14.4	0.14	3.6	91	32.6	1995	21	-6.1	1985	38	3.3	1973	60	15.6	1959	1.71	43.4	1994
11	71	21.7	46	7.8	58	14.4	0.14	3.6	86	29.9	2001	25	-3.9	1989	50	10.0	1958	65	18.3	2008	1.68	42.7	1962
12	72	22.2	46	7.8	59	15.0	0.15	3.8	87	30.6	1948	26	-3.3	1989	53	11.7	1951	65	18.3	1948	2.75	70.8	2020
13	72	22.2	46	7.8	59	15.0	0.15	3.8	84	28.9	2010*	27	-2.8	1975	42	5.6	1959	66	18.9	1972	2.30	58.4	1966
14	72	22.2	47	8.3	59	15.0	0.15	3.8	88	31.1	2006	24	-4.4	1950	49	9.4	2008	63	17.2	2015	1.83	46.0	2007
15	73	22.8	47	8.3	59	15.0	0.15	3.8	86	30.0	2006*	29	-1.7	2020	45	7.2	1962*	62	16.7	2006*	3.74	95.0	1956
16	73	22.8	47	8.3	60	15.6	0.16	4.1	85	29.4	2010*	27	-2.8	1983	43	6.1	2018	61	15.9	1998	3.49	88.7	1998
17	73	22.8	48	8.9	60	15.6	0.16	4.1	88	31.1	1955	25	-3.9	1950	50	10.0	1986	64	17.8	2006	0.84	21.3	1981
18	73	22.8	48	8.9	60	15.6	0.16	4.1	89	31.7	1955	28	-2.2	1983	44	6.7	1983	62	16.7	1975	2.16	54.9	1998
19	73	22.8	48	8.9	60	15.6	0.16	4.1	88	31.1	1970	22	-5.6	1983	46	7.8	1983	64	17.8	1955	1.85	47.0	1998
20	73	22.8	48	8.9	61	16.1	0.16	4.1	87	30.6	2016*	22	-5.6	1983	45	7.2	1983	62	16.7	1992	0.85	21.2	2020
21	73	22.8	49	9.4	61	16.1	0.15	3.8	89	31.7	1987	24	-4.4	1983	50	10.0	1993	62	16.7	2017*	2.16	54.9	2006
22	74	23.3	49	9.4	61	16.1	0.15	3.8	89	31.7	1988	28	-2.2	2021	49	9.4	1983	64	17.8	1987*	1.27	32.3	2016
23	74	23.3	49	9.4	61	16.1	0.14	3.6	90	32.2	1965	25	-3.9	1986	49	9.4	1971	69	20.6	1988	2.48	63.0	2017
24	74	23.3	49	9.4	61	16.1	0.14	3.6	88	31.1	2009*	28	-2.2	1986	54	12.2	2000*	66	18.9	1961	0.90	22.9	1952
25	74	23.3	50	10.0	62	16.7	0.14	3.6	88	31.1	2009*	31	-0.6	1983	54	12.2	1982	67	19.4	1961	1.05	26.7	1978
26	74	23.3	50	10.0	62	16.7	0.14	3.6	92	33.3	1986	34	1.1	1983	51	10.6	1978	65	18.3	2011	2.35	59.7	1973
27	74	23.3	50	10.0	62	16.7	0.14	3.6	92	33.3	1986	31	-0.6	1976	54	12.2	1973	64	17.8	1959	2.81	71.4	2011
28	75	23.9	50	10.0	62	16.7	0.14	3.6	88	31.1	1957	32	0.0	1967	59	15.0	1992*	62	16.7	2016*	1.82	46.2	2013
29	75	23.9	50	10.0	62	16.7	0.14	3.6	89	31.7	2017	32	0.0	1992	54	12.2	1980	65	18.3	2017	1.96	49.8	1963
30	75	23.9	50	10.0	63	17.2	0.14	3.6	91	32.8	1970	35	1.7	1980	61	16.1	1978	65	18.3	2017*	1.23	31.3	1953

Table 3-5, cont: Monthly-Daily Climate Normals (1991-2020) and Extremes (1947-2022) for Oak Ridge, Tennessee

MAY - Table of Climate Normals (1991-2020) and Extremes (1947-2022)

Oak Ridge, Tennessee

Day	Normal Temperatures						Normal Precipitation		Record Temperatures												Record Precipitation		
	Max °F	Max °C	Min °F	Min °C	Avg °F	Avg °C	Precip (in)	Precip (mm)	Max °F	Max °C	Year	Min °F	Min °C	Year	Low Max °F	Low Max °C	Year	High Min °F	High Min °C	Year	Max (in)	Max (mm)	Year
01	75	23.9	51	10.6	63	17.2	0.15	3.8	89	31.7	2007*	35	1.7	1996	61	16.1	1963	67	19.4	1970	2.22	56.4	2010
02	75	23.9	51	10.6	63	17.2	0.15	3.8	89	31.7	2012*	31	-0.6	1963	54	12.2	1984	68	20.0	2012	2.73	69.4	1999
03	76	24.4	51	10.6	63	17.2	0.16	4.1	89	31.7	1959	35	1.7	1961	55	12.8	1994	67	19.4	2006	1.51	38.4	2021
04	76	24.4	52	11.1	64	17.8	0.16	4.1	90	32.2	1959	30	-1.1	1976	57	13.9	1954	65	18.3	1958	1.68	42.7	2017
05	76	24.4	52	11.1	64	17.8	0.16	4.1	92	33.3	1959	34	1.1	1954	55	12.8	2017	65	18.3	2012	2.02	51.3	2013
06	76	24.4	53	11.7	64	17.8	0.16	4.1	92	33.3	1952	35	1.7	1954	52	11.1	2017	66	19.4	1959	2.34	59.5	1967
07	76	24.4	53	11.7	64	17.8	0.15	3.8	88	31.1	2004	36	2.2	1989	52	11.1	1992	66	19.4	2002	2.60	66.1	1963
08	77	25.0	54	12.2	64	17.8	0.15	3.8	90	32.2	2015*	32	0.0	1989	50	10.0	1992	66	19.4	2012	1.92	48.8	1953
09	77	25.0	54	12.2	65	18.3	0.14	3.6	92	33.3	1963	31	-0.6	2020	58	14.4	1958	66	18.9	2002	2.29	58.2	1956
10	77	25.0	55	12.8	65	18.3	0.14	3.6	89	31.7	1996*	32	0.0	2020	61	16.1	1966*	68	20.0	2006	1.24	31.5	1960
11	77	25.0	55	12.8	65	18.3	0.13	3.3	90	32.2	2015	37	2.8	2020*	49	9.4	1960	66	18.9	2016	2.12	53.9	2019
12	77	25.0	55	12.8	66	18.9	0.13	3.3	90	32.2	1982*	38	3.3	2020*	53	11.7	1960	67	19.4	2002	3.21	81.6	1999
13	78	25.6	55	12.8	66	18.9	0.12	3.1	91	32.8	1962*	36	2.2	1989	59	15.0	1996*	66	18.9	2004	1.46	37.1	1988
14	78	25.6	55	12.8	66	18.9	0.12	3.1	91	33.0	1998	39	3.9	2021*	55	12.8	1978	66	18.9	1968	1.28	32.5	1948
15	78	25.6	55	12.8	66	18.9	0.12	3.1	93	33.7	1998	39	3.9	2016	57	13.9	1981	68	20.0	1968	1.26	31.9	1978
16	78	25.6	56	12.3	67	19.4	0.12	3.1	92	33.3	1962	36	2.3	1997	61	16.1	2006*	67	19.4	2015*	0.60	15.2	1988
17	78	25.6	56	12.3	67	19.4	0.12	3.1	91	32.8	1957	38	3.3	1984	53	11.7	2011	68	20.0	2015	1.49	37.9	1961
18	79	26.1	56	13.3	67	19.4	0.12	3.1	93	33.9	1996*	35	1.7	1973	59	15.0	2011*	67	19.4	2015	1.22	31.0	1949
19	79	26.1	56	13.3	68	20.0	0.12	3.1	93	33.9	1962	34	1.1	1976	62	16.7	2002	68	20.0	1987	1.71	43.4	1971
20	79	26.1	57	13.9	68	20.0	0.12	3.1	92	33.3	1998*	38	3.3	2002	57	13.9	1981	68	20.0	1987	2.78	70.6	1979
21	80	26.7	57	13.9	69	20.6	0.13	3.3	92	33.3	1962	37	2.8	1954	61	16.1	2002	66	18.9	2004*	0.75	19.1	1979
22	80	26.7	58	14.4	69	20.6	0.13	3.3	92	33.3	1962	38	3.3	2002	60	15.6	1990	66	18.9	2018*	0.86	21.9	1997
23	81	27.2	58	14.4	70	21.1	0.13	3.3	91	32.8	1962	41	5.0	1963	64	17.8	1985	72	22.2	1953	2.37	60.2	1969
24	81	27.2	59	15.0	70	21.1	0.13	3.3	93	33.8	1996	41	5.0	1951	62	16.7	1985	67	19.4	1955*	2.60	66.0	1985
25	82	27.8	59	15.0	71	21.7	0.13	3.3	93	33.9	1953	40	4.4	1979	53	11.7	1979	68	20.0	2004	1.08	27.4	1971
26	82	27.8	59	15.0	71	21.7	0.13	3.3	91	32.8	2019*	35	1.7	1979	60	15.6	1974	70	21.1	1957	1.32	33.5	2022
27	82	27.8	60	15.6	71	21.7	0.13	3.3	92	33.3	2012	37	2.8	1961	62	16.7	1979	71	21.7	1991	4.40	111.8	1965
28	82	27.8	60	15.6	71	21.7	0.13	3.3	91	32.8	2012	40	4.4	1961	56	13.3	1992	71	21.7	1991	1.50	38.1	1967
29	83	28.3	61	16.1	71	21.7	0.13	3.3	93	33.6	2019*	39	3.9	1984	62	16.7	1984	70	21.1	1991	1.22	31.0	1967
30	83	28.3	61	16.1	72	22.2	0.13	3.3	93	33.9	2011	36	2.2	1984	58	14.4	1984	70	21.1	1991	0.87	22.1	1982
31	83	28.3	61	16.1	72	22.2	0.14	3.6	95	35.0	2011	35	1.7	1984	66	18.9	1972	70	21.1	2008*	2.20	55.9	1996

Table 3-5, cont: Monthly-Daily Climate Normals (1991-2020) and Extremes (1947-2022) for Oak Ridge, Tennessee

JUNE - Table of Climate Normals (1991-2020) and Extremes (1947-2022)

Oak Ridge, Tennessee

Day	Normal Temperatures						Normal Precipitation		Record Temperatures												Record Precipitation		
	Max °F	Max °C	Min °F	Min °C	Avg °F	Avg °C	Precip (in)	Precip (mm)	Max °F	Max °C	Year	Min °F	Min °C	Year	Low Max °F	Low Max °C	Year	High Min °F	High Min °C	Year	Max (in)	Max (mm)	Year
01	83	28.3	62	16.7	72	22.2	0.14	3.6	94	34.4	2011	40	4.4	1972*	69	20.6	1964	70	21.1	2011	2.98	75.7	1998
02	83	28.3	62	16.7	72	22.2	0.14	3.6	95	35.0	1951	42	5.6	1966	60	15.6	1956	70	21.1	2011	2.23	56.7	2013
03	83	28.3	62	16.7	72	22.2	0.14	3.6	94	34.7	2002*	43	6.1	1956	64	17.8	1967	69	20.8	2011*	1.69	42.9	1967
04	83	28.3	62	16.7	72	22.2	0.15	3.8	95	35.0	2011*	47	8.3	1969	62	16.7	1954	70	21.1	2008*	2.56	65.0	2000
05	83	28.3	62	16.7	73	22.8	0.15	3.8	95	35.0	2011	45	7.2	1950	68	20.0	1997	70	21.1	2008	2.01	51.1	1957
06	84	28.9	62	16.7	73	22.8	0.15	3.8	94	34.4	2008	44	6.7	1976	67	19.4	2000	71	21.7	1953	1.33	33.8	2019
07	84	28.9	63	17.2	73	22.8	0.16	4.1	94	34.4	2008	44	6.7	1977	68	20.0	2003	71	21.7	2008	2.21	56.2	1985
08	84	28.9	63	17.2	73	22.8	0.16	4.1	96	35.6	2011	39	3.9	1977	63	17.2	2003	71	21.7	2004	2.84	72.2	1978
09	84	28.9	63	17.2	74	23.3	0.16	4.1	95	35.0	2008	45	7.2	1980	67	19.4	1997	74	23.3	1953	1.94	49.3	1996
10	84	28.9	63	17.2	74	23.3	0.16	4.1	95	35.0	1964*	42	5.6	1977	67	19.4	1955	70	21.1	2021	1.76	44.5	2009
11	85	29.4	64	17.8	74	23.3	0.15	3.8	96	35.6	2011	46	7.8	1988*	73	22.8	1995	71	21.7	2006*	1.48	37.6	2021
12	85	29.4	64	17.8	74	23.3	0.15	3.8	94	34.4	2016	48	8.9	1985*	70	21.1	1992	73	22.8	2015	2.11	53.6	1991
13	85	29.4	64	17.8	75	23.9	0.15	3.8	95	35.0	1958	43	6.1	1985	70	21.1	1985	72	22.2	2016	1.00	25.4	1961
14	85	29.4	64	17.8	75	23.9	0.15	3.8	95	35.0	2016*	43	6.1	1985	74	23.3	1998*	73	22.8	2022	1.15	29.2	1984
15	86	30.0	64	17.8	75	23.9	0.15	3.8	95	35.0	2022*	49	9.4	1985*	69	20.6	2003	72	22.2	2022	2.29	58.2	1961
16	86	30.0	64	17.8	75	23.9	0.15	3.8	96	35.6	2022*	50	10.0	1974	67	19.4	2003	73	22.8	2022	1.46	37.1	1973
17	86	30.0	65	18.3	76	24.4	0.15	3.8	96	3560	2015	46	7.8	1974	73	22.8	1961	72	22.2	2016*	1.55	39.4	1960
18	86	30.0	65	18.3	76	24.4	0.15	3.8	95	34.8	1998	45	7.2	1974	73	22.8	2020	74	23.3	2015	1.62	41.2	2013
19	87	30.6	65	18.3	76	24.4	0.15	3.8	95	35.0	1952	49	9.4	1965	72	22.2	1976	72	22.2	1991	1.18	30.0	1977
20	87	30.6	65	18.3	76	24.4	0.15	3.8	96	35.6	1952	49	9.4	1985	68	20.0	1961	73	22.8	2009	1.27	32.3	1989
21	87	30.6	65	18.3	76	24.4	0.15	3.8	97	36.1	1953	51	10.6	1985	73	22.8	1961	74	23.3	2009	2.85	72.4	2021
22	87	30.6	66	18.9	76	24.4	0.15	3.8	98	36.7	1988	48	8.9	1992	70	21.1	1972	73	22.8	2009	1.39	35.3	1967
23	87	30.6	66	18.9	77	25.0	0.15	3.8	100	37.8	1988	52	11.1	1992	74	23.3	1974	75	23.9	2015	3.54	89.9	1969
24	87	30.6	66	18.9	77	25.0	0.15	3.8	101	38.3	1988	49	9.4	1972	72	22.2	1974	75	23.9	2015	3.10	78.9	1999
25	87	30.6	66	18.9	77	25.0	0.15	3.8	98	36.7	1988	48	8.9	1974	71	21.7	1974	74	23.3	1952	1.71	43.4	1981
26	87	30.6	66	18.9	77	25.0	0.15	3.8	100	37.8	1988	44	6.7	1974	69	20.6	1961	73	22.8	1952	3.01	76.5	1994
27	87	30.6	66	18.9	77	25.0	0.15	3.8	101	38.3	1954	52	11.1	1974	72	22.2	2018	73	22.8	2016*	1.93	49.0	1962
28	87	30.6	66	18.9	77	25.0	0.15	3.8	102	38.9	2012	52	11.1	2017*	66	18.9	1974	74	23.3	1952	2.84	72.2	1972
29	88	31.1	66	18.9	77	25.0	0.15	3.8	104	40.0	2012	54	12.2	1974*	77	25.0	1980	73	22.8	2005*	1.41	35.8	1965
30	88	31.1	67	19.4	77	25.0	0.15	3.8	105	40.6	2012	52	11.1	1974	70	21.1	1984	74	23.3	1957*	0.94	24.0	2015

Table 3-5, cont: Monthly-Daily Climate Normals (1991-2020) and Extremes (1947-2022) for Oak Ridge, Tennessee

JULY - Table of Climate Normals (1991-2020) and Extremes (1947-2022)

Oak Ridge, Tennessee

Day	Normal Temperatures						Normal Precipitation		Record Temperatures												Record Precipitation		
	Max °F	Max °C	Min °F	Min °C	Avg °F	Avg °C	Precip (in)	Precip (mm)	Max °F	Max °C	Year	Min °F	Min °C	Year	Low Max °F	Low Max °C	Year	High Min °F	High Min °C	Year	Max (in)	Max (mm)	Year
01	88	31.1	67	19.4	77	25.6	0.16	4.1	104	40.0	2012	53	11.7	1980	74	23.3	1989	75	23.9	2012	2.50	63.6	1952
02	88	31.1	67	19.4	78	25.6	0.16	4.1	99	37.2	1954	49	9.4	1988	74	23.3	1989	74	23.3	2014	1.41	35.9	1999
03	88	31.1	67	19.4	78	25.6	0.16	4.1	98	36.7	1970	45	7.2	1950	68	20.0	1976	72	22.2	2016	1.62	41.2	1956
04	88	31.1	67	19.4	78	25.6	0.16	4.1	96	35.6	2016*	54	12.2	1967	73	22.8	1976	74	23.3	2016	1.52	38.6	1984
05	88	31.1	68	20.0	78	25.6	0.16	4.1	100	37.8	2012	51	10.6	1967	74	23.3	1972	74	23.3	1999	1.88	47.8	2001
06	88	31.1	68	20.0	78	25.6	0.17	4.3	97	36.1	2012	54	12.2	1972*	75	23.9	2013*	75	23.9	1953	3.26	82.8	2013*
07	88	31.1	68	20.0	78	25.6	0.17	4.3	99	37.2	2012	52	11.1	1972	70	21.1	1979	72	22.2	2012*	2.35	59.7	1963
08	88	31.1	68	20.0	78	25.6	0.17	4.3	101	38.3	1988	54	12.2	1984*	71	21.7	1979	78	25.6	2012	1.23	31.3	1953
09	88	31.1	68	20.0	78	26.1	0.18	4.6	102	38.9	1988	55	12.8	1984	69	20.6	1979	73	22.8	2012*	1.20	30.4	2022
10	88	31.1	68	20.0	79	26.1	0.18	4.6	97	36.1	1988	51	10.6	1961*	74	23.3	1948	73	22.8	2000	1.98	50.3	1960
11	89	31.7	68	20.0	79	26.1	0.19	4.8	99	37.2	1980	54	12.2	1963*	74	23.3	1999	74	23.3	1949	4.71	119.7	1967
12	89	31.7	68	20.0	79	26.1	0.19	4.8	100	37.8	1980	53	11.7	1963	71	21.6	1999	73	22.8	2019	2.91	74.0	1999
13	89	31.7	68	20.0	79	26.1	0.19	4.8	100	37.8	1980*	56	13.3	1974	72	22.2	2002	74	23.3	2015*	1.94	49.3	1988
14	89	31.7	68	20.0	79	26.1	0.19	4.8	101	38.3	1954	55	12.8	1976	73	22.8	1967	77	25.0	1954	3.24	82.3	2005
15	89	31.7	68	20.0	79	26.1	0.19	4.8	100	37.8	1980	50	10.0	1967	72	22.2	1978	75	23.9	1954	1.53	38.9	2011
16	89	31.7	68	20.0	79	26.1	0.19	4.8	103	39.4	1980	53	11.7	1967	74	23.3	1989	73	22.8	2005*	2.28	57.9	2009
17	89	31.7	69	20.6	79	26.1	0.19	4.8	103	39.4	1980	56	13.3	2014*	79	26.1	1984*	75	23.9	2010	1.57	39.9	1961
18	89	31.1	69	20.6	79	26.1	0.19	4.8	97	36.0	2020*	53	11.7	1976	71	21.7	2014	74	23.3	2015	2.30	58.4	1949
19	90	32.2	69	20.6	79	26.1	0.19	4.8	101	38.4	1998	54	12.2	1976	74	23.3	2014	74	23.3	1958	1.26	32.0	2002
20	90	32.2	69	20.6	79	26.1	0.19	4.8	99	37.2	1986	57	13.9	2009	70	21.1	1979	76	24.4	1954	2.25	57.2	2018
21	89	31.7	69	20.6	79	26.1	0.20	5.1	99	37.4	1998	59	15.0	2009*	72	22.2	1979	76	24.4	2016	2.89	73.4	1979
22	89	31.7	69	20.6	79	26.1	0.20	5.1	100	37.8	1952	59	15.0	1974	75	23.9	1970	76	24.4	2016	3.57	90.8	1997
23	89	31.7	69	20.6	79	26.1	0.20	5.1	101	38.3	1952	61	16.1	2019*	74	23.3	1974	74	23.3	2016*	2.01	51.1	2014
24	89	31.7	69	20.6	79	26.1	0.20	5.1	98	36.7	1993*	55	12.8	2019	78	25.6	2007	75	23.9	2012*	2.26	57.4	1985
25	89	31.7	69	20.6	79	26.1	0.19	4.8	97	36.3	2016*	54	12.2	1948	70	21.1	1978	78	25.6	2010	1.82	46.2	1971
26	89	31.7	69	20.6	79	26.1	0.19	4.8	100	37.8	1993*	58	14.4	2019	75	23.9	1979	77	25.0	2016	1.65	41.9	1971
27	89	31.7	69	20.6	79	26.1	0.18	4.6	102	38.9	1952	54	12.2	1962	75	23.9	1994	77	25.0	2016*	2.62	66.6	1965
28	89	31.7	69	20.6	79	26.1	0.18	4.6	105	40.6	1952	56	13.3	1962	75	24.1	1996	74	23.3	2015	2.95	75.0	1967
29	89	31.7	68	20.0	79	26.1	0.17	4.3	103	39.4	1952	57	13.9	2013	70	21.1	1977	75	23.9	2011	2.72	69.1	2001
30	89	31.7	68	20.0	79	26.1	0.17	4.3	98	36.7	1986	54	12.2	2014	74	23.3	1984	74	23.3	2016*	2.04	51.8	1982
31	89	31.7	68	20.0	78	25.6	0.16	4.1	100	37.8	1995*	56	13.3	1974	73	22.6	1996	74	23.5	2016*	4.76	120.99	1996

Table 3-5, cont: Monthly-Daily Climate Normals (1991-2020) and Extremes (1947-2022) for Oak Ridge, Tennessee

AUGUST - Table of Climate Normals (1991-2021) and Extremes (1947- 2022)

Oak Ridge, Tennessee

Day	Normal Temperatures						Record Temperatures													Record Precipitation		
	Max °F	Max °C	Min °F	Min °C	Avg °F	Avg °C	Precip (in)	Precip (mm)	Max °F	Max °C	Year	Min °F	Min °C	Year	Low Max °F	Low Max °C	Year	High Min °F	High Min °C	Year	Max (in)	Max (mm)	Year
01	89	31.7	68	20.0	78	25.6	0.16	4.1	97	36.1	1954	57	13.9	1993	73	22.8	1981	74	23.9	2010*	1.84	46.8	1989
02	89	31.7	68	20.0	78	25.6	0.15	3.8	96	35.7	2011*	58	14.6	1997	73	22.8	1985*	76	24.4	2010	2.08	52.8	1950
03	88	31.1	68	20.0	78	25.6	0.14	3.6	98	36.7	1957	55	12.8	1976	76	24.4	1974	78	25.6	2010	0.86	21.9	1975
04	88	31.1	68	20.0	78	25.6	0.13	3.3	96	35.7	2002*	51	10.6	1950	78	25.6	1950	76	24.4	2010	1.92	48.8	2017
05	88	31.1	68	20.0	78	25.6	0.12	3.0	98	36.7	1954	55	12.8	1974	73	22.8	1948	74	23.3	2010	2.76	70.1	1959
06	88	31.1	68	20.0	78	25.6	0.12	3.0	97	36.1	1980	50	10.0	1948	73	22.8	1992*	77	25.0	2007*	1.34	34.0	1993
07	88	31.1	68	20.0	78	25.6	0.12	3.0	99	37.2	1980	51	10.6	1948	75	23.9	2005	74	23.3	1951	2.15	54.6	2017
08	88	31.1	68	20.0	78	25.6	0.11	2.8	100	37.8	1980	50	10.0	1989	76	24.4	1976	76	24.4	2007	1.95	49.5	1991
09	88	31.1	68	20.0	78	25.6	0.11	2.8	99	37.2	2007*	54	12.2	1989	69	20.8	1997	74	23.3	2016*	4.88	124.0	1970
10	88	31.1	68	20.0	78	25.6	0.11	2.8	99	37.2	1980	54	12.2	1976	74	23.3	2007*	76	24.4	2010	7.45	189.3	1960
11	88	31.1	68	20.0	78	25.6	0.11	2.8	98	36.7	1957	52	11.1	1989	75	23.9	1967	77	25.0	2010	1.65	41.8	1996
12	88	31.1	68	20.0	78	25.6	0.11	2.8	97	36.1	2007*	57	13.9	2008*	69	20.6	2004*	75	23.9	2010	2.41	61.2	2017
13	88	31.1	68	20.0	78	25.6	0.11	2.8	99	37.1	1995	52	11.1	1964	74	23.3	2004	76	24.4	2016	1.49	37.9	2019
14	88	31.1	68	20.0	78	25.6	0.11	2.8	100	37.6	1995	54	12.2	1967	73	22.8	1964	77	25.0	2010	0.63	16.0	2012
15	88	31.1	68	20.0	78	25.6	0.11	2.8	100	37.7	2007*	54	12.2	1963	62	16.7	1964	75	23.9	2010	1.23	31.3	2021
16	88	31.1	68	20.0	78	25.6	0.11	2.8	103	39.4	2007	52	11.1	1979	65	18.3	1964	75	23.9	2010	2.17	55.1	1964
17	88	31.1	68	20.0	78	25.6	0.11	2.8	99	37.5	1995	51	10.6	1979	70	21.1	1985*	74	23.3	2007	2.37	60.2	1985
18	88	31.1	68	20.0	78	25.6	0.10	2.5	100	37.6	1995	54	12.2	1958	74	23.3	1981	72	22.5	2015*	0.79	20.1	2016
19	88	31.1	68	20..0	78	25.6	0.10	2.5	99	37.4	1995	54	12.2	1977	79	26.1	2013*	72	22.2	2016*	2.76	70.1	2015
20	88	31.1	67	19.4	78	25.6	0.10	2.5	98	36.7	1983	53	11.7	1976	78	25.6	1988	75	23.9	2005	1.34	34.0	2014
21	88	31.1	67	19.4	78	25.6	0.10	2.5	102	38.9	1983	56	13.3	2012*	74	23.3	1956	75	23.9	2007	1.16	29.5	2016
22	88	31.1	67	19.4	78	25.6	0.10	2.5	103	39.4	1983	51	10.6	1956	74	23.3	1992	73	22.8	2007	1.44	36.6	1958
23	88	31.1	67	19.4	78	25.6	0.10	2.5	102	38.9	1968	51	10.6	1956	72	22.2	1985	72	22.2	2014*	1.32	33.5	2015
24	88	31.1	67	19.4	78	25.6	0.09	2.2	101	38.3	2007	53	11.6	1997	69	20.6	1985*	78	25.6	2007	1.24	31.5	1985
25	88	31.1	67	19.4	78	25.6	0.09	2.2	99	37.1	1995	57	13.9	2015*	75	23.9	1966	75	23.9	2007	1.51	38.5	1999
26	88	31.1	67	19.4	78	25.6	0.09	2.2	95	35.0	2016	55	12.3	1982	72	22.2	2019*	72	22.2	2016*	2.27	57.7	2008
27	88	31.1	67	19.4	78	25.6	0.09	2.2	97	36.1	2007	54	12.2	1966	78	25.6	2008*	73	22.2	2016	2.75	69.9	1976
28	88	31.1	67	19.4	78	25.6	0.10	2.5	98	36.5	1995	54	12.2	1986	68	20.0	1952	74	23.3	2020*	1.15	29.2	2019
29	88	31.1	67	19.4	77	25.0	0.10	2.5	98	36.9	1995	52	11.1	1992	75	23.9	1986	74	21.7	2007	1.26	32.0	1974
30	88	31.1	67	19.4	77	25.0	0.10	2.5	99	37.2	1995	51	10.6	1986	74	23.3	2001*	75	23.9	2003	2.44	30.0	1950
31	87	30.6	66	18.9	77	25.0	0.10	2.5	100	37.5	1995	52	11.1	1976	70	21.1	1986	73	22.8	2012	3.78	96.0	2021

Table 3-5, cont: Monthly-Daily Climate Normals (1991-2020) and Extremes (1947-2022) for Oak Ridge, Tennessee

SEPTEMBER - Table of Climate Normals (1991-2020) and Extremes (1947-2021)

Oak Ridge, Tennessee

Day	Normal Temperatures						Record Temperatures														Record Precipitation		
	Max °F	Max °C	Min °F	Min °C	Avg °F	Avg °C	Precip (in)	Precip (mm)	Max °F	Max °C	Year	Min °F	Min °C	Year	Low Max °F	Low Max °C	Year	High Min °F	High Min °C	Year	Max (in)	Max (mm)	Year
01	87	30.6	66	18.9	77	25.0	0.11	2.8	101	38.3	1953	51	10.6	1954	66	18.9	1976	75	23.9	1961	3.27	83.1	1982
02	87	30.6	66	18.9	77	25.0	0.11	2.8	99	37.2	1953	48	8.9	1987	67	19.4	2017	73	22.8	2012*	1.33	33.8	1974
03	87	30.6	65	18.3	76	24.4	0.12	3.0	99	37.2	2011	50	10.0	1987	69	20.6	1974	73	22.8	1993*	1.71	43.4	1993
04	87	30.6	65	18.3	76	24.4	0.12	3.0	100	37.8	1954	49	9.4	1952	67	19.4	1974	74	23.3	1966	2.27	57.7	1988
05	86	30.0	64	17.8	75	23.9	0.12	3.0	102	38.9	1954	50	10.0	2011*	70	21.1	2011	71	21.7	2018	6.30	160.1	2011
06	86	30.0	64	17.8	75	23.9	0.12	3.0	102	38.9	1954	49	9.4	1984	70	21.1	1988	72	22.2	1947	1.04	26.4	1975
07	86	30.0	63	17.2	74	23.3	0.12	3.0	99	37.2	1954	46	7.8	2017	69	20.6	2011	73	22.8	2007	1.42	36.1	2004*
08	86	30.0	63	17.2	74	23.3	0.13	3.3	94	34.4	2016	48	8.9	2017	68	20.0	2011	70	21.1	1990*	0.87	22.1	1987
09	86	30.0	63	17.2	74	23.3	0.13	3.3	97	36.1	1954	47	8.3	1958	73	22.8	2011	71	21.7	2015*	2.07	52.6	1968
10	85	29.4	62	16.7	74	23.3	0.13	3.3	96	35.6	2002	48	8.9	1993	69	20.6	1948	73	22.8	2007	2.18	55.4	1960
11	85	29.4	62	16.7	73	22.8	0.13	3.3	93	33.9	1983	42	5.6	1976	62	16.7	2017	73	22.8	2014	2.43	61.7	2010
12	85	29.4	62	16.7	73	22.8	0.14	3.6	94	34.3	1998	45	7.2	1976	70	21.1	2017	72	22.2	1965	2.52	64.0	1987
13	85	29.4	62	16.7	73	22.8	0.14	3.6	101	38.3	1998	49	9.4	1975	65	18.3	2017	70	21.1	1991*	2.34	59.5	1957
14	84	28.9	61	16.1	72	22.2	0.14	3.6	98	36.8	1998	42	5.6	1985	70	21.1	1985	70	21.1	2019*	1.46	37.1	2007
15	84	28.9	61	16.1	72	22.2	0.14	3.6	94	34.4	2016*	42	5.6	1961	68	20.0	1961	69	20.6	2002	2.16	54.9	1981
16	83	28.3	61	16.1	72	22.2	0.14	3.6	94	34.4	2016*	42	5.6	1962	66	18.9	2011	71	21.7	2018	3.37	85.6	1962
17	83	28.3	61	16.1	71	21.7	0.14	3.6	94	34.4	1991	45	7.2	1975	65	18.3	1975	70	21.1	1991	2.89	73.4	2012
18	82	27.8	60	15.6	71	21.7	0.14	3.6	95	35.0	1954	39	3.9	1981	60	15.6	1981	70	21.1	1991*	2.10	53.4	2012
19	82	27.8	60	15.6	71	21.7	0.14	3.6	97	36.1	1954	39	3.9	1966	66	18.9	1966	73	22.8	1957	2.74	69.6	1969
20	81	27.2	60	15.6	70	21.1	0.15	3.8	94	34.4	2016*	40	4.4	1991	68	20.0	1991*	73	22.8	1957	1.33	33.8	1954
21	81	27.2	59	15.0	70	21.1	0.15	3.8	95	35.0	1955	42	5.6	1982	66	18.9	1999*	74	23.3	1957	2.34	59.5	2013
22	80	26.7	59	15.0	70	21.1	0.15	3.8	95	35.0	1955	36	2.2	1975	59	15.0	1975	69	20.6	1980*	2.19	55.6	2003
23	80	26.7	58	14.4	70	21.1	0.15	3.8	93	33.9	2007	37	2.8	1975	62	16.7	1975	69	20.6	2009	2.78	70.6	2006
24	80	26.7	58	14.4	69	20.6	0.15	3.8	92	33.3	2016*	37	2.8	1974	60	15.6	1974	71	21.7	2009	1.94	49.2	1997
25	80	26.7	57	13.9	69	20.6	0.15	3.8	94	34.4	2016*	40	4.4	1989	58	14.4	1989	70	21.1	2009	1.01	25.4	2020*
26	79	26.1	57	13.9	68	20.0	0.14	3.6	93	33.8	1998	37	4.4	2001	62	16.7	1975	69	20.6	2018*	3.37	85.6	2018
27	79	26.1	56	13.3	68	20.0	0.13	3.3	95	35.0	1998	40	4.4	1980	64	17.8	1980*	69	20.6	1972	1.54	39.1	2018
28	79	26.1	56	13.3	67	19.4	0.13	3.3	91	32.9	2019*	41	5.0	1980	58	14.4	1980	68	20.1	1998	0.91	23.1	1967
29	78	25.6	55	12.8	67	19.4	0.12	3.0	92	33.3	2019	40	4.4	1967	54	12.2	1967	70	21.1	1989	1.89	48.0	1964
30	78	25.6	55	12.8	66	19.4	0.12	3.0	89	34.4	2019	33	0.6	1984	54	12.2	1984	74	23.3	1989	2.36	60.0	1955

Table 3-5, cont: Monthly-Daily Climate Normals (1991-2020) and Extremes (1947-2022) for Oak Ridge, Tennessee

OCTOBER - Table of Climate Normals (1991-2020) and Extremes (1947-2022)

Oak Ridge, Tennessee – Oak Ridge National Laboratory

Day	Normal Temperatures						Record Temperatures														Record Precipitation		
	Max °F	Max °C	Min °F	Min °C	Avg °F	Avg °C	Precip (in)	Precip (mm)	Max °F	Max °C	Year	Min °F	Min °C	Year	Low Max °F	Low Max °C	Year	High Min °F	High Min °C	Year	Max (in)	Max (mm)	Year
01	78	25.6	54	12.2	66	18.9	0.11	2.8	95	35.0	2019	36	2.2	1974	58	14.4	2011	68	20.0	2019*	1.22	31.0	1964
02	78	25.6	53	11.7	65	18.3	0.11	2.8	96	35.6	2019	34	1.1	1974	56	13.3	1974	67	19.4	1986*	0.40	10.2	1954
03	77	25.0	53	11.7	65	18.3	0.11	2.8	96	35.6	2019	29	-1.7	1974	56	13.3	1961	66	18.9	2021*	1.68	42.7	1957
04	77	25.0	53	11.7	65	18.3	0.10	2.5	89	21.7	1954	30	-1.1	1974	57	13.9	1980	68	20.0	2007	1.52	38.6	1972
05	76	24.4	52	11.1	65	18.3	0.10	2.5	90	32.2	1954	34	1.1	1974*	59	15.0	1980	69	20.6	2007	1.45	36.8	1995
06	76	24.4	52	11.1	64	17.8	0.10	2.5	90	32.2	1951	33	0.6	1985	56	13.3	1968	66	18.9	2021*	1.03	26.2	2014
07	76	24.4	52	11.1	64	17.8	0.10	2.5	90	32.2	2007	32	0.0	1991	57	13.9	2012	66	18.9	2018	1.46	37.1	1955
08	75	23.9	52	11.1	64	17.8	0.10	2.5	88	31.1	2007	29	-1.4	2000	51	10.6	2012	69	20.6	2017	2.52	64.0	2017
09	75	23.9	52	11.1	64	17.8	0.10	2.5	86	30.0	1990	32	0.0	1987*	55	12.8	2000	70	21.1	2017	1.35	34.3	1994
10	75	23.9	51	10.6	63	17.2	0.10	2.5	85	29.4	1980*	29	-1.4	2000	56	13.3	1979*	69	20.6	2017	1.30	33.0	2020
11	74	23.3	51	10.6	63	17.2	0.10	2.5	85	29.4	2017*	32	0.3	2000	60	15.6	1993	66	18.9	2017	0.84	21.3	1970
12	74	23.3	51	10.6	63	17.2	0.10	2.5	86	29.8	1997*	32	0.0	1988	56	13.3	1987	65	18.3	2020	1.37	34.8	2004
13	73	22.8	50	10.0	62	16.7	0.10	2.5	84	28.9	1997*	29	-1.7	1988	51	10.6	1977	65	18.3	2014	1.51	38.4	1983
14	72	22.2	49	9.4	62	16.7	0.10	2.5	85	29.4	1954	28	-2.2	1988	58	14.4	1977	63	17.2	1970	1.53	38.9	1970
15	72	22.2	48	8.9	61	16.1	0.10	2.5	83	28.3	2021*	29	-1.7	1978	57	13.9	2004	62	16.7	2021	1.40	35.6	1974
16	71	21.7	47	8.3	60	15.6	0.10	2.5	84	28.9	1950	33	0.6	1986	53	11.7	1954	65	18.3	1947	1.20	30.5	1975
17	71	21.7	47	8.3	59	15.0	0.10	2.5	84	28.9	1953	29	-1.7	1977	50	10.0	2009	64	17.8	2007*	1.65	41.9	1948
18	70	21.1	46	7.8	59	15.0	0.09	2.2	85	29.4	2016	27	-2.8	2022	47	8.6	2022	64	17.8	2007*	1.73	44.0	1966
19	70	21.1	46	7.8	58	14.4	0.09	2.2	89	31.7	2016	23	-5.0	1948	46	7.8	1989	63	17.2	2004*	1.68	42.7	2004
20	70	21.1	46	7.8	58	14.4	0.09	2.2	88	31.1	2016	25	-3.7	2022	45	7.2	1989	66	18.9	1993	1.00	25.4	1984
21	70	21.1	46	7.8	57	13.9	0.09	2.2	85	29.4	1963	28	-2.2	1989*	54	12.2	1997	63	17.2	1984	1.39	35.3	2005
22	70	21.1	46	7.8	57	13.9	0.09	2.2	83	28.3	1947	24	-4.4	1952	50	10.0	1948	62	16.7	1984	2.19	55.6	1984
23	69	20.6	46	7.8	57	13.9	0.09	2.2	84	28.9	1947	27	-2.8	1974	46	7.8	2006	62	16.7	1985	1.55	39.4	1983
24	69	20.6	45	7.2	57	13.9	0.10	2.5	83	28.3	1991	29	-1.7	1952	47	8.3	2005	62	16.7	1947	1.34	34.0	2020
25	69	20.6	45	7.2	56	13.3	0.10	2.5	83	28.3	1991	27	-2.8	1965	48	8.9	1990	61	16.1	2015	2.38	60.5	2010
26	68	20.0	45	7.2	56	13.3	0.10	2.5	84	28.9	1991	25	-3.9	1962	46	7.8	1957	60	15.6	2020	1.70	43.0	1997
27	68	20.0	45	7.2	56	13.3	0.10	2.5	82	27.8	1991	24	-4.4	1962	44	6.7	1957	62	16.7	2004	2.18	55.4	2006
28	68	20.0	45	7.2	56	13.3	0.10	2.5	86	30.0	1991	27	-2.8	2001*	50	10.0	2012*	63	17.2	2004	2.66	67.6	2020
29	67	19.4	44	6.7	56	13.3	0.10	2.5	83	28.3	2016	24	-4.4	1976	42	6.3	2017	65	18.3	2004	1.66	42.2	1970
30	67	19.4	44	6.7	55	12.8	0.11	2.8	85	29.4	2016	21	-6.1	1952	46	7.8	1954	65	18.3	2004	0.75	19.1	1976
31	67	19.4	43	6.7	55	12.8	0.11	2.8	83	28.3	1950	24	-4.4	1954	39	3.9	1993	62	16.7	2004	1.88	47.8	2019

Table 3-5, cont: Monthly-Daily Climate Normals (1991-2020) and Extremes (1947-2022) for Oak Ridge, Tennessee

NOVEMBER - Table of Climate Normals (1991-2020) and Extremes (1947-2022)

Oak Ridge, Tennessee

Day	Normal Temperatures						Record Temperatures															Record Precipitation		
	Max °F	Max °C	Min °F	Min °C	Avg °F	Avg °C	Precip (in)	Precip (mm)	Max °F	Max °C	Year	Min °F	Min °C	Year	Low Max °F	Low Max °C	Year	High Min °F	High Min °C	Year	Max (in)	Max (mm)	Year
01	66	18.9	42	5.6	54	12.2	0.12	3.0	85	29.4	2016	28	-2.2	1993	47	8.3	1954	64	17.8	1971	2.55	64.8	1967
02	66	18.9	42	5.6	54	12.2	0.12	3.0	83	28.3	1961	22	-5.6	1954	41	5.0	1966	66	18.9	1971	1.07	27.2	1992
03	65	18.3	41	5.0	54	12.2	0.13	3.3	82	27.8	2003*	17	-8.3	1954	38	3.3	1951	64	17.8	2004	2.48	63.0	1982
04	64	17.8	41	5.0	53	11.7	0.13	3.3	79	26.1	2003	21	-6.1	1966	39	3.9	1991	60	15.6	2017	3.16	80.3	2004
05	64	17.8	40	4.4	53	11.7	0.14	3.6	78	25.6	1948	17	-8.3	1991	41	5.0	1962	64	17.8	2003	1.13	28.7	2002
06	63	17.2	40	4.4	52	11.7	0.14	3.6	78	25.8	2022	20	-6.7	1982	39	3.9	1992	61	16.1	2003	1.95	49.5	1951
07	63	17.2	40	4.4	52	11.1	0.14	3.6	78	25.6	2022	21	-6.1	1967*	40	4.4	1951	58	14.4	1977	2.13	54.1	2017
08	62	16.7	39	3.9	51	10.6	0.15	3.8	79	26.3	1999*	20	-6.7	1953	40	4.4	1991	60	15.6	1989*	1.23	31.3	1962
09	62	16.7	39	3.9	51	10.6	0.15	3.8	79	26.1	2020	20	-6.7	1953	41	5.0	1968	51	10.6	2020*	2.31	58.9	2000
10	61	16.1	38	3.3	50	10.0	0.15	3.8	80	26.7	2020	26	-3.3	1973	41	5.0	1973	61	16.1	2002	2.42	61.5	2002
11	60	15.6	38	3.3	50	10.0	0.15	3.8	75	23.9	1989	24	-4.4	1987	40	4.4	1968	60	15.6	2020	2.54	64.5	2020
12	60	15.6	38	3.3	49	9.4	0.15	3.8	78	29.8	1989	20	-6.7	1987	38	3.3	1968	60	15.6	2003	1.75	44.5	1975
13	60	15.6	38	3.3	49	9.4	0.15	3.8	76	24.4	1989*	20	-6.7	2019*	36	2.0	2022	55	12.8	1955	0.81	20.6	2008
14	60	15.6	37	2.8	49	9.4	0.16	4.1	78	25.7	1999	20	-6.7	1986	36	2.2	1976	61	16.6	2011	1.28	32.5	1957
15	59	15.0	37	2.8	48	8.9	0.16	4.1	74	23.3	1964	17	-8.3	1969	38	3.3	1969	60	15.6	1993*	2.40	61.0	1989
16	59	15.0	37	2.8	48	8.9	0.16	4.1	74	23.3	1991*	20	-6.7	1982	38	3.3	1970	59	15.0	1958	2.56	65.0	1957
17	59	15.0	36	2.2	48	8.9	0.16	4.1	80	26.7	1958	19	-6.9	1997	37	2.8	1951	60	15.6	1964	2.25	57.2	1957
18	59	15.0	36	2.2	48	8.9	0.16	4.1	77	25.0	2016*	20	-6.7	2022*	33	0.6	2014	61	16.1	1957	1.51	38.4	2003
19	59	15.0	36	2.2	48	8.9	0.17	4.3	80	26.7	1985	17	-8.3	2022*	36	2.2	1951	55	12.8	2004*	3.10	78.8	1948
20	59	15.0	36	2.2	47	8.3	0.17	4.3	74	23.3	1992*	17	-8.3	1951	40	4.4	1984*	56	13.3	1991	0.95	24.1	1983
21	59	15.0	36	2.2	47	8.3	0.17	4.3	73	22.8	2007*	17	-8.3	2022	35	1.7	1981	58	14.4	2011*	1.79	45.5	1965
22	58	14.4	35	1.7	47	8.3	0.17	4.3	74	23.5	2011*	17	-8.6	2008*	39	3.9	2008	56	13.3	2011*	1.81	46.0	1977
23	58	14.4	35	1.7	47	8.3	0.17	4.3	74	23.5	1999	17	-8.3	1976	36	2.2	1989	56	13.3	2004*	1.80	45.7	2019
24	58	14.4	35	1.7	46	7.8	0.18	4.6	74	23.3	1958	3	-16.1	1950	23	-5.0	1950	56	13.3	1973	1.74	44.2	2004
25	57	13.9	35	1.7	46	7.8	0.18	4.6	75	23.9	1958	3	-16.1	1950	12	-11.1	1950	51	10.6	1986	1.35	34.3	1999
26	57	13.9	35	1.7	46	7.8	0.18	4.6	69	20.6	1988	12	-11.1	1950	35	1.7	1977	56	13.3	1985	3.13	78.5	1973
27	57	13.9	34	1.1	46	7.8	0.18	4.6	79	26.1	1990	21	-6.1	1974	34	1.1	1977	61	16.1	1985	4.98	126	1973
28	56	13.3	34	1.1	45	7.2	0.19	4.8	75	23.9	2001	18	-7.8	1955	31	-0.6	1950	56	13.3	1985	3.20	81.3	1948
29	56	13.3	34	1.1	45	7.2	0.19	4.8	76	24.4	2001	15	-9.4	1955	32	0.0	1959	55	12.8	2001	1.67	42.4	2015
30	56	13.3	34	1.1	45	7.2	0.19	4.8	73	22.5	1998	10	-12.2	1976	32	0.0	1976	54	12.2	2006	4.16	105.7	2016

Table 3-5, cont: Monthly-Daily Climate Normals (1991-2020) and Extremes (1947-2022) for Oak Ridge, Tennessee

DECEMBER - Table of Climate Normals (1991-2020) and Extremes (1947-2022)

Oak Ridge, Tennessee

Day	Normal Temperatures						Record Temperatures														Record Precipitation		
	Max °F	Max °C	Min °F	Min °C	Avg °F	Avg °C	Precip (in)	Precip (mm)	Max °F	Max °C	Year	Min °F	Min °C	Year	Low Max °F	Low Max °C	Year	High Min °F	High Min °C	Year	Max (in)	Max (mm)	Year
01	55	12.8	34	1.1	45	7.2	0.19	4.8	70	21.1	2006	14	-10.0	1976*	34	1.1	1979	58	14.4	2015*	3.09	78.5	1991
02	55	12.8	34	1.1	44	6.7	0.19	4.8	75	23.9	1982*	18	-7.8	1985*	36	2.2	1974*	58	14.4	1991*	2.20	55.9	1991
03	55	12.8	34	1.1	44	6.7	0.19	4.8	77	25.0	1982	17	-8.3	1985*	32	0.0	1989	50	10.0	1982	1.52	38.6	1983
04	54	12.2	34	1.1	44	6.7	0.19	4.8	78	25.6	1982	14	-10.0	1989	36	2.2	1991*	57	13.9	1982*	4.89	124	1993
05	54	12.2	34	1.1	43	6.1	0.19	4.8	72	22.2	2013	18	-7.8	1991	37	2.8	2018	58	14.4	2013	1.56	39.6	1954
06	53	11.7	34	1.1	43	6.1	0.19	4.8	74	23.2	1998	12	-11.1	1984	31	-0.6	1962*	58	14.4	1956	2.10	53.4	1971
07	53	11.7	34	1.1	43	6.1	0.19	4.8	75	23.9	1998	7	-13.9	1977	26	-3.3	1977	57	13.9	2001	2.97	75.5	1957
08	52	11.1	34	1.1	43	6.1	0.19	4.8	72	22.2	1978*	14	-10.0	1984	32	0.0	2006	61	16.1	1951*	2.60	66.0	1998
09	52	11.1	33	0.6	43	6.1	0.19	4.8	73	22.8	1966	14	-10.0	2006*	36	2.2	1992*	59	15.0	2012	2.65	67.3	1953
10	51	10.6	33	0.6	42	5.6	0.19	4.8	73	23.3	2007	6	-14.5	1995	30	-1.1	1977	52	11.1	1967*	2.41	61.2	1972
11	51	10.6	33	0.6	42	5.6	0.19	4.8	75	23.9	2007	7	-13.9	1962	29	-1.7	1962	53	11.7	2015	2.16	54.9	2008
12	51	10.6	33	0.6	42	5.6	0.18	4.6	70	21.1	2015	0	-17.8	1962	10	-12.2	1962	54	12.2	2015*	3.28	83.3	1956
13	51	10.6	33	0.6	42	5.6	0.18	4.6	70	21.1	2015	-3	-19.4	1962	23	-5.0	1962	56	13.3	1956*	3.04	77.2	1956
14	51	10.6	33	0.6	42	5.6	0.18	4.6	72	22.2	1984	12	-11.1	1985	27	-2.8	2010	56	13.3	1956	2.75	69.9	1951
15	51	10.6	33	0.6	42	5.6	0.18	4.6	71	21.7	1971	12	-11.1	1989*	29	-1.7	2010*	60	15.6	1948	1.45	36.8	1947
16	51	10.6	33	0.6	42	5.6	0.18	4.6	70	21.1	2021	3	-16.1	1989	22	-5.6	1989	52	11.1	1971	1.88	47.8	1961
17	51	10.6	32	0.0	42	5.6	0.18	4.6	68	20.0	1984	12	-11.1	1972*	28	-2.2	1989*	54	12.2	2021	2.26	57.2	1961
18	50	10.0	32	0.0	41	5.0	0.17	4.3	72	22.2	1984	7	-13.9	1953	28	-2.2	1981	52	11.1	2021	2.30	58.4	1967
19	50	10.0	32	0.0	41	5.0	0.17	4.3	65	18.3	1967	4	-15.6	1963	29	-1.7	1981	59	15.0	1967*	1.19	30.0	2002
20	50	10.0	32	0.0	41	5.0	0.17	4.3	70	21.1	1978	2	-16.7	1981	26	-3.3	1963	55	12.8	1967	2.05	52.1	1951*
21	49	9.4	31	-0.6	40	4.4	0.17	4.3	72	22.2	2013	7	-13.9	1985	28	-2.2	1976	56	13.3	1956*	0.92	23.4	1962
22	49	9.4	31	-0.6	40	4.4	0.17	4.3	67	19.4	2013	-2	-18.9	1989	10	-12.2	1989	57	13.9	1956	3.63	92.2	1990
23	49	9.4	31	-0.6	40	4.4	0.16	4.1	68	20.0	1970*	-1	-18.3	1989	16	-8.9	1989	57	13.9	1956	1.96	49.8	1990
24	49	9.4	31	-0.6	40	4.4	0.16	4.1	75	23.9	2015	-2	-18.9	1983*	22	-5.4	2022	60	15.6	2015	1.84	46.8	1977
25	49	9.4	31	-0.6	40	4.4	0.16	4.1	74	23.3	1982	-7	-21.7	1983*	13	-10.6	1983	61	16.1	2015	2.28	57.9	2015
26	49	9.4	31	-0.6	40	4.4	0.16	4.1	74	23.3	2015	1	-17.2	1983	22	-5.6	1983	61	16.1	2015	2.80	71.1	1973
27	49	9.4	31	-0.6	40	4.4	0.16	4.1	76	24.4	2015	8	-13.3	2022	25	-3.9	2022	58	14.4	2015	1.37	34.8	1990
28	49	9.4	31	-0.6	40	4.4	0.16	4.1	73	22.8	2021	9	-12.8	1977*	32	0.0	1977	58	14.4	2015	2.00	50.8	1954
29	49	9.4	30	-1.1	40	4.4	0.16	4.1	69	20.6	2019*	10	-12.2	1961	25	-3.9	1961	56	13.3	2021	2.87	72.9	1954
30	49	9.4	30	-1.1	40	4.4	0.16	4.1	68	20.0	2019*	6	-14.4	1983*	20	-6.7	1983	53	11.9	1996	4.11	104	1969
31	49	9.4	30	-1.1	40	4.4	0.16	4.1	70	21.2	2018*	5	-15.0	1983*	31	-0.7	2017*	56	13.3	1951*	1.61	40.9	1988

Table 3-5, cont: Monthly-Daily Climate Normals (1991-2020) and Extremes (1947-2022) for Oak Ridge, Tennessee

Phenomena	Frequency (Days or Hours /Year)
Lightning	50 Days
Heat Stress	400 Hours
Cold Stress/Wind Chill	100-200 Hours
Winter Weather / Icing	2 to 5 Days
Severe Storms / Weather Advisories	40 to 50 Days
High Winds	5 to 15 Days
Smoke / Fire	Infrequent / Variable

Table 3-6: Weather-Related Safety Requirements on the Oak Ridge Reservation

Site	Status	Altitude (m)	Heights AGL (m)	All Measurements
ORNL Tower "A"	Active	266	2, 15, 30	2m – Air Pressure, Precipitation 15m – Temperature, Relative Humidity, Wind 30m – Temperature, Relative Humidity, 3D Wind
ORNL Tower "B"	Active	255	15, 30	15m – Temperature, Relative Humidity, Wind 30m – Temperature, Relative Humidity, 3D Wind
ORNL Tower "D"	Active	261	2, 15, 35, 60	2m – Temperature, Relative Humidity, Air Pressure, Precipitation 15m – Temperature, Relative Humidity, 3D Wind 35m – Temperature, 2D Wind 60m – Temperature, 2D Wind, 3D Wind
ORNL Tower "F"	Active	354	2, 10	2m – Air Pressure, Solar Radiation, Precipitation 10m – Temperature, Relative Humidity, 3D Wind
Y-12 Tower "J"	Active	237	20	20m – Temperature, Air Pressure, 3D Wind, Precipitation
ETTP Tower "K"	Retired	263	2, 10, 60	2m – Air Pressure, Precipitation 10m – Temperature, Relative Humidity, 3D Wind, Solar Radiation 60m – Temperature, 3D Wind
ETTP Tower "L"	Retired	244	2, 15, 30	2m – Temperature, Relative Humidity, Air Pressure 15m – Temperature, Solar Radiation, 3D Wind 30m – Temperature, 3D Wind
Y-12 Tower "S"	Active	352	25	25m – Temperature, Air Pressure, 3D Wind
Y-12 Tower "W"	Active[a]	326	2, 10, 30, 60	2m – Temperature, Relative Humidity, Precipitation 10m – Temperature, 3D Wind, Solar Radiation 30m – Temperature, 3D Wind 60m – Temperature, 3D Wind
Y-12 Tower "Y"	Active	290	2, 15, 33	2m – Temperature, Relative Humidity, Solar Radiation, Precipitation 15m – Temperature, 3D Wind 33m – Temperature, 3D Wind
ORNL Sodar "DS"	Partial	262	40-800	40-800m 3D Wind
Y-12 Sodar "YS"	Active	359	40-800	40-800m 3D Wind
ORNL Lidar "Q"	Active	235	2, 40-380	2m – Temperature, Relative Humidity, Air Pressure 40-380m 3D Wind

[a] Offline January 2022-mid-2023

Table 3-7: Instrument Heights and Complement for Meteorological Towers and Wind Profilers on the Oak Ridge Reservation as of May 2023

Fujita Scale			Enhanced Fujita Scale	
	Fastest ¼ mile	3 Second Gust		3 Second Gust
F0	40-72	45-78	EF0	65-85
F1	73-112	79-117	EF1	86-110
F2	113-157	118-161	EF2	111-135
F3	158-207	162-209	EF3	136-165
F4	208-260	210-261	EF4	166-200
F5	261-318	262-317	EF5	>200

Table 3-8: Comparison of Fujita and Enhanced Fujita Tornado Intensity Scale in mph

	<25 km	<50 km	<100 km	<200 km	<300 km		Total
EF0	2	1	9	14	18		44
EF1	0	0	4	10	22		36
EF2	1	0	1	7	10		19
EF3	0	0	1	0	3		4
EF4	0	0	0	4	3		7
EF5	0	0	0	0	0		0
F0	0	1	9	10	15		35
F1	2	1	9	15	23		50
F2	1	0	14	12	22		49
F3	1	4	2	19	8		34
F4	0	0	0	3	4		7
F5	0	0	0	0	0		0
Total	**7**	**7**	**49**	**94**	**128**		**285**

Table 3-9: Documented Tornadoes within 300 km of the Oak Ridge Reservation Enhanced Fujita and Fujita Scale 1885-2012*

	<25 km	<50 km	<100 km
EF0	0	1	1
EF1	0	0	2
EF2	0	0	2
EF3	0	0	1
EF4	0	0	0
EF5	0	0	0

Table 3-10: Documented Tornadoes within 100 km of the Oak Ridge Reservation Enhanced Fujita and Fujita Scale 2013-2022

	<25 km	<50 km	<100 km
EF0	2	3	19
EF1	2	1	15
EF2	1	0	10
EF3	1	0	9
EF4	1	4	2
EF5	0	0	0
Total	7	8	55

Table 3-11: Documented Tornadoes within 35 km of the Oak Ridge Reservation Enhanced Fujita Scale 1885-2022*

Date	Time (LST)	Dead	Injured	Path Length (miles)	Rating	Location
05/02/1953	0300	0	2	10.0	F2	Claxton
04/04/1974	0130	0	0	8.7	F0	Norris to Ridenour
02/21/1993	0435	0	3	10.0	F3	Oak Ridge to S Clinton
11/10/2002	2100	0	0	5.5	F2	Briceville to Medford
06/24/2011	0000	0	0	1.5	EF1	Edgemoor

Source: National Weather Service, Morristown, TN

Table 3-12: Documented tornadoes for Anderson County, Tennessee

Date	Time (LST)	Dead	Injured	Path Length (miles)	Rating	Location
05/02/1953	0300	0	2	10.0	F2	Powell
04/15/1965	0530	0	6	7.4	F2	Concord/Bearden
04/04/1974	0030	2	21	4.0	F2	Sunrise/Skaggston
05/27/1981	1940	0	0	0.4	F0	Karns
02/21/1993	1705	0	0	6.0	F3	Powell/Northbrook
06/30/1993	1900	0	1	2.0	F0	Halls Crossroads
06/30/1993	1942	0	0	1.0	F0	Knoxville
05/18/1995	2100	0	0	2.0	F1	Fountain City
05/23/2000	1605	0	1	0.5	F1	Powell
05/15/2003	1710	0	0	1.0	F1	S Knoxville
05/15/2003	1715	0	0	1.3	F1	S Knoxville
04/27/2011	2000	0	0	1.0	EF1	S Knoxville
04/27/2011	2142	0	0	1.0	EF0	Farragut
06/24/2011	0020	0	0	1.0	EF0	Knoxville
03/02/2012	2133	0	0	0.3	EF0	Near Farragut
03/02/2012	2200	0	0	2.1	EF0	Near Mascot

Source: National Weather Service, Morristown, TN

Table 3-13: Documented tornadoes for Knox County, Tennessee

Date	Time (LST)	Dead	Injured	Path Length (miles)	Rating	Location
01/25/1908	?	0	0	2.0	F2	Near Philadelphia
03/17/1965	1247	0	0	0.1	F1	Near Morganton
04/03/1974	1700	0	2	2.0	F2	Near Greenback
05/07/1974	1820	0	0	1.0	F2	Loudon
02/21/1993	1710	1	55	15.0	F3	Eaton Forest to Disco
05/18/1995	2200	0	0	8.0	EF1	Near Greenback
04/25/2010	0055	0	0	8.0	EF1	Near Greenback
03/23/2011	2050	0	1	2.2	EF1	Near Greenback
04/27/2011	1900	0	0	1.0	EF0	Near Greenback

Source: National Weather Service, Morristown, TN

Table 3-14: Documented tornadoes for Loudon County, Tennessee

Date	Time (LST)	Dead	Injured	Path Length (miles)	Rating	Location
10/02/1977	0015	0	0	0.2	F0	Near Midway
02/21/1993	1705	0	0	1.5	F3	Near New Midway to Oral
02/21/1993	1720	0	0	3.0	F1	Near Midway to Paintrock
06/22/2011	1740	0	0	0.1	EF0	Dogwood
06/10/2014	1706	0	0	0.5	EF0	Between Kingston and Lenoir City

Source: National Weather Service, Morristown, TN

Table 3-15: Documented tornadoes for Roane County, Tennessee

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	13.3	12.3	**16.3**	14.7	12.5	9.3	14.2	13.9	12.4	13.6	15.1	10.4	8.3	7.6	14.4	7.5	10.1	9.0	13.1	10.7	11.2	11.6	15.7	8.8	13.7
Feb	15.7	13.5	13.9	15.9	14.4	**17.2**	12.2	9.2	12.7	13.6	16.3	14.5	7.9	14.3	13.9	9.7	12.1	13.5	14.4	12.1	13.3	12.6	10	13.5	14.1
Mar	17.0	13.7	13.3	14.4	17.5	11.4	15.1	12.1	12.4	12.1	13.8	11.0	10.6	11.1	12.1	10.7	12.4	10.8	15.4	14.1	13.1	13.7	12.7	12.1	**18.1**
Apr	15.2	15.8	16.2	11.3	13.6	13	12.5	11.7	12.2	11.5	15.5	10.9	13.2	15.5	11.5	11.7	11.6	11.3	12.9	12.2	15.4	**18.5**	13.9	10.6	11.7
May	12.2	12.1	**15.3**	12.4	11.6	10.9	9.9	8.6	9.5	8.8	13.0	9.0	12.4	9.9	7.4	8.7	11.7	8.7	9.0	12.7	8.8	11.6	9.7	13.5	11.6
Jun	11.3	11.1	12.3	9.9	9.7	9.4	9.2	9.6	7.9	9.4	9.7	7.6	7.5	10.8	8.9	8.3	8.7	9.5	9.1	**14.3**	10.9	10.7	11.2	11.5	8.7
Jul	8.6	10.3	10.6	8.8	9.0	10.0	16.9	9.8	9.2	8.0	8.2	9.1	6.9	8.4	**18.2**	7.8	9.9	8.9	9.3	8.4	10.0	9.4	8.0	10.2	10.3
Aug	8.4	9.1	10.7	9.8	8.2	8.0	12.1	**14.9**	7.8	9.4	6.9	8.7	7.6	8.1	5.9	6.5	6.5	8.3	11.1	7.7	11.3	8.7	12.3	7.5	7.6
Sep	9.4	10.1	9.5	9.4	10.5	9.0	10.6	7.2	8.3	7.5	12.4	6.3	6.4	10.8	6.4	8.0	7.6	7.1	9.8	**13.9**	10.1	8.6	10.7	7.4	9.9
Oct	12.1	10.0	7.5	12.3	**15.5**	10.1	9.8	9.2	9.9	9.1	7.8	9.5	14.2	9.3	9.8	10.5	8.4	9.1	10.4	11.1	10.5	12.7	10.1	8.9	9.0
Nov	15.1	11.0	12.2	11.1	**16.0**	12.9	12.5	10.2	10.6	10.8	9.0	8.9	12.5	12.5	10.6	11.5	12.6	10.3	10.8	13.9	11.3	8.7	12.9	12.3	12.7
Dec	13.6	13.4	10.6	15.3	10.2	13.6	14.2	10.9	15.9	10.4	15.2	12.9	9.2	10.9	12.1	10.5	8.4	11.7	**18.4**	15.9	13.2	12.5	9.7	14.7	11.3
Year	17.0	15.8	16.3	15.9	17.5	17.2	16.9	14.9	15.9	13.6	16.3	14.5	14.2	15.5	18.2	11.7	12.6	13.5	18.4	15.9	15.4	**18.5**	15.7	14.7	18.1

Table 3-16: Fastest 1-hour Wind Speed (mph) at ORNL Tower "A" at 10/15 m from 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	16.3	16.8	19.4	19.4	15.6	13.5	17.6	17.6	16.0	17.8	18.8	15.6	12.9	12.0	18.4	11.8	16.0	10.5	15.4	13.4	16.1	15.5	**19.5**	13.0	17.6
Feb	18.9	16.8	17.2	21.9	17.9	21.2	15.5	15.5	17.6	18.0	**22.4**	19.2	14.8	21.1	19.2	14.8	16.5	17.5	17.7	15.3	16.1	17.0	13.4	17.2	17.6
Mar	19.9	15.2	19.6	20.3	21.2	14.1	19.1	16.2	16.1	19.5	19.4	14.8	13.2	14.9	16.0	18.9	17.6	16.1	18.0	17.3	16.8	17.4	16.0	15.3	**22.6**
Apr	17.5	20.6	20.2	14.8	16.8	15.6	15.7	15.2	16.1	14.7	20.8	16.0	17.7	21.6	15.5	16.5	15.8	16.8	17.0	15.3	19.3	**24.0**	17.2	14.1	14.8
May	14.7	14.7	**18.3**	15.1	14.2	15.0	12.6	10.6	12.7	12.3	17.7	12.8	16.4	13.6	10.5	11.8	16.4	12.2	11.0	16.2	10.8	14.8	12.9	17.8	14.7
Jun	14.3	13.7	14.7	12.5	12.8	12.1	13.8	13.2	11.4	12.1	11.7	10.2	10.3	13.8	12.4	11.8	12.4	13.5	13.3	**17.3**	13.0	12.9	13.7	13.8	10.9
Jul	12.0	11.9	13.5	14.8	13.3	12.2	10.6	13.1	13.6	11.2	10.8	11.7	9.4	12.5	**26.7**	10.2	13.2	12.5	12.1	10.8	12.8	11.6	9.6	12.1	12.4
Aug	10.4	11.1	**19.5**	12.4	11.2	10.0	14.9	19.3	10.2	11.9	11.2	11.9	9.6	10.4	8.9	8.6	9.7	12.2	13.3	9.6	13.3	10.4	15.9	9.8	9.9
Sep	11.9	13.0	14.6	12.8	13.4	11.1	15.3	9.2	12.5	9.2	16.2	10.4	10.5	14.7	11.3	10.3	10.8	9.1	12.8	**17.3**	12.4	10.8	13.5	9.4	12.3
Oct	15.7	13.1	10.6	16.1	**20.5**	17.5	14.7	12.6	12.9	12.7	11.0	12.9	19.2	13.2	13.1	14.4	12.1	11.2	13.5	13.8	13.1	16.3	13.6	10.6	11.8
Nov	18.6	15.6	16.8	14.6	20.1	16.5	15.3	**25.1**	13.8	14.2	11.9	11.7	17.4	16.5	14.3	16.0	17.6	13.5	14.8	18.7	15.5	13.9	16.7	14.4	17.2
Dec	16.7	15.6	15.4	19.0	15.0	17.0	17.7	15.6	22.0	16.2	19.9	20.7	12.5	15.0	16.7	15.0	12.0	14.0	**22.4**	19.4	16.4	17.3	12.7	18.7	18.7
Year	19.9	20.6	20.2	21.9	21.2	21.2	19.1	25.1	22.0	19.5	22.4	20.7	19.2	21.6	**26.7**	18.9	17.6	17.5	22.4	19.4	19.3	24.0	19.5	18.7	22.6

Table 3-17: Fastest 1-hour Wind Speed (mph) at ORNL Tower "A" at 30 m from 1998-2022

Year	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	10.1	9.3	10.9	13.6	12	9.9	14.2	13.4	13.5	12.0	10.8	**14.7**	13.1	14.3	12.7	11.7	10.3	14.1	14.2	11.6	10.7	13.3
Feb	10.4	11.3	11.7	10.0	10.7	7.3	10.6	11.9	11.9	13.4	14.3	14.7	14.2	10.4	**16.6**	12	11.9	10	15.4	11.3	11.7	14.3
Mar	13.1	11.8	9.7	13.8	12.6	10.8	10.1	12.2	10.3	10.3	11.2	13.5	15.1	**16.3**	11.3	10.7	12.8	12.3	13.5	11.9	12.6	15.3
Apr	12.5	10.5	9.7	11.2	11.6	13.5	10.9	11.3	12.9	12.0	12.2	10.9	10.7	12.3	12.8	14.7	12.1	12.8	**16.5**	12.1	12.3	13.2
May	8.7	9.9	10.3	7.6	8.8	9.6	9.3	**13.6**	8.0	10.9	9.4	7.2	9.8	11.4	9.5	9.8	11.6	9.7	9.6	10.6	13.4	9.4
Jun	7.5	8.0	7.5	7.3	6.9	**12.0**	7.8	9.0	8.1	8.1	8.9	9.2	8.9	8.5	9.9	7.7	8.4	8.1	10.1	9.5	9.1	9.5
Jul	7.5	7.3	7.0	7.4	6.8	12.6	8.1	6.9	7.4	7.4	6.9	**13.7**	6.3	9.6	9.2	9.2	9.1	8.6	8.2	9.1	8.7	10.0
Aug	7.1	7.7	6.4	7.9	7.4	9.0	7.6	6.8	7.0	6.6	9.7	7.5	6.8	7.0	8.2	7.9	8.0	8.8	9.5	**10.2**	8.8	9.8
Sep	9.1	8.0	8.2	10.3	7.7	11.0	7.0	7.2	10.6	9.3	8.7	9.0	6.6	8.1	7.6	10.7	**13.5**	10.6	5.8	11.0	8.7	11.8
Oct	12.0	9.8	12.8	10.8	9.7	12.1	7.8	8.9	9.1	11.0	12.0	9.9	10.6	9.8	9.4	11.4	9.9	9.4	11.4	**12.8**	12	10.7
Nov	9.0	13.8	10.6	10.3	10.7	10.6	8.7	10.7	9.8	12.6	9.8	8.4	10	**15.6**	12.2	12.6	15.3	13.6	11.9	12.8	10.4	12.7
Dec	13.1	12.2	15.7	11.1	9.7	12.8	11.5	9.8	16.4	11.9	10.4	14.3	10.4	10.4	9.6	12.3	12.2	11.4	14.1	11.0	11.2	**18.3**
Year	17.0	17.5	17.2	16.9	14.9	15.9	13.6	16.3	14.5	14.2	15.5	18.2	15.1	16.3	16.6	14.7	15.3	14.1	16.5	12.8	13.4	**18.3**

Table 3-18: Fastest 1-hour Wind Speed (mph) at ORNL Tower "B" at 10/15 m from 2001-2022

Year	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	14.3	13.3	14.8	14.5	15.3	16.1	17.0	20.9	**21.8**	16.1	14.4	19.6	17.5	18.5	16.5	15.7	13.5	17.7	17.4	15.1	13.1	15.7
Feb	15.4	15.9	17.1	16.1	15.1	13.9	16.2	18.1	16.9	16.3	19.7	18.8	18.1	14.2	**21.1**	16.2	14.9	12.3	18.5	13.7	14.6	17.5
Mar	18.3	16.8	13.2	17.8	17.6	13.0	15.9	18.0	15.7	12.7	15.0	18.4	**20.0**	19.8	14.5	13.5	16.3	15.4	16.0	15.0	15.9	19.1
Apr	15.4	14.1	13.2	15.6	15.4	18.5	16.0	16.1	19.8	16.1	16.0	14.3	13.0	11.5	17.2	18.9	15.6	16.3	**20.0**	15.1	15.7	16.4
May	12.7	14.5	14.5	12.1	12.1	13.8	14.4	**21.7**	12.8	14.0	13.5	9.3	12.7	15.2	12.6	12.5	16.1	12.0	11.8	13.7	15.9	11.8
Jun	11.6	12.9	11.5	9.5	11.6	12.5	11.2	12.1	12.4	10.5	12.2	13.1	12.8	12.6	**13.4**	10.6	10.8	9.8	12.2	12.4	11.4	10.9
Jul	11.9	11.9	12.7	10.5	10.4	15.0	13.8	10.8	11.5	10.1	9.4	**19.1**	9.2	13.1	12.6	13.0	11.6	11.4	10.2	11.2	10.8	12.6
Aug	9.8	12.2	9.3	10.9	**13.6**	10.2	12.1	12.2	11.3	9.7	11.8	9.3	9.7	9.4	10.5	10.9	9.8	7.7	12.0	13.0	10.7	11.3
Sep	14.8	12.0	11.1	16.2	9.2	11.3	11.7	13.2	13.1	12.7	11.5	12.1	8.9	11.0	10.1	14.3	**18.4**	13.3	6.7	14.4	11.0	13.9
Oct	16.6	13.9	**17.9**	15.2	11.6	12.7	11.2	13.0	11.9	14.4	15.6	12.8	13.6	12.6	12.4	14.7	12.5	11.6	14.1	16.0	14.2	13.0
Nov	13.2	19.1	15.2	14.5	14.4	13.8	13.1	16.0	12.2	17.0	12.3	11.3	14.0	**20.2**	16.2	16.8	19.1	17.1	15.4	15.9	12.6	15.9
Dec	18.6	17.9	16.9	16.1	13.7	19.7	18.1	14.1	22.2	15.4	14.6	19.3	13.0	14.6	12.2	15.4	16.3	13.1	17.7	13.1	13.5	**22.4**
Year	18.6	19.1	17.9	17.8	17.6	19.7	18.1	21.7	22.2	17.0	19.7	19.6	20.0	20.2	21.1	18.9	19.1	17.7	20.0	16.0	15.9	**22.4**

Table 3-19: Fastest 1-hour Wind Speed (mph) at ORNL Tower "B" at 30 m from 2001-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	12.1	13.5	13.8	14.0	12.9	11.2	13.2	12.2	12.4	12.2	13.3	**15.5**	11.9	9.3	12.0	11.4	13.1	13.2	13.1	12.1	11.5	11.9	13.7	10.7	12.8
Feb	12.9	12.3	11.2	15.1	14.1	15.6	10.1	10.7	13.1	13.5	**15.8**	13.6	10.5	14.6	15.2	12.5	11.5	14.9	15.6	12.6	11.7	14.6	11.1	13.1	15.7
Mar	14.6	11.2	15.2	13.5	15.2	11.4	13.2	13.0	12.5	**17.0**	13.9	12.5	9.7	11.1	11.9	13.4	15.9	11.7	12.1	12.7	13.0	13.0	12.8	13.6	16.8
Apr	13.8	**17.8**	15.0	12.6	13.1	11.3	12.2	11.9	13.4	12.1	14.7	13.1	13.8	16.1	11.8	11.0	12.7	12.2	15.8	12.1	13.7	16.8	12.6	12.1	12.6
May	11.1	10.5	11.8	11.4	11.1	11.4	10.1	11.7	10.7	8.5	14.4	9.3	10.9	9.4	6.9	8.6	9.7	9.4	9.2	**20.8**	9.0	11.6	11.6	13.0	11.8
Jun	**11.7**	10.3	10.4	9.1	9.1	9.6	7.4	9.5	8.7	8.7	8.9	8.6	8.0	8.0	8.0	9.3	9.2	10.2	10.0	11.1	8.6	9.7	9.9	10.8	8.7
Jul	8.5	10.0	9.1	8.3	9.7	9.3	8.0	9.3	9.5	9.8	8.2	8.2	7.8	9.8	**11.8**	6.7	10.1	9.9	10.4	7.8	7.7	8.2	7.8	9.2	9.0
Aug	7.3	8.7	8.3	9.1	8.3	7.0	7.5	**12.2**	8.1	9.5	8.0	6.9	6.8	8.3	6.7	8.1	7.6	9.1	11.2	8.0	7.9	7.1	10.4	6.6	8.2
Sep	8.8	9.6	10.8	10.5	11.2	8.7	9.8	8.3	9.6	8.6	11.2	8.5	7.3	9.4	8.3	7.5	7.2	7.5	9.3	**11.4**	9.3	7.1	9.7	7.8	8.9
Oct	8.7	10.5	8.6	12.8	**13.1**	12.9	11.4	8.8	10.5	9.1	9.2	8.9	13.0	9.5	9.2	9.2	8.7	9.2	10.6	10.1	10.4	11.0	12.2	9.8	10.5
Nov	11.2	10.5	12.2	11.0	13.6	11.7	11.7	**19.3**	10.7	10.5	9.0	8.4	12.4	10.7	10.5	10.9	13.7	13.0	12.2	13.4	12.2	10.7	12.7	10.8	14.1
Dec	11.8	12.4	11.4	16.0	11.9	13.0	14.9	10.9	17.1	12.6	11.3	**17.2**	10.9	10.4	12.8	10.0	8.6	12.6	13.9	13.9	12.7	15.8	11.1	13.4	14.5
Year	14.6	17.8	15.2	16.0	15.2	15.6	14.9	19.3	17.1	17.0	15.8	17.2	13.8	16.1	15.2	13.4	15.9	14.9	15.8	**20.8**	13.7	16.8	13.7	13.6	16.8

*10m 1998-Apr 2014 / 15m-Apr 2014-2022

Table 3-20: Fastest 1-hour Wind Speed (mph) at ORNL Tower "C/D" at 10/15 m* from 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	16.9	16.9	**23.0**	17.9	15.9	13.6	16.7	15.2	16.0	15.4	17.7	19.9	15.7	12.3	15.8	14.5	16.2	16.7	15.8	14.8	13.9	14.9	16.2	13.1	15.9
Feb	18.4	15.2	13.8	18.6	18.4	19.7	13.3	13.6	17.4	17.1	**21.0**	17.6	13.8	19.2	20.2	16.6	15.0	17.5	19.6	15.8	13.8	18.2	13.3	15.7	19.9
Mar	20.4	13.9	18.3	17.0	19.1	14.2	16.5	15.5	15.7	**21.4**	18.7	16.7	13.0	15.2	16.1	17.6	18.6	14.5	14.4	15.4	14.6	15.6	15.4	16.3	20.6
Apr	19.3	**21.5**	18.7	14.9	15.7	13.8	15.6	15.3	16.8	15.1	19.0	17.3	18.5	20.6	16.4	14.9	15.8	15.2	18.8	14.5	16.0	21.1	16.1	14.9	15.3
May	15.4	13.0	14.9	14.9	14.2	14.8	13.8	10.7	14.0	11.3	19.6	12.7	14.7	13.0	9.1	11.7	13.1	11.0	11.9	**23.0**	12.0	14.8	14.8	16.3	14.8
Jun	**16.9**	13.2	12.6	12.5	12.3	12.6	14.0	11.7	11.6	12.0	12.0	12.1	10.7	10.8	10.9	13.3	14.6	13.8	13.3	14.5	10.8	12.4	12.5	13.7	10.1
Jul	12.3	13.1	11.3	11.1	13.7	12.1	10.9	12.3	13.3	13.4	11.1	11.6	10.6	12.9	**23.9**	9.8	16.9	12.9	13.4	11.1	9.9	10.3	10.2	11.8	12.1
Aug	10.3	10.2	11.1	11.2	11.3	9.9	10.0	**17.1**	11.0	12.9	9.9	13.9	9.5	10.7	9.1	9.9	11.1	11.7	14.2	9.8	9.2	9.3	14.2	11.3	12.0
Sep	11.8	12.0	14.3	12.3	15.7	11.3	16.6	10.1	13.0	9.7	15.9	11.3	9.8	12.5	10.6	7.9	10.4	10.2	12.8	**19.3**	11.9	8.4	12.7	10.3	12.2
Oct	15.9	12.9	9.3	16.6	16.5	17.1	14.9	11.3	14.5	12.2	11.6	12.3	**17.4**	13.1	12.8	11.8	12.2	12.7	12.6	12.5	12.8	13.6	15.9	11.9	12.0
Nov	15.4	12.9	15.1	14.1	17.3	15.3	14.4	**24.6**	13.3	14.0	12.1	11.7	16.6	14.2	13.1	15.5	18.8	16.2	15.7	17.4	14.5	13.3	15.8	12.9	17.6
Dec	14.8	15.3	14.7	20.1	15.0	16.6	19.2	14.6	**23.5**	16.4	14.6	22.9	14.2	14.2	17.6	13.4	12.5	15.4	16.9	17.5	15.6	19.3	14.3	16.5	18.1
Year	20.4	21.5	23.0	20.1	19.1	19.7	19.2	**24.6**	23.5	21.4	21.0	22.9	18.5	20.6	23.9	17.6	18.8	17.5	19.6	23.0	16.0	21.1	16.2	16.5	20.6

*30m 1998-Apr 2014 / 35m-Apr 2014-2022

Table 3-21: Fastest 1-hour Wind Speed (mph) at ORNL Tower "C/D" at 30/35 m* from 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	22.9	28.1	**29.9**	25.2	21.9	18.1	22.5	22.1	25.0	21.7	27.8	28.5	22.6	18.8	23.2	23.2	21.5	21.6	19.7	19.0	18.3	18.9	20.5	16.7	19.9
Feb	28.9	24.5	22.1	25.6	26.1	28.5	20.1	21.6	26.3	24.2	**30.7**	28.4	21.4	29.0	29.0	25.1	19.8	24.9	24.6	19.7	18.2	22.7	16.1	19.6	29.9
Mar	27.6	24.3	26.1	28.8	26.9	21.7	25.3	22.4	21.4	**30.8**	28.9	23.8	20.7	22.9	25.0	27.3	23.6	18.8	17.9	19.1	18.4	19.1	19.0	20.8	24.8
Apr	26.3	**31.9**	27.2	20.5	23.4	18.2	21.0	22.0	23.8	20.3	27.5	23.3	26.9	30.7	22.5	21.8	15.5	19.4	23.5	17.8	20.9	27.4	21.5	18.4	18.0
May	22.6	20.6	20.7	21.9	19.9	21.2	20.8	14.8	20.8	17.0	**29.6**	21.1	22.1	20.7	14.8	18.6	15.6	14.0	14.9	26.0	16.4	18.6	18.9	21.4	17.7
Jun	**23.2**	19.9	17.3	18.9	19.5	17.3	15.8	17.0	16.8	16.1	18.5	17.5	17.2	18.8	17.3	20.8	18.8	18.0	16.9	18.9	13.8	15.9	15.5	17.3	12.3
Jul	18.6	18.3	16.7	14.6	19.1	20.4	17.1	18.4	16.5	19.2	20.9	18.0	17.7	17.5	**39.8**	17.5	13.8	16.6	17.0	17.2	14.2	12.9	13.3	15.1	15.6
Aug	16.1	17.1	16.3	14.9	18.6	13.6	15.2	**26.6**	16.6	17.1	16.8	24.6	14.4	15.6	12.4	16.5	13.8	14.8	17.5	12.6	12.6	12.3	18.1	17.1	14.1
Sep	17.5	18.6	21.3	20.7	24.6	15.6	**29.0**	17.1	18.2	15.7	23.6	17.8	14.1	20.7	15.7	12.6	12.9	13.3	16.6	24.7	16.3	10.0	15.6	14.8	14.9
Oct	23.8	17.3	14.6	**25.7**	25.1	25.7	21.0	17.7	22.3	16.8	17.0	17.9	25.3	19.2	18.7	20.3	15.2	16.9	15.5	15.6	17.4	18.0	20.3	14.8	13.9
Nov	23.7	20.3	21.1	21.3	**25.8**	23.1	21.7	24.6	19.0	21.8	19.5	16.4	25.3	20.9	17.4	24.7	23.0	20.0	19.9	23.4	18.9	17.0	20.2	16.3	21.2
Dec	23.9	22.1	22.7	28.2	21.7	24.7	27.0	22.9	**35.1**	24.7	23.4	32.4	20.9	20.9	26.5	19.9	15.0	19.0	22.3	22.4	21.1	24.2	18.0	21.6	22.2
Year	28.9	31.9	29.9	28.8	26.9	28.5	29.0	26.6	35.1	30.8	30.7	32.4	26.9	30.7	**39.8**	27.3	23.6	24.9	24.6	26.0	21.1	27.4	21.5	21.6	29.9

*100m 1998-Apr 2014 / 60m-Apr 2014-2022

Table 3-22: Fastest 1-hour Wind Speed (mph) at ORNL Tower "C/D" at 100/60 m* from 1998-2022

Year	18	19	20	21	22
Jan	12.3	16.1	**22.5**	10.6	18.1
Feb	19.1	17.6	12.8	11.5	**22.4**
Mar	15.4	17.6	16.4	14.5	**18.0**
Apr	16.9	**25.7**	16.7	12.2	18.0
May	10.7	17.2	13.3	**18.0**	12.0
Jun	12.5	**13.3**	10.1	14.4	9.7
Jul	11.1	11.9	9.9	**12.3**	10.7
Aug	11.3	10.7	**17.1**	10.9	9.7
Sep	11.5	8.8	**13.4**	9.9	11.2
Oct	14.3	**14.9**	14.2	10.3	10.3
Nov	**16.2**	11.7	16.0	10.8	15.2
Dec	**18.0**	17.0	11.9	16.3	12.0
Year	17.0	**25.7**	22.5	18.0	22.4

Table 3-23: Fastest 1-hour Wind Speed (mph) at ORNL Tower "F" at 10 m from 2018-2022

Year	17	18	19	20	21	22
Jan		**22.2**	21.6	17.0	19.3	19.6
Feb		15.7	**24.5**	18.8	17.7	22.2
Mar	22.0	18.7	18.5	20.7	21.9	**24.8**
Apr	19.5	19.7	**23.9**	18.8	18.6	18.3
May	**21.8**	13.1	16.8	18.6	20.3	17.0
Jun	15.8	14.7	16.4	16.6	15.7	**17.5**
Jul	12.5	11.0	11.3	14.4	**16.9**	15.0
Aug	12.1	12.8	11.9	**16.6**	12.4	12.5
Sep	**19.8**	14.4	10.4	16.3	17.2	15.7
Oct		18.5	**24.8**	20.9	19.1	16.7
Nov	**25.0**	21.9	18.7	19.2	16.7	22.3
Dec	20.7	18.0	20.8	18.3	19.8	**28.3**
Year	17.0	22.2	24.8	20.9	21.9	**28.3**

Table 3-24: Fastest 1-hour Wind Speed (mph) at Y-12 Tower "J" at 20 m from 2017-2022

Year	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
Jan	15.8	15.5	14.7	14.3	13.1	18.3	14.8	16.2	16.3	16.1	13.5	13.1	14.3	15.6	16.7	14.2	12.6	13.3	**19.4**	15.6	15.1	14.5
Feb	14.4	15.3	18.0	15.2	11.2	15.9	16.4	15.0	**19.0**	17.7	14.8	17.4	17.1	15.8	15.9	17.9	16.2	13.7	14.0	18.4	15.8	14.3
Mar	17.8	19.0	17.2	13.0	14.2	17.1	18.0	17.9	**20.1**	16.6	12.5	16.5	18.6	15.0	19.0	13.4	14.4	14.7	15.5	15.8	16.7	16.2
Apr	17.8	17.1	17.3	11.9	14.0	17.7	19.8	17.4	17.7	14.7	15.6	17.0	13.7	13.2	14.2	14.1	16.1	15.1	15.9	**21.4**	16.8	14.7
May	14.8	13.9	13.0	15.6	11.8	10.0	15.2	11.1	**17.4**	14.2	15.4	12.6	8.7	10.5	12.4	10.4	13.4	15.0	11.2	12.7	13.9	
Jun	11.6	9.9	10.3	10.5	10.4	10.2	11.3	11.2	13.5	10.6	10.4	10.9	10.0	11.6	11.7	10.7	11.5	12.3	12.3	12.8	**13.9**	
Jul	11.8	10.9	11.5	11.1	12.3	11.3	11.2	11.2	10.2	12.5	8.8	10.2	**16.1**	9.2	10.8	11.1	11.1	10.6	10.6	9.6	11.1	
Aug	18.9	8.8	**23.8**	11.2	9.6	15.2	11.8	11.0	10.6	16.1	9.9	10.5	8.9	9.8	9.3	9.2	9.4	9.8	10.8	10.5	13.2	
Sep	12.4	12.2	11.9	11.2	**14.8**	12.0	12.1	11.6	14.2	10.7	9.6	12.6	10.8	8.8	8.2	9.2	11.4	14.0	13.2	9.5	12.7	
Oct	11.9	**20.9**	14.4	16.5	14.1	9.6	12.6	11.3	11.7	13.0	17.8	13.8	13.4	12.9	11.8	11.5	12.0	12.4	12.4	14.7	16.8	
Nov	14.2	12.1	17.3	14.3	13.8	16.2	12.3	12.9	13.8	13.4	12.8	13.2	12.5	12.1	14.2	12.1	14.4	**18.1**	16.6	13.8	14.9	
Dec	16.2	18.3	15.5	15.8	16.8	15.7	18.3	16.1	16.6	**18.8**	12.8	13.6	16.4	11.9	11.7	12.7	16.4	15.8	14.1	15.5	13.7	
Year	17.0	15.8	16.3	15.9	17.5	17.2	16.9	14.9	15.9	13.6	16.3	14.5	14.2	15.5	18.2	17.9	16.4	18.1	19.4	**21.4**	16.8	16.2

*10m 2000-Aug 2017 / 15m-Aug 2017-May 2021

Table 3-25: Fastest 1-hour Wind Speed (mph) at ETTP Tower "L" at 10/15 m from 2000-2021

Year	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
Jan	18.5	18.5	18.0	17.5	17.0	22.9	18.2	20.1	20.0	19.6	17.7	16.5	17.9	19.8	22.6	19.4	16.0	18.3	**23.9**	19.0	17.3	17.2
Feb	16.8	19.2	20.1	18.3	16.7	19.9	19.4	20.7	23.0	21.6	18.0	21.7	21.1	19.6	19.5	**24.1**	20.0	19.1	16.1	21.3	19.0	16.8
Mar	21.0	22.7	23.5	15.0	21.2	21.7	21.4	24.2	16.7	21.5	15.1	19.4	22.2	18.4	**24.9**	17.3	18.7	19.8	19.3	18.2	20.2	18.6
Apr	21.9	21.0	20.2	15.0	18.0	21.7	24.2	20.9	21.4	17.5	19.0	20.8	18.5	17.9	18.6	17.6	20.5	19.9	19.9	**24.4**	19.8	16.6
May	16.8	17.3	16.2	19.9	15.3	15.1	18.6	16.0	**20.8**	17.4	19.0	16.0	12.1	14.4	15.7	14.2	18.9	18.9	14.3	15.5	17.5	
Jun	13.7	13.9	12.9	12.9	12.8	16.2	14.2	16.4	17.4	13.5	13.6	14.2	13.4	14.5	15.8	13.6	15.6	**17.5**	14.2	16.6	16.9	
Jul	13.9	13.1	15.2	13.5	15.0	13.8	13.3	13.8	13.5	16.1	12.7	13.4	**22.5**	13.2	14.1	16.4	14.9	14.4	12.7	11.5	12.9	
Aug	**24.0**	10.9	14.6	13.6	14.4	18.9	14.7	12.8	14.5	19.3	13.2	14.7	11.8	13.3	12.7	12.0	12.9	11.5	13.0	11.9	16.1	
Sep	15.1	16.1	13.1	13.6	22.1	13.9	15.5	13.2	17.5	14.0	12.7	16.1	14.5	10.8	10.2	12.6	14.6	**23.3**	16.1	11.3	15.4	
Oct	13.3	18.1	17.1	20.2	17.1	15.9	16.3	13.5	15.2	15.4	**21.7**	17.5	19.1	17.1	16.0	15.4	15.2	14.6	17.8	18.4	19.5	
Nov	16.6	17.1	20.8	19.6	17.3	18.8	15.6	16.1	17.1	15.9	15.7	16.7	15.5	16.1	18.6	16.5	18.9	**21.7**	15.5	16.4	18.3	
Dec	18.5	18.7	17.1	**24.1**	20.4	19.8	22.5	19.0	20.6	22.5	18.1	16.0	20.3	16.4	16.5	15.8	20.8	21.0	16.6	18.7	16.8	
Year	24.0	22.7	23.5	24.1	22.1	22.9	24.2	24.2	23.0	22.5	21.7	21.7	22.5	19.8	**24.9**	24.1	20.8	23.3	23.9	24.4	20.2	18.6

*

Table 3-26: Fastest 1-hour Wind Speed (mph) at ETTP Tower "L" at 30 m from 2000-2021

M	Aug 21	Sep 21	Oct 21	Nov 21	Dec 21	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Mar 23	Apr 23
40	26.6	15.5	19.8	32.4	24.0	28.8	26.9	**55.5**	25.2	21.0	22.3	25.8	29.7	19.9	21.0	25.3	26.7	24.3	38.1	37.9	33.1
60	30.6	20.4	23.4	29.2	29.5	26.3	29.3	**54.0**	31.2	23.4	29.9	30.3	34.7	22.3	35.9	28.7	31.6	37.7	34.9	45.8	40.3
80	33.1	24.5	26.7	31.4	28.5	26.7	30.9	**53.6**	35.5	24.4	34.1	34.9	38.2	23.4	24.3	33.4	36.5	38.8	34.0	48.3	43.7
100	34.3	28.6	28.7	27.7	33.6	28.6	31.8	**57.9**	38.4	34.6	36.2	36.9	40.7	23.1	25.3	31.2	38.7	36.2	44.6	50.5	45.6
120	36.3	31.3	29.9	28.9	36.3	30.7	33.6	**54.5**	40.3	32.8	37.8	38.6	42.3	24.2	26.1	31.8	40.2	32.6	48.6	52.7	47.3
140	37.4	33.9	30.6	30.7	33.0	31.8	34.1	**60.0**	41.8	33.3	38.8	39.5	44.2	24.6	29.7	32.4	41.4	35.0	48.6	53.7	48.7
160	38.8	35.6	31.3	30.7	34.0	33.7	35.1	**74.3**	42.4	36.2	39.6	39.0	45.6	27.9	35.9	34.0	42.1	44.7	42.3	55.2	49.3
180	40.4	38.6	32.4	36.4	35.8	35.0	35.6	**76.4**	43.3	36.0	41.1	40.2	46.1	26.8	30.0	38.9	42.7	43.0	37.5	56.7	50.0
200	40.5	40.3	33.1	40.0	37.3	43.5	38.2	**78.8**	43.8	42.6	40.1	40.9	46.3	29.7	30.4	37.0	42.9	35.6	40.9	57.1	50.8
220	42.1	40.5	33.8	49.2	38.6	43.1	39.1	**67.8**	45.8	39.9	41.0	40.1	46.4	28.7	34.0	37.3	43.6	37.7	42.0	57.4	51.1
240	40.2	41.1	33.8	53.3	40.0	37.0	62.7	**74.2**	40.2	36.7	39.9	40.4	45.6	31.7	34.6	35.3	43.9	38.9	53.5	58.5	51.1
260	40.4	39.0	34.0	57.0	41.9	36.5	**78.9**	77.0	38.4	39.4	39.8	39.6	45.1	31.4	35.7	36.2	44.6	39.0	68.0	56.8	50.8
280	39.8	37.6	34.2	56.3	44.2	48.1	**86.1**	76.2	40.2	37.8	38.6	38.7	44.5	32.3	35.4	36.3	44.7	42.0	72.3	58.7	50.6
300	41.1	38.9	36.2	57.7	45.9	54.3	**82.9**	79.5	40.3	39.2	39.9	38.6	45.4	34.5	39.6	40.2	44.9	43.0	78.7	60.0	50.9
320	40.9	41.0	36.5	52.7	46.6	55.7	**83.0**	78.6	41.2	35.3	39.8	35.6	44.5	33.0	42.2	38.7	45.5	42.7	75.7	53.8	51.7
340	39.8	42.7	37.1	48.6	47.6	56.0	**86.8**	80.0	47.6	38.1	39.8	38.4	45.0	36.4	43.7	41.7	45.3	44.2	82.8	56.2	70.1
360	40.4	45.1	35.6	72.0	47.8	56.2	**96.4**	87.9	46.4	37.8	45.8	42.7	46.0	37.6	44.3	39.2	45.6	47.2	84.8	58.3	52.4
All	42.1	45.1	37.1	72.0	47.8	56.2	**96.4**	87.9	47.6	42.6	45.8 *	42.7	46.4	37.6	44.3	41.7	45.6	47.2	84.8	60	70.1

Table 3-27: Fastest 5-min Wind Speed (mph) at ORNL Lidar "Q" from 40 to 360 m from August 2021 – April 2023

Year	12	13	14	15	16	17	18	19	20	21	22
Jan	25.0	25.8	**27.0**	22.7	23.2	18.9	20.8	23.1	22.1	19.6	21.6
Feb	26.5	24.9	19.2	**26.6**	21.1	20.0	16.7	24.2	21.4	20.8	25.3
Mar	24.8	28.1	**29.9**	20.7	24.7	22.3	22.6	21.3	21.4	23.6	24.7
Apr	19.7	20.5	21.7	23.2	**30.8**	24.0	22.1	26.2	21.7	19.2	19.7
May	14.2	19.7	17.8	16.3	20.2	**22.4**	13.7	15.8	21.4	17.7	16.2
Jun	17.9	16.3	**21.6**	14.9	19.5	17.7	16.0	18.8	16.4	14.9	16.2
Jul	**24.8**	14.2	15.8	18.1	20.2	18.1	18.7	14.6	14.7	17.3	18.2
Aug	15.9	13.4	15.9	13.6	16.5	13.9	15.2	**19.0**	16.9	15.9	14.6
Sep	16.7	13.6	16.9	14.3	16.0	**27.7**	18.5	10.4	17.6	18.2	17.8
Oct	19.9	20.6	19.0	19.2	21.7	16.5	15.8	**24.8**	23.3	22.0	18.6
Nov	16.5	18.1	**26.8**	19.0	22.3	26.6	23.6	21.0	21.1	17.3	21.9
Dec	27.6	19.1	21.8	21.6	24.5	24.2	18.4	22.2	20.3	21.1	**37.1**
Year	27.6	28.1	29.9	26.6	30.8	27.7	23.6	26.2	23.3	23.6	**37.1**

Table 3-28: Fastest 1-hour Wind Speed (mph) at Y-12 Tower "S" at 25 m from 2012-2022

Year	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
Jan	12.6	14.2	13.3	13.6	13.2	13.8	12.5	10.7	13.1	**14.7**	12.0	11.6	14.5	13.8	10.6	12.3	12.5	8.9
Feb	15.8	9.9	13.8	14.5	16.4	**16.8**	12.6	13.4	15.6	13.6	12.9	13.5	13.9	11.5	11.1	13.2	11.5	11.9
Mar	14.4	12.5	13.7	**17.2**	13.6	13.9	14.9	12.6	12.4	12.3	13.1	10.7	11.9	12.8	12.6	11.4	10.8	11.8
Apr	12.1	11.6	11.8	11.3	15.6	12.5	13.7	15.3	11.6	12.5	12.8	12.9	14.2	13.1	13.3	**16.4**	12.5	10.7
May	9.0	10.1	10.9	12.4	14.7	12.9	11.9	10.1	10.1	12.0	10.5	10.1	11.3	12.7	11.9	10.1	11.4	**15.6**
Jun	7.9	**13.7**	10.5	9.7	9.0	10.0	8.1	9.7	10.9	9.7	10.9	9.1	11.3	11.1	8.8	11.5	11.2	8.3
Jul	10.7	10.1	10.3	9.9	8.7	9.3	9.7	10.3	**14.7**	10.3	9.9	12.4	9.7	10.9	9.5	9.5	9.1	8.1
Aug	10.4	**13.2**	9.4	10.2	12.0	9.0	9.3	8.5	7.6	9.4	7.9	9.4	10.2	9.9	9.8	8.8	10.1	10.2
Sep	16.0	8.7	10.0	11.8	11.4	9.5	8.8	12.0	8.4	9.1	10.4	10.7	11.8	**17.2**	13.1	8.1	11.2	9.4
Oct	11.2	10.0	11.3	9.4	11.0	10.8	**14.4**	9.5	10.6	12.3	10.0	9.4	12.0	10.2	11.7	10.3	11.5	8.6
Nov	**14.6**	14.2	11	10.7	10.7	12.4	13.2	12.0	10.4	12.0	12.4	11.8	12.7	12.9	11.9	11.1	10.6	9.9
Dec	14.6	12.3	16.7	11.8	14.0	**19.6**	10.7	11.6	13.6	11.1	10.6	11.7	15.2	12.4	12.7	13.7	9.6	10.8
Year	16.0	14.2	16.7	17.2	16.4	**19.6**	14.9	15.3	15.6	14.7	13.1	13.5	15.2	17.2	13.3	16.4	12.5	15.6

*

Table 3-29: Fastest 1-hour Wind Speed (mph) at Y-12 Tower "W" at 10 m from 2004-2021

Year	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
Jan			15.3	16.7	17.2	17.2	16.4	13.5	19.1	18.4	17.1	19.8	19.5	18.3	17.3	18.5	**21.1**	15.3
Feb			15.9	19.6	21.9	**25.1**	16.9	19.0	22.2	19.9	20.0	17.5	24.0	19.2	16.6	18.8	15.8	19.2
Mar			14.4	20.4	19.8	17.8	19.4	18.9	17.8	17.8	19.4	17.4	18.3	18.9	19.1	18.4	18.9	**20.9**
Apr			12.4	14.5	22.5	15.9	19.3	23.8	17.4	17.9	18.0	19.8	20.5	17.9	21.5	25.9	20.3	**18.0**
May			11.4	15.5	19.6	15.9	17.3	16.2	12.9	14.1	16.6	14.9	14.7	21.6	15.3	17.0	17.1	**18.9**
Jun			11.0	12.8	12.6	13.2	11.1	15.0	15.2	12.4	18.6	15.7	16.1	18.2	15.0	14.8	14.3	**15.6**
Jul			11.8	11.6	10.6	11.9	13.0	13.1	**19.4**	14.5	16.0	16.4	16.3	14.2	12.4	12.4	11.4	13.1
Aug			9.9	13.9	15.9	11.4	11.8	12.5	11.2	12.1	11.2	12.7	14.5	12.8	14.2	12.3	**18.1**	13.5
Sep			10.5	14.7	16.9	11.9	12.6	16.8	11.1	12.1	13.3	15.7	15.2	**23.3**	17.0	10.1	14.3	11.5
Oct			11.9	13.6	14.1	13.9	**22.7**	13.7	15.0	18.9	16.3	16.8	15.2	14.3	15.7	16.4	20.3	11.7
Nov			11.6	15.0	12.7	15.4	19.8	18.1	15.1	18.4	**20.5**	17.2	19.0	19.5	17.1	16.8	16.6	16.0
Dec			19.2	15.7	20.5	25.7	14.5	17.1	20.0	17.5	15.1	20.1	23.6	19.7	20.7	23.4	14.9	**24.0**
Year			19.2	20.4	22.5	25.7	22.7	23.8	22.2	19.9	20.5	20.1	24.0	23.3	21.5	**25.9**	21.1	24.0
									*									

Table 3-30: Fastest 1-hour Wind Speed (mph) at Y-12 Tower "W" at 30 m from 2004-2021

Year	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
Jan	21.3	23.0	23.2	21.0	22.2	21.0	20.3	15.7	22.8	20.6	19.9	23.1	21.0	20.2	20.9	21.1	**24.4**	20.8
Feb	21.4	14.4	23.3	23.5	26.2	**28.5**	18.6	22.6	26.4	23.3	22.2	22.5	27.5	21.8	19.3	22.3	17.9	23.4
Mar	24.2	19.8	22.0	24.5	23.1	20.5	23.4	22.4	20.2	20.4	22.6	20.6	20.7	21.9	21.8	22.5	22.5	**25.0**
Apr	21.4	17.6	17.9	16.5	26.3	20.1	23.6	27.1	20.5	21.0	21.8	22.3	22.2	19.3	25.1	**30.8**	22.5	20.2
May	16.4	14.9	18.4	16.4	24.0	20.3	21.1	19.2	16.0	15.3	18.8	16.8	15.9	**26.5**	16.3	21.5	20.3	22.5
Jun	14.1	20.4	14.8	16.7	15.0	16.2	13.6	18.1	17.6	14.7	**23.0**	19.7	18.9	21.6	18.5	17.1	16.5	18.8
Jul	15.0	17.2	17.4	14.9	13.6	15.4	15.7	13.9	**21.9**	16.5	19.9	18.2	19.2	16.6	13.9	13.8	12.8	15.8
Aug	13.8	**23.9**	12.6	16.6	18.7	13.4	14.1	14.8	12.6	14.1	14.3	15.7	16.6	14.3	15.8	14.2	23.2	15.2
Sep	**25.3**	15.1	17.3	16.3	20.3	15.5	14.8	18.8	14.6	13.4	14.5	19.7	16.0	24.7	18.3	12.2	17.9	14.5
Oct	18.1	14.4	17.7	16.7	17.7	18.1	**25.9**	16.1	17.8	21.6	20.5	18.1	17.3	16.8	17.1	19.9	25.0	14.9
Nov	19.8	22.1	18.1	18.1	17.0	18.1	22.6	20.7	17.3	22.5	**24.4**	19.7	20.9	23.7	18.9	18.8	20.8	19.4
Dec	24.5	19.7	29.2	20.0	23.6	30.0	15.3	19.3	23.7	21.4	16.5	23.3	27.4	24.2	24.1	27.3	18.6	**25.1**
Year	25.3	23.9	29.2	24.5	26.3	30.0	25.9	27.1	26.4	23.3	24.4	23.3	27.5	26.5	25.1	**30.8**	25.0	25.1
									*									

Table 3-31: Fastest 1-hour Wind Speed (mph) at Y-12 Tower "W" at 60 m from 2004-2021

Year	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	13.9	**16.1**	14.9	13.8	13.9	15.4	13.7	15.7	13.6	13.8	12.3	13.4	14.4	14.6	12.3	13.5
Feb	14.3	15.8	16.5	14.0	16.1	**17.6**	14.8	14.7	12.9	16.8	13.2	12.2	14.9	12.3	13.0	15.9
Mar	**19.4**	15.6	13.9	14.2	13.6	13.8	16.4	16.9	13.1	13.5	13.3	14.9	14.8	13.8	14.7	17.8
Apr	13.3	16.7	14.5	15.5	17.1	13.9	15.5	14.2	16.0	17.4	14.4	15.2	**18.3**	15.5	14.6	14.3
May	11.5	**17.6**	13.9	13.5	12.9	10.4	11.0	11.9	10.1	11.0	16.8	11.2	13.5	14.0	15.7	13.1
Jun	10.2	11.1	10.4	11.0	13.4	11.8	10.7	**15.1**	12.9	13.1	13.2	11.5	12.3	11.2	12.3	10.1
Jul	10.4	11.1	10.5	10.9	9.2	**15.4**	9.8	12.5	12.0	13.1	10.9	10.4	11.0	8.9	11.5	12.1
Aug	11.2	9.8	9.0	8.6	9.9	9.2	8.6	10.5	8.6	11.2	9.5	10.7	12.2	**12.8**	9.5	10.4
Sep	10.3	14.2	10.3	9.2	12.8	9.8	8.5	10.2	9.5	10.7	**15.1**	12.9	8.1	12.3	9.6	12.6
Oct	10.4	10.0	11.1	**17.7**	13.1	12.6	12.4	12.2	12.2	13.9	11.2	11.9	12.2	14.5	11.3	12.3
Nov	11.5	12.2	10.3	14.9	13.9	10.3	14.0	15.6	12.6	13.0	**16.2**	14.7	13.6	12.9	12.1	15.2
Dec	14.9	15.1	20.5	14.0	14.2	17.4	11.3	13.3	12.6	16.7	14.1	13.3	16.7	12.3	16.2	**22.5**
Year	13.6	16.3	14.5	14.2	15.5	18.2	16.4	16.9	16.0	17.4	16.8	15.2	18.3	15.5	16.2	**22.5**

*

Table 3-32: Fastest 1-hour Wind Speed (mph) at Y-12 Tower "Y" at 15 m from 2007-2021

Year	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	19.4	**21.2**	20.0	18.4	17.2	19.7	18.5	20.0	17.6	18.0	15.9	16.8	18.9	18.6	16.6	18.5
Feb	20.7	22.5	21.4	18.2	20.9	**23.2**	18.5	19.1	17.5	21.8	16.7	15.7	19.1	15.3	16.6	20.6
Mar	**25.5**	23.2	19.5	19.3	17.8	18.4	20.8	20.9	16.7	17.3	16.7	18.5	18.7	17.8	18.8	23.2
Apr	18.1	**24.4**	19.3	20.8	22.2	17.8	20.3	18.6	21.0	22.3	18.2	19.2	23.9	19.7	18.8	18.4
May	16.2	**23.4**	18.8	17.7	16.5	13.4	13.8	15.3	12.4	13.8	21.2	14.4	16.7	17.7	20.0	16.7
Jun	14.0	**25.9**	13.4	13.8	17.3	15.4	13.4	20.3	16.3	16.9	16.7	14.4	16.0	14.3	15.7	13.0
Jul	14.0	14.3	14.3	13.8	11.5	**20.7**	12.4	16.2	15.1	17.0	14.4	13.6	13.8	11.0	14.2	15.4
Aug	15.6	14.1	12.2	12.2	13.4	11.7	11.0	13.3	11.3	14.0	12.5	13.2	15.3	**16.5**	12.8	13.5
Sep	14.1	19.2	13.2	12.3	17.5	12.2	11.3	13.5	13.1	14.1	**20.4**	16.6	10.1	15.8	12.0	16.7
Oct	14.6	12.7	15.1	**22.7**	16.8	16.1	15.7	16.5	16.1	17.8	13.9	15.3	20.0	19.1	13.8	15.2
Nov	16.7	15.8	14.2	19.7	17.8	12.9	18.6	20.3	16.6	16.6	**20.6**	18.7	17.5	16.4	15.2	19.8
Dec	19.6	19.6	**28.6**	17.6	18.4	22.6	15.0	16.9	16.3	21.1	18.1	17.3	22.0	15.2	20.6	28.2
Year	25.5	25.9	**28.6**	22.7	22.2	23.2	20.8	20.9	21.0	22.3	21.2	19.2	23.9	19.7	20.6	28.2

*

Table 3-33: Fastest 1-hour Wind Speed (mph) at Y-12 Tower "Y" at 33 m from 2007-2021

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	41.5	38.4	**50.9**	45.9	39.0	29.0	44.3	43.4	38.7	42.5	47.1	33.7	30.2	28.9	34.6	31.8	30.5	31.1	32.0	29.0	30.5	33.2	43.0	29.3	38.6
Feb	46.9	40.4	41.6	47.5	43.1	**51.4**	36.5	27.5	38.0	40.7	48.7	45.6	30.0	40.3	36.4	33.9	43.5	32.5	47.4	36.2	32.8	38.3	28.8	37.8	39.1
Mar	51.3	41.4	40.2	43.5	52.9	34.4	45.6	36.5	37.5	36.5	41.7	35.3	30.7	28.4	31.8	48.5	44.9	23.3	40.9	38.5	33.3	40.8	37.0	34.9	**62.2**
Apr	45.9	47.7	48.9	34.1	41.1	39.3	37.8	35.3	36.9	34.7	46.8	47.2	46.0	40.8	29.1	32.3	31.4	36.6	45.1	35.5	37.3	45.7	**54.7**	30.8	36.8
May	42.5	42.2	53.4	43.2	40.5	38.0	34.5	30.0	33.1	30.7	45.3	39.6	44.9	30.0	33.0	26.6	**67.1**	29.7	38.2	51.0	34.3	31.0	39.1	41.3	43.2
Jun	41.9	41.2	45.6	36.7	36.0	34.9	34.1	35.6	29.3	34.9	31.5	32.7	31.1	34.8	23.4	35.3	36.2	27.8	37.8	34.9	32.7	42.3	**46.6**	33.2	27.3
Jul	32.3	38.7	39.8	33.1	33.8	37.6	**63.5**	36.8	34.6	30.1	24.3	29.5	25.4	27.5	43.7	36.4	29.1	26.2	53.1	40.8	30.5	27.2	33.1	28.1	38.7
Aug	26.4	28.6	33.7	30.8	25.8	25.2	38.1	**46.9**	24.6	29.6	19.9	27.0	32.3	20.3	34.6	24.5	27.9	22.2	32.4	34.1	39.9	36.8	37.1	32.3	39.2
Sep	38.6	41.5	39.0	38.6	43.1	36.9	**43.5**	29.6	34.1	30.8	41.2	26.3	28.6	35.7	26.1	33.7	22.0	21.9	26.4	42.8	28.4	17.9	28.1	35.6	25.7
Oct	37.4	30.9	23.2	38.0	**47.9**	31.2	30.3	28.4	30.6	28.1	23.4	28.9	38.9	27.7	28.4	32.7	30.5	24.3	30.3	29.8	29.0	43.6	33.6	30.2	40.6
Nov	54.9	40.0	44.3	40.3	58.1	46.9	45.4	37.1	38.5	39.2	**60.2**	24.0	37.8	32.8	29.8	31.1	34.6	32.7	39.9	40.5	35.3	30.6	31.7	31.4	36.8
Dec	40.6	40.0	31.7	45.7	30.5	40.6	42.4	32.6	47.5	31.1	36.0	45.1	27.9	35.3	34.6	38.7	25.4	35.8	**83.7**	42.9	34.9	40.0	24.8	42.9	43.1
Year	54.9	47.7	53.4	47.5	58.1	51.4	63.5	46.9	47.5	42.5	60.2	47.2	46.0	40.8	43.7	48.5	67.1	36.6	**83.7**	51.0	39.9	45.7	54.7	42.9	62.2

Table 3-34: Peak 1-Second Wind Gusts (mph) at ORNL Tower "A" at 10/15 m from 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	40.7	45.3	52.3	52.3	42.0	36.4	47.4	47.4	43.1	48.0	50.7	49.7	34.3	33.0	42.4	41.4	37.8	35.7	36.0	31.6	36.8	**67.6**	56.8	43.4	58.4
Feb	40.0	41.2	42.2	53.7	43.9	52.0	38.0	39.0	43.2	44.1	54.9	47.4	36.6	55.0	44.4	44.9	44.9	43.7	52.4	61.3	36.3	**63.7**	33.6	49.0	42.6
Mar	36.1	39.8	51.3	53.1	55.5	36.9	50.0	42.4	42.1	51.0	50.8	36.6	37.3	33.9	49.9	47.9	45.8	36.9	58.2	**69.9**	37.6	41.4	47.5	68.6	60.3
Apr	40.3	53.5	52.5	38.5	43.6	40.5	40.8	39.5	41.8	38.2	54.0	55.2	42.6	50.6	34.6	44.7	**66.6**	49.9	42.4	44.7	40.9	53.3	58.6	35.7	44.8
May	38.1	43.1	53.6	44.3	41.6	44.0	36.9	31.1	37.2	36.0	51.9	44.9	36.0	48.5	36.9	30.9	40.1	56.1	37.0	55.2	64.8	34.6	**69.0**	46.1	40.7
Jun	30.2	48.7	52.2	44.4	45.5	43.0	49.0	46.9	40.5	43.0	41.6	41.4	44.7	44.0	27.3	39.2	53.8	45.3	40.5	40.6	**66.5**	48.4	47.2	48.0	62.9
Jul	28.5	41.3	46.9	51.4	46.2	42.4	36.8	45.5	47.2	38.9	28.9	39.6	33.2	36.0	52.2	43.1	39.6	39.2	**67.3**	58.3	52.2	33.5	45.9	47.2	61.1
Aug	20.6	33.1	58.1	36.9	33.4	29.8	44.4	57.5	30.4	35.5	22.4	36.0	36.9	24.5	41.5	26.1	34.3	34.1	34.2	43.5	37.0	52.1	41.7	54.9	**72.1**
Sep	45.5	47.7	53.6	47.0	49.2	40.8	56.2	33.8	45.9	33.8	**65.0**	30.9	44.0	43.1	30.9	41.9	28.9	41.4	29.0	47.4	28.4	19.4	31.8	34.6	29.5
Oct	20.4	34.2	27.7	42.0	**53.5**	45.7	38.4	32.9	33.7	33.1	26.8	31.8	44.4	33.9	34.6	35.5	32.7	25.9	33.7	46.3	31.8	48.5	43.1	33.2	36.6
Nov	24.3	42.2	45.4	39.5	54.3	44.6	41.4	**67.8**	37.3	38.4	38.9	27.0	42.8	36.6	36.0	38.0	46.0	52.4	44.7	45.7	37.1	36.1	38.8	31.4	41.0
Dec	36.0	39.3	36.5	45.0	35.6	40.3	42.0	37.0	52.1	38.4	41.0	46.7	31.8	37.8	46.0	54.7	37.8	37.1	**83.4**	48.4	67.9	48.0	30.2	75.7	45.1
Year	45.5	53.5	58.1	53.7	55.5	52.0	56.2	67.8	52.1	51.0	65.0	55.2	44.7	55.0	52.2	54.7	66.6	56.1	**83.4**	69.9	67.9	67.6	69.0	75.7	72.1

Table 3-35: Peak 1-Second Wind Gusts (mph) at ORNL Tower "A" at 30 m from 1998-2022

Year	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan		36.0	**40.8**	27.7	35.7	37.8	36.0	30.5	35.3	37.3	30.9	33.4	35.7	27.0	30.8
Feb		38.2	30.7	**58.2**	36.2	33.4	40.1	39.8	41.7	31.1	29.8	35.6	30.3	38.3	35.3
Mar		26.8	34.3	30.0	45.3	38.5	43.1	37.6	35.7	35.0	31.9	36.3	37.2	35.6	**48.7**
Apr		35.5	32.7	36.2	30.7	34.1	39.6	**49.9**	41.4	35.7	42.0	42.5	37.8	33.4	40.4
May		30.0	30.9	38.2	36.4	30.7	25.9	41.7	34.1	**43.0**	32.3	33.6	28.8	36.6	38.2
Jun		**39.8**	38.5	33.4	25.4	30.5	31.4	38.7	37.8	27.9	37.3	32.7	33.4	27.7	32.5
Jul	21.3	28.4	26.1	24.5	52.9	42.1	31.6	39.2	**53.1**	44.6	28.4	26.5	28.1	30.9	43.3
Aug	19.9	27.9	38.5	25.7	**41.0**	26.6	37.3	23.8	32.5	34.1	35.3	32.0	27.9	25.6	35.6
Sep	27.2	24.7	**38.7**	29.4	27.3	33.0	19.5	22.0	26.3	33.0	28.3	17.3	27.4	30.0	25.1
Oct	23.4	28.4	35.3	27.5	27.7	35.3	27.7	23.4	30.0	32.8	27.2	**41.0**	29.8	35.2	26.1
Nov	26.1	25.0	35.0	26.2	23.8	32.7	36.2	32.7	34.1	42.0	30.6	29.7	**42.0**	25.2	37.4
Dec	31.4	47.6	30.2	28.6	39.6	35.7	32.5	36.6	38.7	34.6	27.8	37.1	30.8	**49.5**	42.5
Year	31.4	47.6	40.8	**58.2**	52.9	42.1	43.1	49.9	53.1	44.6	42	42.5	42.0	49.5	48.7

Table 3-36: Peak 1-Second Wind Gusts (mph) at ORNL Tower "B" at 10/15 m from 2008-2022

Year	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan		42.6	38.5	34.3	40.1	36.6	40.8	33.2	41.2	**45.3**	40.4	37.5	38.0	31.5	37.7
Feb		44.2	35.3	**60.9**	39.8	37.6	43.1	49.9	45.6	40.3	31.9	38.0	37.4	41.7	41.7
Mar		35.5	41.0	34.1	46.9	40.3	45.1	50.8	50.4	**59.1**	39.0	33.3	41.2	37.7	52.0
Apr		49.5	37.6	43.3	33.2	39.2	35.1	52.4	47.6	43.7	**59.8**	54.5	45.3	33.9	48.7
May		36.6	31.8	37.8	39.2	34.3	30.9	54.0	47.6	**57.5**	36.5	30.9	35.4	41.3	39.9
Jun		49.2	39.2	40.3	36.0	32.1	34.6	**53.4**	40.3	34.8	46.0	38.3	31.2	34.2	37.0
Jul	25.6	35.0	28.9	29.5	59.5	44.2	38.0	45.6	**59.5**	47.2	35.7	29.3	30.5	31.8	46.6
Aug	25.9	35.2	44.4	33.4	**45.8**	28.4	38.9	26.1	35.0	40.1	34.7	33.4	29.1	27.2	35.4
Sep	36.9	**49.2**	42.6	38.2	29.8	42.1	24.5	30.5	29.1	34.8	28.7	18.6	31.6	33.3	28.1
Oct	29.8	36.9	39.2	35.7	33.2	38.2	33.2	27.9	30.0	36.2	27.3	**41.8**	34.3	34.1	31.1
Nov	33.2	28.4	40.1	34.1	27.7	38.7	38.2	37.6	41.2	**48.3**	35.9	33.6	37.1	29.0	36.5
Dec	42.6	49.2	33.9	33.0	41.7	43.5	35.0	43.7	41.2	37.2	31.4	48.4	31.3	**49.4**	47.6
Year		42.6	49.5	44.4	**60.9**	59.5	44.2	45.1	54.0	59.5	59.1	59.8	54.5	45.3	49.4

Table 3-37: Peak 1-Second Wind Gusts (mph) at ORNL Tower "B" at 30 m from 2008-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	47.8	53.3	54.5	55.3	51.0	44.2	52.1	48.2	49.0	48.2	**66.2**	56.8	57.7	33.0	41.0	35.3	41.9	30.0	35.0	27.0	33.7	34.0	40.2	25.2	31.3
Feb	42.4	40.5	36.8	49.3	46.4	51.3	33.2	35.2	43.1	44.4	**56.8**	47.2	28.9	47.2	43.7	35.7	36.9	36.7	44.6	46.9	38.2	37.2	37.1	34.2	37.6
Mar	53.2	40.8	55.4	49.2	55.4	41.5	48.1	47.4	45.5	61.9	**77.9**	42.8	33.0	33.4	44.0	39.2	46.9	33.1	34.0	51.3	43.7	46.9	42.9	31.9	56.6
Apr	44.1	**56.9**	48.0	40.3	41.9	36.1	39.0	38.1	42.9	38.7	36.4	50.6	45.1	55.0	39.4	35.0	38.9	48.5	37.9	43.0	47.9	42.5	36.1	31.6	40.1
May	63.6	60.1	67.6	65.3	63.6	65.3	57.8	67.0	61.3	48.7	**109.9**	38.0	40.5	75.3	32.5	30.5	35.3	40.9	29.7	53.6	42.6	32.3	32.6	44.4	35.1
Jun	59.8	52.7	53.2	46.5	46.5	46.5	37.8	48.6	44.5	44.5	**74.9**	35.5	36.0	34.6	38.5	46.7	53.6	37.6	37.4	34.4	38.9	36.0	33.6	35.5	34.5
Jul	31.2	36.7	33.4	30.5	35.6	30.5	29.4	34.2	34.9	36.0	34.1	31.1	30.5	30.7	32.3	35.0	34.8	35.7	**56.2**	45.6	28.2	31.5	44.2	31.0	37.6
Aug	25.5	30.4	29.0	31.8	29.0	31.8	26.2	42.6	28.3	33.2	20.2	30.5	31.4	20.8	32.8	23.4	39.6	26.8	**45.1**	34.1	27.0	29.5	31.8	30.8	31.5
Sep	33.3	36.3	40.8	39.7	**42.3**	39.7	37.0	31.4	36.3	32.5	41.2	31.1	32.7	38.2	26.1	31.1	21.8	26.0	24.9	34.1	28.3	19.4	31.2	28.0	25.0
Oct	27.2	32.8	26.9	40.0	40.9	40.0	35.6	27.5	32.8	28.4	26.1	28.2	38.0	30.0	33.0	34.6	28.4	27.0	27.5	31.0	32.8	**45.0**	29.9	26.6	43.3
Nov	36.8	34.5	40.1	36.2	44.7	36.2	38.5	**96.3**	35.2	34.5	32.7	36.0	38.5	28.4	28.4	34.6	41.7	38.8	42.1	37.1	31.6	31.1	36.7	28.5	37.1
Dec	41.1	43.2	39.7	55.8	41.5	55.8	45.3	38.0	**59.6**	43.9	35.7	43.1	34.8	29.5	41.9	37.8	29.3	34.2	40.0	37.1	34.6	44.2	29.3	36.5	39.1
Year	63.6	60.1	67.6	65.3	63.6	65.3	57.8	96.3	61.3	61.9	**109.9**	56.8	57.7	75.3	44.0	46.7	53.6	48.5	56.2	53.6	47.9	46.9	44.2	44.4	56.6

*10m 1998-Apr 2014 / 15m-Apr 2014-2022

Table 3-38: Peak 1-Second Wind Gusts (mph) at ORNL Tower "C/D" at 10/15 m* from 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	53.4	53.4	72.7	56.6	50.3	43.0	52.8	48.1	50.6	48.7	**77.4**	55.6	34.1	35.0	44.7	38.2	52.0	45.6	48.1	41.2	41.7	42.6	50.1	31.1	36.0
Feb	54.8	45.3	41.1	55.4	54.8	58.7	39.6	40.5	51.8	50.9	**78.8**	49.0	39.8	53.6	44.7	44.0	42.8	46.7	57.5	48.5	39.8	41.9	50.2	35.5	40.8
Mar	66.6	45.4	59.7	55.5	62.3	46.4	53.9	50.6	51.2	69.9	**89.1**	45.8	40.5	52.0	45.8	45.1	49.0	36.2	44.7	56.1	46.9	49.9	46.3	56.6	66.2
Apr	54.2	**60.4**	52.6	41.9	44.1	38.8	43.8	43.0	47.2	42.4	46.7	58.9	52.7	59.8	39.6	37.3	52.4	50.8	47.9	58.9	48.8	51.5	49.9	43.5	44.0
May	66.2	55.9	64.1	64.1	61.1	63.7	59.4	46.0	60.2	48.6	**104.2**	42.6	41.4	58.6	52.4	37.8	38.0	48.1	51.1	65.0	33.3	43.1	41.2	50.6	41.0
Jun	82.4	64.3	61.4	60.9	59.9	61.4	68.2	57.0	56.5	58.5	**109.2**	47.2	45.3	38.5	43.5	56.3	61.1	45.1	40.5	36.2	41.2	41.7	41.0	41.7	34.1
Jul	42.9	45.7	39.4	38.7	47.8	42.2	38.0	42.9	46.4	46.7	41.4	44.0	34.3	34.8	52.4	39.6	43.7	45.0	**67.3**	48.3	38.0	30.9	38.7	33.4	43.3
Aug	43.3	42.9	46.7	47.1	47.5	41.6	42.0	**71.9**	46.2	54.2	24.5	40.5	35.0	27.3	38.5	27.0	46.7	30.0	37.3	71.0	33.0	37.3	32.7	55.6	32.3
Sep	40.6	41.3	49.2	42.3	54.0	38.9	57.1	34.8	44.8	33.4	**65.0**	34.3	38.5	36.9	29.3	40.3	30.7	30.5	39.2	57.2	40.1	21.1	26.6	36.0	27.7
Oct	45.0	36.5	26.3	47.0	46.7	**48.4**	42.2	32.0	41.1	34.6	31.8	34.3	40.3	39.2	43.5	33.0	35.5	48.3	38.7	42.1	44.7	44.0	39.6	39.2	44.9
Nov	48.2	40.4	47.3	44.2	54.2	47.9	45.1	**77.0**	41.6	43.8	39.6	46.5	46.9	40.1	34.1	43.5	42.4	41.4	46.0	52.2	35.7	42.4	43.3	31.4	36.9
Dec	43.8	45.3	43.5	59.5	44.4	49.1	56.8	43.2	**69.6**	48.6	42.4	48.3	40.8	33.9	52.2	52.2	38.0	44.2	54.0	48.8	50.8	47.4	44.7	41.2	41.9
Year	82.4	64.3	72.7	64.1	62.3	63.7	68.2	77.0	69.6	69.9	**109.2**	58.9	52.7	59.8	52.4	56.3	61.1	50.8	67.3	71.0	50.8	51.5	50.2	56.6	66.2

*30m 1998-Apr 2014 / 35m-Apr 2014-2022

Table 3-39: Peak 1-Second Wind Gusts (mph) at ORNL Tower "C/D" at 30/35 m* from 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	62.3	76.5	81.4	68.6	59.6	49.3	61.3	60.2	68.1	59.1	**111.7**	63.4	46.7	51.5	65.3	48.3	52.6	78.6	54.1	33.0	46.5	59.4	59.4	34.1	61.1
Feb	74.1	62.8	56.7	65.6	66.9	73.1	51.5	55.4	67.4	62.0	63.7	64.3	63.0	**87.0**	69.6	56.1	50.8	79.9	70.1	36.8	54.0	49.0	48.8	57.3	45.3
Mar	71.0	62.5	67.2	74.1	69.2	55.8	65.1	57.6	55.1	**79.2**	66.9	54.3	46.9	57.9	63.0	79.0	52.6	43.5	66.9	41.4	62.4	40.1	74.6	57.9	65.3
Apr	65.8	**79.9**	68.1	51.3	58.6	45.6	52.6	55.1	59.6	50.8	69.4	58.4	61.6	63.9	60.0	61.8	49.6	62.7	43.8	55.3	43.0	71.4	65.2	42.6	50.4
May	76.7	69.9	70.2	74.3	67.5	71.9	70.6	50.2	70.6	57.7	**103.3**	57.0	56.1	85.2	60.0	44.0	46.3	75.2	74.9	65.9	33.3	74.8	73.0	57.0	44.0
Jun	78.3	67.2	58.4	63.8	65.8	58.4	53.3	57.4	56.7	54.3	49.9	52.4	60.7	**84.5**	43.7	55.2	68.5	53.4	76.0	39.7	30.3	74.0	69.8	58.6	50.1
Jul	56.0	55.1	50.3	43.9	57.5	61.4	51.5	55.4	49.7	57.8	56.6	49.7	44.2	45.8	77.4	41.5	57.0	70.9	74.1	75.7	61.3	61.7	**78.3**	35.0	68.4
Aug	50.4	53.6	51.1	46.7	58.3	42.6	47.6	**83.3**	52.0	53.6	34.3	53.1	36.0	31.6	52.0	47.4	46.7	73.3	60.7	56.4	35.6	58.6	69.9	55.9	51.1
Sep	51.3	54.6	62.5	60.7	72.2	45.8	**85.1**	50.2	53.4	46.1	58.9	56.1	46.5	50.2	43.3	51.3	41.9	79.9	70.1	57.5	43.3	21.3	74.7	39.5	35.1
Oct	62.5	45.4	38.3	67.5	65.9	67.5	55.2	46.5	58.6	44.1	40.1	47.4	68.7	44.4	50.4	42.1	57.7	**75.8**	33.8	48.3	44.0	51.5	40.6	36.6	50.4
Nov	66.0	56.5	58.8	59.3	71.9	64.3	60.4	68.5	52.9	60.7	49.0	38.2	**89.1**	47.4	54.0	80.4	60.7	45.8	70.9	44.0	38.5	71.4	52.8	34.8	44.9
Dec	57.8	53.4	54.9	68.2	52.5	59.7	65.3	55.4	**84.9**	59.7	53.4	74.4	49.2	43.5	63.0	54.0	39.6	81.4	68.3	62.2	53.4	57.9	79.5	66.7	64.6
Year	78.3	79.9	81.4	74.3	72.2	73.1	85.1	83.3	84.9	79.2	**111.7**	74.4	89.1	87.0	77.4	80.4	68.5	81.4	76.0	75.7	62.4	74.8	79.5	66.7	68.4

*100m 1998-Apr 2014 / 60m-Apr 2014-2022

Table 3-40: Peak 1-Second Wind Gusts (mph) at ORNL Tower "C/D" at 100/60 m* from 1998-2022

Year	18	19	20	21	22
Jan	27.2	35.0	**46.5**	23.9	38.4
Feb	40.1	36.6	29.2	28.9	**56.1**
Mar	**66.7**	37.2	36.5	41.9	45.0
Apr	34.7	**53.0**	39.1	26.0	45.0
May	28.5	32.8	32.3	**41.2**	30.0
Jun	38.0	32.9	23.2	**39.1**	21.7
Jul	30.5	35.9	22.9	27.8	**59.8**
Aug	23.8	29.7	39.3	**49.4**	26.1
Sep	24.4	19.0	**27.7**	24.9	24.7
Oct	31.9	**39.5**	32.5	33.6	22.9
Nov	35.8	32.7	31.5	21.9	33.9
Dec	37.2	38.9	35.2	33.0	**59.0**
Year	**66.7**	53.0	46.5	49.4	59.8

Table 3-41: Peak 1-Second Wind Gusts (mph) at ORNL Tower "F" at 10 m from 2018-2022

Year	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
Jan	52.5	51.5	48.9	47.5	43.6	60.8	49.2	53.9	54.2	38.9	31.3	**79.9**	45.3	41.0	39.2	40.0	31.1	37.3	38.2	33.6	35.9	28.2
Feb	30.6	32.5	38.3	32.3	23.8	33.8	34.9	31.9	40.4	40.3	30.6	34.8	38.7	32.3	36.0	39.2	37.1	39.2	31.0	38.7	33.4	**68.9**
Mar	43.3	46.2	41.8	31.6	34.5	41.6	43.8	43.5	48.9	37.3	38.9	30.9	44.7	37.8	45.8	42.6	**78.3**	47.2	34.5	36.0	36.3	34.2
Apr	44.3	42.6	43.1	29.6	34.9	44.1	49.3	43.3	44.1	32.9	32.9	**50.1**	32.1	37.3	34.1	42.4	40.1	47.6	46.5	46.2	47.4	34.3
May	42.9	40.3	37.7	45.2	34.2	29.0	44.0	32.2	**50.4**	38.0	35.7	31.6	35.5	30.0	47.9	38.2	31.8	49.2	32.7	40.2	35.8	
Jun	53.1	45.3	47.1	48.1	47.6	46.7	51.7	51.3	61.8	58.6	35.2	**75.1**	25.0	35.3	63.2	31.1	35.7	33.2	40.3	54.7	40.2	
Jul	48.3	44.6	47.1	45.5	50.4	46.3	45.9	45.9	41.8	39.8	32.9	**70.3**	41.5	27.7	33.9	30.0	39.4	45.8	48.8	30.8	30.7	
Aug	55.0	25.6	**69.2**	32.6	27.9	44.2	34.3	32.0	30.8	34.5	37.0	19.7	34.4	38.0	47.4	25.0	31.8	24.5	32.4	32.6	35.4	
Sep	48.1	47.4	46.2	43.5	57.5	46.6	47.0	45.0	55.1	**63.4**	38.9	36.6	28.6	30.9	24.5	21.1	35.0	30.8	32.1	33.7	29.1	
Oct	29.3	**51.5**	35.5	40.6	34.7	23.6	31.0	27.8	28.8	30.9	41.9	32.3	37.3	31.8	34.3	27.7	25.9	27.3	27.4	36.8	35.4	
Nov	32.9	28.1	**40.1**	33.2	32.0	37.6	28.5	29.9	32.0	27.9	31.3	32.8	28.4	29.1	32.5	35.0	36.0	38.6	40.0	33.4	33.6	
Dec	38.8	43.9	37.2	37.9	40.3	37.6	43.9	38.6	39.8	44.4	28.8	33.4	41.5	37.1	27.9	31.1	**48.8**	38.5	39.4	41.4	29.7	
Year	55.0	51.5	69.2	48.1	57.5	60.8	51.7	53.9	61.8	63.4	41.9	79.9	45.3	41.0	63.2	42.6	78.3	49.2	48.8	54.7	47.4	**68.9**

*10m 2000-Aug 2017 / 15m-Aug 2017-May 2021

Table 3-42: Peak 1-Second Wind Gusts (mph) at ETTP Tower "L" at 10/15 m from 2000-2021

Year	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
Jan	48.8	48.8	47.5	46.2	44.9	60.4	48.0	53.1	52.8	42.6	**74.0**	34.1	49.0	40.3	39.8	59.5	44.8	50.2	41.6	36.7	40.9	33.3
Feb	38.1	43.6	45.6	41.5	37.9	45.2	44.0	47.0	52.2	46.0	35.0	71.9	41.5	39.4	39.8	46.7	43.8	48.6	33.5	40.6	39.4	**89.7**
Mar	48.0	51.9	53.7	34.3	48.4	49.6	48.9	55.3	38.1	36.9	41.4	35.3	59.5	45.3	50.6	70.8	**84.5**	64.6	34.0	41.2	48.8	63.5
Apr	47.5	45.6	43.8	32.5	39.0	47.1	52.5	45.3	46.4	38.2	37.6	55.2	34.4	38.9	42.1	41.9	57.3	**75.1**	45.6	50.7	52.1	39.7
May	55.9	57.6	53.9	66.2	50.9	50.2	61.9	53.2	69.2	42.8	41.4	**83.8**	41.5	35.5	50.1	43.3	40.7	40.7	40.2	32.2	58.6	
Jun	46.2	46.9	43.5	43.5	43.2	54.6	47.9	55.3	58.7	67.3	36.9	51.3	29.1	34.6	**71.4**	33.7	41.1	45.9	42.0	59.0	42.1	
Jul	40.1	37.8	43.9	39.0	43.3	39.8	38.4	39.8	39.0	44.2	43.3	45.1	45.6	30.2	38.7	48.3	47.5	31.8	**53.7**	36.1	36.8	
Aug	61.1	27.7	37.2	34.6	36.6	48.1	37.4	32.6	36.9	40.1	40.3	23.6	40.5	42.6	**61.1**	38.5	38.4	34.4	55.5	33.6	41.0	
Sep	41.0	43.7	35.6	36.9	**60.0**	37.7	42.1	35.8	47.5	30.9	48.3	39.2	35.0	32.8	28.2	25.8	43.8	56.5	33.5	34.7	31.1	
Oct	30.3	41.2	38.9	46.0	38.9	36.2	37.1	30.7	34.6	35.7	**49.5**	38.7	43.7	39.8	43.7	32.7	36.5	42.1	32.7	39.4	39.0	
Nov	34.7	35.8	43.5	41.0	36.2	39.3	32.6	33.7	35.8	30.9	36.2	35.7	30.7	35.7	38.7	61.2	54.4	**67.7**	46.2	33.8	35.0	
Dec	39.7	40.1	36.7	51.7	43.7	42.4	48.2	40.7	44.2	46.9	32.3	43.1	40.8	44.2	35.3	39.5	**57.8**	45.6	38.8	42.7	33.3	
Year	61.1	57.6	53.9	66.2	60.0	60.4	61.9	55.3	69.2	67.3	74.0	83.8	59.5	45.3	71.4	70.8	84.5	75.1	55.5	59.0	58.6	**89.7**

*

Table 3-43: Peak 1-Second Wind Gusts (mph) at ETTP Tower "L" at 30 m from 2000-2021

M	Aug 21	Sep 21	Oct 21	Nov 21	Dec 21	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Mar 23	Apr 23
40	44.8	31.5	38.8	62.3	41.7	56.2	50	**85.7**	65.7	35.0	46.0	46.3	42.5	32.3	44.7	40.7	55.9	43.5	81.2	66.4	53.0
60	50.0	49.2	37.4	62.1	47.9	55.4	49.0	**88.0**	64.4	38.1	51.1	51.7	49.7	34.1	43.0	51.6	51.9	48.5	80.9	75.4	60.6
80	50.7	50.3	41.3	57.2	47.9	46.5	50.6	**87.0**	63.2	41.3	49.1	52.0	50.8	33.8	41.6	53.0	56.4	60.2	79.1	80.7	68.2
100	49.0	51.6	39.8	58.2	52.4	47.1	57.3	**87.5**	62.7	44.3	50.3	54.4	53.3	34.6	46.4	46.5	57.3	58.0	70.6	76.7	65.7
120	49.8	57.0	42.0	48.7	53.4	51.4	57.1	**86.0**	72.7	44.4	48.5	53.0	53.9	36.7	40.5	58.1	58.4	49.9	81.4	76.5	67.2
140	51.9	50.3	44.9	61.6	52.7	52.2	54.4	**81.5**	70.4	48.9	54.6	55.7	52.0	37.3	38.5	50.6	59.2	60.9	82.0	76.3	67.0
160	53.7	54.6	46.3	63.9	54.0	52.8	55.7	**83.7**	71.5	48.2	54.3	61.9	53.1	37.8	39.7	48.3	60.8	71.9	82.4	74.1	71.7
180	55.4	53.2	45.7	63.5	57.5	54.6	57.1	**84.5**	76.7	47.2	55.6	62.7	55.1	36.2	41.5	52.3	62.4	71.6	83.1	76.6	72.7
200	55.0	54.3	47.3	72.4	59.5	57.2	63.4	**84.4**	70.6	43.8	53.3	58.7	53.6	35.2	43.2	48.6	63.0	54.4	83.9	81.8	73.4
220	55.8	55.9	45.8	66.6	60.3	56.9	63.4	**84.1**	59.8	43.7	51.3	60.4	51.9	34.8	43.8	50.5	61.1	55.6	85.0	82.3	71.2
240	51.6	54.3	46.9	68.5	64.4	55.3	**98.2**	83.4	60.1	42.9	49.9	62.8	53.2	50.8	42.0	52.2	62.2	58.1	83.7	76.6	69.5
260	52.3	53.5	48.5	69.6	62.1	56.0	**99.3**	82.2	69.7	43.1	48.8	62.6	51.6	59.3	63.9	48.3	64.3	65.9	86.2	76.8	70.8
280	55.2	52.9	47.9	68.6	64.8	55.1	**99.5**	83.5	71.2	50.2	51.4	59.1	51.4	60	65.1	45.5	61.7	61.4	85.8	70.0	68.7
300	56.2	55.8	46.7	73.9	63.8	58.1	**99.4**	83.5	63.4	53.1	53.8	63.1	49.5	58.9	65.7	46.1	57.9	57.4	87.5	70.2	71.9
320	57.6	53.0	49.0	54.0	61.9	59.0	**101.3**	79.5	58.9	43.4	53.6	53.1	49.8	57.3	63.9	45.1	55.8	55.8	88.0	72.5	70.3
340	52.1	53.5	48.9	54.8	65.0	61.1	**101.5**	84.0	61.5	57.6	52.4	51.6	46.3	61.3	62.4	43.8	57.0	56.1	89.3	70.8	70.1
360	55.8	52.8	47.4	79.3	65.4	60.8	**102.8**	88.6	58.0	59.7	54.3	56.1	50.0	42.6	61.0	46.4	57.3	58.7	90.7	74.3	71.2
All	57.6	57.0	49.0	79.3	65.4	61.1	**102.8**	88.6	76.7	59.7	55.6 *	63.1	55.1	61.3	65.7	58.1	64.3	71.9	90.7	82.3	73.4

Table 3-44: Peak 1-Second Wind Gusts (mph) at ORNL Lidar "Q" from 40 to 360 m from August 2021 – April 2023

Year	12	13	14	15	16	17	18	19	20	21	22
Jan	**51.5**	44.7	51.2	39.6	44.3	39.8	37.7	42.5	49.3	40.5	45.8
Feb	45.3	48.3	46.7	50.2	45.5	38.2	40.1	43.6	49.6	37.2	**51.4**
Mar	50.8	52.9	53.6	35.4	48.4	45.7	41.4	40.1	41.6	44.1	**59.8**
Apr	49.5	45.6	44.9	**61.9**	51.4	53.0	56.0	53.1	60.6	39.7	58.6
May	43.5	47.9	37.1	36.5	46.9	50.7	40.0	37.0	42.2	**53.5**	41.2
Jun	35.5	45.6	64.3	42.0	46.6	40.3	41.8	60.3	41.2	57.1	**74.2**
Jul	60.5	36.0	54.0	56.3	**64.3**	53.4	52.3	33.7	39.0	36.7	51.5
Aug	**54.7**	30.0	36.2	26.6	37.6	40.4	42.6	41.0	38.6	36.8	37.0
Sep	29.8	39.2	36.9	30.0	**48.9**	47.1	34.8	24.3	37.2	38.6	32.9
Oct	49.2	41.9	**57.7**	36.8	37.8	39.3	32.5	44.1	44.9	39.1	50.3
Nov	33.0	41.0	45.2	54.4	53.8	**61.0**	42.9	37.0	42.0	38.0	47.2
Dec	47.6	55.2	38.1	54.0	50.3	44.9	35.7	51.0	35.0	52.7	**59.1**
Year	60.5	55.2	64.3	61.9	64.3	61.0	56.0	60.3	60.6	57.1	**74.2**

Table 3-45: Peak 1-Second Wind Gusts (mph) at Y-12 Tower "S" at 25 m from 2012-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan		34.1	37.8	38.5	38.0	**38.9**	29.5	32.7	35.7	36.2	36.6	30.2	31.1	26.3	27.7	34.1	29.5	36.6	30.2	31.1	26.3	27.7	34.1	29.5	31.8
Feb	28.4	35.3	35.5	46.7	45.6	31.6	41.9	41.7	34.1	37.3	33.9	45.1	33.2	28.2	34.3	**46.9**	32.5	33.9	45.1	33.2	28.2	34.3	46.9	32.5	25.0
Mar	33.2	35.0	**50.4**	43.1	33.2	33.2	35.3	38.5	40.1	38.7	31.4	37.6	34.8	34.6	30.2	31.6	30.0	31.4	37.6	34.8	34.6	30.2	31.6	30.0	
Apr	39.6	30.2	29.5	40.8	38.5	38.5	38.7	37.6	36.4	32.7	37.3	36.9	41.0	**42.8**	41.2	38.0	32.0	37.3	36.9	41.0	42.8	41.2	38.0	32.0	
May	29.5	30.2	36.4	41.2	33.4	34.1	39.4	44.9	**74.9**	30.0	31.3	24.3	42.1	29.3	29.1	37.3	35.0	31.3	24.3	42.1	29.3	29.1	37.3	35.0	
Jun	37.8	30.5	30.0	31.8	41.4	27.2	39.8	30.2	29.1	**60.0**	36.6	40.8	35.3	27.9	30.5	28.9	32.7	36.6	40.8	35.3	27.9	30.5	28.9	32.7	
Jul	38.0	28.9	24.0	43.7	22.9	31.4	27.9	**44.0**	26.8	29.1	30.9	29.8	25.0	33.4	32.1	31.1	28.2	30.9	29.8	25.0	33.4	32.1	31.1	28.2	
Aug	41.7	30.9	29.8	27.2	30.5	19.9	**44.2**	36.2	26.8	24.3	19.0	32.1	24.0	25.9	28.2	30.5	27.0	19.0	32.1	24.0	25.9	28.2	30.5	27.0	
Sep	23.1	26.6	26.3	36.6	27.2	23.8	31.8	22.0	22.0	23.1	22.0	31.6	**41.9**	30.0	18.3	26.3	19.0	22.0	31.6	41.9	30.0	18.3	26.3	19.0	
Oct	23.6	35.3	26.6	23.1	29.1	44.2	29.8	41.9	37.3	**49.5**	28.2	25.4	27.5	28.9	38.0	32.1	26.8	28.2	25.4	27.5	28.9	38.0	32.1	26.8	
Nov	**47.2**	25.9	27.2	29.3	26.3	42.4	31.8	28.9	32.5	36.2	31.4	38.0	45.8	31.8	28.6	31.4	21.3	31.4	38.0	45.8	31.8	28.6	31.4	21.3	
Dec	32.5	**49.5**	33.4	39.8	44.0	28.6	31.6	39.2	29.5	26.1	40.5	38.7	33.7	32.3	32.1	23.6	41.7	40.5	38.7	33.7	32.3	32.1	23.6	41.7	
Year	47.2	49.5	50.4	46.7	45.6	44.2	44.2	44.9	**74.9**	60.0	40.5	45.1	45.8	42.8	41.2	46.9	41.7	40.5	45.1	45.8	42.8	41.2	46.9	41.7	31.8

*

Table 3-46: Peak 1-Second Wind Gusts (mph) at Y-12 Tower "W" at 10 m from 2004-2021

Year	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
Jan			42.3	40.6	40.1	38.2	36.7	35.2	35.0	**54.6**	34.2	38.2	38.5	39.0	37.6	36.9	48.1	36.0
Feb			39.5	47.2	36.3	**72.8**	35.1	38.4	37.6	53.0	38.1	39.4	66.2	36.2	36.0	48.1	49.9	52.2
Mar			41.2	47.4	37.8	**49.0**	46.0	39.8	40.2	37.5	34.5	36.0	47.4	48.8	39.2	41.0	38.7	41.9
Apr			40.1	38.9	**59.8**	49.3	50.0	44.9	54.3	47.7	33.1	52.7	46.9	51.5	47.9	54.0	50.4	38.7
May			**73.8**	37.1	33.1	30.9	61.5	34.9	38.7	41.7	41.1	36.4	31.4	56.3	37.8	37.6	41.7	44.2
Jun			33.6	**73.0**	46.4	62.3	43.8	36.5	41.5	37.9	39.0	43.7	62.5	44.0	34.3	44.4	41.9	41.9
Jul			44.3	40.1	43.8	43.9	**50.6**	37.0	33.4	39.1	29.8	44.9	50.4	40.5	39.8	33.0	38.0	39.2
Aug			26.8	35.7	23.9	35.0	35.0	33.8	38.4	44.0	37.0	25.4	35.4	37.6	35.0	35.0	**49.7**	38.5
Sep			28.8	26.9	26.5	44.4	44.2	35.8	23.2	31.8	32.0	29.1	43.1	**47.6**	34.1	19.9	31.6	31.4
Oct			44.8	**60.0**	33.4	31.5	33.8	35.9	49.5	40.7	28.0	32.7	30.0	33.9	37.3	50.6	38.5	29.1
Nov			44.7	42.8	47.9	45.5	**62.1**	36.2	37.0	40.9	30.4	51.1	44.2	50.4	37.8	36.2	40.8	32.1
Dec			36.0	31.9	45.3	**59.8**	45.5	39.4	43.4	30.2	43.7	49.7	52.9	52.4	39.8	48.5	34.1	45.1
Year			**73.8**	73.0	59.8	72.8	62.1	44.9	54.3	54.6	43.7	52.7	66.2	56.3	47.9	54.0	50.4	52.2

*

Table 3-47: Peak 1-Second Wind Gusts (mph) at Y-12 Tower "W" at 30 m from 2004-2021

Year	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
Jan		42.6	38.2	32.3	44.9	41.4	44.4	38.2	38.5	39.0	37.6	36.9	48.1	36.0	38.2	38.5	39.0	37.6	36.9	**48.1**	36.0
Feb		55.2	39.4	56.3	49.5	43.0	48.5	39.4	66.2	36.2	36.0	48.1	49.9	52.2	39.4	**66.2**	36.2	36.0	48.1	49.9	52.2
Mar	53.8	38.9	45.1	44.7	**60.7**	54.5	52.9	36.0	47.4	48.8	39.2	41.0	38.7	41.9	36.0	47.4	48.8	39.2	41.0	38.7	41.9
Apr	52.2	42.1	45.3	48.5	**54.3**	40.0	39.8	52.7	46.9	51.5	47.9	54.0	50.4	38.7	52.7	46.9	51.5	47.9	54.0	50.4	38.7
May	53.8	46.3	46.0	43.3	54.7	**75.6**	37.3	36.4	31.4	56.3	37.8	37.6	41.7	44.2	36.4	31.4	56.3	37.8	37.6	41.7	44.2
Jun	51.8	54.5	38.5	57.7	38.7	33.9	**72.8**	43.7	62.5	44.0	34.3	44.4	41.9	41.9	43.7	62.5	44.0	34.3	44.4	41.9	41.9
Jul	**65.7**	32.3	32.1	34.6	59.3	37.8	52.0	44.9	50.4	40.5	39.8	33.0	38.0	39.2	44.9	50.4	40.5	39.8	33.0	38.0	39.2
Aug	29.8	43.3	32.7	49.5	44.4	28.4	35.5	25.4	35.4	37.6	35.0	35.0	**49.7**	38.5	25.4	35.4	37.6	35.0	35.0	49.7	38.5
Sep	**54.0**	32.7	28.9	38.9	27.7	29.3	29.3	29.1	43.1	47.6	34.1	19.9	31.6	31.4	29.1	43.1	47.6	34.1	19.9	31.6	31.4
Oct	28.9	39.6	53.1	38.5	38.9	41.9	**63.0**	32.7	30.0	33.9	37.3	50.6	38.5	29.1	32.7	30.0	33.9	37.3	50.6	38.5	29.1
Nov	40.1	31.8	42.6	41.0	35.0	44.0	43.5	**51.1**	44.2	50.4	37.8	36.2	40.8	32.1	51.1	44.2	50.4	37.8	36.2	40.8	32.1
Dec	46.9	**55.9**	32.5	36.4	55.0	39.2	33.7	49.7	52.9	52.4	39.8	48.5	34.1	45.1	49.7	52.9	52.4	39.8	48.5	34.1	45.1
Year	65.7	55.9	53.1	57.7	60.7	**75.6**	72.8	52.7	66.2	56.3	47.9	54.0	50.4	52.2	52.7	66.2	56.3	47.9	54.0	50.4	52.2

*

Table 3-48: Peak 1-Second Wind Gusts (mph) at Y-12 Tower "W" at 60 m from 2004-2021

Year	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	33.3	**38.7**	35.6	33.0	33.3	36.9	32.8	35.0	28.6	31.3	27.6	26.0	29.7	34.7	28.3	31.1
Feb	35.8	39.4	41.2	35.1	40.3	43.9	40.2	39.2	33.2	44.3	30.7	27.6	35.0	**45.7**	29.4	37.5
Mar	46.6	37.4	33.3	34.1	32.6	33.0	35.5	40.2	28.3	32.9	34.2	33.8	32.1	29.7	28.9	**47.6**
Apr	37.3	46.6	40.6	43.4	**47.9**	38.8	35.0	29.9	42.0	44.7	36.5	40.8	40.0	39.8	27.6	38.3
May	34.6	**52.7**	41.6	40.5	38.6	31.1	45.1	28.3	22.1	44.6	43.1	29.9	28.3	30.9	37.5	36.9
Jun	28.4	31.0	29.3	30.8	37.5	33.0	25.6	**54.5**	32.8	35.3	35.6	30.7	33.2	29.3	38.3	39.6
Jul	40.4	43.2	40.5	42.5	35.8	**60.0**	29.4	31.7	40.6	35.0	38.5	38.8	29.7	28.9	26.0	35.6
Aug	**39.1**	34.4	31.5	30.2	34.7	32.1	23.9	35.5	20.2	27.5	27.2	35.6	29.1	35.3	34.0	28.4
Sep	30.8	**42.7**	30.8	27.5	38.3	29.4	25.4	23.5	22.2	30.9	37.1	25.1	18.4	25.7	26.6	24.9
Oct	29.0	28.0	31.0	**49.7**	36.5	35.3	33.2	43.5	25.7	28.0	26.2	25.1	37.3	35.5	25.4	24.8
Nov	32.2	34.3	28.7	**41.9**	38.8	28.7	32.1	32.0	33.6	37.1	39.8	32.1	30.3	28.4	25.7	33.6
Dec	41.9	42.3	**57.4**	39.1	39.8	48.6	36.3	32.8	41.0	36.3	37.1	28.6	36.3	24.8	36.9	44.1
Year	46.6	52.7	57.4	49.7	47.9	**60.0**	45.1	54.5	42.0	44.7	43.1	40.8	40.0	45.7	38.3	47.6

*

Table 3-49: Peak 1-Second Wind Gusts (mph) at Y-12 Tower "Y" at 15 m from 2007-2021

Year	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	37.0	**43.0**	39.6	36.7	37.0	41.0	36.4	38.9	31.8	34.8	30.7	28.9	33.0	38.5	31.4	34.6
Feb	39.8	43.8	45.8	39.0	44.8	48.8	44.7	43.5	36.9	49.2	34.1	30.7	38.9	**50.8**	32.7	41.7
Mar	51.8	41.5	37.0	37.9	36.2	36.7	39.4	44.7	31.4	36.6	38.0	37.6	35.7	33.0	32.1	**52.9**
Apr	41.4	51.8	45.1	48.2	**53.2**	43.1	38.9	33.2	46.7	49.7	40.5	45.3	44.4	44.2	30.7	42.6
May	38.4	**58.5**	46.2	45.0	42.9	34.5	50.1	31.4	24.5	49.5	47.9	33.2	31.4	34.3	41.7	41.0
Jun	31.6	34.4	32.5	34.2	41.7	36.7	28.4	**60.5**	36.4	39.2	39.6	34.1	36.9	32.5	42.6	44.0
Jul	44.9	48.0	45.0	47.2	39.8	**66.7**	32.7	35.2	45.1	38.9	42.8	43.1	33.0	32.1	28.9	39.6
Aug	**43.4**	38.2	35.0	33.6	38.5	35.7	26.6	39.4	22.4	30.5	30.2	39.6	32.3	39.2	37.8	31.6
Sep	34.2	**47.4**	34.2	30.6	42.6	32.7	28.2	26.1	24.7	34.3	41.2	27.9	20.4	28.6	29.5	27.7
Oct	32.2	31.1	34.4	**55.2**	40.6	39.2	36.9	48.3	28.6	31.1	29.1	27.9	41.4	39.4	28.2	27.5
Nov	35.8	38.1	31.9	**46.5**	43.1	31.9	35.7	35.5	37.3	41.2	44.2	35.7	33.7	31.6	28.6	37.3
Dec	46.5	47.0	**63.8**	43.4	44.2	54.0	40.3	36.4	45.6	40.3	41.2	31.8	40.3	27.5	41.0	49.0
Year	51.8	58.5	63.8	55.2	53.2	**66.7**	50.1	60.5	46.7	49.7	47.9	45.3	44.4	50.8	42.6	52.9

*

Table 3-50: Peak 1-Second Wind Gusts (mph) at Y-12 Tower "Y" at 33 m from 2007-2021

Period	Site	Snowfall (in)	Date
12-hour	Knoxville	18.2	Nov 1952
	Oak Ridge	12.0	Mar 1960, Mar 1993
1-month	Knoxville	23.3	Feb 1960
	Oak Ridge	21.0	Mar 1960
Annual	Knoxville	56.7	1959-1960
	Oak Ridge	41.4	1959-1960

Table 3-51: Record snowfall for Oak Ridge and Knoxville, Tennessee

Monthly and Annual Snow/Ice for Oak Ridge, Tennessee, January 1985 - December 2022

Year	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
1985	9.4	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	13.0
1986	2.5	5.0	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	7.5
1987	4.7	Trace	Trace	5.9	0.0	0.0	0.0	0.0	0.0	0.0	Trace	Trace	10.6
1988	6.9	0.1	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	4.2	11.2
1989	Trace	4.1	0.0	Trace	0.0	0.0	0.0	0.0	0.0	Trace	Trace	9.5	13.6
1990	Trace	Trace	Trace	0.0	Trace	0.0	0.0	0.0	0.0	0.0	0.0	Trace	Trace
1991	Trace	Trace	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	Trace	Trace
1992	Trace	0.0	1.0	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.6
1993	0.0	2.8	12.0	Trace	0.0	0.0	0.0	0.0	0.0	Trace	0.0	0.5	15.3
1994	0.9	0.1	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
1995	1.8	2.4	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	Trace	6.4
1996	9.0	12.0	0.8	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.5	Trace	22.3
1997	3.2	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	8.7
1998	Trace	2.8	Trace	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	3.2
1999	1.1	1.5	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	3.0
2000	2.0	Trace	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	4.3
2001	0.1	0.0	0.0	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
2002	Trace	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
2003	0.9	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	1.0	6.6
2004	1.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0
2005	0.2	Trace	0.0	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
2006	0.3	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	Trace	3.8
2007	Trace	1.0	0.0	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	1.0
2008	0.5	0.3	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	0.0	0.8
2009	1.0	1.0	0.0	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	4.0
2010	5.0	2.5	Trace	0.0	0.0	0.0	0.0	0.0	0.0	Trace	0.0	3.6	11.1
2011	4.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	Trace	4.3
2012	0.1	Trace	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	0.1
2013	0.3	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	2.8
2014	2.6	7.4	Trace	Trace	0.0	0.0	0.0	0.0	0.0	0.0	Trace	0.0	10.0
2015	0.3	10.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6
2016	3.4	1.4	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	4.8
2017	2.6	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	2.6
2018	1.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	1.0	2.7
2019	0.5	Trace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.4	2.9
2020	Trace	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Trace	1.9	2.5
2021	Trace	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
2022	3.4	Trace	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	8.1
1991-2020	**1.8**	**2.6**	**0.8**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**1.0**	**4.9**

Table 3-52: Monthly and Annual Snowfall/Ice for Oak Ridge, Tennessee 1985-2022

Year	Days	Year	Days
1999	0	2012	0
2000	2	2013	3
2001	0	2014	1
2002	3	2015	3
2003	0	2016	2
2004	0	2017	0
2005	5	2018	2
2006	0	2019	0
2007	0	2020	0
2008	1	2021	1
2009	0	2022	0
2010	5	**1991-2022**	**1.2**

Table 3-53: Freezing Rain Days for Oak Ridge, Tennessee 1999-2022

Hourly Freeze Data for Oak Ridge, Tennessee January 1985 - 2022

Number of Hours Temperatures (C) were at or below freezing (NOAA-ATDD 1985-2000; KOQT ASOS 2001-2015, ORNL Tower "D" 2016-2022)

	January				February				March			April		May		October		November			December				Annual			
Year	<=0	<-5	<-10	<-15	<=0	<-5	<-10	<-15	<=0	<-5	<-10	<=0	<-5	<=0	<-5	<=0	<-5	<=0	<-5	<-10	<=0	<-5	<-10	<-15	<=0	<-5	<-10	<-15
1985	467	195	103	39	331	127	26	0	105	6	0	43	3	0	0	0	0	22	0	0	431	201	66	2	1399	532	195	41
1986	308	125	38	10	161	29	3	0	124	28	0	17	0	0	0	0	0	32	10	0	232	34	0	0	874	226	41	10
1987	302	53	7	0	111	19	3	0	95	0	0	55	4	0	0	36	0	103	18	0	151	16	0	0	853	110	10	0
1988	385	182	43	0	294	102	19	0	97	9	0	6	0	0	0	45	0	62	3	0	301	55	0	0	1190	351	62	0
1989	163	27	0	0	190	66	10	0	35	0	0	18	0	3	0	7	0	125	14	0	421	188	71	30	962	295	81	30
1990	142	13	0	0	115	5	0	0	35	0	0	35	0	0	0	19	0	62	1	0	172	43	5	0	580	62	5	0
1991	186	44	0	0	158	47	15	0	49	0	0	0	0	0	0	4	0	148	16	0	192	38	0	0	737	145	15	0
1992	230	65	8	0	116	22	0	0	116	4	0	27	2	0	0	7	0	100	0	0	166	9	0	0	762	102	8	0
1993	125	11	0	0	245	47	8	0	124	32	9	3	0	0	0	0	0	152	2	0	223	44	0	0	872	136	17	0
1994	337	191	85	26	196	46	3	0	66	0	0	18	0	0	0	0	0	53	1	0	142	0	0	0	812	238	88	26
1995	240	45	6	0	217	84	18	0	37	0	0	0	0	0	0	0	0	142	3	0	288	84	10	0	924	216	34	0
1996	301	91	0	0	225	110	62	27	182	49	6	23	0	0	0	3	0	101	0	0	194	40	4	0	1029	290	72	27
1997	254	101	24	0	67	0	0	0	25	0	0	6	0	0	0	6	0	96	10	0	232	14	0	0	686	125	24	0
1998	97	10	7	0	25	0	0	0	74	20	0	0	0	0	0	0	0	38	0	0	132	4	0	0	366	34	7	0
1999	181	68	0	0	113	14	0	0	62	0	0	0	0	0	0	4	0	41	0	0	177	23	0	0	578	105	0	0
2000	273	62	5	0	127	30	0	0	18	0	0	8	0	0	0	11	0	94	11	0	345	124	7	0	876	227	12	0
2001	281	60	5	0	79	9	0	0	53	0	0	2	0	0	0	18	0	28	0	0	137	35	0	0	598	104	5	0
2002	185	28	0	0	121	16	0	0	91	17	0	2	0	0	0	0	0	41	0	0	82	6	0	0	522	67	0	0
2003	345	123	26	0	117	12	0	0	19	0	0	0	0	0	0	0	0	37	0	0	102	9	0	0	620	144	26	0
2004	285	50	2	0	76	0	0	0	18	0	0	0	0	0	0	0	0	9	0	0	247	41	4	0	635	91	6	0
2005	151	65	6	0	52	1	0	0	81	1	0	0	0	0	0	1	0	55	0	0	176	28	0	0	516	95	6	0
2006	70	0	0	0	169	19	0	0	44	0	0	0	0	0	0	15	0	37	0	0	126	41	1	0	461	60	1	0
2007	189	30	5	0	280	73	0	0	29	0	0	32	0	0	0	0	0	60	0	0	83	8	0	0	673	111	5	0
2008	242	86	11	0	114	7	0	0	69	6	0	0	0	0	0	15	0	89	18	0	157	34	5	0	686	151	16	0
2009	238	93	29	0	178	64	5	0	55	15	0	5	0	0	0	0	0	8	0	0	178	22	0	0	662	194	34	0
2010	384	181	14	0	289	32	0	0	40	2	0	0	0	0	0	0	0	46	0	0	364	109	11	0	1123	324	25	0
2011	300	61	0	0	108	14	0	0	2	0	0	0	0	0	0	5	0	29	0	0	91	0	0	0	535	75	0	0
2012	169	32	0	0	78	20	0	0	9	0	0	1	0	0	0	0	0	46	0	0	76	0	0	0	379	52	0	0
2013	245	49	0	0	120	12	0	0	95	7	0	0	0	0	0	11	0	121	0	0	173	6	0	0	765	74	0	0
2014	371	208	76	12	109	5	0	0	68	0	0	5	0	0	0	0	0	122	10	0	94	1	0	0	769	224	76	12
2015	228	52	16	0	371	120	31	6	52	16	0	0	0	0	0	0	0	11	0	0	41	0	0	0	703	188	47	6
2016	333	82	12	0	211	17	0	0	35	0	0	9	0	0	0	0	0	44	3	0	163	32	0	0	795	134	12	0
2017	130	47	11	1	64	5	0	0	82	8	0	0	0	0	0	8	0	67	0	0	252	20	0	0	603	80	11	1
2018	362	199	86	4	67	7	0	0	49	2	0	11	0	0	0	0	0	89	6	0	102	11	0	0	680	225	86	4
2019	146	46	1	0	46	0	0	0	80	9	0	5	0	0	0	0	0	93	11	0	90	0	0	0	460	66	1	0
2020	124	14	0	0	102	11	0	0	20	1	0	12	0	4	0	0	0	30	0	0	210	49	11	0	502	75	11	0
2021	151	1	0	0	144	33	0	0	34	0	0	31	0	0	0	0	0	121	0	0	70	0	0	0	551	34	0	0
2022	322	75	16	2	165	24	0	0	60	14	4	9	0	0	0	29	0	116	20	0	246	99	55	21	947	232	75	23
Avg	**243**	**75**	**17**	**2**	**151**	**33**	**5**	**1**	**61**	**6**	**1**	**10**	**0**	**0**	**0**	**6**	**0**	**70**	**4**	**0**	**186**	**39**	**7**	**1**	**729**	**158**	**29**	**5**

Table 3-54: Hours ≤ 0° C by Month and Year for Oak Ridge, Tennessee 1985-2022

Year	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Feb	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Mar	0.0	0.0	1.0	0.0	2.0	3.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	2.0	0.0	0.0	0.0
Apr	2.0	0.0	1.0	1.0	1.0	0.0	0.0	2.0	0.0	0.0	1.0	5.0	1.0	0.0	0.0	2.0	2.0	0.0
May	4.0	2.0	11.0	1.0	1.0	0.0	1.0	3.0	0.0	0.0	10.0	2.0	0.0	2.0	1.0	0.0	2.0	0.0
Jun	5.0	3.0	4.0	2.0	4.0	1.0	4.0	6.0	1.0	0.0	5.0	8.0	1.0	7.0	0.0	0.0	2.0	4.0
Jul	1.0	2.0	2.0	5.0	0.0	2.0	6.0	0.0	1.0	2.0	1.0	2.0	3.0	10.0	3.0	3.0	3.0	1.0
Aug	7.0	2.0	8.0	10.0	3.0	1.0	6.0	6.0	4.0	8.0	12.0	2.0	7.0	5.0	3.0	0.0	1.0	4.0
Sep	9.0	2.0	15.0	9.0	0.0	7.0	4.0	4.0	6.0	3.0	15.0	7.0	4.0	2.0	10.0	3.0	5.0	5.0
Oct	3.0	3.0	3.0	5.0	3.0	2.0	3.0	3.0	3.0	1.0	8.0	3.0	6.0	3.0	5.0	1.0	1.0	5.0
Nov	1.0	1.0	0.0	7.0	0.0	2.0	0.0	4.0	0.0	0.0	1.0	5.0	0.0	0.0	1.0	5.0	0.0	1.0
Dec	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0	2.0
Year	33.0	15.0	46.0	40.0	14.0	18.0	24.0	29.0	16.0	14.0	55.0	37.0	23.0	29.0	25.0	14.0	16.0	23.0

Table 3-55: Number of potential air stagnation days by month and year for Oak Ridge, Tennessee during 2005-2012

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	5.7	6.1	3.3	1.9	5.0	0.7	2.6	5.6	7.2	4.7	2.7	2.0	1.1	1.8	5.6	5.3	-0.8	2.6	1.8	7.7	1.0	4.2	6.6	4.0	2.3
Feb	7.0	6.5	7.3	7.1	4.8	4.4	4.4	6.6	4.3	2.9	5.7	5.7	1.5	6.8	7.7	4.9	4.8	-0.1	5.2	9.0	9.7	8.4	6.6	4.8	6.3
Mar	9.2	7.3	11.5	7.5	10.0	11.6	11.5	8.7	10.0	13.2	9.5	10.5	8.4	10.7	15.2	6.3	8.6	10.5	12.9	10.8	9.0	8.9	13.0	12.0	11.6
Apr	13.7	16.3	13.3	15.9	16.5	15.3	14.3	14.3	16.7	12.9	14.8	14.5	16.4	16.5	15.4	14.3	16.7	15.5	15.7	17.8	12.4	16.1	13.0	13.9	14.5
May	20.8	18.7	20.2	18.5	17.4	18.6	20.5	17.2	17.7	20.0	20.3	18.6	20.1	18.7	20.5	18.0	19.1	20.2	18.3	18.8	21.8	21.1	17.3	18.0	20.5
Jun	24.1	22.5	22.5	21.4	23.5	21.0	22.5	22.9	22.2	22.8	23.3	23.2	24.5	23.7	23.0	22.6	22.6	23.6	23.9	21.9	23.5	22.1	22.2	23.1	24.3
Jul	24.7	24.7	23.9	23.9	25.1	23.2	23.8	24.5	24.6	23.4	23.5	22.3	25.5	25.7	25.5	22.9	22.7	24.3	25.4	24.5	24.6	24.5	25.6	24.2	25.2
Aug	24.2	24.3	23.3	23.5	24.8	23.9	22.3	24.6	25.1	27.0	23.5	23.0	25.5	25.0	22.9	22.9	23.1	22.7	25.5	23.1	23.5	24.0	23.9	24.1	23.7
Sep	23.2	20.2	19.8	18.8	22.5	19.4	20.5	21.8	18.7	22.3	21.3	20.5	21.0	19.2	19.7	20.5	21.1	20.6	23.1	19.6	23.2	23.7	20.5	20.2	20.0
Oct	15.6	14.2	14.7	13.0	16.2	14.0	16.7	14.4	12.7	16.9	13.8	13.3	14.1	13.1	13.4	14.8	14.6	14.8	17.6	15.3	15.5	16.3	15.6	16.3	12.9
Nov	10.2	11.1	7.6	12.0	7.6	11.1	11.4	9.9	8.8	8.7	7.0	10.0	9.5	10.2	7.8	7.2	5.9	11.8	11.1	10.0	6.8	7.0	10.8	7.2	10.4
Dec	6.7	5.9	0.3	7.3	4.4	3.2	3.9	2.6	6.2	7.1	5.4	3.8	0.2	6.6	7.5	5.1	6.0	11.1	5.2	4.5	6.3	7.4	4.1	10.3	4.9
Year	15.4	14.8	14.0	14.2	14.8	13.9	14.5	14.4	14.5	15.2	14.2	14.0	14.0	14.8	15.4	13.7	13.7	14.8	15.5	15.3	14.8	15.3	14.9	14.8	14.7

Table 3-56: Average monthly temperatures in degrees C for ORNL Tower "A" at 10/15 meters during 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	5.9	5.9	3.2	2.1	5.1	0.7	2.8	6.2	7.1	4.6	2.7	2.1	1.1	1.8	5.6	5.5	-0.7	2.8	2.1	7.8	1.3	4.2	6.8	4.2	2.6
Feb	7.0	6.9	8.8	7.3	4.8	4.4	4.2	6.6	4.1	2.9	5.7	6.0	1.4	6.8	7.7	5.1	5.0	0.0	5.3	9.2	9.9	8.6	6.8	4.8	6.5
Mar	9.1	7.2	12.1	7.5	10.1	11.5	11.7	8.7	10.1	13.2	9.0	10.9	8.3	10.7	15.2	6.4	8.8	10.6	13.1	11.0	9.0	9.1	13.1	12.1	11.8
Apr	13.6	16.2	13.5	16.1	16.4	15.3	14.5	14.3	16.8	12.9	14.6	14.8	16.4	16.5	15.4	14.7	16.7	15.7	16.0	18.0	12.6	16.4	13.2	14.0	14.7
May	20.3	18.5	20.3	18.6	17.5	18.5	20.7	17.2	17.0	19.9	18.2	18.9	20.1	18.7	20.5	18.3	19.3	20.4	18.5	19.0	22.0	21.4	17.4	18.0	20.6
Jun	24.0	22.5	22.6	21.4	23.5	21.0	22.3	22.9	22.2	23.3	23.2	23.5	24.5	23.7	23.0	22.8	22.6	23.7	24.1	22.1	23.6	22.2	22.3	23.0	24.4
Jul	24.7	24.7	23.9	23.9	25.1	23.2	23.2	24.5	24.5	23.4	23.4	22.6	25.5	25.7	25.5	23.1	22.9	24.3	25.5	24.6	24.6	24.6	25.7	24.2	25.1
Aug	24.3	24.1	23.5	23.5	24.7	24.0	21.8	24.6	25.1	27.0	23.4	23.3	25.5	25.0	22.9	23.1	23.2	22.9	25.7	23.2	23.6	24.2	23.9	24.0	23.6
Sep	23.5	19.7	19.9	19.0	22.4	19.3	20.3	21.8	18.6	22.3	21.2	20.8	21.1	19.2	19.7	20.8	21.2	20.8	23.4	19.9	23.3	24.1	20.7	20.3	20.3
Oct	16.0	13.8	15.3	13.5	16.7	14.0	16.8	14.8	12.8	16.9	13.8	13.5	14.1	13.1	13.4	15.2	14.9	15.1	18.0	15.5	15.7	16.6	15.9	16.2	13.4
Nov	9.8	10.7	7.9	12.8	7.5	11.1	11.6	9.9	8.9	8.6	7.0	10.6	9.6	10.2	7.8	7.5	6.2	12.1	11.5	10.3	7.0	7.2	11.2	7.5	10.9
Dec	6.9	5.4	9.6	7.6	4.3	3.2	4.1	2.5	6.2	7.1	5.4	3.8	0.2	6.6	7.5	5.3	6.2	11.4	5.4	4.7	6.5	7.6	4.4	10.5	5.3
Year	15.4	14.6	15.1	14.4	14.8	13.9	14.5	14.5	14.5	15.2	14.0	14.2	14.0	14.8	15.4	14.0	13.9	15.0	15.7	15.4	14.9	15.5	15.1	14.9	14.9

Table 3-57: Average monthly temperatures in degrees C for ORNL Tower "A" at 30 meters during 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	1.6	5.5	0.4	2.3	5.3	6.9	3.8	2.5	1.8	1.1	1.3	5.3	5.1	-1.1	2.4	1.5	7.5	0.5	4.1	6.3	3.9	2.2	1.6	5.5	0.4
Feb	6.8	4.3	4.2	4.6	6.1	4.1	2.6	5.6	5.2	1.4	6.4	7.2	4.8	4.6	-0.2	5.3	8.6	9.3	8.4	6.5	4.6	5.9	6.8	4.3	4.2
Mar	7.3	8.8	11.2	11.3	8.3	9.5	11.9	9.3	10.1	8.3	10.5	14.8	6.1	8.3	10.3	12.4	10.5	8.9	8.6	13.0	11.6	11.3	7.3	8.8	11.2
Apr	15.8	16.0	14.9	14.0	13.8	16.4	11.8	14.7	14.1	16.4	16.2	15.2	14.0	15.4	15.3	15.5	17.5	12.0	16.0	13.0	13.6	14.2	15.8	16.0	14.9
May	18.5	17.2	18.6	20.4	16.8	17.7	19.0	18.3	18.8	20.1	18.5	20.4	17.9	19.0	20.1	18.2	18.8	21.9	21.1	17.4	18.0	20.7	18.5	17.2	18.6
Jun	21.3	23.2	21.7	22.4	22.7	22.1	22.1	23.2	23.4	24.5	23.6	22.8	22.6	22.7	23.6	23.7	21.9	23.6	22.3	22.5	23.1	24.4	21.3	23.2	21.7
Jul	24.0	25.0	24.0	23.4	24.4	24.6	22.8	23.7	22.5	25.5	25.6	25.5	23.0	22.7	24.4	25.5	24.5	24.6	24.7	25.8	24.3	25.4	24.0	25.0	24.0
Aug	23.6	24.5	24.3	21.9	24.6	25.2	26.1	23.5	23.4	25.5	24.8	22.8	23.0	23.2	22.8	25.5	23.3	23.6	24.2	24.2	24.2	23.9	23.6	24.5	24.3
Sep	18.7	22.2	19.3	20.1	21.4	18.5	22.3	21.1	20.9	21.1	19.2	19.6	20.3	21.1	20.6	22.8	19.6	23.4	23.7	20.8	20.4	20.1	18.7	22.2	19.3
Oct	12.3	16.1	13.5	16.4	14.4	12.4	15.8	13.4	13.4	14.1	12.9	13.2	14.6	14.5	14.7	17.1	14.9	15.6	16.3	15.8	16.4	12.8	12.3	16.1	13.5
Nov	10.9	7.4	10.8	12.0	9.4	8.3	7.5	6.6	9.7	9.6	9.9	7.2	6.9	5.6	11.4	10.5	9.3	6.7	6.7	10.3	6.8	10.3	10.9	7.4	10.8
Dec	6.6	3.9	2.6	3.2	2.4	5.7	5.9	5.2	3.6	0.2	6.2	7.3	4.9	5.9	10.6	5.0	4.3	6.1	7.1	3.8	9.9	4.6	6.6	3.9	2.6
Year	14.0	14.5	13.8	14.3	14.1	14.3	14.3	13.9	13.9	14.0	14.6	15.1	13.6	13.5	14.7	15.3	15.1	14.7	15.3	15.0	14.7	14.7	14.0	14.5	13.8

Table 3-58: Average monthly temperatures in degrees C for ORNL Tower "B" at 10/15 meters during 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	2.4	4.7	0.7	2.5	5.8	7.3	4.9	3.0	2.1	1.1	1.7	5.8	5.4	-0.8	2.7	1.8	7.7	0.9	4.0	6.5	4.0	2.2	2.4	4.7	0.7
Feb	7.3	4.8	4.4	4.3	6.7	4.3	3.0	6.0	5.7	1.3	6.9	7.7	5.0	4.8	0.0	5.5	9.0	9.5	8.4	6.6	4.7	6.2	7.3	4.8	4.4
Mar	7.5	9.8	11.5	11.3	8.8	10.0	13.4	9.7	10.6	8.6	10.9	15.3	6.3	8.6	10.6	12.8	10.8	8.9	8.8	13.1	11.9	11.6	7.5	9.8	11.5
Apr	16.0	16.3	15.2	14.2	14.4	16.8	13.0	15.0	14.5	17.0	16.6	15.6	14.3	15.7	15.6	15.7	17.9	12.3	16.2	13.1	13.8	14.4	16.0	16.3	15.2
May	18.6	17.3	18.8	20.4	17.1	17.7	20.2	18.6	19.0	20.4	18.9	20.7	18.1	19.2	20.2	18.3	18.9	22.0	21.3	17.5	17.9	20.7	18.6	17.3	18.8
Jun	21.4	23.2	21.9	22.3	22.8	22.2	23.4	23.5	23.4	24.7	23.8	22.9	22.6	22.7	23.6	23.9	22.0	23.7	22.3	22.5	23.1	24.5	21.4	23.2	21.9
Jul	24.0	25.0	24.1	23.2	24.5	24.5	23.9	23.9	22.4	25.7	25.9	25.6	23.0	22.8	24.4	25.5	24.6	24.7	24.7	25.8	24.3	25.5	24.0	25.0	24.1
Aug	23.6	24.6	24.2	21.8	24.6	25.1	27.0	23.8	23.4	25.8	25.1	23.0	23.0	23.2	22.8	25.5	23.3	23.6	24.2	24.2	24.2	24.0	23.6	24.6	24.2
Sep	18.8	22.3	19.3	20.3	21.7	18.5	22.4	21.3	21.2	21.5	19.8	19.9	20.4	21.1	20.7	22.9	19.8	23.4	23.9	20.7	20.4	20.0	18.8	22.3	19.3
Oct	12.7	16.2	13.7	16.8	14.8	12.8	17.3	13.8	13.5	14.8	13.5	13.6	14.8	14.7	14.8	17.5	15.0	15.6	16.3	15.8	16.3	12.8	12.7	16.2	13.7
Nov	11.8	7.6	11.1	11.4	9.9	9.0	9.1	7.1	10.1	10.0	10.7	7.9	7.2	5.9	11.8	11.0	9.8	6.7	6.9	10.7	7.1	10.4	11.8	7.6	11.1
Dec	7.1	4.2	3.1	4.0	2.6	6.3	7.5	5.5	3.8	0.1	6.9	7.6	5.2	6.1	11	5.2	4.4	6.2	7.3	4.0	10.2	4.7	7.1	4.2	3.1
Year	14.3	14.7	14.0	14.4	14.5	14.5	15.4	14.3	14.1	14.3	15.1	15.5	13.8	13.7	14.9	15.5	15.3	14.8	15.4	15.0	14.8	14.8	14.3	14.7	14.0

Table 3-59: Average monthly temperatures in degrees C for ORNL Tower "B" at 30 meters during 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan																		2.2	1.3	7.4	0.4	4.0	6.1	3.7	1.9
Feb																		-0.3	5.0	8.5	9.5	8.2	6.4	4.5	5.6
Mar																		10.2	12.3	10.4	8.8	8.4	12.7	11.2	10.9
Apr																		15.2	15.2	17.3	12.0	15.7	12.7	13.2	13.8
May																		20.1	18.1	18.6	21.6	20.9	17.1	17.5	20.3
Jun																	22.7	23.5	23.7	21.8	23.5	22.2	22.2	22.7	24.1
Jul																	22.7	24.3	25.5	24.5	24.7	24.5	25.6	24.0	25.1
Aug																	23.1	22.8	25.6	23.2	23.5	24.1	23.9	23.9	23.4
Sep																	21.1	20.7	22.9	19.5	23.3	23.6	20.4	20.1	19.3
Oct																	14.4	14.6	17.1	14.9	15.4	16.1	15.5	16.0	11.6
Nov																	5.5	11.3	10.3	9.3	6.6	6.5	9.8	6.4	8.7
Dec																	5.8	10.4	4.8	4.2	5.9	6.8	3.4	9.4	3.4
Year																	16.5	14.6	15.2	15.0	14.6	15.1	14.7	14.4	14.0

Table 3-60: Average monthly temperatures in degrees C for ORNL Tower "D" at 2 meters during 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	5.8	3.0	2.1	2.1	5.2	0.8	2.4	5.8	7.4	4.9	2.8	2.1	1.0	1.7	5.8	5.3	-0.9	2.7	1.9	7.8	1.0	4.3	6.7	4.2	2.5
Feb	7.1	7.5	7.4	7.4	4.9	4.5	4.3	6.7	4.5	3.1	5.8	5.8	1.3	6.8	7.8	4.9	4.8	0.1	5.3	9.1	9.9	8.6	6.9	4.8	6.4
Mar	9.0	11.7	7.7	7.7	10.1	11.7	12.2	8.8	10.2	13.6	9.7	10.6	8.6	10.8	15.4	6.3	8.6	10.7	12.9	10.9	9.1	9.0	13.1	11.9	11.9
Apr	13.5	13.4	16.2	16.2	16.6	15.4	15.1	14.5	17.1	13.2	14.8	14.6	16.7	16.7	15.7	14.3	15.7	15.7	15.8	17.9	12.6	16.3	13.2	13.9	14.7
May	20.3	20.3	18.8	18.8	17.5	18.6	21.3	17.4	17.9	20.4	20.5	18.8	20.2	18.9	20.8	18.1	19.3	20.4	18.5	19.0	22.0	21.4	17.5	18.0	20.7
Jun	23.2	22.6	21.6	21.6	23.5	21.1	23.0	22.9	22.5	23.0	23.5	23.4	24.7	23.8	23.2	22.6	22.7	23.7	24.0	22.0	23.6	22.3	22.4	23.0	24.4
Jul	24.8	23.9	24.0	24.0	25.1	23.3	23.4	24.5	24.9	23.6	23.8	22.4	25.6	25.9	25.6	23.0	22.9	24.4	25.5	24.6	24.7	24.6	25.6	24.2	25.3
Aug	24.3	23.5	23.7	23.7	24.8	24.0	22.1	24.8	25.3	27.3	23.9	23.2	25.7	25.2	23.1	23.0	23.3	23.0	25.7	23.3	23.7	24.2	24.0	24.0	23.8
Sep	23.4	19.9	19.0	19.0	22.6	19.6	20.6	22.1	18.9	22.5	21.5	20.8	21.3	19.4	20.0	20.5	21.3	20.9	23.2	19.8	23.4	23.9	20.7	20.3	20.1
Oct	15.8	15.1	13.1	13.1	16.2	14.3	16.8	14.7	13.0	17.1	14.0	13.4	14.5	13.5	13.6	14.8	14.9	15.1	17.8	15.4	15.8	16.5	15.9	16.3	13.0
Nov	10.3	7.8	12.1	12.1	7.7	11.3	11.6	10.2	9.1	8.9	7.2	10.3	9.7	10.4	8.1	7.2	6.1	12.0	11.2	10.0	7.0	7.1	10.8	7.3	10.4
Dec	6.8	0.3	7.3	7.3	4.6	3.3	4.1	2.8	6.5	7.2	5.4	3.7	0.1	6.9	7.7	5.1	6.2	11.1	5.3	4.7	6.4	7.5	4.2	10.2	5.0
Year	15.4	14.1	14.4	14.4	14.9	14.0	14.7	14.6	14.8	15.4	14.4	14.1	14.1	15.0	15.6	13.8	13.7	15.0	15.6	15.4	14.9	15.5	15.1	14.8	14.9

*ORNL Tower C operated until April 2014 with measurement heights of 10, 30, and 100 m AGL; it was replaced with ORNL Tower D at the same site with measurement heights of 15, 35, and 60 m AGL.

Table 3-61: Average monthly temperatures in degrees C for ORNL Tower "C/D" at 10/15 meters during 1998-2022*

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	5.8	5.8	3.0	2.0	5.1	0.8	2.4	6.3	7.4	4.9	2.8	2.0	0.9	1.7	5.8	5.4	-0.6	2.8	2.1	7.8	1.2	4.3	6.8	4.2	2.6
Feb	7.0	6.2	7.1	7.3	5.1	4.4	4.2	6.8	4.3	3.0	5.9	5.7	1.3	6.9	7.8	5.1	5.0	0.1	5.4	9.3	9.9	8.6	6.9	4.9	6.5
Mar	8.9	7.1	11.4	7.6	10.0	11.7	12.2	8.7	10.2	13.5	9.3	10.6	8.3	10.8	15.4	6.3	8.8	10.8	13.1	11.0	9.1	9.1	13.2	12.1	11.8
Apr	13.3	16.2	12.9	16.0	16.9	15.3	15.1	14.5	17.1	13.1	14.9	14.5	16.4	16.7	15.7	14.5	15.9	15.8	16.0	18.0	12.7	16.4	13.3	14.0	14.6
May	20.1	18.4	20.0	18.7	17.5	18.6	21.3	17.3	17.7	20.3	17.8	18.8	20.1	18.9	20.8	18.3	19.4	20.5	18.6	19.1	22.1	21.5	17.5	18.0	20.8
Jun	23.5	22.4	22.5	21.5	23.5	21.1	23.0	23.1	22.4	23.0	23.6	23.4	24.4	23.8	23.2	22.8	22.8	23.8	24.1	22.1	23.7	22.3	22.4	23.0	24.6
Jul	24.6	24.6	23.8	24.0	25.1	23.2	23.4	24.5	24.8	23.7	23.7	22.4	25.4	25.9	25.6	23.1	23.0	24.5	25.5	24.7	24.7	24.6	25.7	24.2	25.3
Aug	24.2	24.0	23.4	23.8	24.8	24.0	22.0	24.8	25.3	27.3	23.8	23.2	25.5	25.2	23.1	23.1	23.4	23.0	25.7	23.3	23.7	24.3	24.0	24.0	23.9
Sep	23.1	19.8	19.9	19.1	22.5	19.7	20.7	22.0	19.0	22.5	21.8	20.8	21.1	19.4	20.0	20.7	21.3	21.0	23.3	19.9	23.4	24.1	20.7	20.3	20.2
Oct	15.5	13.8	14.9	13.0	16.3	14.2	16.8	15.1	13.0	17.1	14.4	13.4	14.2	13.5	13.6	15.0	15.0	15.2	18.0	15.5	15.8	16.6	16.0	16.3	13.1
Nov	9.9	11.2	7.8	12.1	7.7	11.3	11.7	10.4	9.1	9.0	7.3	10.4	9.5	10.4	8.1	7.4	6.2	12.3	11.5	10.3	7.0	7.2	11.2	7.5	10.5
Dec	6.6	5.5	0.4	7.4	4.5	3.3	4.1	2.8	6.6	7.2	5.5	3.7	0.0	6.9	7.7	5.3	6.3	11.4	5.4	4.7	6.5	7.6	4.4	10.5	5.0
Year	15.2	14.6	13.9	14.4	14.9	14.0	14.7	14.7	14.7	15.4	14.2	14.1	13.9	15.0	15.6	13.9	13.9	15.1	15.7	15.5	15.0	15.6	15.2	14.9	14.9

*ORNL Tower C operated until April 2014 with measurement heights of 10, 30, and 100 m AGL; it was replaced with ORNL Tower D at the same site with measurement heights of 15, 35, and 60 m AGL.

Table 3-62: Average monthly temperatures in degrees C for ORNL Tower "C/D" at 30/35 meters during 1998-2022*

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	6.3	6.1	3.1	2.4	6.3	0.7	2.9	6.5	7.9	5.0	2.9	2.1	1.0	1.9	6.2	5.4	-0.7	3.0	2.3	8.0	1.4	4.4	7.0	4.3	2.8
Feb	7.0	6.4	7.3	7.9	5.3	4.5	4.8	7.0	4.5	3.0	6.0	6.0	1.3	6.9	7.9	5.0	4.9	0.2	5.5	9.6	10.0	8.8	7.0	5.0	7.0
Mar	9.0	7.3	11.8	7.8	10.2	11.9	11.9	8.8	10.2	14.2	9.5	10.9	8.5	10.6	15.9	6.2	8.7	11.0	13.4	11.2	9.2	9.3	13.3	12.5	12.4
Apr	13.4	16.3	13.0	16.4	16.8	16.7	14.9	15.1	17.5	13.4	15.1	15.0	16.7	17.1	16.1	14.6	15.8	16.1	16.3	18.3	12.9	16.7	13.5	14.4	15.2
May	20.2	18.5	20.1	19.2	17.2	18.6	21.0	17.9	17.9	21.2	18.1	18.9	20.2	19.2	21.3	18.2	19.6	20.7	18.7	19.3	22.3	21.7	17.7	18.3	20.8
Jun	23.2	22.5	22.6	21.9	23.9	21.2	22.4	23.1	22.9	23.4	24.0	23.8	24.6	24.0	23.7	22.6	22.9	24.0	24.3	22.3	23.8	22.4	22.5	23.2	24.5
Jul	24.7	24.7	24.0	24.1	25.2	23.3	23.5	24.5	25.2	23.7	24.1	22.6	25.6	26.0	25.6	22.9	23.1	24.6	25.7	24.8	24.9	24.8	25.8	24.3	25.1
Aug	24.3	24.1	23.5	24.0	25.2	24.1	22.0	25.0	25.7	27.9	24.3	23.5	25.7	25.5	23.4	22.9	23.5	23.2	25.8	23.5	23.9	24.4	24.1	24.2	23.7
Sep	23.3	20.0	19.9	19.5	23.1	20.1	20.9	23.1	19.2	23.5	22.3	20.8	21.4	19.7	20.5	20.6	21.5	21.2	23.7	20.1	23.5	24.5	20.8	20.5	20.1
Oct	15.8	14.0	15.2	14.2	16.4	14.9	17.1	15.9	13.5	18.1	15.2	13.8	14.5	14.3	13.8	15.0	15.3	15.5	18.5	15.9	16.1	16.9	16.3	16.5	13.3
Nov	10.3	11.4	8.0	13.8	8.0	12.0	12.0	11.0	9.9	9.5	8.1	11.4	9.8	11.0	8.7	7.4	6.5	12.5	12.0	10.7	7.2	7.5	11.7	8.0	10.6
Dec	6.9	5.3	0.4	7.9	4.8	3.4	4.5	3.1	7.6	7.0	5.6	3.7	0.0	7.6	7.6	5.3	6.4	11.7	5.6	4.9	6.7	7.9	4.7	10.8	5.0
Year	15.4	14.7	14.1	14.9	15.2	14.3	14.8	15.1	15.2	15.8	14.6	14.4	14.1	15.3	15.9	13.8	14.0	15.3	16.0	15.7	15.2	15.8	15.4	15.2	15.0

*ORNL Tower C operated until April 2014 with measurement heights of 10, 30, and 100 m AGL; it was replaced with ORNL Tower D at the same site with measurement heights of 15, 35, and 60 m AGL.

Table 3-63: Average monthly temperatures in degrees C for ORNL Tower "C/D" at 60/100 meters during 1998-2022*

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan																					0.9	3.7	6.4	3.7	2.1
Feb																					9.4	8.4	6.3	4.4	6.6
Mar																					8.8	8.9	12.9	12.3	11.8
Apr																					12.6	16.6	13.4	14.4	14.9
May																					22.3	21.8	17.6	18.4	21.0
Jun																					23.7	22.3	22.5	23.2	24.8
Jul																					24.8	24.7	25.8	24.2	25.2
Aug																					23.8	24.5	24.0	24.2	23.8
Sep																					23.5	25.0	20.8	20.7	20.5
Oct																					16.0	17.0	16.5	16.5	14.1
Nov																					6.8	7.3	11.8	8.0	11.1
Dec																					6.3	7.7	4.4	10.5	5.5
Year																					14.9	15.7	15.2	15.0	15.1

Table 3-64: Average monthly temperatures in degrees C for ORNL Tower "F" at 10 meters during 2018-2022

Year	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Jan																				1.1	4.4	6.8	4.5	2.6	6.8
Feb																				10.3	8.8	7.0	4.9	6.1	9.8
Mar																			11.1	9.4	8.9	13.3	12.0	11.5	10.4
Apr																			18.4	12.8	16.5	13.5	13.9	14.4	
May																			19.9	23.1	22.2	18.2	18.5	20.3	
Jun																			23.2	25.2	23.4	23.5	24.1	24.8	
Jul																			26.1	26.1	25.6	26.9	25.5	26.7	
Aug																			24.6	25.3	25.5	25.4	25.4	24.9	
Sep																			20.8	24.9	25.0	21.8	21.4	20.7	
Oct																				16.6	17.2	16.6	17.1	12.0	
Nov																			8.2	7.2	7.1	10.9	7.2	10.1	
Dec																			4.9	6.7	6.3	4.2	10.2	4.8	
Year																				15.7	15.9	15.7	15.4	14.9	

Table 3-65: Average monthly temperatures in degrees C for Y-12 Tower "J" at 20 meters during 2017-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan			2.8	1.7	4.5	0.6	2.3	5.4	6.8	4.4	2.5	1.9	0.9	1.4	5.4	5.2	-1.1	2.5	1.6	7.5	0.5	3.7	6.1	3.6	
Feb			6.8	6.8	4.5	4.4	4.3	6.3	4.1	2.7	5.5	5.2	1.3	6.3	7.4	4.9	4.6	0.0	5.6	8.4	9.6	7.9	6.3	4.1	
Mar			11.5	7.5	9.5	11.4	11.3	8.5	9.6	12.7	9.2	10.1	8.3	10.6	15.2	6.3	8.3	10.6	12.4	10.5	8.8	8.1	12.6	11.2	
Apr			13.0	15.8	16.2	15.1	14.1	14.0	16.6	12.9	14.7	14.2	16.2	16.4	15.6	14.1	15.4	15.6	15.6	17.4	12.2	15.6	12.9	13.3	
May			20.1	18.8	17.4	19.0	20.5	17.1	17.9	20.1	20.6	19.0	20.3	18.9	20.9	18.3	19.2	20.4	18.7	18.7	21.8	21.1	17.3		
Jun			22.7	21.7	23.5	21.2	22.7	22.8	22.5	23.0	23.5	23.5	24.8	23.9	23.1	22.9	23.0	24.0	24.3	21.8	23.5	22.3	22.3		
Jul			24.2	24.2	25.3	23.4	23.5	24.6	24.8	23.7	23.9	22.5	25.8	26.0	25.7	23.4	23.0	24.8	25.7	24.5	24.7	24.6	25.4		
Aug			23.5	23.9	24.9	24.0	22.1	24.8	25.3	27.1	23.8	23.4	25.8	25.1	23.1	23.4	23.5	23.2	25.6	23.1	23.5	24.3	23.9		
Sep			20.0	19.0	22.4	19.6	20.6	21.9	18.9	22.1	21.3	20.9	21.3	19.6	19.9	20.9	21.2	21.1	22.9	19.5	23.3	23.7	20.5		
Oct			14.7	12.7	16.4	13.9	16.7	14.4	12.8	16.9	13.8	13.6	14.1	13.2	13.5	15.0	15.0	15.1	17.1	15.0	15.4	16.2	15.6		
Nov			7.6	10.8	7.7	10.9	11.2	9.4	8.3	8.4	6.8	9.7	9.1	10.0	7.2	7.0	5.7	11.6	10.5	9.1	6.5	6.4	9.9		
Dec			0.3	6.8	4.2	2.9	3.4	2.4	5.6	6.7	5.1	3.8	0.1	6.3	7.2	4.9	6	10.7	5.1	4.7	5.7	6.7	3.3		
Year			13.9	14.1	14.7	13.9	14.4	14.3	14.4	15.1	14.2	14.0	14.0	14.8	15.4	13.9	13.7	15.0	15.4	15.0	14.6	15.1	14.7		

*ETTP Tower L operated until May 2021. Measurements heights were 10 and 30 m AGL but the 10m level was increased to 15 m in August 2017.

Table 3-66: Average monthly temperatures in degrees C for ETTP Tower "L" at 10/15 meters during 2000-2022*

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan			3.0	1.7	4.7	0.7	2.4	5.5	7.0	4.7	2.5	2.4	0.9	1.6	5.4	5.3	-0.8	2.7	1.9	7.8	0.6	3.7	6.1	3.6	
Feb			7.0	6.9	4.6	4.4	4.3	6.4	4.2	3.0	5.5	5.2	1.3	6.3	7.3	5.0	4.9	0.1	5.8	8.9	9.7	8.0	6.2	4.1	
Mar			11.6	7.4	9.7	11.5	11.3	8.7	9.8	12.4	9.2	10.1	8.2	10.6	15.2	6.3	8.6	10.7	12.8	10.9	8.9	8.3	12.6	11.3	
Apr			12.4	15.8	16.2	15.2	14.1	14.2	16.9	12.4	14.7	14.2	16.2	16.4	15.6	14.2	15.6	15.7	15.8	17.9	12.3	15.8	12.8	13.3	
May			17.9	18.7	17.3	19.0	20.5	17.1	18.0	20.3	18.4	19.0	20.3	18.9	20.9	18.1	19.3	20.5	18.8	19.2	21.7	20.9	17.2		
Jun			22.5	21.7	23.4	21.2	22.7	22.9	22.7	23.0	23.6	23.5	24.8	23.9	23.1	22.7	23.0	24.0	24.4	22.3	23.6	22.0	22.3		
Jul			24.2	24.2	25.2	23.4	23.5	24.6	24.9	23.7	23.9	22.5	25.7	26.0	25.7	23.2	23.1	24.7	25.8	24.9	24.7	24.2	25.5		
Aug			23.4	23.8	24.6	24.0	22.1	24.7	25.4	27.1	23.8	23.4	25.8	25.1	23.1	23.1	23.5	23.2	25.7	23.3	23.5	23.9	24.0		
Sep			19.9	19.1	22.3	19.5	20.5	21.9	19.2	22.2	21.3	20.9	21.4	19.6	20.0	20.7	21.4	21.1	23.2	19.5	23.2	23.4	20.5		
Oct			14.8	12.7	16.3	14.1	16.7	14.9	13.2	17.0	13.8	13.6	14.1	13.2	13.6	15.1	15.0	15.2	17.6	15.1	15.3	15.9	15.6		
Nov			7.6	10.8	7.6	11.0	11.2	9.8	8.8	8.7	6.8	9.7	9.1	10.0	7.2	7.3	6.0	11.9	10.9	9.3	6.5	6.4	10.1		
Dec			0.3	6.9	4.3	3.0	3.4	2.5	6.2	6.9	5.1	3.8	0.1	6.3	7.2	5.2	6.2	11.0	5.4	4.8	6.0	6.7	3.4		
Year			13.7	14.1	14.7	13.9	14.4	14.4	14.7	15.1	14.1	14.0	14.0	14.8	15.4	13.9	13.8	15.1	15.7	15.3	14.7	14.9	14.7		

Table 3-67: Average monthly temperatures in degrees C for ETTP Tower "L" at 30 meters during 2000-2022

Year	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Jan																								1.1	6.6
Feb																								5.9	9.8
Mar																								11.4	10.3
Apr																								14.5	15.3
May																								20.9	
Jun																								24.7	
Jul																								25.9	
Aug																							25.2	24.2	
Sep																							21.0	20.3	
Oct																							16.5	12.8	
Nov																							7.1	10.8	
Dec																							7.7	4.7	
Year																								14.8	

Table 3-68: Average monthly temperatures in degrees C for ORNL Lidar "Q" at 2 meters during August 2021 to April 2023

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan																			2.0	7.0	1.1	3.8	6.6	3.6	2.0
Feb																			5.2	9.3	9.8	8.5	6.5	5.8	6.9
Mar																			13.1	10.8	8.7	8.8	12.9	12.2	12.3
Apr																			15.8	18.1	12.2	16.6	13.2	14.2	15.2
May																			18.7	19.5	23.2	22.1	17.7	20.4	20.8
Jun																			24.8	22.8	24.3	22.8	22.8	24.0	24.7
Jul																			26.6	25.6	25.3	25.3	26.2	24.6	25.7
Aug																			26.5	24.1	24.4	25.0	24.5	24.6	24.2
Sep																			24.2	20.7	24.1	25.0	21.0	20.9	21.9
Oct																			19.0	16.8	16.4	17.2	16.8	19.2	16.8
Nov																			12.3	10.9	7.0	7.4	11.9	8.0	13.0
Dec																			5.1	4.5	6.5	8.0	4.5	10.6	8.4
Year																			16.1	15.8	15.3	15.9	15.4	15.7	16.0

Table 3-69: Average monthly temperatures in degrees C for Y-12 Tower "S" at 25 meters during 2016 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan									7.4	4.7	2.8	1.4	0.9	1.7	5.8	5.4	-0.7	2.7	1.9	7.5	1.1	4.0	6.6	4.4	
Feb									4.5	3.0	5.8	5.7	1.3	6.3	7.7	5.0	4.9	-0.2	5.2	9.1	9.7	8.4	6.8	4.6	
Mar									10.1	13.8	9.6	10.7	8.8	10.7	15.5	6.2	8.7	11.2	13.0	10.9	8.9	9.1	13.0	12.1	
Apr									17.0	13.2	14.9	14.6	17.0	16.6	15.7	14.5	16.0	15.8	16.0	17.9	12.6	16.3	13.3	14.1	
May									17.8	20.7	18.2	18.6	20.2	19.0	20.8	18.3	19.6	20.8	18.5	19.0	22.1	21.5	17.6	18.2	
Jun									22.6	23.1	23.3	23.2	24.5	23.9	23.4	22.8	22.9	24.0	24.2	22.3	23.8	22.3	22.4	23.0	
Jul									24.9	23.4	23.8	22.3	25.7	25.8	25.3	23.2	23.5	24.5	25.8	24.6	24.2	24.6	25.8	24.2	
Aug									25.2	27.5	24.1	23.2	25.7	25.2	23.0	23.1	23.7	23.3	25.3	23.3	24.8	24.2	24.1	24.2	
Sep									18.9	22.9	21.9	20.8	21.6	19.5	20.2	20.8	21.4	21.3	23.7	20.1	23.2	24.6	20.8	20.5	
Oct									13.0	17.3	14.3	13.4	14.8	13.7	13.6	15.2	15.1	15.2	18.4	15.6	16.4	16.7	15.7	16.3	
Nov									8.8	9.0	7.4	10.8	10.1	10.7	8.3	7.4	6.2	12.1	11.7	10.3	7.0	7.0	11.2	7.7	
Dec									6.9	7.4	5.3	3.6	-0.1	7.0	7.7	5.3	6.2	11.2	5.1	4.5	6.2	7.6	4.2	10.2	
Year									14.8	15.5	14.3	14.0	14.2	15.0	15.6	13.9	14.0	15.2	15.7	15.4	15.0	15.5	15.1	15.0	

*Y-12 Tower "W" was offline during 2022 as it was undergoing replacement.

Table 3-70: Average monthly temperatures in degrees C for Y-12 Tower "W" at 10 meters during 2006 to 2021*

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan							2.8	5.9	7.7	5.0	2.8	2.1	1.0	1.9	5.8	5.5	-0.6	2.8	2.1	7.7	1.3	4.1	6.8		
Feb							4.6	6.8	4.6	3.0	5.8	6.0	1.3	6.4	7.7	5.6	4.9	0.0	5.3	9.3	9.8	8.5	6.8		
Mar							11.9	8.9	10.2	14.1	9.7	10.9	8.9	10.8	15.5	6.3	8.9	11.3	13.2	11.1	9.0	9.2	13.1	12.3	
Apr							14.8	15.0	17.3	13.4	14.9	15.0	17.4	16.9	15.7	14.8	16.2	15.9	16.2	18.1	12.7	16.5	13.4	14.4	
May							20.8	17.8	17.9	20.9	18.2	18.9	20.4	19.1	20.9	18.4	19.7	20.8	18.6	19.2	22.2	21.8	17.7	18.4	
Jun							22.4	23.0	22.7	23.2	23.3	23.6	24.7	24.0	23.4	22.9	22.8	24.1	24.2	22.3	23.7	22.4	22.4	23.2	
Jul							23.3	24.3	25.0	23.5	23.8	22.5	25.7	25.9	25.3	23.2	23.5	24.5	25.7	24.7	24.9	24.7	25.8	24.3	
Aug							22.7	24.9	25.3	27.7	24.1	23.4	25.8	25.3	23.0	23.1	23.7	23.4	25.3	23.4	24.9	24.4	24.2	24.3	
Sep							20.8	22.8	19.0	23.2	21.8	20.8	21.9	19.6	20.2	20.9	21.4	21.3	23.7	20.2	23.5	24.9	20.9	20.7	
Oct							16.9	15.8	13.3	17.6	14.3	13.6	15.2	14.0	13.5	15.3	15.2	15.5	18.6	15.9	16.3	16.9	15.8	16.4	
Nov							11.8	10.7	9.6	9.3	7.4	11.1	10.4	10.8	8.3	7.6	6.3	12.4	12.0	10.7	7.1	7.3	11.6	7.8	
Dec							4.3	3.0	7.2	7.5	5.4	3.7	0.0	7.3	7.7	5.5	6.3	11.6	5.2	4.6	6.6	7.7	4.6	10.3	
Year							14.8	14.9	15.0	15.7	14.3	14.3	14.4	15.2	15.6	14.1	14.0	15.3	15.8	15.6	15.2	15.7	15.3	17.2	

*Y-12 Tower "W" was offline during 2022 as it was undergoing replacement.

Table 3-71: Average monthly temperatures in degrees C for Y-12 Tower "W" at 30 meters during 2004 to 2021*

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan							2.6	5.8	7.7	4.7	2.9	1.3	0.8	1.8	6.6	5.3	-0.7	2.7	2.1	7.4	1.3	3.9	6.7		
Feb							4.6	6.7	4.5	2.9	5.8	5.8	0.9	6.3	7.8	5.4	4.7	-0.2	5.0	9.3	9.5	8.5	6.7		
Mar							11.9	8.8	10.1	14.0	9.6	10.8	8.9	10.7	15.8	5.9	8.7	11.2	13.1	10.9	8.7	9.1	12.9	12.3	
Apr							14.9	14.9	17.3	13.4	14.9	14.9	17.7	16.9	15.9	14.7	16.0	15.8	16.2	18.0	12.6	16.5	13.4	14.5	
May							21.0	18.0	18.0	21.2	18.4	18.8	20.4	19.2	21.2	18.4	19.8	20.8	18.5	19.2	22.2	21.8	17.6	18.3	
Jun							22.3	23.0	22.7	23.3	24.0	23.3	24.8	24.0	23.6	22.9	22.7	24.0	24.3	22.0	23.7	22.3	22.3	23.1	
Jul							23.4	24.3	25.1	23.4	24.1	22.5	25.9	25.9	25.7	23.0	23.4	24.4	25.5	24.6	24.8	24.6	25.7	24.1	
Aug							22.2	24.9	25.3	28.0	24.4	23.5	25.8	25.4	23.8	23.0	23.5	23.3	25.1	23.3	24.9	24.4	23.9	24.2	
Sep							20.9	23.0	19.0	23.4	22.0	20.7	22.1	19.6	20.6	20.9	21.3	21.3	23.8	20.2	23.4	25.1	20.7	20.7	
Oct							17.0	15.6	13.3	17.9	14.8	13.7	15.8	14.1	13.9	15.5	15.2	15.7	18.9	16.2	16.1	17.0	16.0	16.6	
Nov							11.9	10.9	9.2	9.3	7.8	11.2	10.6	10.9	9.1	7.6	6.3	12.5	12.5	10.8	7.0	7.5	12.0	8.2	
Dec							4.4	2.9	7.4	7.7	5.4	3.5	-0.2	7.4	7.9	5.4	6.1	11.8	5.2	4.5	6.5	7.9	4.7	11.2	
Year							14.8	14.9	15.0	15.8	14.5	14.2	14.5	15.2	16.0	14.0	13.9	15.3	15.9	15.5	15.1	15.7	15.2	17.3	

*Y-12 Tower "W" was offline during 2022 as it was undergoing replacement.

Table 3-72: Average monthly temperatures in degrees C for Y-12 Tower "W" at 60 meters during 2004 to 2021*

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan										5.4	3.3	2.5	1.4	2.2	6.2	5.7	-0.2	3.2	2.4	8.1	1.4	4.7	7.0	4.5	2.9
Feb										3.5	6.2	6.2	1.7	7.2	8.2	5.5	5.3	0.5	5.7	9.6	10.2	9.0	9.0	5.1	6.9
Mar										14.3	10.1	10.9	9.0	11.2	15.9	6.8	9.2	11.1	13.4	11.4	9.5	9.5	13.5	12.5	12.2
Apr										14.0	15.6	15.2	17.6	17.4	16.4	15.1	16.6	16.4	16.7	18.5	13.1	17.0	14.0	14.7	15.3
May										21.6	19.3	19.7	21.3	20.0	21.9	19.2	20.5	21.6	19.5	20.0	23.1	22.6	18.4	19.1	21.6
Jun										24.2	24.8	24.7	25.9	25.0	24.6	23.8	23.8	25.1	25.3	23.1	24.8	23.3	23.4	24.2	25.7
Jul										24.5	25.0	23.6	26.9	27.1	26.6	24.1	24.0	25.5	26.8	25.7	25.8	25.8	26.8	24.3	26.2
Aug										28.5	25.2	24.5	26.8	26.3	24.1	24.1	24.1	24.1	26.7	24.4	24.8	25.4	24.9	25.2	24.8
Sep										23.8	22.6	21.6	22.5	20.3	21.2	21.7	22.3	22.0	24.4	20.8	24.3	25.6	21.6	21.4	21.1
Oct										17.9	14.9	14.1	15.4	14.4	14.2	16.0	15.6	15.8	18.8	16.3	16.1	17.4	16.8	17.1	13.8
Nov										9.5	7.7	10.8	10.2	10.9	8.6	7.8	6.7	12.4	11.9	10.6	7.4	7.7	11.6	8.1	9.9
Dec										7.7	5.9	4.1	0.5	7.3	8.1	5.7	6.7	11.6	5.8	5.0	6.8	7.9	4.7	10.7	5.4
Year										16.2	15.1	14.8	14.9	15.8	16.3	14.6	14.6	15.8	16.5	16.1	15.6	16.3	16.0	15.6	15.5

Table 3-73: Average monthly temperatures in degrees C for Y-12 Tower "Y" at 15 meters during 2007 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan										5.3	3.2	2.4	1.3	2.1	6.2	5.6	-0.3	3.1	2.3	8.0	1.4	4.5	6.9	4.4	2.8
Feb										3.4	6.2	6.2	1.5	7.1	8.1	5.4	5.2	0.3	5.5	9.5	10.1	8.8	8.8	5.0	6.8
Mar										14.2	10.0	10.9	9.0	11.0	15.8	6.6	9.1	11.0	13.3	11.2	9.3	9.4	13.4	12.4	12.1
Apr										13.9	15.3	15.2	17.5	17.2	16.2	15.0	16.4	16.2	16.5	18.4	13.0	16.9	13.8	14.6	15.1
May										21.3	19.1	19.4	21.0	19.6	21.6	18.9	20.2	21.3	19.2	19.7	22.8	22.3	18.1	18.8	21.3
Jun										23.9	24.4	24.3	25.5	24.6	24.3	23.5	23.5	24.8	25.0	22.9	24.5	23.0	23.1	23.9	25.3
Jul										24.2	24.6	23.3	26.5	26.7	26.3	23.7	23.6	25.2	26.4	25.4	25.5	25.4	26.5	24.2	25.9
Aug										28.5	24.8	24.1	26.4	25.9	23.8	23.8	24.1	23.9	26.4	24.0	24.4	25.1	24.6	24.9	24.5
Sep										23.5	22.3	21.3	22.2	20.0	20.9	21.4	22.0	21.7	24.1	20.5	24.0	25.4	21.3	21.1	20.8
Oct										17.8	14.8	13.9	15.3	14.2	14.1	15.8	15.5	15.7	18.7	16.1	16.3	17.2	16.6	16.9	13.7
Nov										9.5	7.7	10.9	10.3	10.8	8.7	7.7	6.6	12.4	11.9	10.6	7.3	7.6	11.6	8.1	10.8
Dec										7.7	5.9	3.9	0.3	7.4	8.0	5.7	6.5	11.6	5.6	4.9	6.7	7.9	4.7	10.7	5.5
Year										16.1	14.9	14.7	14.7	15.6	16.2	14.4	14.4	15.6	16.2	15.9	15.4	16.1	15.8	15.4	15.4

Table 3-74: Average monthly temperatures in degrees C for Y-12 Tower "Y" at 15 meters during 2007 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	79.0	74.8	80.6	73.3	75.2	66.7	70.7	77.8	77.5	70.9	68.2	75.3	75.4	73.9	73.3	78.2	64.0	69.2	69.7	75.3	65.9	76.2	75.1	75.7	73.6
Feb	73.1	69.4	80.4	70.4	64.0	80.3	75.3	80.3	69.4	57.8	70.9	65.4	73.7	66.3	71.0	68.2	64.1	65.5	70.4	65.1	79.3	79.3	80.3	74.2	70.9
Mar	66.6	60.9	76.6	62.3	68.1	72.3	66.8	69.4	64.1	61.5	67.0	68.2	71.0	69.8	66.1	65.8	60.3	70.1	64.2	58.4	62.3	62.9	86.0	61.8	61.4
Apr	70.9	64.6	79.9	63.2	66.4	74.8	70.1	74.2	72.7	62.7	67.1	65.0	61.0	65.8	69.2	65.1	60.6	69.1	58.0	68.5	62.9	71.3	70.4	61.9	64.7
May	73.9	78.7	82.7	76.1	79.9	83.7	83.8	75.8	79.4	64.5	72.3	78.2	76.1	75.7	76.2	74.1	71.7	70.5	72.3	76.2	76.8	79.3	75.2	70.5	77.5
Jun	73.1	81.4	84.5	79.8	76.3	83.5	82.9	84.2	72.0	73.1	68.8	77.6	79.0	74.4	66.4	79.7	80.5	76.9	71.0	77.7	79.7	83.7	70.5	77.9	72.4
Jul	75.7	86.6	78.6	83.0	81.6	87.9	72.3	90.1	74.0	75.2	75.8	79.4	76.1	77.7	76.3	83.6	76.0	82.5	75.3	79.9	81.6	83.7	71.5	81.0	84.3
Aug	72.1	77.9	82.2	85.8	76.2	87.7	86.3	87.1	79.1	57.5	72.3	82.1	79.3	69.3	78.4	83.1	81.6	79.6	75.8	79.6	85.1	81.6	76.4	84.2	85.1
Sep	65.3	74.1	81.2	83.0	80.1	86.6	87.3	80.8	83.0	71.0	76.7	86.3	77.7	80.9	80.1	81.6	81.2	80.1	66.5	80.0	87.1	77.2	74.2	84.6	80.6
Oct	71.8	82.9	74.0	73.1	90.1	84.0	88.5	83.2	80.3	76.8	72.3	86.5	72.1	76.8	78.1	80.6	80.9	79.4	65.1	80.0	84.6	82.7	74.7	87.7	71.1
Nov	75.8	78.4	76.7	68.4	79.9		82.5	70.9	75.8	72.6	73.5	75.0	77.2	78.1	70.3	68.8	67.1	74.3	65.2	76.6	84.0	76.4	69.6	71.9	67.1
Dec	78.4	79.2	72.8	75.1	78.7		77.4	77.5	74.4	79.5	78.9	77.7	73.1	80.7	78.6	80.5	80.8	82.4	73.9	71.2	83.3	80.3	80.0	79.6	77.7
Year	73.0	75.7	79.2	74.5	76.4	80.8	78.7	79.3	75.1	68.6	72.0	76.4	74.3	74.1	73.7	75.8	72.4	75.0	69.0	74.0	77.7	77.9	75.3	75.9	73.9

Table 3-75: Average monthly relative humidity in percent for ORNL Tower "A" at 10/15 meters during 1998 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan																		69.3	72.2	77.7	70.0	73.7	76.9	77.5	76.2
Feb																		66.6	70.4	68.3	82.0	76.5	79.5	76.6	71.6
Mar																		71.2	66.2	60.8	67.1	62.8	75.2	66.9	63.9
Apr																		70.6	61.2	69.5	68.3	68.3	69.3	65.8	67.5
May																	73.1	70.6	76.1	76.8	76.0	73.1	76.0	71.0	77.1
Jun																	79.3	77.5	73.3	78.2	78.0	77.8	75.8	77.6	70.9
Jul																	75.2	81.7	77.1	79.6	78.3	78.6	73.9	79.1	82.9
Aug																	80.1	78.6	76.8	77.9	82.5	76.1	81.2	82.7	82.1
Sep																	79.2	78.5	67.3	79.3	83.4	70.8	80.9	82.3	79.0
Oct																	79.1	78.8	65.7	81.8	81.5	78.1	82.7	87.7	72.3
Nov																	67.7	75.4	65.1	80.0	81.5	76.9	75.6	75.2	71.8
Dec																	80.7	84.0	76.2	73.8	80.8	80.0	81.9	84.2	81.7
Year																	**76.8**	**75.2**	**70.6**	**75.3**	**77.5**	**74.4**	**77.4**	**77.2**	**74.8**

Table 3-76: Average monthly relative humidity in percent for ORNL Tower "D" at 2 meters during 2014 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	80.3	75.8	69.2	71.9	72.9	64.6	66.7	74.8	74.6	71.5	68.4	75.7	76.2	74.2	73.3	78.5	63.4	64.6	66.0	74.8	64.6	71.0	72.1	74.3	69.6
Feb	74.8	71.3	68.1	69.3	62.0	77.9	70.5	76.5	66.4	57.9	71.2	65.5	74.5	67.2	71.8	67.8	64.8	61.8	66.2	63.4	80.5	73.6	75.2	74.4	70.8
Mar	68.6	62.6	64.0	60.7	65.3	68.2	61.5	65.3	60.5	62.4	67.2	69.1	72.4	69.4	67.3	65.2	61.0	67.2	61.4	55.2	62.7	57.3	71.5	60.7	61.3
Apr	72.8	65.7	68.9	61.6	62.3	70.5	64.0	69.6	67.7	63.8	67.7	66.0	61.2	65.9	70.3	65.4	62.2	66.2	55.0	65.6	63.8	64.3	64.3	60.4	64.5
May	76.7	69.9	73.5	73.5	75.3	79.2	77.8	70.4	78.5	64.8	73.9	80.1	78.5	77.2	78.0	74.7	70.2	68.3	71.1	73.4	75.9	72.7	74.3	68.5	78.3
Jun	78.2	74.6	77.9	77.3	70.8	79.0	81.1	78.8	73.7	74.5	71.3	79.7	82.7	76.7	68.1	81.7	78.6	76.0	70.5	76.0	78.0	78.1	76.6	76.9	72.6
Jul	77.0	82.5	74.8	79.0	77.2	83.1	82.5	85.8	75.7	77.1	77.3	81.8	79.4	80.0	79.0	85.4	73.8	81.4	76.7	79.9	78.2	80.7	76.5	80.4	84.6
Aug	73.1	72.4	77.5	82.9	71.4	83.2	81.4	82.4	80.9	68.5	72.6	84.5	82.9	71.1	80.3	85.0	79.3	77.2	76.1	80.0	82.5	78.4	82.8	83.4	84.8
Sep	66.2	68.1	77.6	80.1	76.4	81.6	82.2	76.1	84.1	71.0	78.4	88.1	80.0	81.9	81.4	82.9	78.7	77.7	65.3	80.2	83.4	72.5	80.9	82.9	80.1
Oct	72.9	75.3	71.1	70.5	86.6	79.0	84.7	79.7	80.6	76.7	72.7	87.9	73.4	77.0	78.7	81.8	77.2	75.7	62.9	79.8	80.4	77.3	81.7	86.6	72.4
Nov	77.3	73.5	73.8	65.1	76.9	74.0	78.2	67.5	76.4	72.4	73.7	76.1	78.1	78.5	69.5	68.3	62.6	70.0	61.2	75.1	79.6	73.2	70.1	69.6	68.7
Dec	80.5	73.9	71.9	73.3	75.9	74.4	73.4	74.7	74.4	80.3	79.8	78.7	73.3	81.4	78.9	80.5	77.3	79.3	71.9	69.0	78.0	76.2	78.3	78.2	79.3
Year	74.9	72.1	72.4	72.1	72.8	76.2	75.3	75.1	74.5	70.1	72.9	77.8	76.1	75.0	74.7	76.4	70.8	72.1	67.0	72.7	75.6	72.9	75.4	74.7	73.9

*Tower "C" was replaced by Tower "D" in April 2014 at which time the relative humidty measurement was moved from 10 to 15 meters.

Table 3-77: Average monthly relative humidity in percent for ORNL Tower "C/D" at 15 meters during 1998 to 2022*

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan																					62.2	74.8	73.3	80.4	77.3
Feb																					76.1	72.0	76.7	79.5	70.3
Mar																					69.0	56.9	68.6	61.8	59.8
Apr																					63.7	55.3	61.0	58.9	60.4
May																					64.0	64.1	65.0	61.9	65.1
Jun																					66.4	70.6	69.6	65.6	59.6
Jul																					66.3	69.9	67.6	67.5	74.5
Aug																					70.4	69.7	74.3	69.1	75.2
Sep																					72.1	62.8	74.7	71.1	73.1
Oct																					74.4	74.7	77.2	77.9	70.5
Nov																					84.1	71.8	71.0	68.9	72.2
Dec																					77.4	73.4	82.5	76.6	84.1
Year																					70.5	68.0	71.8	69.9	70.2

Table 3-78: Average monthly relative humidity in percent for ORNL Tower "F" at 10 meters during 2018 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan																						76.0	75.4	77.7	
Feb																						78.9	77.6	77.3	
Mar																						65.8	74.2	66.6	
Apr																						70.8	67.5	65.6	
May																						76.9	74.7		
Jun																						80.9	75.4		
Jul																						83.5	76.6		
Aug																					78.9	81.6	81.9		
Sep																					84.0	79.1	80.9		
Oct																					83.2	82.0	82.5		
Nov																					83.7	77.0	76.8		
Dec																					83.8	79.7	83.1		
Year																						77.7	77.2		

*ETTP Tower L operated until May 2021. Humidity measurements began in August 2018.

Table 3-79: Average monthly relative humidity in percent for ETTP Tower "L" at 2 meters during 2018 to 2021*

Year	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Jan																								72.9	81.0
Feb																								71.1	74.0
Mar																								63.8	65.2
Apr																								66.1	68.0
May																								74.1	
Jun																								70.6	
Jul																								80.8	
Aug																							81.8	81.8	
Sep																							81.1	80.1	
Oct																							84.8	74.5	
Nov																							73.9	74.6	
Dec																							79.5	81.0	
Year																								74.3	

Table 3-80: Average monthly relative humidity in percent for ORNL Lidar "Q" at 2 meters From August 2021 to April 2023

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan										68.6	66.0	75.2	77.9	76.6	75.6	84.3	62.2	68.1	67.8	78.0	63.6	70.4	70.2	71.8	
Feb										54.0	69.0	63.0	76.7	67.6	73.4	72.4	64.3	64.7	67.0	65.1	80.5	73.5	75.3	71.2	
Mar										55.6	63.9	65.9	70.9	73.1	69.3	70.7	60.0	68.7	60.4	55.7	64.0	55.9	70.7	57.8	
Apr										59.0	65.3	63.2	56.8	68.4	72.8	66.1	59.5	66.5	51.9	65.6	63.0	63.1	61.8	56.7	
May										58.5	71.2	79.1	79.0	80.4	83.4	78.1	73.2	67.5	67.9	74.3	73.7	70.4	70.9	64.2	
Jun										70.6	68.7	79.0	83.7	78.7	69.8	89.0	85.3	74.3	67.2	75.2	76.9	76.8	68.9	72.1	
Jul										75.9	75.0	80.5	79.9	85.9	85.6	91.6	81.1	81.6	73.9	76.5	78.0	78.4	72.9	76.8	
Aug										63.9	67.5	82.6	83.5	75.6	85.0	90.7	83.8	75.5	74.1	74.0	81.9	76.0	79.3	81.8	
Sep										56.4	73.8	87.3	77.1	85.7	85.1	87.2	79.2	76.7	63.0	73.9	83.4	65.6	76.7	82.1	
Oct										72.8	67.0	88.0	69.1	77.3	85.3	85.2	80.1	76.0	59.8	74.4	77.6	75.0	77.0	87.3	
Nov										68.5	70.1	72.5	77.7	79.7	69.5	67.6	65.7	70.5	59.9	68.7	78.4	70.4	65.7	69.7	
Dec										78.4	77.6	78.5	77.1	84.8	86.4	80.5	80.2	81.1	74.1	68.4	76.9	73.8	73.0	82.4	
Year										65.2	69.6	76.2	75.8	77.8	78.4	80.3	72.9	72.6	65.6	70.8	74.8	70.8	71.9	72.8	

*Y-12 Tower "W" was offline during 2022 as it was undergoing replacement.

Table 3-81: Average monthly relative humidity in percent for Y-12 Tower "W" at 10 meters during 2007 to 2021*

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan										67.2	65.2	73.0	75.2	75.7	75.9	83.1	66.1	64.7	67.5	74.0	62.2	67.1	70.2	71.7	67.3
Feb										54.0	67.6	62.3	74.8	67.2	73.4	70.6	69.2	61.9	67.1	62.6	76.1	71.5	73.8	71.8	65.0
Mar										56.5	63.5	66.5	71.7	71.2	69.2	68.9	62.8	66.4	61.7	54.6	59.5	54.1	69.4	58.7	54.5
Apr										57.9	62.9	61.5	57.1	66.8	69.5	65.8	63.2	63.4	52.7	63.6	58.8	59.5	59.9	55.9	56.7
May										56.2	65.0	73.8	74.1	77.2	78.0	74.7	74.8	62.6	61.1	68.4	65.9	63.6	67.0	61.7	67.6
Jun										64.7	63.3	70.8	77.0	75.9	64.2	83.4	85.4	68.4	64.4	69.5	68.3	70.1	68.8	68.4	60.6
Jul										69.3	69.7	71.9	73.5	81.2	80.4	89.0	79.9	75.5	69.8	72.5	68.8	70.6	67.8	76.4	75.8
Aug										59.2	61.4	74.9	78.1	71.4	82.6	88.9	84.0	70.5	70.9	71.9	73.2	68.8	75.3	74.9	74.5
Sep										61.8	67.0	81.3	73.6	84.0	82.4	86.0	75.0	69.7	61.7	72.7	76.6	62.1	74.3	75.1	71.1
Oct										69.8	64.4	83.9	68.2	76.6	82.4	85.4	75.6	68.7	60.4	72.6	72.2	72.4	75.3	81.6	64.2
Nov										66.7	68.7	72.8	77.7	80.8	72.1	71.1	62.4	64.0	60.9	70.8	75.0	68.8	66.3	64.8	63.8
Dec										76.7	76.1	77.4	74.7	86.0	84.7	86.2	75.1	80.9	71.0	66.1	74.8	73.2	73.8	76.5	75.2
Year										63.3	66.2	72.5	73.0	76.2	76.2	79.4	72.8	68.1	64.1	68.3	69.3	66.8	70.2	69.8	66.4

Table 3-82: Average monthly relative humidity in percent for Y-12 Tower "Y" at 15 meters during 2007 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	2.9	2.2	-1.9	-3.2	-0.1	-5.7	-3.4	1.0	2.4	-0.5	-3.5	-2.5	-3.3	-3.1	0.2	1.0	-7.9	-4.2	-4.6	2.9	-5.9	-1.2	1.3	-0.6	-3.3
Feb	3.1	1.7	2.1	1.1	-2.9	0.3	-1.1	2.0	-2.2	-5.5	0.0	-1.4	-3.3	-0.1	1.9	-1.5	-2.5	-7.3	-1.2	1.1	6.0	3.2	1.9	-0.2	0.5
Mar	3.9	0.8	5.3	-0.5	2.6	5.2	3.4	1.6	1.7	5.1	2.5	3.8	2.6	4.2	7.9	-0.9	-0.1	3.4	4.2	0.7	1.0	-0.5	7.0	3.0	4.2
Apr	8.6	10.1	8.0	7.6	8.3	9.0	6.4	7.6	9.7	5.1	7.6	6.6	7.0	8.7	8.8	6.4	6.9	7.9	5.2	9.8	4.3	8.2	5.3	4.9	7.6
May	16.0	13.0	15.5	13.0	12.3	14.3	16.0	10.5	13.3	11.9	14.3	14.2	15.3	13.7	15.6	12.4	12.6	13.2	12.1	13.0	16.5	15.3	11.8	10.9	16.5
Jun	19.2	18.0	18.6	16.6	17.1	16.7	18.8	17.8	16.7	17.2	16.4	18.5	20.4	18.2	15.3	18.4	18.0	18.3	17.1	16.6	18.5	17.4	17.2	17.8	19.0
Jul	20.6	21.5	19.3	19.6	20.2	20.2	19.8	21.2	19.4	18.7	18.2	18.1	20.5	21.0	20.4	19.7	17.0	20.2	20.1	20.0	19.8	20.2	20.1	19.8	22.2
Aug	19.3	19.0	19.4	20.1	18.5	20.6	18.2	20.9	21.1	20.1	17.1	19.5	21.5	18.0	18.2	19.5	18.6	17.9	20.1	18.8	19.7	19.3	20.1	20.2	20.8
Sep	16.7	13.7	15.9	14.9	17.3	15.7	16.9	16.7	15.6	15.3	16.2	18.0	16.4	15.2	15.5	16.7	16.7	16.0	15.0	15.4	19.6	17.6	16.5	16.5	16.2
Oct	10.8	9.7	9.8	6.6	13.7	9.8	13.7	10.4	8.8	11.7	7.7	10.8	8.0	8.1	8.9	11.0	10.2	9.9	9.4	11.0	11.6	11.5	12.1	13.5	7.5
Nov	6.3	6.6	3.6	4.2	3.4	6.1	7.2	3.3	4.1	2.9	1.5	4.9	5.0	5.8	1.2	0.7	-1.4	5.6	2.8	5.0	3.2	1.8	4.5	1.1	4.1
Dec	3.7	1.4	-3.6	2.1	0.0	-1.5	-1.0	-1.9	1.3	3.2	1.4	-0.4	-4.7	3.0	3.5	1.4	2.1	7.1	-0.2	-1.3	2.3	2.9	0.3	6.0	0.9
Year	10.9	9.8	9.3	8.5	9.2	9.2	9.6	9.3	9.3	8.8	8.3	9.2	8.8	9.4	9.8	8.7	7.5	9.0	8.3	9.4	9.7	9.6	9.8	9.4	9.7

Table 3-83: Average monthly dew point in degrees C for ORNL Tower "C/D" at 10/15 meters during 1998 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	17.1	15.8	13.7	12.1	16.4	12.2	17.7	15.9	14.6	17.1	16.3	14.6	12.7	13.8	15.8	17.9	13.0	14.0	9.2	16.4	13.6	12.9	16.3	14.3	17.9
Feb	11.7	15.4	15.8	16.2	16.3	14.7	11.5	13.3	11.7	13.8	16.8	14.9	9.3	16.5	17.5	11.9	16.1	10.7	15.8	15.9	18.7	17.5	15.3	17.0	17.1
Mar	18.0	10.9	13.8	13.6	17.3	16.7	19.0	17.0	17.9	18.8	18.0	15.4	13.8	14.8	18.8	13.4	16.1	15.7	16.3	16.8	14.7	16.7	17.2	16.8	17.8
Apr	18.4	19.3	16.1	18.5	19.6	17.7	18.5	16.7	18.8	18.5	18.7	16.7	18.1	19.4	19.4	18.1	18.6	18.8	17.9	19.4	17.8	17.4	16.4	17.2	17.9
May	22.0	19.1	22.2	20.7	21.2	22.3	22.7	19.3	22.8	20.4	21.9	21.0	21.9	23.1	21.8	20.6	20.6	20.8	20.3	22.2	22.8	21.1	21.3	21.1	22.0
Jun	**25.4**	23.8	22.9	21.5	22.7	22.8	**25.0**	23.3	22.7	23.3	23.2	24.2	**26.2**	22.9	22.0	24.5	21.7	22.8	23.2	22.6	23.8	22.7	23.4	22.3	**26.4**
Jul	24.2	**26.0**	24.8	24.6	24.4	24.7	24.6	**25.3**	24.2	**25.2**	23.8	23.8	**26.0**	**25.2**	**25.3**	24.0	22.5	24.0	23.4	24.5	**25.1**	24.5	23.9	23.7	**25.6**
Aug	23.1	**26.0**	24.3	23.9	23.4	24.5	23.4	**26.4**	**25.1**	24.4	23.6	**25.3**	**26.6**	24.8	23.9	24.2	23.5	22.3	23.5	24.5	23.7	23.9	24.3	23.8	23.8
Sep	23.3	21.3	22.7	22.4	22.7	23.4	22.1	23.0	22.1	23.2	23.8	23.1	23.9	21.3	24.5	23.9	22.4	21.7	20.9	23.6	24.2	21.9	23.5	22.2	23.2
Oct	20.2	20.1	18.0	19.3	22.4	19.0	20.6	20.9	21.1	21.9	18.2	23.3	20.2	17.0	19.3	20.4	19.2	17.4	17.5	24.7	22.5	21.1	20.4	20.9	18.6
Nov	17.0	17.3	18.9	17.5	19.6	21.8	20.2	18.7	16.8	17.5	15.0	12.9	16.6	18.2	15.6	18.7	13.1	17.9	18.5	20.1	16.5	15.5	19.9	14.4	18.8
Dec	18.9	16.0	11.7	15.8	13.0	11.4	18.4	11.8	18.8	17.6	17.0	13.8	8.0	16.1	14.6	18.7	13.4	17.6	16.8	17.3	16.2	17.0	13.2	17.2	17.5
Year	**25.4**	**26.0**	24.8	24.6	24.4	24.7	**25.0**	**26.4**	**25.1**	**25.2**	23.8	**25.3**	**26.6**	**25.2**	**25.3**	24.5	23.5	24.0	23.5	24.7	**25.1**	24.5	24.3	23.8	**26.4**

Table 3-84: Monthly maximum dew point in degrees C for ORNL Tower "C/D" at 10/15 meters during 1998 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan																					-6.6	-0.9	1.6	0.2	-1.8
Feb																					4.6	3.1	2.2	0.6	0.9
Mar																					2.6	-0.5	6.4	4.3	3.8
Apr																					4.7	6.1	5.0	5.6	6.3
May																					14.1	13.8	10.1	10.1	13.3
Jun																					15.9	15.9	15.9	15.5	16.8
Jul																					16.7	18.0	18.4	17.0	20.1
Aug																					17.2	17.7	18.3	17.3	18.9
Sep																					17.3	16.5	15.4	14.5	15.1
Oct																					10.8	11.6	11.9	12.1	8.1
Nov																					4.0	2.0	6.1	2.1	5.6
Dec																					2.1	2.8	1.4	6.1	2.8
Year																					8.6	8.8	9.4	8.8	9.2

Table 3-85: Average monthly dew point in degrees C for ORNL Tower "F" at 10 meters during 2018 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan										-1.1	-3.6	-2.5	-2.9	-2.5	1.0	2.2	-7.8	-3.3	-3.9	3.4	-5.6	-1.5	1.0		
Feb										-6.7	-0.1	-1.6	-3.0	0.0	2.2	-0.7	-2.6	-6.7	-1.1	1.9	6.0	3.2	1.7		
Mar										3.9	2.0	3.3	2.6	4.7	8.6	-0.1	-0.3	3.9	4.3	1.1	1.5	-0.6	6.8	2.7	
Apr										4.0	7.2	6.4	6.6	9.5	9.5	6.7	6.6	8.3	4.7	10.0	4.5	8.3	4.9	4.6	
May										10.8	11.7	14.2	15.6	14.6	17.1	13.4	13.5	13.4	11.5	13.3	16.4	15.1	11.3	10.4	
Jun										16.3	17.1	18.8	20.8	18.7	16.1	20.2	19.4	18.2	16.6	16.6	18.4	17.2	16.0	16.8	
Jul										18.0	18.1	18.2	20.9	22.5	21.9	21.0	18.6	20.3	19.6	19.2	19.9	19.9	19.5	18.8	
Aug										18.9	16.8	19.5	21.8	19.4	19.6	20.8	19.8	17.9	19.9	17.4	19.7	18.9	19.4	19.7	
Sep										12.0	16.0	17.9	16.4	16.2	17.0	18.0	17.0	16.2	14.9	14.2	19.7	16.8	15.8	16.2	
Oct										11.6	7.4	11.1	8.0	8.9	10.6	12.2	11.1	10.3	9.6	10.2	11.1	11.3	11.6	13.4	
Nov										2.9	1.6	5.4	5.6	6.5	2.3	0.9	-0.3	6.2	3.4	4.2	3.1	1.5	4.4	1.8	
Dec										3.5	1.3	-0.3	-4.1	4.3	5.2	1.7	2.8	7.9	0.2	-1.2	2.2	2.7	-0.3	7.0	
Year										7.8	8.0	9.2	9.0	10.2	10.9	9.7	8.2	9.4	8.3	9.2	9.7	9.4	9.3	11.1	

*Y-12 Tower "W" was offline during 2022 as it was undergoing replacement.

Table 3-86: Average monthly dew point in degrees C for Y-12 Tower "W" at 10 meters during 2007 to 2021*

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan										-1.1	-3.6	-1.5	-2.2	-1.5	2.2	2.9	-5.5	-2.4	2.5	4.1	-4.4	-0.4	2.4	0.2	-2.0
Feb										-6.4	-0.2	0.1	-2.0	1.6	3.7	0.6	0.0	-5.5	0.7	3.2	6.4	4.2	2.9	0.6	1.0
Mar										4.2	2.1	5.1	4.2	6.1	10.2	1.4	2.3	5.1	6.5	3.3	2.6	1.3	8.2	4.9	4.0
Apr										3.9	6.8	8.2	9.1	11.1	10.7	8.6	9.4	9.5	7.8	11.8	5.7	9.6	6.6	6.6	7.3
May										10.3	10.7	15.0	16.5	15.7	17.6	14.4	15.7	14.6	13.5	14.3	16.9	15.9	12.5	12.0	15.8
Jun										15.1	15.5	19.3	21.5	20.3	17.3	20.5	21.0	19.3	18.6	17.6	18.9	17.8	17.8	18.4	18.1
Jul										16.9	16.6	18.6	21.7	23.4	22.6	21.7	20.1	21.1	21.2	20.7	20.2	20.4	20.8	19.8	21.8
Aug										17.9	15.3	19.9	22.6	20.6	20.5	21.8	21.3	18.8	21.4	19.3	20.0	19.6	20.5	20.6	20.2
Sep										14.0	14.6	18.3	17.4	17.3	17.7	18.9	17.9	16.6	17.1	16.0	20.1	18.4	17.0	16.9	15.8
Oct										10.9	6.7	11.4	9.4	10.0	11.0	13.4	11.6	10.3	11.7	11.6	11.5	12.5	12.6	14.0	7.6
Nov										2.6	1.2	6.3	6.5	7.5	3.6	2.9	0.6	6.1	5.2	6.0	3.7	2.7	5.8	2.4	3.9
Dec										3.2	1.2	0.6	-3.4	5.0	5.6	3.5	3.1	8.6	1.3	-0.1	3.0	3.8	0.9	7.0	1.6
Year										7.6	7.2	10.1	10.1	11.4	11.9	10.9	9.8	10.2	10.6	10.7	10.4	10.5	10.7	10.3	9.6

Table 3-87: Average monthly dew point in degrees C for Y-12 Tower "Y" at 15 meters during 2007 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan												4.6	4.4	4.1	5.4	5.9	3.2	3.9	3.8	6.9	3.9	5.0	6.1	4.9	4.2
Feb												4.9	4.0	5.3	5.9	4.6	4.4	3.2	5.1	6.0	8.0	6.6	6.3	5.1	5.5
Mar												6.9	6.0	6.6	8.8	4.9	5.1	6.6	6.9	5.8	5.7	5.1	8.7	6.5	6.5
Apr												7.8	7.9	9.1	9.2	7.9	8.2	8.8	7.4	9.7	6.9	8.7	7.8	7.2	8.1
May												12.6	13.3	12.1	13.3	11.2	12.3	11.7	11.0	11.6	14.1	13.1	11.0	10.3	13.7
Jun												15.9	17.7	15.5	13.1	15.7	16.3	15.6	14.6	14.3	15.8	15.0	13.5	17.0	15.7
Jul												15.5	17.9	18.2	17.6	16.9	15.6	17.4	17.2	17.2	16.9	17.5	16.2	17.4	19.0
Aug												16.8	18.9	15.4	15.7	16.8	16.8	15.2	17.3	16.1	16.9	16.5	15.9	14.2	17.6
Sep												15.6	14.1	13.1	13.5	14.3	14.3	13.7	12.8	13.3	16.8	14.9	13.0	19.3	13.8
Oct												10.2	8.5	8.6	9.1	10.4	9.8	9.6	9.2	10.7	11.1	10.7	9.9	12.1	8.0
Nov												6.9	7.0	7.7	5.4	5.5	4.7	7.9	6.2	7.4	6.3	5.7	6.9	5.5	7.1
Dec												5.0	3.6	6.2	6.6	6.3	5.9	8.5	5.3	5.0	5.9	6.2	5.1	7.8	6.0
Year												10.2	10.3	10.2	10.3	10.0	9.7	10.2	9.7	10.3	10.7	10.4	10.0	10.6	10.4

*Tower "C" was replaced by Tower "D" in April 2014 at which time the absolute humidity measurement was moved from 10 to 15 meters.

Table 3-88: Average monthly absolute humidity (g/m^3) for ORNL Tower "C/D" at 10/15 meters during 2009 to 2022*

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan																					3.5	4.9	5.7	5.1	4.5
Feb																					7.2	8.1	5.8	5.3	5.4
Mar																					6	4.9	7.7	6.7	6.3
Apr																					6.8	7.5	6.9	7.2	7.5
May																					12.1	11.8	9.7	9.5	11.4
Jun																					13.5	13.5	13.5	13.1	13.1
Jul																					14.1	15.3	15.5	14.3	16.6
Aug																					14.5	14.9	15.5	14.6	15.5
Sep																					14.6	13.8	13.2	14.4	12.8
Oct																					10.2	10.6	10.8	10.9	8.4
Nov																					6.6	5.7	7.6	5.7	7.5
Dec																					5.8	6.1	5.5	7.7	6.5
Year																					9.6	9.8	9.8	9.5	9.6

Table 3-89: Average monthly absolute humidity (g/m^3) for ORNL Tower "F" at 10 meters during 2018 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan												5.9	5.6	5.3	7.0	7.7	4.0	5.0	4.8	9.0	5.0	6.4	7.9	6.2	5.4
Feb												6.3	5.1	6.9	7.7	6.0	5.7	4.1	6.6	7.9	10.6	8.6	8.1	6.6	7.1
Mar												9.0	7.8	8.6	11.8	6.4	6.7	8.7	9.1	7.7	7.5	6.7	11.5	8.6	8.6
Apr												10.4	10.6	12.2	12.4	10.5	10.8	11.8	9.9	13.1	9.1	11.6	10.3	9.5	10.8
May												17.0	18.0	16.4	18.1	15.1	15.3	15.9	14.9	15.7	19.2	17.8	14.8	13.9	18.7
Jun												21.7	24.3	21.2	17.9	21.5	20.9	21.4	20.0	19.5	21.7	20.5	18.4	23.3	21.5
Jul												21.2	24.6	25.1	24.3	23.2	19.9	23.9	23.7	23.7	23.3	24.1	22.3	23.9	26.2
Aug												22.9	26.0	21.2	28.7	23.0	21.8	20.8	23.8	22.1	23.2	22.6	21.8	19.3	24.1
Sep												21.2	19.2	17.7	18.3	19.4	19.5	18.6	17.5	18.0	23.0	20.5	17.7	14.2	18.8
Oct												13.6	11.3	11.3	12.0	13.9	13.1	12.9	12.3	14.3	14.9	14.4	13.2	16.2	10.6
Nov												9.0	9.2	10.1	7.0	7.2	6.1	10.5	8.2	9.7	8.2	7.4	9.1	7.1	9.4
Dec												6.5	4.6	8.1	8.6	7.6	7.6	11.2	6.9	6.5	7.7	8.1	6.7	10.3	7.9
Year												13.7	13.9	13.7	14.5	13.5	12.6	13.7	13.1	13.9	14.5	14.1	13.5	13.3	14.1

*Tower "C" was replaced by Tower "D" in April 2014 at which time the absolute humidity measurement was moved from 10 to 15 meters.

Table 3-90: Average monthly vapor pressure in millibars for ORNL Tower "C/D" at 10/15 meters during 2009 to 2022*

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan																					4.4	6.3	7.5	6.5	5.8
Feb																					9.5	6.2	7.6	6.8	7.0
Mar																					7.9	6.5	10.2	8.9	8.3
Apr																					9.0	10.0	9.2	9.6	10.1
May																					16.6	16.1	13.0	12.9	15.5
Jun																					18.5	18.5	18.4	17.9	18.0
Jul																					19.4	21.0	21.4	19.6	22.8
Aug																					19.9	20.4	21.3	20.0	21.3
Sep																					20.0	19.0	18.0	16.9	17.4
Oct																					13.7	14.2	14.4	14.6	11.2
Nov																					8.6	7.4	10.0	7.4	9.9
Dec																					7.5	7.9	7.1	10.1	8.4
Year																					12.9	12.8	13.2	12.6	13.0

Table 3-91: Average monthly vapor pressure in millibars for ORNL Tower "F" at 10 meters during 2018 to 2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan		2	7	3	5	5	2	4	2	4	1	3	4	3	5	5	1	1	4	6	4	2	0	6	5
Feb		3	1	2	3	6	3	2	1	0	2	3	1	3	6	2	3	3	7	6	3	2	4	2	9
Mar		2	1	1	0	4	3	3	0	1	4	3	3	1	3	2	1	1	2	2	2	1	2	4	2
Apr		2	5	1	1	5	0	5	4	2	4	2	4	2	7	4	2	4	2	4	2	1	1	1	1
May		7	10	8	7	9	8	7	7	1	4	6	11	8	7	5	6	2	3	0	1	5	3	4	3
Jun		9	6	7	1	7	10	9	6	5	4	7	5	6	2	12	7	3	0	7	3	8	8	5	1
Jul		13	4	7	8	12	11	11	4	6	5	5	9	8	4	4	8	5	3	8	10	5	5	4	1
Aug		10	3	9	5	15	9	6	5	2	2	9	6	3	7	12	8	5	6	6	6	3	7	5	1
Sep		2	6	14	5	13	13	4	13	6	5	11	12	10	5	15	8	11	3	11	11	5	10	15	8
Oct		11	6	12	7	11	10	8	7	5	4	9	8	7	5	11	11	7	2	10	11	13	8	19	2
Nov		4	2	6	5	8	5	4	8	6	4	7	6	11	6	1	3	4	4	5	10	5	5	6	4
Dec		2	2	6	2	6	7	2	6	8	5	6	0	8	2	1	3	9	3	4	6	4	8	6	8
Year		67	53	76	49	101	81	65	63	46	44	71	69	70	59	74	61	55	39	69	69	54	61	77	45

Table 3-92: Average monthly and annual fog days for Oak Ridge, Tennessee during 1999 to 2022

Duration Frequency (years)	Minutes						Hours				
	5	10	15	30	60		2	3	6	12	24
2	0.43	0.65	0.80	1.14	1.50		1.8	2.0	2.4	2.8	3.3
5	0.50	0.78	0.98	1.43	1.90		2.4	2.5	3.0	3.6	4.2
10	0.56	0.89	1.12	1.65	2.20		2.7	2.9	3.5	4.1	4.8
25	0.64	1.03	1.30	1.89	2.50		3.0	3.4	3.9	4.7	5.5
50	0.71	1.15	1.45	2.11	2.80		3.4	3.7	4.7	5.3	6.1
100	0.77	1.26	1.60	2.36	3.10		3.8	4.0	4.9	5.7	6.6

Source: U.S. Department of Commerce, Climatic Atlas of the United States, Environmental Data Service, Washington, DC, 1968

Table 3-93: Precipitation (inches) verses frequency for areas within a 10-mile radius in Anderson and Knox Counties, Tennessee

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	25-Yr Max	25-Yr StDev
Jan	5.61	8.60	4.98	3.95	8.19	2.17	3.18	4.94	5.34	2.93	4.49	5.82	7.85	3.99	6.52	10.51	2.95	3.91	3.54	4.01	1.87	6.48	8.79	2.49	6.20	10.51	2.28
Feb	4.81	3.87	3.44	7.62	1.97	12.78	5.71	4.05	2.39	1.31	5.25	3.51	3.62	5.70	3.76	2.32	5.07	4.06	5.86	2.67	9.54	15.14	12.25	5.17	8.09	15.14	3.53
Mar	6.01	4.91	4.93	2.46	8.82	2.85	6.19	2.96	4.64	3.29	5.01	4.38	3.57	6.65	5.59	5.72	3.74	4.16	2.83	4.82	4.42	4.48	8.15	9.83	3.21	9.83	1.89
Apr	14.03	3.68	7.28	2.16	1.76	8.03	3.33	6.28	7.66	5.31	3.61	3.81	2.94	9.13	3.10	6.37	4.44	5.04	2.97	9.62	4.92	3.91	7.26	1.43	4.44	14.03	2.89
May	3.99	4.42	6.58	3.67	5.18	10.01	3.90	3.19	2.27	2.72	3.05	5.81	6.08	2.14	2.84	5.33	2.47	2.08	2.81	4.51	4.04	4.61	4.46	4.55	4.30	10.01	1.74
Jun	10.13	6.21	4.23	3.38	1.50	6.05	7.75	4.01	1.35	1.59	1.74	5.47	3.32	7.30	1.40	7.92	5.59	5.36	4.61	4.19	4.60	7.00	2.29	7.46	1.61	10.13	2.46
Jul	3.41	8.03	3.65	7.55	6.37	5.29	4.94	7.60	4.26	4.19	4.90	5.43	5.95	4.80	5.84	8.04	7.48	8.36	3.65	6.26	5.17	5.64	2.86	3.10	9.61	9.61	1.82
Aug	1.35	1.74	1.77	3.04	2.53	3.86	2.91	1.40	5.03	0.71	3.08	4.57	2.80	0.91	2.89	4.61	5.89	4.51	2.39	5.52	3.25	6.79	4.90	11.23	4.08	11.23	2.25
Sep	1.37	1.27	2.84	4.79	7.06	4.68	7.61	1.86	4.77	2.47	1.27	5.48	5.10	10.14	7.17	3.38	2.52	3.17	1.38	4.42	7.61	0.01	5.07	2.15	2.91	10.14	2.50
Oct	1.65	2.09	0.01	0.88	3.85	1.58	5.51	1.81	4.93	2.78	2.01	5.73	3.83	4.59	1.66	0.72	6.30	2.50	0.06	5.52	3.52	8.02	7.25	5.57	1.12	8.02	2.29
Nov	2.40	2.71	4.15	1.85	5.57	5.89	11.15	4.11	3.41	5.07	3.96	2.62	7.45	10.89	1.14	4.43	2.41	5.20	4.76	3.06	5.87	5.33	3.57	1.29	4.19	11.15	2.49
Dec	8.47	1.57	3.50	4.97	6.29	3.72	5.36	2.90	2.50	3.50	8.07	8.14	2.19	5.02	6.58	8.04	5.82	7.87	7.29	3.88	7.56	5.61	4.04	4.74	7.53	8.47	2.11
Annual Sum	63.23	49.10	47.36	46.32	59.09	66.91	67.54	45.11	48.55	35.87	46.44	60.77	54.70	71.26	48.49	67.39	54.68	56.22	42.15	58.48	62.37	73.02	70.89	59.01	57.29	73.02	10.00
Monthly Max	14.03	8.60	7.28	7.62	8.82	12.78	11.15	7.60	7.66	5.31	8.07	8.14	7.85	10.89	7.17	10.51	7.48	8.36	7.29	9.62	9.54	15.14	12.25	11.23	9.61	15.14	3.53

Table 3-94: Total monthly precipitation in inches at Tower "D" during 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	25-Yr Max	25-Yr StDev
Jan	0.21	0.66	1.61	0.22	0.48	0.30	0.22	0.39	0.28	0.62	0.70	0.43	0.55	0.50	0.65	0.69	0.44	0.59	0.38	0.63	0.13	0.43	1.09	0.25	1.27	1.61	0.34
Feb	0.21	0.31	0.51	0.48	0.33	1.00	0.52	0.26	0.26	0.21	0.37	0.48	0.46	0.93	0.36	0.23	0.37	0.38	0.43	0.44	0.42	0.61	0.59	0.39	0.35	1.00	0.19
Mar	0.45	0.87	1.53	0.18	0.73	0.65	0.71	0.43	0.80	0.20	0.47	0.21	0.38	0.35	0.62	0.46	0.39	0.14	0.44	0.67	0.42	0.44	0.41	0.88	0.27	1.53	0.30
Apr	0.58	0.59	0.64	0.24	0.47	0.78	0.39	0.61	0.54	0.62	0.38	0.52	0.45	0.86	0.67	0.89	0.45	0.45	0.90	0.96	0.48	0.47	0.52	0.21	0.51	0.96	0.19
May	0.67	0.76	0.66	1.52	1.04	0.79	0.47	0.59	0.24	0.80	0.73	0.76	0.62	0.34	1.09	0.52	0.59	1.02	0.54	0.45	0.65	0.67	0.57	1.43	1.04	1.52	0.31
Jun	0.74	3.53	0.90	0.35	0.29	0.51	1.36	0.27	0.22	0.52	0.63	1.05	0.39	0.96	1.18	0.85	0.81	0.65	1.23	0.37	0.55	1.04	0.28	1.42	0.35	3.53	0.67
Jul	0.38	1.61	0.97	2.31	1.01	0.60	0.69	1.44	0.99	0.89	1.39	0.66	0.56	0.48	0.67	1.14	0.54	0.99	0.65	1.84	1.55	0.98	0.55	1.91	1.28	2.31	0.51
Aug	0.24	0.48	1.18	0.45	0.66	0.66	0.86	0.40	1.02	0.19	0.46	1.45	0.93	1.02	0.70	0.87	1.02	0.98	0.78	1.45	0.70	2.23	0.97	1.07	1.49	2.23	0.45
Sep	0.55	0.13	1.67	0.47	1.57	0.99	0.86	0.42	0.51	0.59	1.18	0.58	0.63	1.01	0.86	0.83	0.19	0.51	0.49	0.92	0.85	0.01	0.57	0.42	0.55	1.67	0.39
Oct	0.44	0.27	0.00	0.21	0.45	0.38	0.67	0.09	0.26	0.72	0.30	0.32	0.32	0.49	0.50	0.22	0.61	0.24	0.03	0.69	0.70	0.83	0.97	0.69	0.14	0.97	0.26
Nov	0.37	0.70	0.42	0.55	0.85	0.43	0.81	0.77	0.31	0.54	0.54	0.30	0.46	0.52	0.24	0.23	0.22	0.50	1.04	0.56	0.58	0.40	0.77	0.54	0.47	1.04	0.21
Dec	0.76	0.23	1.42	0.33	0.31	0.28	0.30	0.23	0.41	0.40	0.87	0.55	0.13	0.35	0.34	0.46	0.38	0.44	0.40	0.39	0.48	0.43	0.29	0.57	0.67	1.42	0.26
Annual Sum	0.76	3.53	1.67	2.31	1.57	1.00	1.36	1.44	1.02	0.89	1.39	1.45	0.93	1.02	1.18	1.14	1.02	1.02	1.23	1.84	1.55	2.23	1.09	1.91	1.49	3.53	0.67

Table 3-95: Maximum monthly 1-hour precipitation in inches at Tower "D" during 1998-2022

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	25-Yr Max	25-Yr StDev
Jan	1.52	1.90	1.44	1.73	3.63	1.09	1.18	1.81	2.05	1.10	2.37	2.30	2.95	2.56	1.33	2.75	1.13	1.52	1.42	0.76	0.77	2.28	2.68	0.67	1.78	3.63	0.76
Feb	2.13	1.23	0.92	2.90	0.81	5.18	3.03	1.42	0.75	1.10	1.68	1.71	1.75	2.26	0.89	0.66	1.37	1.69	1.45	0.86	2.43	5.78	3.68	1.21	2.17	5.78	1.31
Mar	1.72	1.11	1.19	0.69	4.54	1.10	2.41	1.43	1.92	1.47	1.53	1.14	1.05	2.30	1.61	1.48	1.44	0.76	0.50	1.01	1.19	1.24	1.18	1.63	0.66	4.54	0.79
Apr	3.81	1.27	3.61	1.38	1.12	2.06	1.46	1.35	2.93	2.01	1.05	1.20	1.56	2.96	1.44	2.47	0.93	0.94	0.92	1.83	1.30	1.31	2.75	0.78	1.52	3.81	0.86
May	1.79	2.37	3.80	1.61	1.44	2.80	1.02	2.79	0.76	1.56	0.68	1.40	2.31	1.42	1.70	2.17	0.64	1.16	0.61	1.68	0.91	2.12	1.21	1.64	1.32	3.80	0.77
Jun	2.98	2.61	1.39	0.89	0.76	2.48	2.06	1.27	0.51	0.52	0.58	2.40	0.96	2.15	0.50	2.62	0.99	1.44	1.67	1.19	1.75	1.36	0.37	2.51	0.67	2.98	0.81
Jul	0.89	2.49	1.37	2.84	3.18	1.53	1.42	4.14	1.00	1.22	1.57	2.59	1.35	3.38	1.10	4.55	2.01	1.50	1.09	1.84	2.25	1.30	1.17	0.91	1.64	4.55	1.01
Aug	1.09	1.41	1.23	1.59	0.77	1.56	0.72	0.57	0.75	0.40	2.32	1.62	0.81	0.40	0.73	1.37	1.70	2.18	0.73	1.65	1.26	2.26	1.19	3.78	2.70	3.78	0.80
Sep	0.90	0.86	1.33	1.91	2.20	2.55	5.11	1.05	2.82	1.46	1.08	2.16	2.43	6.54	4.87	2.34	1.36	0.89	1.23	2.30	1.54	0.01	1.72	0.86	1.36	6.54	1.49
Oct	1.16	1.33	0.01	0.48	1.12	0.69	1.98	1.39	2.18	1.19	1.21	1.21	2.39	2.49	0.52	0.46	1.47	0.48	0.03	2.52	0.95	1.88	2.66	1.43	0.28	2.66	0.79
Nov	1.07	1.44	2.12	0.62	2.66	2.03	3.90	1.66	1.36	2.30	1.32	1.33	3.91	3.66	0.62	2.16	0.86	1.79	4.05	2.13	0.94	1.80	2.54	0.65	1.46	4.05	1.04
Dec	3.23	0.61	1.49	1.26	2.02	0.94	2.59	0.98	1.02	1.19	2.25	3.08	0.70	1.45	1.39	2.28	1.63	1.64	1.13	1.40	1.51	0.95	1.61	1.11	2.25	3.23	0.69
Annual Sum	3.81	2.61	3.80	2.90	4.54	5.18	5.11	4.14	2.93	2.30	2.37	3.08	3.91	6.54	4.87	4.55	2.01	2.18	4.05	2.52	2.43	5.78	3.68	3.78	2.70	6.54	1.49

Table 3-96: Maximum monthly 24-hour precipitation in inches at Tower "D" during 1998-2022

Year	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	17-Yr Max	17-Yr StDev
Jan		2.99	4.80	5.71	7.79	3.90	6.76	10.51	2.49	3.61	3.10	4.34	1.99	5.61	8.01	2.73	5.53	6.29	10.51	2.30
Feb		1.39	4.66	3.03	3.15	5.71	3.63	2.39	5.02	3.36	6.59	2.91	10.51	14.17	12.05	5.34	8.19	5.89	14.17	3.58
Mar		2.98	5.27	4.35	3.67	7.08	6.37	5.80	5.02	4.56	3.58	4.28	3.95	4.44	8.66	9.65	3.26	5.08	9.65	1.85
Apr		5.12	3.65	4.18	3.24	9.92	3.96	6.60	4.84	6.38	3.88	9.66	4.60	3.83	7.13	1.73	3.97	2.92	9.92	2.24
May		2.07	3.26	6.34	6.51	2.11	4.33	5.51	2.08	0.93	2.81	4.50	3.48	4.55	5.15	5.10	4.31	3.39	6.51	1.59
Jun		1.33	1.37	7.43	2.78	6.47	1.41	5.94	4.65	5.36	4.17	4.48	4.45	7.07	5.23	5.20	2.08	8.87	8.87	2.24
Jul		5.44	6.59	6.10	6.32	3.55	5.59	8.37	5.52	7.94	3.68	7.93	5.90	3.47	3.30	4.59	10.64	2.96	10.64	2.11
Aug		0.54	3.64	6.01	4.26	1.31	3.19	3.44	4.87	4.22	3.05	5.24	3.01	5.49	3.43	8.85	2.64		8.85	1.94
Sep	5.15	2.01	1.14	6.15	3.97	10.70	6.93	3.48	0.88	2.83	2.06	4.25	6.51	0.06	4.20	2.35	3.46		10.70	2.64
Oct	5.25	3.22	2.20	6.06	4.32	4.75	1.71	0.65	7.20	3.04	0.09	5.95	3.02	7.20	5.82	5.51	1.01		7.20	2.27
Nov	3.91	5.19	3.99	2.85	7.76	11.28	1.21	4.20	2.20	5.69	4.86	3.04	5.77	5.20	2.94	1.06	3.58		11.28	2.47
Dec	2.79	3.89	8.50	7.85	1.92	5.13	6.35	7.82	5.80	8.53	7.01	4.18	7.22	5.23	3.53	4.28	4.90		8.53	2.02
Annual Sum	17.10	36.17	49.07	66.06	55.69	71.91	51.44	64.71	50.57	56.45	44.88	60.76	60.41	66.32	69.45	56.39	53.57	35.40	71.91	13.77
Monthly Max	5.25	5.44	8.50	7.85	7.79	11.28	6.93	10.51	7.20	8.53	7.01	9.66	10.51	14.17	12.05	9.65	10.64	8.87	0.00	3.58

Table 3-97: Total monthly precipitation in inches at Tower "Y" during 2006-2023

Year	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	17-Yr Max	17-Yr StDev
Jan		0.41	0.64	0.44	0.50	0.56	0.50	0.76	0.47	0.57	0.26	0.30	0.14	0.40	0.78	0.26	0.95	0.67	0.95	0.21
Feb		0.26	0.33	0.38	0.45	1.01	0.27	0.23	0.41	0.33	0.54	0.39	0.45	0.61	0.54	0.29	0.28	0.39	1.01	0.19
Mar		0.25	0.46	0.18	0.48	0.35	0.75	0.67	0.37	0.25	0.44	0.55	0.33	0.34	0.52	0.74	0.28	0.55	0.75	0.17
Apr		0.41	0.18	0.54	0.52	1.04	0.56	0.51	0.64	1.10	0.46	1.04	0.33	0.40	0.47	0.22	0.37	0.56	1.10	0.27
May		0.36	0.61	0.49	0.93	0.37	0.61	0.48	0.35	0.21	0.51	0.55	0.76	0.47	0.50	1.19	0.92	1.34	1.34	0.31
Jun		0.26	0.31	1.69	0.44	0.86	0.39	1.07	0.80	0.51	0.94	0.58	1.13	1.18	0.94	1.06	0.45	1.35	1.69	0.40
Jul		0.91	1.15	0.79	0.79	0.83	0.66	0.60	1.05	1.35	0.95	1.05	0.99	0.59	0.74	1.03	0.77	0.35	1.35	0.24
Aug		0.29	0.38	0.81	1.00	0.77	0.55	0.41	0.64	0.85	0.53	0.84	0.70	1.56	0.29	0.68	0.66		1.56	0.31
Sep	0.72	0.70	0.26	0.68	0.46	0.93	1.02	0.71	0.27	0.53	0.50	0.68	0.56	0.03	0.33	0.34	1.09		1.09	0.28
Oct	0.36	0.57	0.28	0.56	0.73	0.40	0.27	0.11	0.87	0.66	0.04	0.74	0.48	0.64	0.63	0.75	0.12		0.87	0.25
Nov	0.30	0.69	0.59	0.24	0.52	0.85	0.27	0.30	0.24	0.58	0.95	0.51	0.41	0.38	0.58	0.26	0.29		0.95	0.22
Dec	0.34	0.56	0.76	0.52	0.16	0.29	0.34	0.53	0.35	0.62	0.45	0.49	0.40	0.55	0.28	0.54	0.49		0.76	0.15
Annual Sum	1.72	5.67	5.95	7.32	6.98	8.26	6.19	6.38	6.46	7.56	6.57	7.72	6.68	7.15	6.60	7.36	6.67	5.21	8.26	3.00
Monthly Max	0.72	0.91	1.15	1.69	1.00	1.04	1.02	1.07	1.05	1.35	0.95	1.05	1.13	1.56	0.94	1.19	1.09	1.35	0.00	0.40

Table 3-98: Maximum monthly 1-hour precipitation in inches at Tower "Y" during 2006-2023

Year	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	17-Yr Max	17-Yr StDev
Jan		1.06	2.55	2.13	2.80	2.69	1.27	2.86	1.07	1.23	1.12	1.07	0.32	2.17	2.57	0.72	1.65	0.92	2.86	0.82
Feb		0.39	1.33	1.36	1.71	2.55	0.66	0.59	1.29	1.28	1.65	0.42	2.53	4.64	3.55	1.13	1.59	1.59	4.64	1.12
Mar		1.38	1.59	1.15	1.00	1.41	1.63	1.43	1.44	0.65	0.70	0.83	1.02	1.12	1.07	1.86	0.85	0.88	1.86	0.35
Apr		1.48	0.75	1.16	1.46	2.95	1.24	1.26	1.06	1.45	1.01	2.77	1.33	1.21	2.53	0.77	1.68	0.84	2.95	0.67
May		0.84	0.64	0.99	2.05	1.55	1.90	2.59	0.66	0.34	0.93	1.01	1.33	1.54	1.47	3.11	1.56	1.38	3.11	0.72
Jun		0.27	0.53	2.20	0.74	2.41	0.75	2.09	1.17	1.44	1.35	1.42	1.78	1.49	1.74	2.85	0.88	2.16	2.85	0.71
Jul		1.56	2.15	1.15	2.11	2.82	0.96	2.60	1.48	1.52	1.08	2.74	2.16	1.00	1.03	1.34	1.61	1.55	2.82	0.62
Aug		0.32	2.35	1.31	1.57	0.78	0.96	0.57	1.00	2.15	0.80	2.04	0.96	1.63	0.79	3.37	0.72		3.37	0.81
Sep	3.21	1.21	0.80	2.29	1.91	6.51	2.49	2.43	0.47	0.74	1.61	2.09	2.29	0.03	1.51	0.72	2.02		6.51	1.46
Oct	2.28	1.22	1.31	1.04	2.33	2.15	0.57	0.43	1.57	0.71	0.05	2.51	0.90	1.55	2.05	1.29	0.33		2.51	0.76
Nov	1.53	2.31	0.91	1.42	3.09	3.26	0.63	1.86	0.45	1.81	4.04	1.59	0.81	1.75	2.06	0.45	1.13		4.04	1.02
Dec	1.05	1.27	2.34	1.96	0.53	1.15	1.36	2.08	1.79	2.23	1.88	1.47	1.36	0.72	1.52	1.01	1.37		2.34	0.51
Annual Sum	8.07	13.31	17.25	18.16	21.30	30.23	14.42	20.79	13.45	15.55	16.22	19.96	16.79	18.85	21.89	18.62	15.39	9.32	30.23	9.57
Monthly Max	3.21	2.31	2.55	2.29	3.09	6.51	2.49	2.86	1.79	2.23	4.04	2.77	2.53	4.64	3.55	3.37	2.02	2.16	0.00	1.46

Table 3-99: Maximum monthly 24-hour precipitation in inches at Tower "Y" during 2006-2023

Year / Hour	1998-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	25-Year
1	5.9	5.7	5.9	6.0	6.0	5.9	5.8	5.9	5.9	6.0	5.8	5.9
2	5.9	5.7	5.9	6.0	6.0	5.9	5.8	5.9	5.9	6.0	5.8	5.9
3	5.9	5.7	5.9	5.9	6.0	5.9	5.8	5.8	5.9	5.9	5.8	5.9
4	5.9	5.7	5.9	5.9	6.0	5.8	5.8	5.8	5.9	5.9	5.8	5.9
5	5.9	5.7	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.9	5.7	5.9
6	5.8	5.7	5.8	5.9	5.9	5.8	5.7	5.8	5.8	5.9	5.7	5.8
7	5.8	5.6	5.8	5.8	5.9	5.8	5.7	5.8	5.8	5.8	5.6	5.8
8	4.1	4.9	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.7	4.0	4.1
9	3.4	3.5	3.4	3.4	3.3	3.4	3.4	3.3	3.3	3.1	3.3	3.4
10	2.8	2.9	2.8	2.8	2.6	2.9	2.9	2.9	2.8	2.7	2.9	2.8
11	2.6	2.6	2.5	2.6	2.5	2.6	2.6	2.6	2.5	2.4	2.7	2.6
12	2.4	2.4	2.3	2.2	2.1	2.3	2.3	2.4	2.3	2.1	2.5	2.4
13	2.2	2.2	2.2	2.2	2.0	2.3	2.2	2.3	2.2	2.2	2.4	2.2
14	2.2	2.2	2.2	2.2	2.0	2.2	2.3	2.3	2.3	2.2	2.4	2.2
15	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.4	2.2	2.5	2.3
16	2.6	2.5	2.4	2.5	2.4	2.5	2.5	2.5	2.5	2.4	2.6	2.6
17	4.3	2.9	4.6	4.7	4.6	4.5	4.6	4.6	4.5	4.4	4.4	4.3
18	4.6	3.5	4.8	4.9	4.8	4.7	4.8	4.8	4.8	2.4	4.6	4.5
19	5.0	4.4	5.1	5.3	5.1	5.1	5.1	5.2	5.2	5.2	4.9	5.0
20	5.4	5.1	5.5	5.6	5.6	5.5	5.5	5.6	5.6	5.7	5.4	5.4
21	5.7	5.6	5.8	5.9	5.9	5.8	5.6	5.8	5.8	5.9	5.6	5.7
22	5.9	5.7	5.8	5.9	5.9	5.8	5.7	5.9	5.9	5.9	5.7	5.9
23	5.9	5.7	5.9	6.0	6.0	5.9	5.8	5.9	5.9	6.0	5.8	5.9
24	5.9	5.7	5.9	6.0	6.0	5.9	5.8	5.9	5.9	6.0	5.8	5.9
All	4.5	4.3	4.5	4.6	4.5	4.5	4.5	4.5	4.5	4.4	4.5	4.5

Table 3-100: Average annual hourly stability for ORNL Tower "D" for 1998-2012, 2013 to 2022 individually, and for the 25-year average (Stability "A"=1, "G=7)

Year / Hour	1998-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	25-Year
1	5.7	5.5	5.7	5.8	5.7	5.8	5.7	5.5	5.7	5.7	5.7	5.7
2	5.7	5.5	5.7	5.8	5.6	5.8	5.7	5.5	5.7	5.7	5.7	5.7
3	5.6	5.5	5.7	5.7	5.6	5.7	5.7	5.5	5.6	5.7	5.7	5.6
4	5.6	5.5	5.6	5.7	5.6	5.6	5.7	5.5	5.7	5.6	5.7	5.6
5	5.6	5.5	5.7	5.7	5.5	5.6	5.6	5.5	5.6	5.6	5.6	5.6
6	5.6	5.5	5.7	5.6	5.6	5.6	5.6	5.5	5.6	5.6	5.6	5.6
7	5.6	5.4	5.6	5.6	5.5	5.5	5.6	5.4	5.6	5.5	5.6	5.6
8	4.2	5.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.2
9	3.9	4.0	4.0	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.9
10	3.2	3.3	3.1	3.2	3.2	3.4	3.3	3.3	3.3	3.4	3.1	3.2
11	3.0	3.2	3.0	3.0	3.2	3.2	3.2	3.2	3.1	3.2	3.0	3.1
12	3.0	3.0	2.8	2.8	2.9	3.0	2.9	3.0	3.0	3.1	3.0	3.0
13	2.9	3.0	2.7	2.9	2.9	3.0	2.9	3.1	3.0	3.0	2.8	2.9
14	2.9	2.9	2.8	3.0	2.9	3.1	3.0	3.1	2.9	3.0	2.9	2.9
15	3.1	3.2	2.9	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1
16	3.2	3.2	3.1	3.2	3.1	3.4	3.3	3.2	3.2	3.2	3.2	3.2
17	4.5	3.7	4.6	4.7	4.7	4.5	4.6	4.7	4.6	4.6	4.6	4.5
18	4.9	4.8	4.9	5.1	5.1	4.8	5.1	5.0	5.0	5.0	4.8	4.9
19	5.3	5.3	5.4	5.4	5.3	5.2	5.5	5.4	5.4	5.5	5.3	5.3
20	5.5	5.4	5.5	5.6	5.6	5.5	5.7	5.5	5.7	5.6	5.5	5.5
21	5.6	5.5	5.6	5.8	5.6	5.6	5.7	5.6	5.8	5.8	5.6	5.6
22	5.6	5.6	5.7	5.7	5.6	5.6	5.7	5.5	5.8	5.7	5.7	5.6
23	5.6	5.5	5.7	5.8	5.6	5.7	5.7	5.5	5.8	5.7	5.7	5.6
24	5.7	5.5	5.7	5.9	5.7	5.8	5.7	5.5	5.7	5.7	5.7	5.7
All	4.6	4.6	4.6	4.7	4.6	4.7	4.7	4.6	4.7	4.7	4.6	4.7

Table 3-101: Average seasonal hourly stability for ORNL Tower "D" for 1998-2012, 2013 to 2022 individually, and for the 25-year average during Winter (December, January, February) (Stability "A"=1, "G=7)

Year / Hour	1998-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	25-Year
1	5.9	5.7	6.1	6.1	6.0	5.9	5.9	6.0	5.8	6.1	6.0	5.9
2	5.9	5.7	6.1	6.0	6.0	5.9	5.8	5.9	5.8	6.1	6.2	5.9
3	6.0	5.7	6.0	6.0	6.1	5.9	5.9	5.9	5.9	6.1	6.1	6.0
4	5.9	5.7	6.0	5.9	6.0	5.9	5.9	5.9	5.9	6.1	6.1	5.9
5	5.9	5.7	6.0	5.9	6.0	5.9	5.8	5.9	5.8	6.0	5.9	5.9
6	5.9	5.7	5.9	5.9	6.0	5.9	5.7	5.9	5.8	6.1	6.0	5.9
7	5.9	5.6	5.8	5.9	5.9	5.8	5.7	5.9	5.8	6.0	5.7	5.9
8	4.0	4.2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
9	3.1	3.4	3.2	3.1	3.1	3.2	3.2	3.2	3.1	2.8	3.1	3.1
10	2.8	2.8	2.7	2.7	2.5	2.8	2.9	3.1	2.9	2.7	3.0	2.8
11	2.5	2.5	2.5	2.5	2.3	2.7	2.5	2.7	2.5	2.3	2.5	2.5
12	2.3	2.2	2.2	2.2	2.0	2.4	2.3	2.6	2.3	2.2	2.3	2.3
13	2.1	2.2	2.1	2.1	1.9	2.3	2.2	2.6	2.2	2.0	2.2	2.1
14	2.1	2.1	2.1	2.0	1.9	2.2	2.1	2.7	2.2	2.1	2.2	2.1
15	2.3	2.2	2.2	2.0	2.1	2.3	2.2	2.6	2.3	2.2	2.3	2.3
16	2.5	2.4	2.4	2.4	2.3	2.6	2.4	2.7	2.5	2.4	2.4	2.5
17	4.1	2.7	4.3	4.5	4.4	4.2	4.3	4.3	4.4	4.4	3.8	4.1
18	4.2	2.9	4.4	4.6	4.5	4.4	4.4	4.3	4.5	4.4	4.1	4.2
19	4.6	3.8	4.6	4.8	4.6	4.6	4.6	4.6	4.6	4.7	4.3	4.6
20	5.1	4.3	5.1	5.2	5.2	5.0	5.0	5.2	5.1	5.3	5.1	5.1
21	5.5	5.2	5.7	5.7	5.7	5.5	5.4	5.7	5.6	5.7	5.5	5.5
22	5.7	5.4	5.8	5.8	5.8	5.8	5.6	5.8	5.8	5.8	5.7	5.7
23	5.9	5.6	5.9	5.9	5.9	5.9	5.7	5.9	5.9	6.0	5.8	5.9
24	5.9	5.6	6.0	6.0	6.0	6.0	5.9	6.0	5.8	6.1	6.0	5.9
All	4.4	4.1	4.5	4.5	4.4	4.5	4.4	4.6	4.4	4.5	4.4	4.4

Table 3-102: Average seasonal hourly stability for ORNL Tower "D" for 1998-2012, 2013 to 2022 individually, and for the 25-year average during Spring (March, April, May) (Stability "A"=1, "G=7)

Year / Hour	1998-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	25-Year
1	6.0	5.9	6.0	6.1	6.1	6.0	6.0	6.0	6.0	6.0	5.8	6.0
2	6.0	5.8	6.0	6.0	6.1	6.1	6.0	6.0	5.9	6.0	5.8	6.0
3	6.0	5.8	6.0	6.0	6.0	6.0	6.0	5.9	6.0	6.0	5.8	6.0
4	6.0	5.8	6.0	6.0	6.0	6.0	5.9	5.9	5.9	6.0	5.8	6.0
5	5.9	5.8	5.9	5.9	6.0	5.9	5.9	6.0	5.9	5.9	5.8	5.9
6	5.9	5.7	5.9	5.9	6.0	5.9	5.9	5.9	5.9	5.9	5.7	5.9
7	5.9	5.6	6.0	5.9	5.9	5.8	5.8	5.8	5.9	5.9	5.6	5.9
8	4.1	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0
9	2.8	3.1	2.7	2.7	2.6	2.8	2.8	2.7	2.7	2.1	2.7	2.8
10	2.4	2.6	2.5	2.4	2.3	2.4	2.4	2.4	2.4	1.9	2.4	2.4
11	2.2	2.2	2.0	2.1	1.9	2.0	2.0	1.9	1.9	1.7	2.1	2.1
12	1.8	1.9	1.8	1.7	1.6	1.7	1.7	1.7	1.8	1.4	1.8	1.8
13	1.6	1.7	1.6	1.6	1.5	1.7	1.6	1.6	1.6	1.4	1.6	1.6
14	1.6	1.6	1.7	1.5	1.4	1.6	1.6	1.5	1.7	1.4	1.6	1.6
15	1.7	1.7	1.7	1.6	1.6	1.7	1.6	1.5	1.8	1.4	1.7	1.7
16	1.9	1.9	1.8	1.8	1.8	1.6	1.8	1.7	1.8	1.5	1.8	1.8
17	4.3	2.1	4.7	4.7	4.7	4.6	4.6	4.6	4.6	4.7	4.6	4.3
18	4.4	2.5	4.8	4.8	4.8	4.8	4.8	4.9	4.7	4.9	4.7	4.5
19	4.6	2.6	5.1	5.2	5.0	5.0	5.0	5.0	4.9	5.1	4.9	4.7
20	5.3	4.4	5.6	5.6	5.6	5.5	5.5	5.5	5.4	5.6	5.3	5.3
21	5.8	5.7	5.9	5.9	6.0	5.9	5.8	5.9	5.7	5.9	5.7	5.8
22	6.0	5.8	5.9	6.0	6.0	5.9	6.0	6.0	5.9	6.0	5.7	6.0
23	6.0	5.8	6.0	6.0	6.0	6.0	6.0	6.1	5.8	6.0	5.8	6.0
24	6.1	5.9	6.0	6.1	6.0	6.0	6.0	6.0	6.0	6.0	5.8	6.1
All	4.3	4.0	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.2	4.3	4.3

Table 3-103: Average seasonal hourly stability for ORNL Tower "D" for 1998-2012, 2013 to 2022 individually, and for the 25-year average during Summer (June, July, August) (Stability "A"=1, "G=7)

Year / Hour	1998-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	25-Year
1	6.1	5.8	5.9	6.1	5.7	5.8	5.7	6.1	6.1	6.0	5.7	6.0
2	6.1	5.8	5.9	5.9	5.6	5.8	5.7	6.0	6.1	6.0	5.6	6.0
3	6.1	5.8	5.8	5.9	5.6	5.7	5.7	6.0	6.0	6.0	5.6	6.0
4	6.0	5.8	5.9	5.9	5.6	5.6	5.7	5.9	6.0	6.0	5.5	5.9
5	6.0	5.8	5.9	5.9	5.5	5.6	5.7	5.9	5.9	6.0	5.5	5.9
6	6.0	5.8	5.8	5.8	5.6	5.6	5.7	5.9	5.9	5.9	5.5	5.9
7	5.9	5.7	5.8	5.8	5.5	5.5	5.7	5.9	5.8	5.9	5.4	5.8
8	4.3	5.6	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.9	3.8	4.2
9	3.8	3.9	3.6	3.7	3.8	3.8	3.7	3.4	3.5	3.6	3.6	3.7
10	2.8	2.8	2.8	2.9	3.2	3.4	2.9	2.8	2.8	2.7	2.9	2.8
11	2.7	2.6	2.7	2.7	3.2	3.2	2.8	2.6	2.7	2.5	3.0	2.7
12	2.4	2.4	2.6	2.3	2.9	3.0	2.5	2.2	2.3	2.3	2.9	2.5
13	2.3	2.0	2.4	2.2	2.9	3.0	2.3	2.0	2.1	2.1	2.9	2.3
14	2.3	2.1	2.3	2.2	2.9	3.1	2.4	2.0	2.3	2.3	2.9	2.4
15	2.4	2.2	2.3	2.3	3.0	3.1	2.5	2.1	2.4	2.3	2.9	2.4
16	2.6	2.4	2.5	2.6	3.1	3.4	2.8	2.3	2.5	2.5	3.1	2.6
17	4.4	2.9	4.6	4.9	4.7	4.5	4.7	4.8	4.7	4.0	4.5	4.4
18	4.8	3.5	5.0	5.1	5.1	4.8	5.0	5.1	5.0	4.5	4.7	4.8
19	5.4	5.5	5.5	5.7	5.3	5.2	5.5	5.6	5.6	5.7	5.2	5.4
20	5.8	5.8	5.9	6.1	5.6	5.5	5.7	6.0	6.0	6.2	5.6	5.8
21	6.0	5.8	5.9	6.1	5.6	5.6	5.8	6.1	6.0	6.1	5.6	5.9
22	6.1	5.8	6.0	6.1	5.6	5.6	5.8	6.2	6.0	6.1	5.7	6.0
23	6.1	5.8	6.0	6.1	5.6	5.7	5.8	6.1	6.0	6.2	5.8	6.0
24	6.1	5.8	6.0	6.0	5.7	5.8	5.8	6.0	6.1	6.3	5.7	6.0
All	4.7	4.5	4.6	4.7	4.6	4.7	4.6	4.6	4.7	4.6	4.6	4.7

Table 3-104: Average seasonal hourly stability for ORNL Tower "D" for 1998-2012, 2013 to 2022 individually, and for the 25-year average during Fall (September, October, November) (Stability "A"=1, "G=7)

Year / Hour	2018	2019	2020	2021	2022	5-Year
1	4.9	4.7	4.7	4.8	5.0	4.8
2	4.9	4.7	4.7	4.8	5.1	4.8
3	4.9	4.7	4.8	4.7	5.0	4.8
4	4.9	4.7	4.8	4.7	5.0	4.8
5	4.9	4.7	4.8	4.8	5.1	4.8
6	4.9	4.6	4.9	4.7	5.1	4.8
7	4.8	4.5	4.7	4.6	4.9	4.7
8	3.2	2.8	3.4	3.3	3.4	3.2
9	2.6	2.1	2.3	2.3	2.4	2.3
10	2.2	1.7	1.9	1.8	1.8	1.9
11	1.9	1.6	1.6	1.5	1.6	1.6
12	1.9	1.5	1.5	1.5	1.6	1.6
13	1.8	1.5	1.5	1.4	1.6	1.5
14	1.8	1.5	1.5	1.4	1.6	1.5
15	1.9	1.5	1.6	1.5	1.6	1.6
16	2.0	1.6	1.6	1.6	1.8	1.7
17	2.3	1.9	2.0	1.9	2.0	2.0
18	2.9	2.7	2.4	2.4	2.8	2.6
19	3.5	3.2	3.3	3.2	8.6	4.4
20	4.3	4.1	4.0	3.9	4.2	4.1
21	4.9	4.6	4.8	4.6	4.9	4.8
22	4.9	4.7	4.9	4.9	5.1	4.9
23	5.0	4.7	4.8	5.0	5.1	4.9
24	4.9	4.7	4.8	5.0	5.1	4.9
All	3.6	3.3	3.4	3.3	3.8	3.5

Table 3-105: Average annual hourly stability for ORNL Tower "F" for 2018 to 2022 with the 5-year average (Stability "A"=1, "G=7)

Year	2018	2019	2020	2021	2022	5-Year
Hour	5.1	4.7	4.7	4.7	4.8	4.8
2	5.0	4.6	4.7	4.6	4.7	4.7
3	4.9	4.6	4.7	4.7	4.7	4.7
4	5.0	4.7	4.8	4.8	4.7	4.8
5	5.0	4.6	4.9	4.7	4.8	4.8
6	4.9	4.6	4.9	4.6	4.9	4.8
7	4.7	4.3	4.7	4.4	4.2	4.5
8	3.7	2.8	3.3	3.1	3.3	3.2
9	3.1	2.5	2.7	2.6	2.7	2.7
10	2.6	2.1	2.2	2.1	2.0	2.2
11	2.2	1.9	1.8	1.8	1.7	1.9
12	2.1	1.8	1.7	1.6	1.6	1.8
13	1.9	1.7	1.7	1.6	1.7	1.7
14	2.1	1.7	1.7	1.6	1.6	1.7
15	2.2	1.8	1.8	1.6	1.7	1.8
16	2.4	2.0	2.0	1.9	1.8	2.0
17	3.3	2.9	3.0	2.7	2.0	2.8
18	4.6	4.4	3.7	3.9	3.4	4.0
19	5.0	4.6	4.8	4.6	4.2	4.6
20	5.1	4.6	4.8	4.5	4.1	4.6
21	5.1	4.5	4.9	4.6	4.7	4.8
22	4.9	4.6	4.8	4.6	4.8	4.7
23	5.1	4.6	4.9	4.7	4.7	4.8
24	5.1	4.6	4.8	4.8	4.7	4.8
All	4.0	3.6	3.7	3.5	3.5	3.6

Table 3-106: Average seasonal hourly stability for ORNL Tower "F" for 2018 to 2022 during Winter (December, January, February) with the 5-year average (Stability "A"=1, "G=7)

Year	2018	2019	2020	2021	2022	5-Year
Hour	4.9	4.9	4.6	4.7	4.8	4.8
2	4.9	4.9	4.7	4.8	4.9	4.8
3	5.1	4.7	4.7	4.7	4.8	4.8
4	5.1	4.6	4.8	4.7	4.9	4.8
5	5.0	4.7	4.7	4.9	4.7	4.8
6	5.0	4.7	4.7	4.8	4.7	4.8
7	4.8	4.5	4.5	4.6	4.8	4.6
8	3.2	2.8	3.4	3.7	3.2	3.3
9	2.6	2.2	2.3	2.4	2.0	2.3
10	2.3	1.6	1.9	1.8	1.4	1.8
11	2.0	1.6	1.7	1.5	1.5	1.7
12	2.1	1.5	1.5	1.5	1.6	1.6
13	1.9	1.6	1.5	1.5	1.4	1.6
14	2.0	1.6	1.6	1.5	1.5	1.6
15	2.2	1.7	1.7	1.6	1.5	1.7
16	2.3	1.7	1.7	1.6	1.5	1.8
17	2.4	1.8	1.8	1.7	1.6	1.9
18	2.6	2.3	2.1	2.0	1.7	2.1
19	3.0	2.5	2.2	2.4	1.9	2.4
20	4.6	4.3	3.6	3.7	3.5	3.9
21	4.9	4.7	4.4	4.6	4.4	4.6
22	5.0	4.8	4.5	4.8	5.0	4.8
23	5.1	4.8	4.6	4.9	5.0	4.9
24	4.9	4.9	4.5	5.0	5.0	4.9
All	3.7	3.3	3.2	3.3	3.2	3.3

Table 3-107: Average seasonal hourly stability for ORNL Tower "F" for 2018 to 2022 during Spring (March, April, May) with the 5-year average *(Stability "A"=1, "G=7)*

Year	2018	2019	2020	2021	2022	5-Year
Hour	4.8	4.6	4.8	4.9	5.0	4.8
2	4.8	4.6	4.8	4.7	5.1	4.8
3	4.8	4.4	4.8	4.6	5.1	4.7
4	4.7	4.5	4.9	4.7	5.2	4.8
5	4.8	4.5	4.8	4.7	5.1	4.8
6	4.8	4.5	5.0	4.7	5.1	4.8
7	4.8	4.5	4.6	4.7	5.1	4.7
8	2.8	2.6	3.0	3.0	3.5	3.0
9	2.0	1.8	1.8	1.9	2.5	2.0
10	1.8	1.6	1.5	1.5	2.0	1.7
11	1.7	1.4	1.3	1.4	1.6	1.5
12	1.6	1.4	1.2	1.4	1.7	1.5
13	1.6	1.3	1.2	1.3	1.6	1.4
14	1.5	1.3	1.2	1.2	1.6	1.4
15	1.5	1.3	1.3	1.3	1.4	1.4
16	1.5	1.4	1.3	1.4	1.7	1.5
17	1.6	1.4	1.4	1.5	1.7	1.5
18	1.7	1.6	1.6	1.5	1.9	1.7
19	2.1	1.7	1.9	1.6	2.3	1.9
20	2.8	2.6	2.3	2.3	3.5	2.7
21	4.7	4.5	4.3	4.2	5.1	4.6
22	4.8	4.6	4.9	4.9	5.4	4.9
23	4.9	4.6	4.6	4.9	5.3	4.9
24	4.9	4.9	4.5	5.0	5.0	4.8
All	3.2	3.0	3.1	3.1	3.5	3.2

Table 3-108: Average seasonal hourly stability for ORNL Tower "F" for 2018 to 2022 during Summer (June, July, August) with the 5-year average (Stability "A"=1, "G=7)

Year	2018	2019	2020	2021	2022	5-Year
Hour	4.8	4.7	4.8	4.8	5.2	4.9
2	4.8	4.8	4.7	5.0	5.6	5.0
3	4.8	4.9	4.8	4.8	5.5	5.0
4	4.8	4.8	4.8	4.7	5.3	4.9
5	4.8	4.8	4.9	4.8	5.6	5.0
6	4.9	4.7	4.9	4.7	5.5	4.9
7	4.7	4.7	4.8	4.7	5.5	4.9
8	3.1	3.1	3.8	3.4	3.6	3.4
9	2.5	2.0	2.5	2.3	2.2	2.3
10	2.0	1.6	1.8	1.7	1.9	1.8
11	1.7	1.4	1.5	1.4	1.7	1.5
12	1.6	1.2	1.5	1.3	1.6	1.4
13	1.6	1.3	1.4	1.3	1.6	1.4
14	1.6	1.2	1.4	1.3	1.7	1.4
15	1.6	1.3	1.4	1.3	1.9	1.5
16	1.7	1.4	1.4	1.4	2.2	1.6
17	2.0	1.6	1.6	1.6	2.5	1.9
18	2.8	2.5	2.2	2.1	4.1	2.7
19	4.0	4.0	4.4	4.2	5.2	4.4
20	4.5	4.9	5.4	5.1	5.5	5.1
21	4.7	4.8	5.5	5.1	5.4	5.1
22	4.8	4.8	5.3	5.1	5.3	5.1
23	4.7	4.8	5.0	5.3	5.4	5.0
24	4.8	4.8	4.9	5.3	5.4	5.0
All	3.5	3.3	3.5	3.4	4.0	3.6

Table 3-109: Average seasonal hourly stability for ORNL Tower "F" for 2018 to 2022 during Fall (September, October, November) with the 5-year average (Stability "A"=1, "G=7)

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	14-Year
1	5.3	5.4	5.9	5.8	5.9	5.9	5.9	5.3	5.6	5.5
2	5.3	5.4	5.8	5.9	6.0	5.9	5.9	5.3	5.6	5.5
3	5.3	5.5	5.7	5.8	5.9	5.9	5.9	5.2	5.5	5.5
4	5.2	5.4	5.7	5.8	5.9	5.8	5.9	5.2	5.5	5.4
5	5.2	5.4	5.6	5.8	5.9	5.8	5.8	5.2	5.4	5.4
6	5.2	5.3	5.6	5.8	5.9	5.8	5.8	5.2	5.3	5.4
7	5.1	5.3	5.6	5.8	5.9	5.8	5.8	5.2	5.3	5.4
8	4.2	4.8	4.4	4.5	4.5	4.8	4.4	4.3	4.8	4.4
9	3.4	3.6	3.5	3.7	3.5	3.6	3.5	3.5	3.8	3.5
10	2.9	2.9	2.9	2.9	2.8	3.0	3.0	8.5	3.2	3.3
11	2.8	2.6	2.5	2.6	2.5	2.7	2.7	2.6	2.7	2.7
12	2.5	2.4	2.2	2.3	2.3	2.4	2.5	2.3	2.6	2.4
13	2.4	2.2	2.3	2.3	2.2	2.3	2.4	2.2	2.4	2.3
14	2.4	2.2	2.3	2.3	2.2	2.3	2.4	2.3	2.3	2.3
15	2.5	2.4	2.3	2.3	2.3	2.4	2.5	2.3	2.5	2.4
16	2.7	2.6	2.4	2.5	2.5	2.5	2.7	2.4	2.5	2.6
17	3.9	3.7	4.1	4.0	4.0	3.9	4.0	4.1	3.1	3.9
18	4.2	4.4	4.7	4.7	4.5	4.5	4.6	4.7	4.6	4.4
19	4.6	4.9	5.2	4.9	4.7	4.9	4.9	4.9	5.0	4.8
20	4.9	5.2	5.6	5.2	5.1	5.1	5.2	5.3	5.4	5.1
21	5.2	5.7	5.9	5.5	5.4	5.6	5.6	5.5	5.7	5.4
22	5.3	5.8	6.1	5.7	5.7	5.7	5.9	5.6	5.8	5.6
23	5.4	5.7	6.0	5.8	5.9	5.8	6.0	5.4	5.8	5.6
24	5.3	5.6	5.9	5.8	5.9	5.9	6.0	5.4	5.7	5.6
All	4.2	4.3	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4

Table 3-110: Average annual hourly stability for ETTP Tower "L" for 2007-2012, 2013 to 2020 individually, and for the 14-year average (Stability "A"=1, "G=7)

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	14-Year
1	5.6	5.6	5.8	5.8	5.6	5.8	5.7	5.4	5.4	5.6
2	5.6	5.5	5.8	5.8	5.6	5.8	5.7	5.3	5.3	5.6
3	5.6	5.6	5.7	5.7	5.5	5.8	5.7	5.2	5.2	5.6
4	5.6	5.5	5.8	5.7	5.5	5.7	5.7	5.2	5.2	5.6
5	5.5	5.5	5.7	5.7	5.4	5.7	5.6	5.2	5.1	5.5
6	5.6	5.3	5.6	5.6	5.5	5.6	5.7	5.1	5.1	5.5
7	5.5	5.3	5.6	5.8	5.5	5.6	5.7	5.1	5.0	5.5
8	4.4	5.3	4.0	4.0	4.0	5.5	4.0	4.0	4.0	4.4
9	3.8	3.9	3.9	3.9	3.9	4.0	4.0	3.9	3.9	3.9
10	3.2	3.4	3.1	3.2	3.3	3.8	3.5	3.4	3.2	3.3
11	3.0	3.1	3.0	2.9	3.2	3.4	3.2	3.2	3.0	3.1
12	2.9	3.0	2.7	2.8	3.1	3.2	3.1	3.1	3.1	3.0
13	2.9	2.9	2.7	3.0	3.1	3.1	3.1	3.1	3.0	3.0
14	2.9	3.0	2.7	3.0	3.0	3.1	3.1	3.2	3.0	3.0
15	3.1	3.1	2.8	3.0	3.2	3.1	3.2	3.2	3.2	3.1
16	3.2	3.2	3.1	3.3	3.2	3.2	3.3	3.3	3.2	3.2
17	4.3	3.7	4.3	4.0	4.2	3.4	4.2	4.4	3.8	4.1
18	4.6	4.6	4.9	4.8	4.6	4.1	4.9	5.0	4.7	4.7
19	5.0	5.1	5.4	5.0	4.9	4.7	5.2	5.3	5.1	5.1
20	5.2	5.6	5.8	5.3	5.2	4.9	5.6	5.5	5.5	5.3
21	5.4	5.7	5.8	5.5	5.4	6.1	5.7	5.6	5.6	5.6
22	5.5	5.6	5.8	5.6	5.4	5.4	5.7	5.5	5.6	5.5
23	5.5	5.6	5.8	5.7	5.5	5.6	5.8	5.3	5.5	5.6
24	5.6	5.6	5.8	5.7	5.5	5.6	5.8	5.4	5.4	5.6
All	4.6	4.6	4.7	4.6	4.6	4.7	4.7	4.5	4.5	4.6

Table 3-111: Average seasonal hourly stability for ETTP Tower "L" for 2007-2012, 2013 to 2020 individually, and for the 14-year average during Winter (December, January, February) *(Stability "A"=1, "G=7)*

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	14-Year
1	5.8	5.4	6.0	5.6	5.6	5.8	5.8	5.7	5.4	5.7
2	5.9	5.5	6.0	5.9	5.9	6.0	5.9	5.6	5.4	5.8
3	5.9	5.6	5.9	5.9	5.9	6.0	5.9	5.5	5.4	5.8
4	5.9	5.5	5.8	5.9	5.9	5.9	5.9	5.4	5.3	5.8
5	5.9	5.5	5.7	5.9	6.0	5.9	6.0	5.4	5.3	5.8
6	5.8	5.5	5.7	5.9	6.0	5.9	6.0	5.4	5.2	5.7
7	5.8	5.4	5.7	5.9	6.0	5.9	5.9	5.4	5.2	5.7
8	4.0	4.6	4.8	5.0	5.1	5.0	5.1	4.7	5.0	4.5
9	3.1	3.8	3.8	3.8	3.7	3.7	3.8	3.8	3.9	3.5
10	2.7	2.8	2.8	2.9	2.7	3.0	3.0	2.8	3.3	2.8
11	2.4	2.7	2.5	2.6	2.6	2.7	2.9	2.6	2.8	2.6
12	2.2	2.3	2.1	2.2	2.4	2.4	2.6	2.3	2.5	2.3
13	2.2	2.2	2.1	2.2	2.2	2.2	2.4	2.1	2.3	2.2
14	2.2	2.1	2.1	2.1	2.1	2.2	2.4	2.1	2.3	2.2
15	2.3	2.2	2.2	2.1	2.3	2.2	2.5	2.3	2.3	2.3
16	2.5	2.4	2.3	2.2	2.3	2.3	2.6	2.4	2.5	2.4
17	3.9	2.6	3.2	3.2	3.2	3.4	3.3	3.3	2.8	3.5
18	4.0	4.0	4.3	4.6	4.3	4.3	4.2	4.3	4.3	4.2
19	4.3	4.3	4.5	4.6	4.4	4.5	4.4	4.5	4.4	4.4
20	4.7	4.1	5.0	4.8	4.6	4.6	4.6	4.8	4.6	4.7
21	5.1	5.1	5.6	5.1	4.9	5.0	5.0	5.4	4.9	5.1
22	5.5	5.6	6.1	5.5	5.5	5.4	5.6	5.9	5.5	5.6
23	5.7	5.8	6.1	5.6	5.7	5.7	5.8	5.7	5.8	5.7
24	5.8	5.6	6.1	5.8	5.8	5.8	5.9	5.7	5.7	5.8
All	4.3	4.2	4.4	4.4	4.4	4.4	4.5	4.3	4.3	4.3

Table 3-112: Average seasonal hourly stability for ETTP Tower "L" for 2007-2012, 2013 to 2020 individually, and for the 14-year average during Spring (March, April, May) *(Stability "A"=1, "G=7)*

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	14-Year
1	5.9	5.2	5.8	5.8	5.9	5.9	6.2	5.0	5.5	5.8
2	5.9	5.2	5.5	5.8	5.9	5.9	6.3	5.0	5.7	5.8
3	5.8	5.2	5.5	5.8	5.9	5.9	6.1	5.0	5.7	5.7
4	5.8	5.1	5.4	5.8	5.8	5.7	6.1	5.0	5.7	5.7
5	5.8	5.1	5.4	5.7	5.8	5.7	6.1	5.0	5.7	5.7
6	5.8	5.0	5.4	5.7	5.9	5.7	6.0	5.0	5.6	5.7
7	5.7	5.0	5.4	5.7	5.9	5.7	6.0	5.0	5.6	5.6
8	4.1	4.0	4.0	4.0	4.0	4.0	4.0	3.9	5.0	4.1
9	2.8	2.9	2.5	3.0	2.5	2.9	2.5	2.7	3.6	2.8
10	2.4	2.5	2.5	2.4	2.4	2.4	2.3	25.0	3.1	4.1
11	2.1	2.1	1.8	2.3	1.9	1.9	1.9	1.9	2.4	2.1
12	1.7	2.0	1.7	1.9	1.5	1.6	1.8	1.8	2.1	1.8
13	1.6	1.7	1.8	1.8	1.5	1.6	1.6	1.7	2.1	1.7
14	1.6	1.7	1.8	1.8	1.6	1.7	1.6	1.7	1.8	1.7
15	1.7	2.1	1.7	2.0	1.7	1.9	1.8	1.8	1.8	1.8
16	1.9	2.2	1.9	2.1	2.1	2.0	2.1	1.8	1.7	2.0
17	3.9	4.3	4.6	4.5	4.5	4.7	4.5	4.5	2.7	4.1
18	4.0	4.4	4.7	4.6	4.5	4.8	4.4	4.6	4.6	4.3
19	4.1	4.4	5.1	4.7	4.6	4.8	4.5	4.6	4.8	4.4
20	4.7	4.9	5.5	4.9	4.8	5.0	4.9	4.9	5.1	4.9
21	5.4	5.8	5.9	5.3	5.4	5.4	5.8	5.0	5.7	5.5
22	5.7	5.8	6.2	5.8	5.7	5.8	6.2	5.3	5.9	5.8
23	5.8	5.6	6.0	5.8	5.9	5.9	6.3	5.1	5.9	5.8
24	5.8	5.4	5.8	5.8	5.9	6.0	6.3	5.1	5.9	5.8
All	4.2	4.1	4.2	4.3	4.2	4.3	4.4	4.9	4.3	4.3

Table 3-113: Average seasonal hourly stability for ETTP Tower "L" for 2007-2012, 2013 to 2020 individually, and for the 14-year average during Summer (June, July, August) *(Stability "A"=1, "G=7)*

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	14-Year
1	6.0	5.3	5.8	5.9	6.3	5.9	6.0	5.0	5.9	5.9
2	6.0	5.5	5.7	6.0	6.4	6.0	5.8	5.1	5.8	5.9
3	6.0	5.5	5.6	5.9	6.4	6.0	5.7	5.2	5.8	5.9
4	6.0	5.5	5.6	5.9	6.3	5.9	5.7	5.1	5.7	5.8
5	5.9	5.4	5.6	5.9	6.2	5.9	5.6	5.1	5.5	5.8
6	5.9	5.4	5.6	5.9	6.2	5.9	5.6	5.1	5.4	5.8
7	5.9	5.3	5.5	5.9	6.1	5.9	5.5	5.1	5.4	5.7
8	4.5	5.4	4.6	4.8	4.7	4.7	4.4	4.4	5.2	4.7
9	3.7	3.9	3.9	3.9	3.8	3.8	3.8	3.5	3.9	3.8
10	2.7	2.7	3.0	3.0	2.8	2.9	3.1	2.8	3.3	2.8
11	2.6	2.5	2.7	2.6	2.4	2.6	2.7	2.5	2.7	2.6
12	2.3	2.2	2.4	2.4	2.1	2.2	2.5	2.1	2.5	2.3
13	2.2	2.1	2.4	2.1	1.9	2.1	2.4	2.0	2.2	2.2
14	2.3	2.0	2.4	2.1	1.9	2.0	2.5	2.0	2.2	2.2
15	2.4	2.1	2.4	2.1	2.1	2.2	2.6	2.0	2.5	2.3
16	2.6	2.4	2.4	2.5	2.3	2.3	2.9	2.2	2.5	2.5
17	4.2	4.1	4.1	4.3	3.9	4.0	4.1	4.2	3.0	4.1
18	4.4	4.4	4.8	4.9	4.6	4.8	4.7	4.7	4.7	4.6
19	5.0	5.6	5.6	5.2	4.9	5.6	5.3	5.3	5.5	5.2
20	5.5	6.1	6.2	5.6	5.7	6.0	5.8	6.0	6.2	5.8
21	5.8	6.0	6.1	5.9	6.0	6.0	6.0	5.8	6.4	5.9
22	6.0	6.0	6.1	6.0	6.2	6.1	5.9	5.5	6.1	6.0
23	6.0	5.8	6.0	6.0	6.4	6.1	5.9	5.3	5.9	6.0
24	6.0	5.6	6.0	5.9	6.4	6.0	5.9	5.2	5.9	5.9
All	4.6	4.5	4.6	4.6	4.7	4.6	4.6	4.2	4.6	4.6

Table 3-114: Average seasonal hourly stability for ETTP Tower "L" for 2007-2012, 2013 to 2020 individually, and for the 14-year average during Fall (September, October, November) (Stability "A"=1, "G=7)

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	15-Year
1	5.3	5.4	5.5	5.4	5.4	5.5	5.5	5.6	5.5	5.4	5.4
2	5.3	5.5	5.5	5.6	5.6	5.5	5.6	5.6	5.5	5.5	5.4
3	5.3	5.4	5.5	5.6	5.6	5.6	5.5	5.5	5.5	5.6	5.4
4	5.2	5.4	5.5	5.6	5.6	5.5	5.5	5.6	5.5	5.5	5.4
5	5.2	5.4	5.4	5.6	5.6	5.5	5.5	5.6	5.5	5.4	5.4
6	5.2	5.4	5.5	5.5	5.6	5.5	5.4	5.5	5.4	5.4	5.4
7	5.1	5.4	5.4	5.5	5.6	5.5	5.4	5.5	5.4	5.3	5.3
8	4.2	4.8	4.5	4.5	4.8	4.4	4.1	4.1	4.1	4.3	4.3
9	3.4	3.8	3.7	3.7	3.6	3.6	3.5	3.5	3.5	3.6	3.5
10	2.9	3.0	3.0	3.1	3.1	3.1	3.0	2.9	2.9	3.1	3.0
11	2.8	2.8	2.7	2.8	2.7	2.8	2.7	2.6	2.6	2.8	2.7
12	2.5	2.5	2.4	2.5	2.4	2.4	2.4	2.3	2.3	2.5	2.4
13	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.4	2.3
14	2.4	2.3	2.3	2.2	2.1	2.2	2.2	2.2	2.2	2.3	2.3
15	2.5	2.4	2.3	2.3	2.2	2.2	2.3	2.2	2.3	2.4	2.4
16	2.7	2.5	2.5	2.5	2.4	2.4	2.5	2.4	2.4	2.5	2.5
17	3.9	2.8	3.8	3.8	3.4	4.1	4.4	4.3	4.3	4.0	3.9
18	4.2	3.1	4.5	4.6	4.5	4.5	4.8	4.7	4.6	4.6	4.3
19	4.6	4.1	4.7	4.8	4.8	4.8	5.0	4.9	4.9	5.0	4.7
20	4.9	4.6	5.0	5.1	5.1	5.1	5.2	5.2	5.1	5.2	5.0
21	5.2	5.4	5.3	5.4	5.4	5.4	5.5	5.5	5.4	5.4	5.3
22	5.3	5.4	5.5	5.5	5.5	5.5	5.5	5.6	5.5	5.5	5.4
23	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.6	5.5	5.6	5.5
24	5.3	5.4	5.5	5.5	5.5	5.5	5.5	5.6	5.6	5.5	5.4
All	4.2	4.2	4.3	4.4	4.3	4.3	4.4	4.4	4.3	4.4	4.3

Table 3-115: Average annual hourly stability for Y-12 Tower "W" for 2007-2012, 2013 to 2021 individually, and for the 15-year average (Stability "A"=1, "G=7)

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	15-Year
1	5.2	5.1	5.2	5.3	5.1	5.3	5.3	5.2	5.2	4.8	5.2
2	5.2	5.1	5.2	5.4	5.0	5.3	5.3	5.2	5.3	4.8	5.2
3	5.2	5.1	5.3	5.4	5.1	5.3	5.2	5.2	5.3	4.8	5.2
4	5.1	5.1	5.2	5.3	5.1	5.3	5.3	5.2	5.3	4.7	5.1
5	5.1	5.2	5.2	5.3	5.1	5.3	5.3	5.3	5.3	4.7	5.2
6	5.1	5.2	5.2	5.3	5.1	5.2	5.2	5.3	5.3	4.7	5.1
7	5.0	5.1	5.2	5.3	5.2	5.2	5.1	5.2	5.3	4.6	5.1
8	4.3	5.1	4.0	4.0	5.1	5.2	4.0	4.0	4.0	4.0	4.3
9	3.9	3.9	3.9	4.0	4.0	4.0	3.9	3.9	3.9	4.0	3.9
10	3.3	3.4	3.3	3.3	3.9	3.9	3.4	3.3	3.2	3.7	3.4
11	3.2	3.1	3.1	3.1	3.3	3.4	3.2	3.2	3.1	3.5	3.2
12	3.1	3.0	2.8	2.9	3.2	3.2	2.9	3.0	3.0	3.4	3.1
13	3.0	2.9	2.8	2.9	3.0	3.0	2.9	3.0	2.9	3.4	3.0
14	3.0	3.0	2.8	2.9	3.0	3.0	2.9	3.0	2.9	3.3	3.0
15	3.2	3.1	2.9	3.0	3.0	3.0	3.1	3.1	3.0	3.4	3.1
16	3.4	3.3	3.2	3.3	3.1	3.0	3.2	3.1	3.2	3.4	3.3
17	4.2	3.7	4.1	4.1	3.0	3.4	4.3	4.3	4.3	4.5	4.1
18	4.6	4.1	4.5	4.7	4.1	4.1	4.8	4.8	4.7	4.7	4.5
19	5.0	4.7	4.8	4.9	4.7	4.6	5.1	5.0	5.0	4.9	4.9
20	5.1	5.0	5.0	5.1	4.9	4.8	5.2	5.1	5.2	4.9	5.1
21	5.2	5.1	5.1	5.3	5.1	5.1	5.3	5.2	5.3	4.9	5.2
22	5.2	5.1	5.1	5.3	5.1	5.1	5.2	5.1	5.3	4.9	5.2
23	5.2	5.1	5.1	5.3	5.1	5.2	5.2	5.2	5.2	4.9	5.2
24	5.2	5.1	5.2	5.4	5.1	5.2	5.3	5.2	5.3	4.8	5.2
All	4.4	4.4	4.3	4.5	4.4	4.4	4.4	4.4	4.4	4.3	4.4

Table 3-116: Average seasonal hourly stability for Y-12 Tower "W" for 2007-2012, 2013 to 2021 individually, and for the 15-year average during Winter (December, January, February) (Stability "A"=1, "G=7)

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	15-Year
1	5.4	5.0	5.1	5.1	5.2	5.3	5.2	5.4	5.4	5.2	5.3
2	5.5	5.4	5.5	5.5	5.6	5.4	5.3	5.6	5.4	5.7	5.5
3	5.4	5.4	5.5	5.5	5.6	5.5	5.3	5.5	5.5	5.7	5.5
4	5.4	5.4	5.5	5.5	5.6	5.4	5.4	5.6	5.5	5.7	5.5
5	5.3	5.5	5.5	5.6	5.7	5.5	5.3	5.7	5.4	5.6	5.4
6	5.3	5.4	5.5	5.6	5.6	5.5	5.4	5.6	5.4	5.6	5.4
7	5.2	5.4	5.4	5.5	5.6	5.5	5.3	5.6	5.4	5.7	5.4
8	4.0	4.8	4.8	4.8	4.9	4.5	4.4	4.5	4.4	4.4	4.4
9	3.3	3.8	3.9	3.8	3.7	3.6	3.6	3.6	3.6	3.3	3.5
10	3.0	3.0	2.8	3.0	2.8	2.9	3.3	3.1	3.0	2.8	3.0
11	2.7	2.9	2.8	2.9	2.7	2.7	2.8	2.9	2.6	2.5	2.7
12	2.4	2.4	2.3	2.4	2.3	2.4	2.5	2.6	2.3	2.1	2.4
13	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.5	2.2	2.1	2.3
14	2.2	2.2	2.1	2.1	2.0	2.2	2.2	2.5	2.1	2.0	2.2
15	2.4	2.3	2.1	2.1	2.1	2.1	2.3	2.5	2.2	2.1	2.3
16	2.6	2.3	2.3	2.3	2.2	2.3	2.5	2.6	2.3	2.3	2.4
17	3.7	2.6	3.1	3.2	3.2	3.8	3.8	3.6	3.8	3.7	3.5
18	3.9	2.9	4.3	4.4	4.4	4.3	4.4	4.4	4.4	4.4	4.1
19	4.3	3.7	4.4	4.6	4.5	4.5	4.5	4.5	4.6	4.6	4.4
20	4.7	4.1	4.5	4.8	4.7	4.7	4.8	4.9	4.8	4.9	4.7
21	5.1	5.1	5.0	5.1	5.1	5.1	5.1	5.4	5.2	5.4	5.1
22	5.3	5.3	5.3	5.4	5.4	5.4	5.2	5.5	5.4	5.4	5.3
23	5.4	5.4	5.4	5.5	5.4	5.5	5.3	5.5	5.5	5.6	5.4
24	5.4	5.3	5.5	5.4	5.5	5.4	5.3	5.6	5.5	5.7	5.4
All	4.2	4.1	4.2	4.3	4.3	4.2	4.2	4.4	4.2	4.3	4.2

Table 3-117: Average seasonal hourly stability for Y-12 Tower "W" for 2007-2012, 2013 to 2021 individually, and for the 15-year average during Spring (March, April, May) (Stability "A"=1, "G=7)

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	15-Year
1	5.1	5.7	5.8	5.7	5.7	5.8	5.8	5.7	5.7	5.8	5.5
2	5.1	5.7	5.8	5.7	5.7	5.7	5.8	5.6	5.7	5.8	5.5
3	5.1	5.6	5.7	5.7	5.8	5.7	5.7	5.6	5.7	5.8	5.5
4	5.1	5.7	5.6	5.8	5.8	5.7	5.6	5.6	5.7	5.7	5.5
5	5.1	5.5	5.6	5.6	5.8	5.6	5.6	5.5	5.7	5.7	5.4
6	5.0	5.5	5.7	5.5	5.8	5.7	5.5	5.5	5.6	5.6	5.4
7	5.0	5.4	5.6	5.6	5.7	5.6	5.5	5.4	5.6	5.6	5.3
8	4.1	4.0	4.5	4.5	4.5	4.0	4.0	4.0	3.8	4.4	4.2
9	2.8	3.0	3.2	3.2	3.0	2.9	2.8	2.8	2.6	3.1	2.9
10	2.6	2.7	2.8	2.7	2.6	2.5	2.4	2.4	2.5	2.6	2.6
11	2.4	2.3	2.2	2.4	2.3	2.1	1.9	1.9	2.0	2.2	2.2
12	1.9	2.0	2.1	2.2	2.0	1.7	1.7	1.7	1.6	1.8	1.9
13	1.8	1.9	1.8	1.9	1.6	1.6	1.5	1.6	1.5	1.5	1.7
14	1.8	1.8	1.9	1.7	1.6	1.6	1.6	1.7	1.5	1.5	1.7
15	2.0	2.0	1.9	1.8	1.6	1.7	1.6	1.5	1.8	1.6	1.8
16	2.2	2.2	1.9	1.9	1.9	1.8	1.7	1.7	1.7	1.7	2.0
17	3.6	2.2	3.7	3.5	3.7	4.6	4.8	4.6	4.6	3.9	3.8
18	3.8	2.5	4.7	4.6	4.6	4.7	4.8	4.8	4.7	4.8	4.2
19	3.9	2.8	4.8	4.8	4.8	4.9	4.8	4.9	4.7	4.9	4.3
20	4.5	3.5	5.1	5.2	5.1	5.3	5.0	5.1	4.9	5.2	4.8
21	4.9	5.6	5.4	5.4	5.5	5.6	5.6	5.5	5.5	5.6	5.3
22	5.1	5.7	5.7	5.8	5.6	5.8	5.7	5.8	5.5	5.7	5.5
23	5.2	5.6	5.8	5.7	5.7	5.7	5.7	5.8	5.7	5.8	5.5
24	5.1	5.7	5.8	5.7	5.8	5.8	5.8	5.7	5.7	5.8	5.5
All	3.9	3.9	4.3	4.3	4.3	4.3	4.2	4.2	4.2	4.3	4.1

Table 3-118: Average seasonal hourly stability for Y-12 Tower "W" for 2007-2012, 2013 to 2021 individually, and for the 15-year average during Summer (June, July, August) *(Stability "A"=1, "G=7)*

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	15-Year
1	5.5	5.7	5.7	5.5	5.6	5.7	5.7	5.9	5.6	5.6	5.6
2	5.5	5.6	5.4	5.6	5.9	5.7	5.8	5.9	5.6	5.8	5.6
3	5.5	5.6	5.5	5.6	5.9	5.7	5.7	5.8	5.6	5.9	5.6
4	5.4	5.5	5.5	5.6	5.9	5.7	5.7	5.8	5.6	5.7	5.6
5	5.3	5.5	5.4	5.7	5.9	5.7	5.7	5.7	5.5	5.6	5.5
6	5.3	5.5	5.4	5.7	5.9	5.6	5.6	5.7	5.4	5.6	5.5
7	5.2	5.5	5.4	5.6	5.8	5.5	5.6	5.7	5.3	5.4	5.4
8	4.4	5.4	4.5	4.7	4.6	4.0	4.0	4.0	4.0	4.5	4.4
9	3.8	4.3	3.9	3.8	3.6	3.8	3.8	3.5	3.7	3.9	3.8
10	2.9	2.8	3.2	3.2	2.9	3.0	3.0	2.8	2.9	3.1	3.0
11	2.7	2.7	2.8	2.8	2.6	2.8	2.8	2.5	2.8	2.8	2.7
12	2.6	2.4	2.5	2.4	2.0	2.2	2.4	1.9	2.2	2.6	2.4
13	2.4	2.1	2.4	2.2	2.0	1.9	2.0	1.7	1.9	2.4	2.2
14	2.4	2.2	2.5	2.2	1.9	1.9	2.1	1.7	2.1	2.4	2.2
15	2.6	2.1	2.4	2.2	2.1	2.1	2.3	1.8	2.1	2.5	2.3
16	2.8	2.3	2.6	2.5	2.2	2.3	2.6	2.0	2.4	2.6	2.6
17	4.0	2.5	4.1	4.2	3.8	4.7	4.7	4.7	4.6	4.0	4.1
18	4.4	3.0	4.6	4.8	4.7	4.7	5.0	4.9	4.7	4.6	4.5
19	5.1	5.2	4.8	5.0	5.1	5.3	5.5	5.2	5.2	5.4	5.2
20	5.4	5.6	5.4	5.4	5.7	5.6	5.8	5.7	5.6	5.7	5.5
21	5.6	5.6	5.6	5.6	5.8	5.7	5.8	5.8	5.6	5.8	5.7
22	5.6	5.6	5.7	5.6	5.7	5.7	5.9	5.9	5.6	5.8	5.7
23	5.6	5.6	5.6	5.6	5.6	5.7	5.9	5.9	5.7	5.9	5.7
24	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.8	5.7	5.8	5.7
All	4.4	4.3	4.4	4.5	4.5	4.4	4.5	4.4	4.4	4.6	4.4

Table 3-119: Average seasonal hourly stability for Y-12 Tower "W" for 2007-2012, 2013 to 2021 individually, and for the 15-year average during Fall (September, October, November) (Stability "A"=1, "G=7)

Year / Month	2003-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	20-Year
Jan	430	431	687	550	517	613	598	512	572	482	495	476
Feb	478	496	721	604	707	690	652	611	536	518	534	530
Mar	600	581	839	642	771	833	806	790	609	582	657	644
Apr	688	639	1050	899	1049	1070	868	933	812	764	766	767
May	729	662	1137	1202	1090	1037	1168	1091	872	752	745	828
Jun	791	654	1218	1281	1263	1152	1232	986	848	747	761	880
Jul	768	636	1074	967	1256	1268	1198	1135	772	1051	952	873
Aug	784	908	1001	989	1210	1221	1100	1086	814	939	984	881
Sep	674	821	932	908	1187	1018	1041	1058	630	679	603	760
Oct	538	615	768	625	847	732	722	644	585	553	530	588
Nov	429	667	646	513	614	576	607	554	551	502	477	486
Dec	392	597	547	553	530	572	567	591	517	492	403	450
Annual	608	642	885	811	920	899	880	833	677	672	659	680

Table 3-120: Average monthly and annual mixing depth in meters for ORNL Tower "C/D" for 2003-2012, 2013 to 2022 individually, and for the last 20 years

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	25-Year
1	309	331	399	302	321	475	468	424	391	342	333	337
2	275	335	382	302	309	468	479	414	390	343	339	315
3	267	342	387	313	317	474	473	402	387	347	332	311
4	265	350	381	293	307	459	471	387	372	347	329	307
5	266	347	393	298	307	455	473	383	362	337	326	307
6	269	337	378	299	325	446	457	380	364	319	318	306
7	276	339	398	319	362	435	434	418	360	315	313	313
8	413	358	440	338	481	447	445	538	376	341	338	412
9	549	430	543	408	902	519	490	1067	447	399	435	555
10	717	581	853	726	1363	859	708	1418	642	680	692	771
11	882	743	1203	1137	1603	1209	1158	1539	925	1043	987	991
12	1044	980	1418	1447	1768	1519	1430	1725	1168	1235	1187	1181
13	1151	1153	1537	1534	1942	1650	1672	1813	1287	1341	1271	1298
14	1212	1276	1648	1665	2006	1829	1787	1897	1373	1442	1430	1381
15	1255	1344	1706	1758	2081	1845	1871	1845	1418	1523	1529	1430
16	1282	1356	1779	1820	2119	1926	1887	1695	1397	1542	1494	1450
17	1032	1299	1871	1824	1986	1837	1903	782	1234	1387	1286	1236
18	904	1043	1733	1676	1351	1726	1547	454	911	846	858	1028
19	699	676	1363	1154	564	858	684	406	553	396	396	701
20	497	422	762	628	336	461	443	399	394	339	319	479
21	436	327	456	332	358	435	448	386	378	328	329	413
22	423	314	425	321	319	442	466	409	394	331	328	404
23	402	326	400	309	311	455	457	405	384	330	337	390
24	350	319	382	316	327	446	468	412	374	325	343	359
All	632	639	885	813	919	903	880	833	678	674	660	695

Table 3-121: Average annual mixing depth by hour of day in meters for ORNL Tower "C/D" for 1998-2012, 2013 to 2022 individually, and for the last 25 years

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	25-Year
1	321	380	466	398	442	505	535	531	476	375	347	371
2	316	377	436	365	413	508	535	506	493	373	373	365
3	315	391	413	373	405	518	525	484	465	403	357	362
4	310	387	360	347	413	518	539	492	438	414	356	357
5	315	372	404	351	384	505	527	468	423	391	370	357
6	313	360	393	368	389	447	489	448	389	355	345	347
7	316	363	461	411	380	449	449	422	371	353	339	350
8	435	384	469	421	415	431	426	458	410	389	374	428
9	470	444	555	464	473	496	474	527	462	458	468	475
10	607	531	696	563	587	583	520	566	559	536	575	593
11	666	608	809	761	753	677	598	654	670	653	667	674
12	717	699	931	820	839	805	709	731	737	713	720	739
13	762	761	1002	909	935	884	835	808	798	786	783	797
14	795	822	1058	999	976	987	877	852	837	857	830	841
15	811	878	1097	1008	1019	1009	949	857	840	882	824	861
16	822	843	1133	1015	1051	1040	1022	894	824	815	824	872
17	618	671	1082	859	805	839	922	650	691	522	470	671
18	505	399	755	630	556	645	642	483	443	424	355	516
19	438	371	596	509	472	508	489	451	407	347	332	442
20	407	370	533	438	473	570	469	477	435	361	310	422
21	402	356	507	418	482	517	470	448	470	375	327	416
22	392	348	513	391	413	508	500	502	471	375	356	410
23	363	363	471	382	414	502	488	480	434	394	365	389
24	330	347	445	430	441	489	507	494	454	374	343	371
All	489	493	649	568	580	623	604	570	542	497	475	518

Table 3-122: Average seasonal mixing depth by hour of day in meters for ORNL Tower "C/D" for 1998-2012, 2013 to 2022 individually, and for the last 25 years during Winter (December, January, February)

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	25-Year
1	345	329	504	308	295	581	472	444	461	351	371	372
2	296	342	424	287	299	553	519	437	432	360	365	338
3	258	346	427	303	329	537	492	423	446	339	354	315
4	266	359	487	283	275	501	516	395	428	332	349	317
5	265	351	468	299	311	504	507	399	406	330	331	315
6	274	335	398	298	354	512	512	406	419	338	330	320
7	276	331	430	314	407	469	489	533	426	325	318	327
8	423	334	509	354	551	515	505	679	420	364	338	437
9	626	407	617	479	978	627	574	1142	466	420	417	620
10	742	537	844	876	1360	835	829	1523	605	796	815	806
11	939	700	1272	1345	1598	1139	1199	1689	1012	1122	1111	1051
12	1116	950	1533	1646	1756	1539	1552	1840	1437	1268	1383	1266
13	1238	1125	1694	1755	1950	1659	1795	2058	1536	1385	1458	1399
14	1293	1257	1853	1877	2112	1941	1921	2200	1630	1510	1587	1491
15	1350	1351	1892	2007	2194	2059	2053	2114	1584	1504	1679	1547
16	1373	1380	2004	2003	2259	2224	2088	2088	1633	1605	1538	1577
17	1190	1371	2210	2014	2166	2170	2053	1082	1441	1542	1379	1411
18	1062	1151	2249	2049	1618	2199	1755	583	942	930	863	1211
19	823	365	1961	1582	816	1283	697	473	573	466	438	840
20	535	324	833	793	359	432	406	452	454	323	372	511
21	455	329	393	348	412	451	453	435	404	334	395	431
22	438	322	428	325	338	450	488	433	446	331	358	420
23	436	351	489	341	322	509	490	437	451	306	378	425
24	387	335	443	305	332	491	488	443	412	318	420	392
All	684	624	1015	925	975	1008	952	946	769	704	723	756

Table 3-123: Average seasonal mixing depth by hour of day in meters for ORNL Tower "C/D" for 1998-2012, 2013 to 2022 individually, and for the last 25 years during Spring (March, April, May)

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	25-Year
1	302	275	268	229	286	369	394	352	309	312	303	305
2	231	273	284	254	267	373	395	358	312	309	302	264
3	221	282	321	285	270	387	398	359	309	315	304	261
4	226	288	326	257	271	387	391	322	314	320	300	263
5	228	301	299	254	266	390	388	318	306	300	294	261
6	229	300	305	250	284	412	368	328	298	280	294	262
7	232	302	308	264	369	419	376	345	305	282	290	270
8	388	332	362	277	645	427	414	601	346	280	318	393
9	625	405	564	354	1641	495	446	1741	484	355	481	654
10	853	578	1179	1032	2234	1393	944	2304	858	786	815	997
11	1137	874	1740	1577	2421	2099	1918	2373	1216	1449	1444	1367
12	1392	1263	2034	2024	2486	2403	2189	2687	1506	1855	1768	1644
13	1514	1457	2008	2035	2707	2563	2605	2617	1677	2068	1877	1773
14	1613	1663	2159	2254	2788	2816	2729	2664	1785	2195	2202	1898
15	1656	1722	2174	2493	2918	2617	2859	2491	1995	2411	2458	1959
16	1692	1733	2275	2571	2864	2692	2757	2214	1830	2495	2373	1967
17	1354	1659	2611	2742	2786	2850	3062	1033	1629	2396	2147	1729
18	1274	1341	2505	2615	2463	2831	2701	420	1526	1601	1770	1555
19	976	1016	2012	2088	592	1187	991	353	854	468	520	989
20	605	585	1083	962	207	409	371	335	381	343	295	562
21	456	269	485	307	233	360	376	333	338	298	294	405
22	428	257	372	278	254	356	377	343	327	300	294	383
23	430	263	283	251	237	366	378	339	314	304	299	380
24	391	262	275	233	267	365	387	344	302	298	299	356
All	769	737	1093	1079	1240	1207	1176	1066	813	918	906	871

Table 3-124: Average seasonal mixing depth by hour of day in meters for ORNL Tower "C/D" for 1998-2012, 2013 to 2022 individually, and for the last 25 years during Summer (June, July, August)

Year / Hour	2007-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	25-Year
1	267	339	357	271	259	443	471	368	319	331	309	299
2	262	347	383	302	255	439	466	356	323	331	315	298
3	259	352	388	292	263	455	475	341	328	329	311	297
4	257	368	351	285	269	430	439	340	307	323	310	291
5	259	364	400	286	265	421	469	345	314	328	309	295
6	269	353	415	278	273	413	458	338	348	304	303	301
7	273	360	395	287	290	403	421	371	336	301	304	302
8	407	381	420	300	314	413	434	414	328	332	320	390
9	470	465	436	333	516	457	466	858	375	364	373	468
10	664	677	694	432	1271	625	540	1278	545	600	562	688
11	779	790	992	864	1639	922	917	1441	802	948	724	869
12	942	1007	1175	1298	1989	1330	1268	1641	991	1103	878	1073
13	1080	1271	1445	1436	2176	1492	1453	1770	1138	1125	966	1219
14	1139	1361	1520	1529	2147	1572	1621	1872	1238	1207	1099	1290
15	1195	1425	1662	1522	2193	1693	1622	1916	1253	1293	1155	1347
16	1233	1467	1703	1692	2300	1749	1679	1584	1299	1251	1239	1378
17	958	1494	1581	1682	2185	1487	1576	364	1176	1088	1147	1126
18	766	1283	1422	1408	768	1227	1091	328	731	428	444	825
19	551	952	883	438	377	453	560	346	378	302	294	530
20	440	410	600	318	304	431	525	332	304	328	299	418
21	430	353	439	255	303	412	491	328	299	305	301	398
22	433	327	387	291	272	452	499	357	330	319	305	401
23	379	325	355	261	269	441	473	365	336	317	307	365
24	293	330	365	296	268	438	488	367	327	311	308	315
All	583	700	782	682	882	775	788	751	589	578	537	633

Table 3-125: Average seasonal mixing depth by hour of day in meters for ORNL Tower "C/D" for 1998-2012, 2013 to 2022 individually, and for the last 25 years during Fall (September, October, November)

Year Hour	2018	2019	2020	2021	2022	5-Year
1	468	424	391	342	333	381
2	479	414	390	343	339	384
3	473	402	387	347	332	377
4	471	387	372	347	329	374
5	473	383	362	337	326	362
6	457	380	364	319	318	348
7	434	418	360	315	313	354
8	445	538	376	341	338	375
9	490	1067	447	399	435	438
10	708	1418	642	680	692	610
11	1158	1539	925	1043	987	1020
12	1430	1725	1168	1235	1187	1231
13	1672	1813	1287	1341	1271	1355
14	1787	1897	1373	1442	1430	1497
15	1871	1845	1418	1523	1529	1586
16	1887	1695	1397	1542	1494	1602
17	1903	782	1234	1387	1286	1530
18	1547	454	911	846	858	1245
19	684	406	553	396	396	706
20	443	399	394	339	319	444
21	448	386	378	328	329	396
22	466	409	394	331	328	389
23	457	405	384	330	337	370
24	468	412	374	325	343	376
All	880	833	678	674	660	740

Table 3-126: Average annual mixing depth by hour of day in meters for ORNL Tower "F" for 2018-2022 and for the last 5 years

Year / Hour	2018	2019	2020	2021	2022	5-Year
1	535	458	449	429	328	440
2	535	425	466	442	369	447
3	525	434	442	419	350	434
4	539	426	452	424	358	440
5	527	388	453	377	358	421
6	489	378	398	364	321	390
7	449	345	436	415	356	400
8	426	365	457	423	373	409
9	474	448	477	477	400	455
10	520	508	545	545	535	531
11	598	615	606	650	653	624
12	709	716	621	704	716	693
13	835	793	649	774	779	766
14	877	834	714	862	823	822
15	949	858	743	897	835	856
16	1022	874	778	764	751	838
17	922	629	704	601	617	695
18	642	448	640	562	449	548
19	489	407	578	498	345	463
20	469	374	591	484	323	448
21	470	343	593	466	324	439
22	500	447	591	462	362	472
23	488	397	431	456	344	423
24	506	425	418	431	347	425
All	604	514	551	539	476	537

Table 3-127: Average seasonal mixing depth by hour of day in meters for ORNL Tower "F" for 2018-2022 and for the last 5 years during Winter (December, January, February)

Year / Hour	2018	2019	2020	2021	2022	5-Year
1	472	360	436	448	346	412
2	519	364	391	441	375	418
3	492	378	375	370	349	393
4	516	359	417	349	339	396
5	507	333	407	329	296	374
6	512	305	448	332	291	378
7	489	318	504	321	287	384
8	505	326	690	338	309	434
9	574	483	892	402	380	546
10	829	658	939	684	684	759
11	1199	1117	1032	975	974	1059
12	1552	1533	1064	1200	1264	1323
13	1795	1167	1144	1339	1449	1379
14	1921	1847	1146	1453	1536	1581
15	2053	2065	1116	1524	1650	1682
16	2088	2211	1047	1532	1604	1696
17	2053	2108	1073	1586	1441	1652
18	1755	2062	996	1338	1048	1440
19	697	1083	1017	831	598	845
20	406	492	943	542	348	546
21	453	398	807	421	302	476
22	488	366	606	363	281	421
23	490	356	432	338	309	385
24	489	344	400	387	343	393
All	952	876	763	743	700	807

Table 3- 128: Average seasonal mixing depth by hour of day in meters for ORNL Tower "F" for 2018-2022 and for the last 5 years during Spring (March, April, May)

Year Hour	2018	2019	2020	2021	2022	5-Year
1	394	319	314	318	279	325
2	395	293	312	322	285	321
3	398	312	309	316	293	326
4	391	285	299	309	298	316
5	388	310	295	279	285	311
6	368	274	279	270	263	291
7	376	294	290	279	263	300
8	414	307	315	277	264	315
9	446	353	434	348	276	371
10	944	598	706	621	434	661
11	1918	1743	1098	1326	1791	1575
12	2189	2310	1393	1785	1431	1822
13	2605	2384	1616	1933	1763	2060
14	2729	2730	1720	2170	1867	2243
15	2859	2619	1900	2424	2191	2399
16	2757	2702	1748	2437	2440	2417
17	3062	2468	1647	2391	2342	2382
18	2701	2266	1470	1886	2123	2089
19	991	1195	1050	618	1716	1114
20	371	382	468	295	511	405
21	376	304	366	299	271	323
22	377	290	324	306	270	313
23	378	318	337	300	269	320
24	387	338	302	300	272	320
All	1176	1058	791	909	925	972

Table 3-129: Average seasonal mixing depth by hour of day in meters for ORNL Tower "F" for 2018-2022 and for the last 5 years during Summer (June, July, August)

Year / Hour	2018	2019	2020	2021	2022	5-Year
469	346	313	310	299	469	347
468	336	303	333	311	468	350
475	339	327	326	312	475	356
439	316	317	336	311	439	344
469	307	312	304	311	469	341
457	304	314	287	308	457	334
422	300	319	313	304	422	332
433	315	316	329	312	433	341
466	356	340	374	352	466	378
539	435	418	555	494	539	488
918	919	712	892	662	918	821
1267	1366	880	1092	834	1267	1088
1454	1502	1070	1130	922	1454	1216
1621	1664	1156	1210	1063	1621	1343
1663	1788	1196	1268	1113	1663	1406
1679	1853	1237	1297	1228	1679	1459
1577	1740	1193	1213	1241	1577	1393
1090	1392	914	552	567	1090	903
560	299	467	326	352	560	401
525	324	395	331	315	525	378
490	314	291	326	298	490	344
499	337	298	305	302	499	348
473	322	314	333	308	473	350
487	373	322	331	308	487	364
789	731	572	586	534	789	643

Table 3-130: Average seasonal mixing depth by hour of day in meters for ORNL Tower "F" for 2018-2022 and for the last 5 years during Fall (September, October, November)

Year / Hour	2001-2012	2013	2014	2015	2016	2017	2018	2019	2020	20-Year
1	329	383	466	398	442	505	535	531	488	409
2	330	358	436	365	413	508	535	506	505	400
3	323	355	413	373	405	518	525	484	476	392
4	323	361	360	347	413	518	539	492	450	387
5	325	343	404	351	384	505	527	468	436	383
6	317	328	393	368	389	447	489	448	402	369
7	320	326	461	411	380	449	449	422	384	371
8	358	346	469	421	415	431	426	458	425	395
9	407	411	555	464	473	496	474	527	480	451
10	514	500	696	563	587	583	520	566	571	548
11	575	592	809	761	753	677	598	654	677	641
12	622	693	931	820	839	805	709	731	744	714
13	678	762	1002	909	935	884	835	808	800	786
14	721	803	1058	999	976	987	877	852	846	837
15	744	845	1097	1008	1019	1009	949	857	851	864
16	769	826	1063	988	1051	1040	1022	894	834	881
17	625	592	1038	869	805	839	922	650	701	726
18	514	322	948	790	556	645	642	483	455	566
19	459	316	757	580	472	508	489	451	420	482
20	403	330	577	479	473	570	469	477	433	445
21	402	313	496	450	482	517	470	448	478	433
22	378	308	503	424	413	508	500	502	465	421
23	356	329	486	392	414	502	488	480	444	405
24	339	316	466	395	441	489	507	494	474	401
All	464	461	662	580	580	623	604	570	552	530

Table 3-131: Average annual mixing depth by hour of day in meters for ETTP Tower "L" for 2001-2012, 2013 to 2020 individually, and for 20 years

Year / Hour	2001-2012	2013	2014	2015	2016	2017	2018	2019	2020	20-Year
1	329	383	466	398	442	505	535	531	488	409
2	330	358	436	365	413	508	535	506	505	400
3	323	355	413	373	405	518	525	484	476	392
4	323	361	360	347	413	518	539	492	450	387
5	325	343	404	351	384	505	527	468	436	383
6	317	328	393	368	389	447	489	448	402	369
7	320	326	461	411	380	449	449	422	384	371
8	358	346	469	421	415	431	426	458	425	395
9	407	411	555	464	473	496	474	527	480	451
10	514	500	696	563	587	583	520	566	571	548
11	575	592	809	761	753	677	598	654	677	641
12	622	693	931	820	839	805	709	731	744	714
13	678	762	1002	909	935	884	835	808	800	786
14	721	803	1058	999	976	987	877	852	846	837
15	744	845	1097	1008	1019	1009	949	857	851	864
16	769	826	1063	988	1051	1040	1022	894	834	881
17	625	592	1038	869	805	839	922	650	701	726
18	514	322	948	790	556	645	642	483	455	566
19	459	316	757	580	472	508	489	451	420	482
20	403	330	577	479	473	570	469	477	433	445
21	402	313	496	450	482	517	470	448	478	433
22	378	308	503	424	413	508	500	502	465	421
23	356	329	486	392	414	502	488	480	444	405
24	339	316	466	395	441	489	507	494	474	401
All	464	461	662	580	580	623	604	570	552	530

Table 3-132: Average seasonal mixing depth by hour of day in meters for ETTP Tower "L" for 2001-2012, 2013 to 2020 individually, and for 20 years during Winter (December, January, February)

Year / Hour	2001-2012	2013	2014	2015	2016	2017	2018	2019	2020	20-Year
1	375	324	524	295	332	581	472	437	481	407
2	325	334	419	291	295	553	519	443	450	375
3	292	342	403	296	299	537	492	444	466	359
4	293	356	485	286	329	501	516	437	448	365
5	284	351	418	294	275	504	507	423	425	350
6	308	334	411	295	311	512	512	395	437	361
7	302	333	414	305	354	469	489	399	443	358
8	344	328	420	393	407	515	505	406	437	391
9	499	381	510	546	551	627	574	533	480	514
10	648	505	676	674	978	835	829	679	618	691
11	872	694	1012	865	1360	1113	1199	1142	1016	974
12	1043	994	1365	1759	1598	1539	1552	1523	1440	1288
13	1182	1189	1585	1807	1756	1659	1795	1689	1541	1437
14	1252	1348	1807	1898	1950	1941	1921	1840	1630	1560
15	1307	1439	1866	2038	2112	2059	2053	2058	1590	1647
16	1362	1477	1951	1980	2194	2224	2088	2200	1640	1709
17	1302	1473	2030	1980	2259	2170	2053	2114	1450	1667
18	1135	1283	2180	1822	2166	2199	1755	2088	958	1519
19	851	1000	1100	1280	1618	1283	697	1082	588	982
20	506	318	850	719	816	432	406	583	479	546
21	430	317	450	346	359	451	453	473	429	418
22	414	307	439	323	412	450	488	452	472	416
23	420	330	462	330	338	509	490	435	479	421
24	391	328	454	356	322	491	489	433	434	404
All	672	670	926	882	975	1006	952	946	785	798

Table 3-133: Average seasonal mixing depth by hour of day in meters for ETTP Tower "L" for 2001-2012, 2013 to 2020 individually, and for 20 years during Spring (March, April, May)

Year / Hour	2001-2012	2013	2014	2015	2016	2017	2018	2019	2020	20-Year
1	353	276	279	243	267	369	394	339	329	330
2	285	275	280	298	286	373	395	344	332	307
3	268	282	308	336	267	387	398	352	329	305
4	274	287	324	296	270	387	391	358	334	306
5	271	301	295	249	271	390	388	361	326	300
6	276	299	279	233	266	412	368	322	318	297
7	268	302	327	233	284	419	376	318	326	300
8	321	332	423	265	369	427	414	328	364	346
9	497	404	722	380	645	495	446	345	501	494
10	763	573	1541	1466	1641	1393	944	601	877	972
11	1099	866	2066	1748	2234	2099	1918	1741	1231	1464
12	1371	1252	2295	2018	2421	2403	2189	2304	1524	1760
13	1499	1448	2146	2135	2486	2563	2605	2373	1695	1889
14	1607	1654	2335	2329	2707	2816	2729	2687	1803	2050
15	1627	1712	2258	2678	2788	2617	2859	2617	2014	2093
16	1671	1726	2320	2870	2918	2692	2757	2664	1848	2130
17	1493	1650	2767	2941	2864	2850	3062	2491	1648	2088
18	1366	1336	2625	2799	2786	2831	2701	2214	1542	1931
19	1032	1002	2364	2580	2463	1187	991	1033	873	1335
20	605	578	1466	1380	592	409	371	420	400	660
21	424	278	633	373	207	360	376	353	358	391
22	408	256	482	277	233	356	377	335	347	365
23	424	262	266	256	254	366	378	333	334	356
24	392	262	256	244	237	365	387	343	322	341
All	775	734	1211	1193	1240	1207	1176	1066	832	950

Table 3-134: Average seasonal mixing depth by hour of day in meters for ETTP Tower "L" for 2001-2012, 2013 to 2020 individually, and for 20 years during Summer (June, July, August)

Year / Hour	2001-2012	2013	2014	2015	2016	2017	2018	2019	2020	20-Year
1	322	274	346	302	269	438	488	357	379	342
2	313	342	336	274	268	443	471	365	361	339
3	310	360	355	295	259	439	466	367	379	341
4	315	341	408	288	255	455	475	368	384	347
5	299	363	375	281	263	430	439	356	386	335
6	321	350	382	292	269	421	469	341	374	344
7	307	358	378	273	265	413	458	340	383	336
8	328	394	394	283	273	403	421	345	381	347
9	395	461	401	294	290	413	434	338	368	383
10	545	640	417	326	314	457	466	371	405	476
11	698	734	614	397	516	625	540	414	562	613
12	869	967	972	866	1271	922	917	858	817	915
13	1013	1282	1246	1369	1639	1330	1268	1278	1000	1178
14	1092	1349	1497	1530	1989	1492	1453	1441	1149	1318
15	1149	1422	1635	1583	2176	1572	1621	1641	1246	1413
16	1170	1465	1709	1576	2147	1693	1662	1770	1261	1450
17	1019	1497	1802	1763	2193	1749	1679	1872	1303	1427
18	779	1349	1806	1993	2300	1487	1576	1916	1208	1308
19	554	1025	1505	1658	2185	1227	1091	1584	858	1033
20	427	452	970	545	768	453	560	364	459	509
21	426	331	657	326	377	431	525	328	380	422
22	419	346	395	295	304	412	491	346	347	389
23	376	326	350	332	303	452	499	332	371	373
24	338	348	342	259	272	441	473	328	395	349
All	574	699	804	725	882	775	789	751	632	679

Table 3-135: Average seasonal mixing depth by hour of day in meters for ETTP Tower "L" for 2001-2012, 2013 to 2020 individually, and for 20 years during Fall (September, October, November)

Year / Hour	2001-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	20-Year
1	233	264	357	275	286	370	375	433	450	431	309
2	241	279	367	284	280	365	383	414	443	449	314
3	240	284	348	286	276	367	371	419	439	438	311
4	235	283	325	269	269	360	374	399	434	430	303
5	237	282	341	269	272	358	359	383	420	407	301
6	237	275	347	277	277	341	351	377	404	405	298
7	239	277	405	302	298	358	351	382	403	408	308
8	262	298	439	345	381	394	363	428	426	393	336
9	339	355	568	485	588	496	422	507	489	462	427
10	527	496	828	810	1010	875	657	704	674	706	662
11	805	658	1316	1192	1478	1286	1130	1211	941	1043	1006
12	1050	884	1456	1458	1663	1539	1420	1516	1189	1221	1243
13	1221	1091	1596	1553	1844	1706	1648	1632	1304	1321	1401
14	1323	1199	1654	1686	2002	1849	1777	1817	1392	1427	1516
15	1385	1270	1754	1749	2040	1874	1886	1863	1433	1512	1579
16	1446	1249	1879	1806	2074	1886	1881	1874	1410	1504	1616
17	1357	1251	1856	1821	2009	1813	1831	1747	1213	1431	1541
18	1074	1038	1536	1583	1755	1491	1468	1370	983	1062	1248
19	689	738	894	968	1142	620	610	646	635	481	724
20	327	336	532	514	443	384	360	432	476	432	391
21	237	280	418	319	338	345	360	403	440	415	316
22	226	277	374	318	309	366	364	401	460	405	309
23	226	277	363	280	289	360	366	416	456	417	305
24	227	278	354	285	288	372	370	447	435	416	307
All	599	580	846	797	900	840	811	842	723	734	711

Table 3-136: Average annual mixing depth by hour of day in meters for Y-12 Tower "W" for 2007-2012, 2013 to 2021 individually, and for 15 years

Year / Hour	2001-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	20-Year
1	263	314	426	383	399	407	448	497	553	511	368
2	273	314	399	346	366	409	421	443	549	575	364
3	271	334	373	356	360	421	430	454	512	578	363
4	266	326	321	326	372	420	424	449	529	588	357
5	269	309	359	326	347	405	387	400	515	581	349
6	262	297	354	351	354	358	360	396	478	589	341
7	262	309	419	391	345	367	340	391	458	548	343
8	286	333	427	403	385	356	366	416	493	486	359
9	326	390	526	444	442	418	418	476	537	570	412
10	396	486	679	543	549	506	510	530	622	569	491
11	494	579	802	751	721	618	583	615	710	643	599
12	584	675	925	809	817	764	765	704	762	658	692
13	653	744	1001	904	915	843	824	784	811	702	763
14	708	809	1053	992	959	956	912	814	862	766	825
15	747	873	1092	999	1000	974	997	840	857	785	860
16	783	786	1059	978	935	950	990	828	876	690	853
17	641	823	1028	858	859	749	609	677	641	677	718
18	426	512	938	775	688	758	404	622	583	578	561
19	329	326	743	566	522	570	386	442	504	509	436
20	289	309	558	470	471	484	386	416	548	497	392
21	289	313	471	434	468	410	380	417	539	498	377
22	276	295	471	415	417	428	399	415	535	492	368
23	264	292	453	378	388	437	396	465	550	511	363
24	258	294	436	383	386	392	416	461	518	511	356
All	400	460	638	566	561	558	523	540	606	588	496

Table 3-137: Average seasonal mixing depth by hour of day in meters for Y-12 Tower "W" for 2007-2012, 2013 to 2021 individually, and for 15 years during Winter (December, January, February)

Year / Hour	2001-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	20-Year
1	232	262	404	261	274	461	363	422	514	492	323
2	252	270	431	282	284	442	424	434	498	507	339
3	246	269	374	264	300	404	379	419	508	441	322
4	231	280	363	273	249	410	413	393	491	423	312
5	239	278	362	269	294	421	407	364	460	398	313
6	242	268	376	291	311	381	397	379	442	402	313
7	246	263	460	325	383	431	388	389	453	411	332
8	268	276	621	461	561	555	410	532	474	410	394
9	365	336	966	854	994	778	498	699	508	462	552
10	551	442	1317	1324	1367	1090	774	1129	637	821	814
11	868	585	1564	1624	1588	1512	1163	1520	1002	1117	1125
12	1143	791	1790	1730	1760	1636	1518	1652	1422	1267	1362
13	1331	1017	1843	1839	1929	1912	1760	1825	1528	1380	1534
14	1432	1172	1935	1973	2105	2031	1888	2038	1603	1509	1656
15	1536	1296	2044	1987	2190	2194	2026	2181	1637	1504	1752
16	1623	1353	2194	1985	2216	2151	2078	2081	1624	1594	1801
17	1624	1353	2193	2012	2090	2158	2051	2035	1519	1561	1781
18	1293	1216	1573	1544	1551	1209	1716	1110	996	1300	1331
19	826	812	702	775	755	349	628	546	665	683	725
20	327	308	406	334	360	357	330	461	546	523	372
21	229	277	431	309	399	369	354	429	479	468	326
22	223	270	420	319	329	418	383	414	545	438	325
23	224	281	433	277	305	396	380	405	527	422	318
24	234	273	374	283	316	488	382	468	517	462	331
All	658	581	982	900	955	940	880	930	816	791	781

Table 3-138: Average seasonal mixing depth by hour of day in meters for Y-12 Tower "W" for 2007-2012, 2013 to 2021 individually, and for 15 years during Spring (March, April, May)

Year / Hour	2001-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	20-Year
1	194	255	259	212	231	270	294	391	337	381	253
2	192	242	297	236	243	272	294	364	338	385	255
3	195	235	297	264	218	286	295	386	331	386	258
4	198	240	272	229	219	286	288	359	321	377	252
5	198	241	276	231	218	289	288	383	317	351	252
6	200	241	290	228	209	313	294	347	311	330	251
7	201	236	357	241	227	323	297	366	325	350	262
8	238	241	300	248	319	335	332	378	355	339	285
9	358	277	400	316	631	416	397	422	480	414	393
10	723	448	750	982	1642	1347	896	652	805	812	845
11	1196	739	2035	1549	2207	2120	1910	1766	1172	1452	1475
12	1570	1104	2003	2003	2398	2438	2182	2332	1553	1844	1818
13	1745	1323	2170	2034	2498	2588	2583	2410	1696	2065	1989
14	1882	1472	2172	2253	2717	2847	2719	2743	1843	2213	2151
15	1923	1490	2283	2490	2796	2643	2881	2636	1962	2453	2211
16	1992	1393	2616	2570	2953	2706	2774	2722	1893	2462	2269
17	1921	1334	2510	2738	2892	2860	3043	2507	1627	2393	2229
18	1733	1045	2028	2614	2809	2812	2681	2311	1595	1824	2008
19	1139	800	1109	2106	2488	1171	924	1220	891	414	1197
20	459	280	476	942	600	336	289	448	425	368	461
21	202	229	361	294	210	274	280	374	374	373	265
22	178	228	266	268	219	260	285	363	356	372	246
23	182	241	234	233	234	264	283	393	344	380	246
24	186	243	248	206	211	263	289	409	326	361	245
All	792	607	1000	1062	1225	1155	1117	1112	832	962	922

Table 3-139: Average seasonal mixing depth by hour of day in meters for Y-12 Tower "W" for 2007-2012, 2013 to 2021 individually, and for 15 years during Summer (June, July, August)

Year / Hour	2001-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	20-Year
1	242	226	339	242	239	343	394	423	397	340	293
2	247	288	342	273	226	338	393	414	386	328	298
3	249	299	348	261	225	355	378	417	404	346	302
4	245	285	343	248	235	324	372	396	394	330	293
5	243	301	367	249	229	315	354	386	387	299	290
6	246	293	369	238	235	310	353	385	385	300	290
7	247	301	382	252	235	309	377	380	375	324	295
8	258	340	408	268	257	328	345	386	380	337	307
9	308	417	379	324	283	371	374	429	431	401	350
10	436	609	567	392	481	558	447	503	632	622	495
11	702	728	864	844	1397	894	863	943	880	958	839
12	862	964	1105	1290	1677	1318	1216	1377	1020	1115	1084
13	1143	1278	1371	1433	2035	1480	1425	1509	1180	1136	1313
14	1259	1341	1456	1526	2225	1563	1588	1672	1261	1221	1427
15	1323	1420	1597	1518	2172	1685	1638	1795	1275	1305	1490
16	1373	1462	1645	1689	2193	1738	1681	1865	1248	1269	1535
17	1228	1493	1694	1674	2195	1485	1620	1768	1064	1093	1430
18	830	1379	1603	1399	1973	1184	1069	1435	757	546	1088
19	451	1014	1023	423	804	389	503	377	478	318	536
20	231	447	686	310	342	358	435	401	383	340	339
21	227	301	407	238	276	325	425	392	366	322	294
22	227	314	339	270	269	358	390	412	405	317	296
23	234	294	331	232	230	343	403	400	401	354	293
24	232	303	357	267	237	344	392	449	378	331	297
All	543	671	763	661	861	709	726	788	636	594	645

Table 3-140: Average seasonal mixing depth by hour of day in meters for Y-12 Tower "W" for 2007-2012, 2013 to 2021 individually, and for 15 years during Fall (September, October, November)

Year	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Jan	83.7	85.3	87.9	95.5	99.3	91.8	92.3	84.3	90.6	93.2	93.4	85.1	84.6	91.0	81.8	76.4	110.9	97.4	96.3	73.3	107.1	93.5	86.2	87.3	104.8
Feb	93.6	119.0	134.4	116.9	141.1	87.7	100.4	107.0	130.3	134.6	109.9	132.8	95.4	117.1	116.0	115.9	128.8	119.3	112.0	120.8	94.9	98.4	100.2	120.6	135.6
Mar	152.6	166.9	188.9	171.1	160.6	167.7	185.2	172.4	175.3	188.5	160.3	140.4	138.6	138.5	181.9	144.3	168.1	161.4	176.8	183.4	158.9	187.0	132.0	180.0	189.6
Apr	175.2	207.8	190.5	221.0	223.6	205.2	212.0	203.2	217.4	224.0	220.2	211.7	245.7	219.3	229.3	211.0	217.7	193.2	245.7	221.9	218.5	240.9	234.3	249.7	220.6
May	236.4	292.5	254.9	239.1	238.1	207.2	238.4	267.5	227.3	283.8	236.2	218.3	245.7	225.2	252.0	241.4	265.8	270.9	254.6	235.0	271.2	288.3	258.8	260.7	245.3
Jun	256.0	249.7	254.1	249.7	282.0	240.4	229.7	251.4	262.3	269.8	281.7	275.9	261.0	256.6	298.3	247.3	240.5	268.0	288.6	250.8	269.4	255.1	268.6	271.2	284.8
Jul	240.1	230.9	266.5	237.3	246.8	229.2	239.3	211.8	253.5	233.8	254.4	242.4	267.6	252.1	254.3	213.4	265.0	241.6	259.1	269.4	275.9	271.1	274.8	262.4	233.7
Aug	252.0	269.7	238.0	213.4	247.8	228.1	223.8	219.7	221.3	255.3	241.8	234.0	260.3	259.3	233.1	208.0	228.7	230.1	242.7	245.4	233.1	263.2	232.0	234.5	240.2
Sep	225.8	224.4	187.7	205.0	180.1	193.5	191.1	222.7	180.5	214.4	205.9	158.8	238.4	173.8	180.3	202.1	201.3	200.4	234.0	209.1	183.9	251.8	204.2	216.0	211.2
Oct	170.2	169.5	175.4	176.6	110.5	143.3	121.9	148.6	154.3	158.8	168.6	113.4	201.2	155.5	126.2	147.2	147.8	152.4	183.3	172.9	162.5	157.6	162.9	143.2	172.7
Nov	99.9	123.5	92.6	128.8	89.6	103.4	95.5	110.0	107.6	115.9	105.2	114.3	116.4	97.2	121.3	110.2	111.9	99.4	130.8	113.0	89.9	121.0	139.3	136.9	119.3
Dec	70.2	94.6	77.2	95.2	77.2	83.0	87.6	80.5	94.6	73.4	62.6	71.3	78.9	79.1	67.0	70.8	64.6	75.1	78.9	80.9	72.4	90.4	92.9	82.1	76.2
Year	171.3	186.2	179.0	179.1	174.7	165.0	168.1	173.3	176.3	187.1	178.4	166.5	186.2	172.1	178.5	165.7	179.3	175.8	191.9	181.3	178.1	193.2	182.2	187.1	186.2

Table 3-141: Monthly and annual average solar radiation in Watts per square meter for ORNL Tower "C/D" from 1998 to 2022

Year	12	13	14	15	16	17	18	19	20	21	22
Jan	0.012	0.012	0.014	0.012	0.012	0.012	0.013	0.012	0.012	0.012	0.015
Feb	0.010	0.012	0.013	0.014	0.012	0.011	0.012	0.012	0.012	0.015	0.016
Mar	0.010	0.011	0.011	0.011	0.010	0.012	0.011	0.012	0.011	0.012	0.014
Apr	0.010	0.010	0.010	0.010	0.009	0.010	0.011	0.009	0.011	0.010	0.011
May	0.006	0.008	0.007	0.007	0.007	0.008	0.006	0.006	0.008	0.009	0.008
Jun	0.006	0.006	0.005	0.004	0.004	0.005	0.005	0.006	0.006	0.006	0.005
Jul	0.004	0.005	0.005	0.004	0.004	0.004	0.005	0.004	0.003	0.005	0.005
Aug	0.004	0.004	0.004	0.005	0.004	0.004	0.004	0.004	0.005	0.004	0.005
Sep	0.006	0.005	0.005	0.005	0.005	0.006	0.006	0.005	0.008	0.006	0.007
Oct	0.009	0.006	0.008	0.008	0.007	0.009	0.009	0.009	0.008	0.008	0.010
Nov	0.007	0.011	0.013	0.009	0.008	0.009	0.011	0.010	0.011	0.010	0.011
Dec	0.011	0.011	0.012	0.010	0.012	0.011	0.011	0.012	0.012	0.012	0.012
Year	0.008	0.008	0.009	0.008	0.008	0.008	0.009	0.008	0.009	0.009	0.010

Table 3-142: Average monthly and annual pressure gradient in millibars / km for Oak Ridge, Tennessee during 2012 – 2022

Year	12	13	14	15	16	17	18	19	20	21	22
Jan	29.0	25.1	26.4	22.7		18.5	16.3	14.9	17.5	22.0	21.9
Feb	22.7	23.5	22.0	22.5		17.1	21.4	18.2	18.3	22.5	24.3
Mar	20.7	22.5	18.6	22.1		17.8	16.9	15.0	18.8	21.3	24.4
Apr	16.2	19.8	23.6	20.1		16.4	16.5	15.5	15.2	17.2	20.8
May	12.9	18.0	19.1			14.8	13.0	13.3	13.7	14.8	17.0
Jun	10.3	15.7	14.6		12.0	11.3	11.1	12.9	12.9	12.7	11.9
Jul	10.4	14.1	13.9		10.8	9.6	8.6	9.2	8.0	12.0	12.3
Aug	8.5	10.8	12.4		9.9	10.1	9.1	7.8	8.5	10.0	10.3
Sep	11.8	9.8	11.9		9.6	12.3	11.5	8.0	11.5	11.7	13.3
Oct	18.2	15.5	15.2		15.3	12.7	12.0	11.7	12.3	16.4	16.4
Nov	15.6	21.8	25.6		17.5	14.4	14.3	13.7	14.0	19.0	18.1
Dec	22.7	25.5	20.5		25.6	15.3	15.2	16.1	15.7	24.6	21.6
Year	16.6	18.5	18.7	21.9	14.4	14.2	13.8	13.0	13.9	17.0	17.7

Table 3-143: Average monthly and annual 850-mb wind speed in knots for Oak Ridge, Tennessee during 2012 – 2022