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20 September 2018
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UNIFIED FACILITIES CRITERIA (UFC)

DESIGN: ENGINEERING WEATHER DATA

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Indicate the preparing activity beside the Service responsible for preparing the document.

U.S. ARMY CORPS OF ENGINEERS

NAVAL FACILITIES ENGINEERING COMMAND (Preparing Activity)

AIR FORCE CIVIL ENGINEER CENTER

Record of Changes (changes are indicated by **1**\ ... /**1**/)

Change No.	Date	Location
1	09 Jan 2024	Updated ASHRAE 90.1 reference in paragraph 1-1; paragraph 2-10.1.3; and Appendix A References.
2	20 Sep 2024	Updated ASCE/SEI 7 reference in paragraph 2-2.6.4.3 and Appendix A References.

This UFC supersedes UFC 3-400-02, dated February 2003.

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the DoD Field Activities in accordance with USD (AT&L) Memorandum dated 29 May 2002. UFC will be used for all DoD projects and work for other customers where appropriate. All construction outside of the United States is also governed by Status of Forces Agreements (SOFA), Host Nation Funded Construction Agreements (HNFA), and in some instances, Bilateral Infrastructure Agreements (BIA.) Therefore, the acquisition team must ensure compliance with the most stringent of the UFC, the SOFA, the HNFA, and the BIA, as applicable.

UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Systems Command (NAVFAC), and Air Force Civil Engineer Center (AFCEC) are responsible for administration of the UFC system. Defense agencies should contact the preparing service for document interpretation and improvements. Technical content of UFC is the responsibility of the cognizant DoD working group. Recommended changes with supporting rationale should be sent to the respective service proponent office by the following electronic form: Criteria Change Request. The form is also accessible from the Internet sites listed below.

UFC are effective upon issuance and are distributed only in electronic media from the following source: Whole Building Design Guide website http://dod.wbdg.org/.

Refer to UFC 1-200-01, *DoD Building Code (General Building Requirements)*, for implementation of new issuances on projects.

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UNIFIED FACILITIES CRITERIA (UFC)
REVISION SUMMARY SHEET

Document: UFC 3-400-02, *DESIGN: ENGINEERING WEATHER DATA*

Superseding: UFC 3-400-02, dated 28 February 2003

Description: The purpose of this document is to provide an overview of and instructions for access to climate data available for use by engineers designing government structures. Final selection of sites was based upon availability of climate data. Most are located at military installations supporting airfield operations, or at local airports/airfields. This UFC is applicable to all service elements and contractors involved in the planning, design and construction of DoD facilities worldwide.

Reasons for Document:

- To update document to include new procedures for accessing weather data, new selection sites, new design values and new format.

Impact:

- There are no impacts.

Unification Issues

None.

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FIGURES

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CHAPTER 1 INTRODUCTION

1-1 PURPOSE AND SCOPE.

The purpose of this document is to provide an overview of and instructions for access to climate data available for use by engineers designing government structures.

The 14th Weather Squadron (14 WS), formerly AFCCC, compiled Engineering Weather Data (EWD) at the request of the Air Force Civil Engineering Center (AFCEC). Sites were identified by AFCEC, US Army Corps of Engineers (USACE), and the Naval Facilities Engineering Command (NAVFAC). Final selection of sites was based upon availability of climate data. Most are located at military installations supporting airfield operations, or at local airports/airfields. Non-DoD requests may be satisfied from a private consulting meteorologist or from NOAA's National Centers for Environmental Information (NCEI, formally the National Climatic Data Center). Each site's EWD is presented as a PDF. To comply with **1**\ ASHRAE Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings* (Refer to UFC 1-200-02, for applicable publication date) /**1**/, the 14 WS has added a separate comma separated values file containing all cooling degree-day data based on 50°F for all sites. Paragraph in Chapter 2 entitled "Alternate Cooling Degree-Days Calculation" covers the use of this file in more detail. Bin Temperature Data .csv files are suitable for importing into Microsoft® Excel.

1-2 APPLICABILITY.

This UFC is applicable to all service elements and contractors involved in the planning, design and construction of DoD facilities worldwide.

1-3 GENERAL BUILDING REQUIREMENTS.

Comply with UFC 1-200-01, *DoD Building Code (General Building Requirements)*. UFC 1-200-01 provides applicability of model building codes and government unique criteria for typical design disciplines and building systems, as well as for accessibility, antiterrorism, security, high performance and sustainability requirements, and safety. Use this UFC in addition to UFC 1-200-01 and the UFCs and government criteria referenced therein.

1-4 REFERENCES.

Appendix A contains a list of references used in this document. The publication date of the code or standard is not included in this document. Unless otherwise specified, the most recent edition of the referenced publication applies.

1-5 GLOSSARY.

Appendix C contains acronyms, abbreviations, and terms.

1-6 ACCESSING EWD.

1-6.1 Retrieving data for .mil domain users.

1. Access https://www.climate.af.mil/.

2. A Common Access Card (CAC) is required to access the 14th Weather Squadron's web site. If you do not have one, call 828-271-4291 to request an EWD or send an email request to 14WS_SAR@us.af.mil.

3. A CAC user can also electronically submit a Support Assistance Request by clicking on the "Request Support" tab at the top of the 14 WS website.

1-6.2 Retrieving Data for Non-DoD (non CAC) Users.

Non-DoD users (e.g., contractors) may access data from the 14 WS if they are working on a DoD contract. If so, follow these instructions:

1. Fill out the Sample SAR Form in Appendix D, and send an email requesting support to 14WS_SAR@us.af.mil. This email inbox is monitored Monday –Friday 0730-1630 with the exception of holidays.

2. Pay particular attention to the fields requesting a complete description of the information being requested (e.g., site location and coordinates), a suspense date, a statement about how the data applies to the mission and the contract number.

3. The 14 WS must be able to verify that the contractor is working on a valid DoD contract before providing the information. The 14 WS will then e-mail the appropriate PDF file for the site requested. Non-DoD contractors and vendors must contact the National Centers for Environmental Information (NCEI, formally NCDC) to purchase the Engineering Weather Data (EWD).

4. Retrieving data for unlisted sites. If a station is not in the EWD list, fill out the 14 WS Support Assistance Request (SAR) form (example in Appendix D) and pay particular attention to the fields requesting a complete description of the information being requested (e.g., site location and coordinates), a suspense date, a statement about how the data applies to the mission, and the contract number.

CHAPTER 2 DATA DESCRIPTION AND APPLICATIONS

2-1 INTRODUCTION.

This chapter summarizes each page in a typical site data set and provides guidance for using the data.

2-2 DATA SET PAGE 1: CLIMATE SUMMARY.

Figure 2-1 is a sample of Data Set Page 1, which summarizes the site's climate.

2-2.1 Location Information.

This section of Data Set Page 1 contains a summary table that includes site name, location, elevation (above mean sea level), period of record (POR), and average (atmospheric) pressure not corrected to sea level (higher elevations result in lower pressures). The POR is the time frame over which the data used to compute the statistics in this document were compiled.

2-2.2 Design Values.

2-2.2.1 Explanation of Design Values.

Design values are provided for dry bulb temperature, wet bulb temperature, and humidity ratio at specific percentile frequencies of occurrence. The design values of 0.4%, 1%, and 2% are based on the entire year. The winter design values of 99.6%, 99%, and 97.5% are also based on the entire year. In other words, the design values are annual values, not seasonal values. These design values were instituted for several reasons. At some locations, the warmest or coldest months of the year do not fall into the months listed above. It is easier to compare locations that are in tropical or marine climates where there is less seasonal variability. It is also more straightforward to compare southern hemisphere locations.

Figure 2-1 Sample Data Set Page 1

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Latitude = 38.55 N
Longitude = 89.84 W
Period of Record = 1985 To 2014

Station ID = ICAO_KBLV
Elevation = 459 Feet
Average Pressure = 29.55 inches Hg

	Mean Coincident (Average) Values				
Dry Bulb Temperature (T)	**Design Value (°F)**	**Wet Bulb Temperature (°F)**	**Humidity Ratio (gr/lb)**	**Wind Speed (mph)**	**Prevailing Direction (NSEW)**
Median of Extreme Highs	100	77	105	7.8	VRB
0.4% Occurrence	95	78	118	7.7	S
1.0% Occurrence	93	77	116	8	S
2.0% Occurrence	90	76	112	8.1	S
Mean Daily Range	20	-	-	-	NW
97.5% Occurrence	18	17	10	8.5	NW
99.0% Occurrence	11	10	7	7.9	NW
99.6% Occurrence	7	6	5	8.3	N
Median of Extreme Lows	0	-1	4	7.6	NNW

Wet Bulb Temperature (T_{wb})	Design Value (°F)	Dry Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	83	92	153	7.4	S
0.4% Occurrence	81	91	143	7.2	S
1.0% Occurrence	79	88	134	7	S
2.0% Occurrence	78	87	130	7	S

Humidity Ratio (HR)	Design Value (gr/lb)	Dry Bulb Temperature (°F)	Vapor Pressure (in. Hg)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	161	87	1.05	6.3	S
0.4% Occurrence	144	85	0.94	6.8	S
1.0% Occurrence	141	83	0.93	4.9	VRB
2.0% Occurrence	134	84	0.88	6.1	S

Air Conditioning/ Humid Area Criteria	Threshold	T ≥ 93°F	T ≥ 80°F	Twb ≥ 73°F	Twb ≥ 67°F
	# of Hours	99	1053	896	2050

Other Site Data

Weather Region	Rain Rate 100 Year Recurrence (in./hr)	Basic Wind Speed 3 sec gust @ 33 ft 50 Year Recurrence (mph)	Ventilation Cooling Load Index (Ton-hr/cfm/yr) Base 75°F-RH 60% Latent + Sensible
7	3.3	90	3.7 + 1.1
Ground Water Temperature (°F) 50 Foot Depth*	Frost Depth 50 Year Recurrence (in)	Ground Snow Load 50 Year Recurrence (lb/ft^2)	Average Annual Freeze-Thaw Cycles (#)
58.6	38	20	55

*Note: Temperatures at greater depths can be estimated by adding 1.5 °F per 100 feet additional depth.

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2-2.2.2 Dry Bulb Temperature.

2-2.2.2.1 Median of Extreme Highs (or Lows).

The dry bulb temperature extreme high (or low) is determined for each calendar year of the POR along with the coincident values for wet bulb temperature, humidity ratio, wind speed, and prevailing wind direction. Median values are determined from the distribution of extreme highs (or lows).

2-2.2.2.2 0.4%, 1.0%, 2.0%, 97.5%, 99.0%, and 99.6% Dry Bulb Design Values.

Listed is the dry bulb temperature corresponding to a given annual cumulative frequency of occurrence and its respective mean coincident values for wet bulb temperature, humidity ratio, wind speed, and prevailing wind direction. The dry bulb temperature listed represents the value that was exceeded for the respective percent of time over the entire POR. For example, the 1.0% occurrence design value temperature (92 °F) has been exceeded only 1 percent of the time during the entire POR. All the

observations occurring within one degree of the design value are grouped, and the Mean Coincident (Average) Values for Wet Bulb Temperature, Humidity Ratio, and Wind Speed are calculated. The prevailing wind direction (the “mode” of the wind direction distribution) is also calculated.

2-2.2.2.3 Mean Daily Range.

The mean daily range (difference between daily maximum and daily minimum temperatures) is the average of all daily dry bulb temperature ranges for the POR.

2-2.3 Wet Bulb Temperature.

2-2.3.1 Median of Extreme Highs.

The Median of Extreme Highs value for wet bulb temperature is the highest annual extreme wet bulb temperature averaged over the POR. The corresponding Mean Coincident (Average) Values are determined the same way as for the respective values for dry bulb temperature.

2-2.3.2 0.4%, 1.0 %, 2.0% Wet Bulb Temperature Design Values.

The design values listed and the corresponding Mean Coincident (Average) Values are determined the same way as for dry bulb temperature, described in 2-2.2.2.2.

2-2.4 Humidity Ratio.

2-2.4.1 Median of Extreme Highs.

The value for humidity ratio is the highest annual extreme averaged over the POR. The corresponding Mean Coincident (Average) Values are determined the same way as described in 2-2.2.2.2.

2-2.4.2 0.4%, 1.0%, and 2.0% Humidity Ratio Design Values.

Design values are provided for humidity ratio and the corresponding Mean Coincident (Average) Values for dry bulb temperature, vapor pressure, wind speed, and wind prevailing direction.

2-2.5 Air Conditioning/Humid Area Criteria.

These are the number of hours, on average, that dry bulb temperatures of 34 °C (93 °F) and 27 °C (80 °F) and wet bulb temperatures of 23 °C (73 °F) and 19 °C (67 °F) are equaled or exceeded during the year.

2-2.6 Other Site Data.

This information is provided **for general reference only, and should not be used as the basis for design**. There are some locations for which this data is not available. In these cases, that portion of the table will be left blank.

2-2.6.1 Weather Region.

Eleven weather regions have been developed by the Department of Energy. They are defined by the range of cooling-degree days and heating-degree days based on 65 °F. ASHRAE/IESNA Standard 90.1 of 2001 uses annual HDD65 (Heating Degree Days based on 65 °F) and CDD50 (Cooling Degree Days based on 50 °F) to select the appropriate Building Envelope Requirements table for energy conservation design. Refer to paragraph 2-10 for further explanation of this data.

2-2.6.2 Ventilation Cooling Load Index.

The Ventilation Cooling Load Index (VCLI) is a two-part index that defines the total annual cooling load for ventilation air by calculating sensible heat load separately from the latent heat load (moisture). The results are expressed in ton-hours per cubic feet per minute per year of latent and sensible load. Values for sensible heat load are calculated by comparing the outdoor temperature to indoor conditions (75 °F and 60% relative humidity [RH]), and calculating how much energy is required to bring the outdoor air to the indoor temperature. The latent load is calculated similarly. Separate calculations are made for each hour of the year and then summed to form the annual VCLI.

2-2.6.3 Average Annual Freeze-Thaw Cycles.

This value is the average number of times per year that the air temperature first drops below freezing and then rises above freezing, regardless of the duration of either the freezing or thawing. The number of cycles is summed per year and averaged over the entire POR. Days with high temperatures or low temperatures at 0 °C (32 °F) are not counted for a freeze- thaw cycle. A cycle is counted only when the temperature drops below freezing (-0.5 °C [31 °F] or colder) or goes above freezing (0.5 °C [33 °F] or warmer).

2-2.6.4 Other Values.

The following values are derived from sources other than the 14 WS. Engineers and architects should review the publications listed below and contact the organizations for current values, including background information and complete guidelines for use of these data elements.

2-2.6.4.1 Groundwater.

National Ground Water Research and Educational Foundation
601 Dempsey Road
Westerville OH 43081-8978
(800) 551-7379
http://www.ngwa.org/

NOTE: Average groundwater temperature parallels long-term average air temperature, because soil at a depth of 15 meters (50 feet) does not undergo significant temperature

change over the course of a year. Soil temperature at 15 meters stays slightly warmer than average annual air temperature by approximately 1.4 °C (2.5 °F).

2-2.6.4.2 Rain Rate.

International Plumbing Code
International Code Council
4051 West Flossmoor Road
Country Club Hills IL 60478
(888) 422-7233
http://www.iccsafe.org/

2-2.6.4.3 Frost Depth, Basic Wind Speed, Ground Snow Loads.

2\ ASCE/SEI 7-16, *Minimum Design Loads and Associated Criteria for Buildings and Other Structures /**2**/*
American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, VA 20191
(800) 548-2723
http://www.asce.org/

NOTE: Use UFC 3-301-01, *Structural Engineering*, for reference on some frost depth and ground snow load values.

2-2.7 Suggestions for Use.

The dry bulb, wet bulb, and humidity ratio values in Figure 2-1 are peak load conditions and are used for sizing mechanical equipment. Design guidance determines the frequency of occurrence design is to be based upon.

2-2.7.1 Dry Bulb Temperature.

The 0.4% dry bulb temperature value is seldom used for sizing conventional comfort control systems but is sometimes appropriate for mission-critical systems where equipment failure due to high heat would be unacceptable. Using the 0.4% value for equipment sizing requires that the engineer consider its operation at less-than-peak design conditions. In the past, oversized cooling equipment has been incapable of modulating during the more common range of operating conditions, yielding comfort control problems. Also, over-sized equipment cycles on and off more frequently, increasing maintenance costs and failing to remove enough moisture to maintain humidity control.

2-2.7.1.1 Design for Extreme Conditions.

Similar special considerations apply to the extreme low dry bulb temperature. Heating equipment designed for extreme conditions must be evaluated carefully to ensure that it

will modulate properly to maintain comfort at less extreme outdoor temperatures that occur in 99.6% of the hours during the year.

2-2.7.1.2 Design of Humidity Control Systems.

The mean coincident value for humidity at the 0.4% peak dry bulb temperature is not the highest moisture value and must not be used for design of humidity control systems. The mean coincident value is the arithmetic average of all the moisture levels that occur when the dry bulb temperature is high; however, the highest moisture values typically occur when the dry bulb temperatures are lower.

2-2.7.2 Wet Bulb Temperature.

High wet bulb temperature is used for sizing cooling towers and other evaporative equipment.

2-2.7.3 Peak Humidity Ratio.

Peak humidity ratio is used for sizing dehumidification systems. Peak moisture condition usually represents a higher enthalpy (total heat) than peak dry bulb condition. Consequently, engineers use the peak moisture condition to cross-check operation of a system that may be primarily intended to control temperature.

2-2.7.4 Coincident Wind Speed.

Coincident wind speed allows the engineer to accurately estimate latent loads due to infiltration of humid air in the summer and of dry air in the winter.

NOTE: The same precautions that apply to heating and cooling equipment also apply to dehumidification and humidification systems. Oversized equipment may not control properly under typical operating conditions without special attention from the engineer.

2-3 DATA SET PAGE 2: AVERAGE ANNUAL CLIMATE.

Figure 2-2 is an example of Data Set Page 2, a graph summarizing the site's average annual climate.

2-3.1 Explanation of Graph.

The graph on Data Set Page 2 shows the site's monthly mean temperature, dew point, and precipitation. The bar graph representing precipitation uses the scale on the right side of the chart (inches or centimeters). Lines of temperature and dew point use the scale on the left side of the chart (degrees Fahrenheit or Celsius). These charts have fixed maximum and minimum values on their axes for easy comparison between different sites. The precipitation chart is capped at a maximum of 45 centimeters (15 inches) per month. A few sites may exceed this value, but to keep the graph readable, a fixed maximum value was used. For a number of sites, no accurate precipitation data was available. In those cases, no bars appear on the chart.

2-3.2 Suggestions for Use.

2-3.2.1 Comparisons.

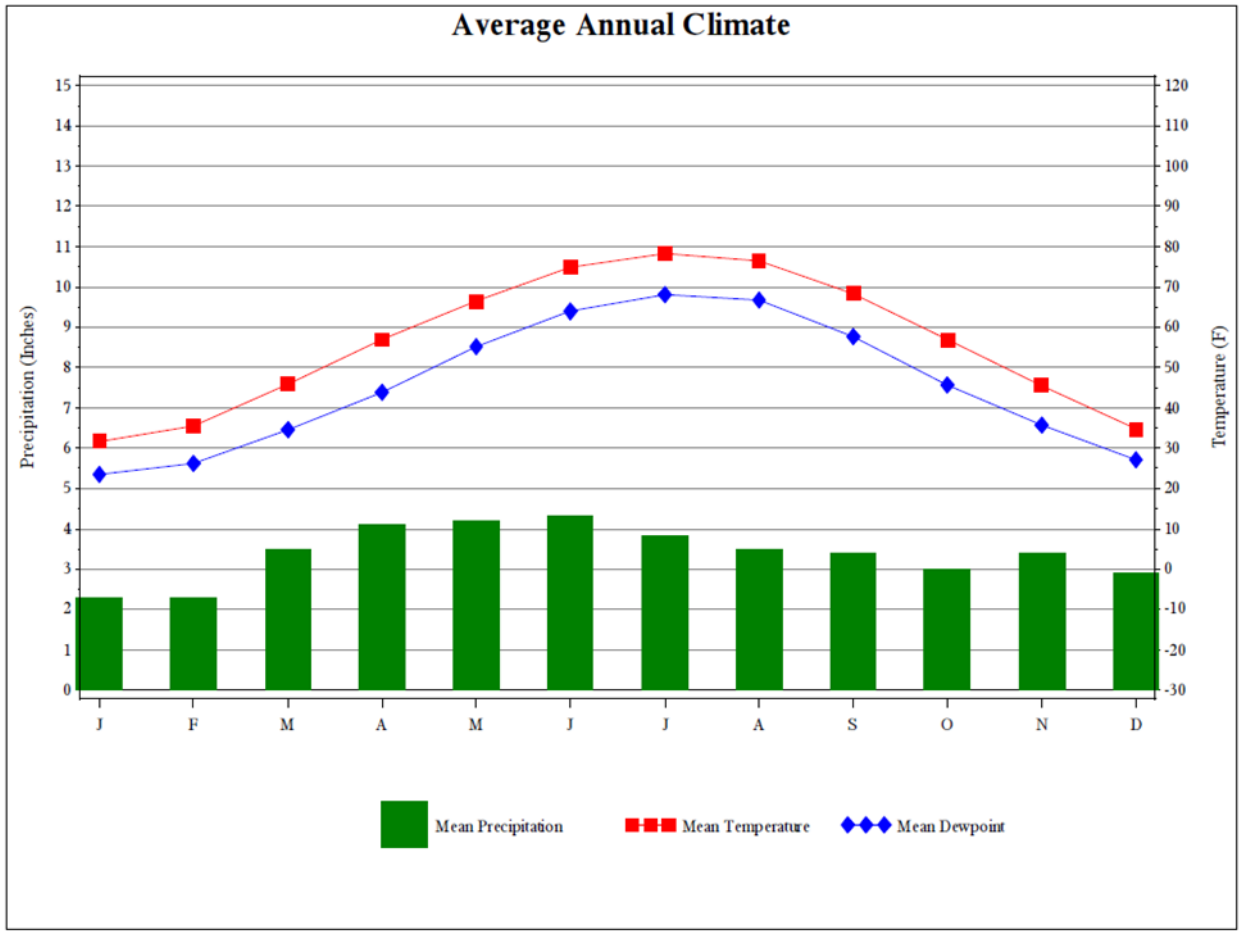
The Data Set Page 2 graph displays the average behavior of weather over a single year. An architect can compare rainfall patterns at one station with another and also the relative importance of water resistance for the exterior envelope. An engineer can compare the temperature and moisture patterns to understand the relative importance of sensible heat loads rather than latent loads at this location.

2-3.2.2 Seasonal Variations.

With averages displayed by month, it is relatively easy to comprehend seasonal variation of each variable, and also to understand which specific months are likely to be hot or cold, humid or dry, or have high precipitation. This can be helpful for mission planning, as well as for planning construction and building operation.

NOTE: This graph displays averages, not design or extreme values. Data shown should not be used to determine equipment capacities or thermal characteristics of building envelopes.

Figure 2-2 Sample Data Set Page 2



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2-4 DATA SET PAGE 3: 30-YEAR PSYCHROMETRIC SUMMARY.

Figure 2-3 is an example of Data Set Page 3, a graph summarizing the site's psychrometric data.

2-4.1 Explanation of Graph.

2-4.1.1 Joint-Frequency Table.

The graph displays the joint cumulative percent frequency of temperature and humidity ratio. Hourly observations are grouped into bins of 5 Fahrenheit degrees and 10 grains per pound (gr/lb) (or 3 Celsius degrees and 1.5 grams per kilogram [g/kg]), centered on each value of temperature or humidity ratio. For example, the 70 °F temperature bin collects all observations between 67.5 °F and 72.5 °F. The bin is depicted as a gridline on the chart; the vertical lines represent the temperature bins and the horizontal lines represent the humidity ratio bins. The intersection of temperature and humidity ratio lines represent a further subdivision of the observations into groups meeting both temperature and humidity ratio criteria. For example, the intersection of the 70 °F bin line and the 40 gr/lb bin line represent the observations when temperature was between 67.5 °F and 72.4 °F and the humidity ratio was between 35 gr/lb and 44 gr/lb. Thus, a joint-frequency table is created for all temperature and humidity ratio bin combinations.

NOTE: The psychrometric graph is intended as a visual tool only. Its purpose is to allow a quick visual comparison between climates at different locations. Extrapolation of data directly from the graph is not advised due to the approximate plotting routine used to generate the graph from the binned data. This is evident where values of humidity appear past their saturation point. This discrepancy between the actual data and the graph is the result of the plotting routine used to generate the graph and not from errors in the original hourly data used to create the binned summary.

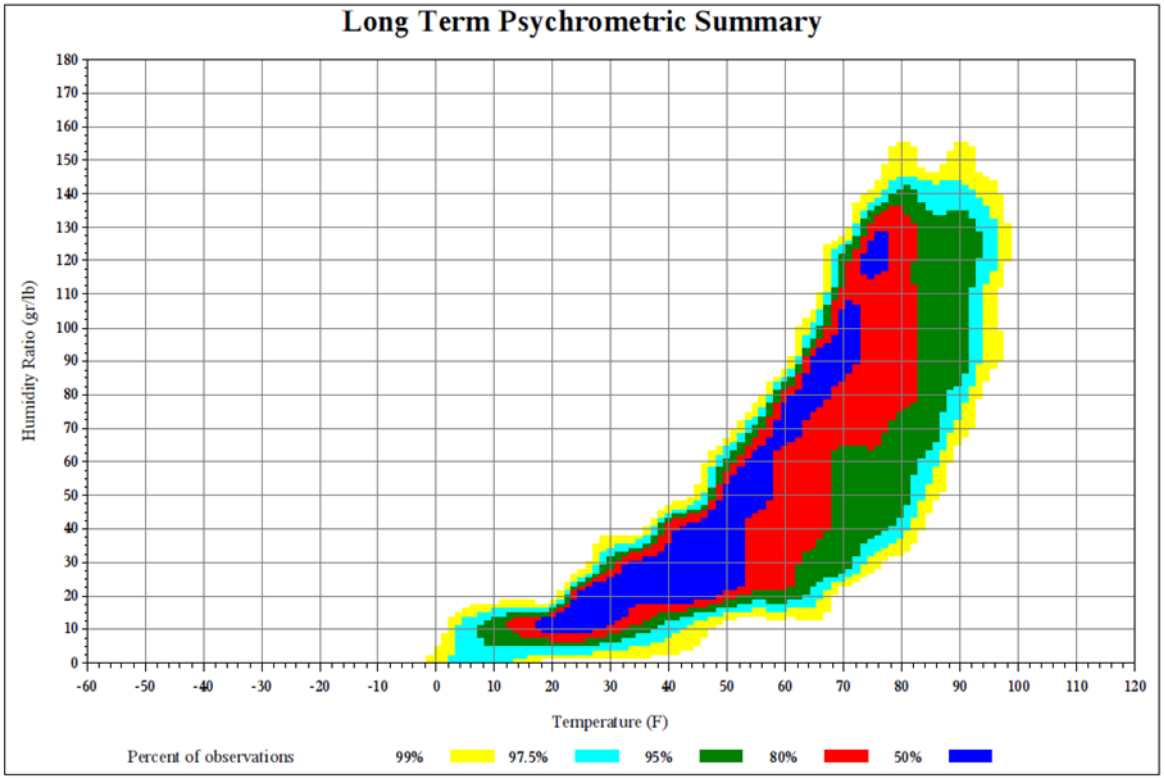
2-4.1.2 Contours.

The contours on this chart represent the areas containing 99%, 97.5%, 95%, 80%, and 50% of all observations (cumulative percent frequency or percentiles). The contours are centered on the most frequently occurring bins (50% contour), spreading outward until almost all observations (99%) are grouped. Contours are defined by calculating a percent frequency for each bin (relative to the others), and then accumulating these percent frequencies (from most frequent to least frequent) until the 50% value is passed, and thus the first set of bins is grouped. The accumulating continues until the 80% value is passed, and the second group of bins is grouped. This process continues until the 95%, 97.5%, and 99% values are passed.

2-4.1.3 Least Frequent (Most Extreme) Bins.

Consequently, the least frequent (most extreme) bins, which when accumulated amount to less than 1 percent of the total observations, are outside of the 99% contour. Any bins outside the 99% contour thus have either not occurred, or have occurred so infrequently that they should not be taken into consideration for sizing equipment.

Figure 2-3 Sample Data Set Page 3



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2-4.2 Suggestions for Use.

2-4.2.1 Most Common Temperature and Moisture Conditions.

The Data Set Page 3 graph displays the long-term history of temperature and moisture at each station (a total of 262,800 hourly observations if the POR is 30 years and if the data is complete over that period). The engineer can use this graph to ascertain the most common temperature and moisture conditions that will be encountered over the operating life of the mechanical equipment.

2-4.2.2 Ensure Modulation and Control Capability.

It is often useful to calculate the behavior of the proposed system at “most common” conditions and assess these calculations in addition to the traditional peak design calculations. This will help ensure that the selected equipment and controls are capable of modulation and control at all points of operation rather than simply at extreme conditions.

2-5 DATA SET PAGE 4: PSYCHROMETRIC DISPLAY OF DESIGN VALUES.

Figure 2-4 is an example of Data Set Page 4, a psychometric display of the site’s design values.

2-5.1 Saturation Curve.

Similar to Data Set Page 3, this chart depicts the saturation curve (when RH = 100%) along with peak design values. The design values are calculated as in the table on Data Set Page 1 (Figure 2-1), but this chart shows their relationships graphically, depicting their position relative to each other and relative to the saturation curve.

2-5.2 Observations.

Above and to the left of the saturation curve, RH would be greater than 100% (not possible). The area below and to the right of the curve (including the points on the curve itself) represent the area where RH is less than or equal to 100%, and thus where all observations occur. Note that since the humidity ratio is a function of pressure, and pressure varies with elevation, different sites will have different saturation curves.

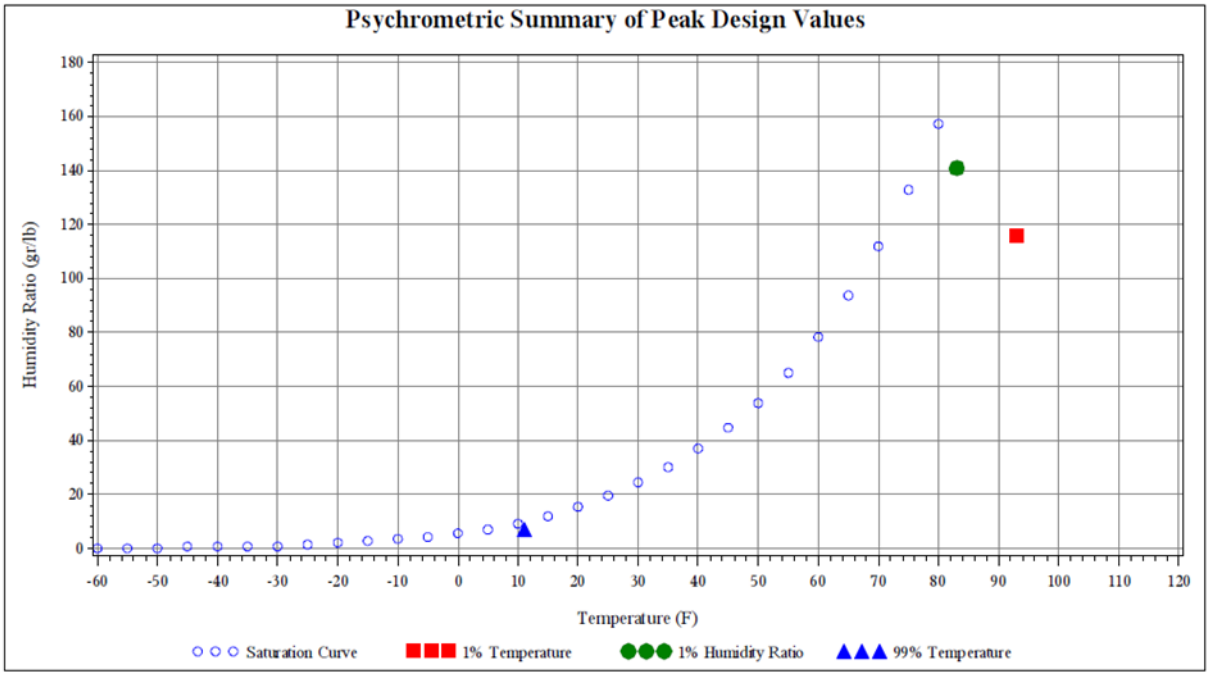
2-5.3 Scatter Plot.

The dry bulb temperature is the horizontal coordinate on this scatter plot, and the humidity ratio is the vertical coordinate. Peak design values are depicted by the red square (1.0% Temperature [dry bulb]), the green circle (1.0% Humidity Ratio), and the blue diamond (99% Temperature [dry bulb]).

2-5.4 Table.

The table below the chart shows the exact values of 99% dry bulb temperature, 1.0% humidity ratio, and 1.0% dry bulb temperature, along with calculated values of enthalpy, mean coincident wet bulb temperature, and humidity ratio (as applicable). The value of enthalpy coincident to each temperature/humidity ratio is created using the psychrometric functions provided by the Linric Company, Bedford, New Hampshire. The dry bulb temperature and humidity ratio are used to calculate enthalpy using the Linric algorithms.

Figure 2-4 Sample Data Set Page 4



	(°F) / (gr/lb)	MCDB (°F)	MCWB (°F)	MCDP (°F)	MCHR (gr/lb)	Enthalpy (btu/lb)
1.0% Dry Bulb	93.0		77		116.0	40.6
99.0% Dry Bulb	11.0				7.0	3.6
1.0% Humidity Ratio	141.0	83.0	78.5	76.7		42.1

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2-6 DATA SET PAGES 5 THROUGH 9: TEMPERATURE BIN DATA.

Figures 2-5 through 2-9 are examples of Data Set Pages 5 through 9, respectively. These tables show the number of hours that temperatures occur in 5 Fahrenheit degree (3 Celsius degree) bins of specific 8-hour daily periods during a given month. The 8-hour periods are based upon a 24-hour clock and displayed in Local Standard Time (LST). For each month, the number of observations for each temperature bin during each of the specific 8-hour periods of the day appear in a column under the specific Hour Group (LST). The total number of observations (hours) in each temperature bin is displayed in the "Total Obs" column for the month. The mean coincident wet bulb temperature is the mean value of all those wet bulb temperatures that occur coincidentally with the dry bulb temperatures in the particular 5° temperature bin. At the upper, or warmer, end of the mean coincident wet bulb distribution, the values occasionally reverse their trend because the highest wet bulb temperatures do not necessarily occur with the highest dry bulb temperatures. There are 13 such tables, one for each month and one representing the overall annual summary (Data Set Page 9).

2-6.1 Suggestions for Use.

Binned summaries are used by many different technical disciplines for different purposes. They are useful in making informal estimates of energy consumption by cooling and heating equipment, and for gaining a general understanding of patterns of temperature and moisture at different times of the day, month, and year.

NOTE: Do not use these binned summaries to calculate design moisture loads.

2-6.2 Comments.

These particular binned summaries are based on the dry bulb temperature. After each observation has been placed into a dry bulb bin, the average humidity ratio is calculated for all observations in each bin. Consequently, dry bulb bins underestimate the magnitude of dehumidification and humidification loads because the averaging calculation "flattens" the peaks and valleys of humidity ratios. The amount of the underestimation varies according to the intended humidity control level.

Figure 2-5 Sample Data Set Page 5

Dry-Bulb Temperature Hours For An Average Year

	January					February					March				
Temperature Range (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)
105/109															
100/104															
95/ 99															
90/ 94															
85/ 89												0	0	0	63.6
80/ 84							0		0	57.3		3	0	3	64.5
75/ 79							0	0	0	60.4		9	2	11	63
70/ 74		1		1	58.8		1	0	1	59.3	1	15	7	23	60.4
65/ 69	0	3	0	3	58.8	0	4	1	5	55.9	3	14	13	30	57.3
60/ 64	2	6	3	11	55.5	2	10	5	17	54.1	11	22	18	51	54.4
55/ 59	4	10	6	20	51.8	4	14	9	27	50.2	16	31	24	71	50.2
50/ 54	7	13	10	30	47	7	21	13	41	45.6	19	36	33	88	45.8
45/ 49	7	22	13	42	41.7	14	28	22	64	41.9	36	39	43	118	42
40/ 44	15	28	23	66	38.2	19	28	27	74	38	34	29	33	96	38.1
35/ 39	37	43	43	123	34.1	35	40	42	117	34	47	26	35	108	34.2
30/ 34	49	45	51	145	29.8	48	33	46	127	29.6	40	16	23	79	29.5
25/ 29	42	31	38	111	24.7	43	20	28	91	24.9	25	6	12	43	24.9
20/ 24	27	16	20	63	20.2	20	11	12	43	20.1	10	2	3	15	20.5
15/ 19	24	15	19	58	15.8	15	7	9	31	15.7	5	1	1	7	16.4
10/ 14	17	9	11	37	10.8	9	4	6	19	10.7	1	0	1	2	11.1
5/ 9	11	4	5	20	6.1	6	2	2	10	6	1	0	0	1	6.2
0/ 4	5	1	2	8	1.1	2	0	1	3	0.8	0			0	3
-5/ -1	1	0	1	2	-3	0	0	0	0	-3.3					
-10/ -6	0	0	0	0	-7.4	1	0	0	1	-7.4					
-15/-11	0	0		0	-13.3	0			0	-12					
-20/-16	0			0	-15.5										

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Figure 2-6 Sample Data Set Page 6

Dry-Bulb Temperature Hours For An Average Year

	April					May					June				
Temperature Range (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)
105/109												0	0	0	71.3
100/104												1	0	1	75.1
95/ 99							0		0	73		5	1	6	75.5
90/ 94		1	0	1	70.4		6	1	7	72.9	0	34	9	43	75.1
85/ 89		4	1	5	68.6		19	5	24	71.6	1	47	19	67	73.3
80/ 84		14	4	18	66.1	1	39	15	55	69.3	8	61	38	107	71.3
75/ 79	0	25	11	36	63.7	7	49	33	89	66.6	34	48	57	139	69.6
70/ 74	6	32	23	61	60.7	26	47	46	119	64.4	72	26	58	156	67.6
65/ 69	12	31	25	68	58.2	44	33	45	122	61.6	56	11	33	100	63.9
60/ 64	28	40	39	107	55.3	57	33	44	134	57.7	43	5	18	66	59.7
55/ 59	39	36	41	116	51.2	45	15	33	93	53	20	2	5	27	55.2
50/ 54	44	27	40	111	47.1	39	6	18	63	49	6	0	1	7	50.4
45/ 49	44	18	28	90	42.7	20	1	7	28	44.5	1			1	46.5
40/ 44	28	9	16	53	38.3	7	0	1	8	40.3					
35/ 39	23	3	10	36	34.5	2		0	2	36.8					
30/ 34	12	1	3	16	29.9										
25/ 29	3	0	0	3	24.7										
20/ 24	0			0	21										
15/ 19															
10/ 14															
5/ 9															
0/ 4															
-5/ -1															
-10/ -6															
-15/-11															
-20/-16															

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Figure 2-7 Sample Data Set Page 7

Dry-Bulb Temperature Hours For An Average Year

	July					August					September				
Temperature Range (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)
105/109															
100/104		2	0	2	76.6		1	0	1	77.1		0		0	77.8
95/99		18	3	21	78.5		14	2	16	78.2		3	0	3	74.6
90/94	0	51	16	67	77.3		41	10	51	77		16	2	18	73.8
85/89	2	59	26	87	75.1	1	56	19	76	74.5	0	26	5	31	71.4
80/84	18	63	56	137	73.2	8	67	45	120	72.6	1	46	15	62	69.2
75/79	65	36	68	169	71.8	45	45	68	158	71.3	10	52	35	97	67.6
70/74	85	15	52	152	68.9	87	18	62	167	68.8	36	45	50	131	65.5
65/69	43	3	19	65	64.7	52	4	27	83	64.5	38	24	41	103	62.5
60/64	27	1	8	36	60.7	38	1	12	51	60.5	53	18	42	113	58.7
55/59	7		1	8	56.6	14		3	17	55.8	46	8	30	84	54.2
50/54	0			0	53	3		0	3	51.1	34	2	14	50	50
45/49						0			0	45.1	14	1	4	19	45.4
40/44											5		1	6	40.5
35/39											2		0	2	36.9
30/34											0			0	31
25/29															
20/24															
15/19															
10/14															
5/9															
0/4															
-5/-1															
-10/-6															
-15/-11															
-20/-16															

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Figure 2-8 Sample Data Set Page 8

Dry-Bulb Temperature Hours For An Average Year

	October					November					December				
Temperature Range (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)
105/109															
100/104															
95/99															
90/94		1		1	71.9										
85/89		5	0	5	69.3										
80/84		16	1	17	66.1		1		1	63.5					
75/79	1	28	7	36	64.1		4	0	4	61.9					
70/74	5	36	19	60	61.7	0	12	2	14	60.8		1		1	62.2
65/69	13	34	24	71	59.4	2	14	7	23	58.8	0	2	0	2	59.9
60/64	28	45	39	112	56	11	25	18	54	55.9	2	7	4	13	57.2
55/59	36	37	46	119	51.8	17	33	24	74	51	5	13	7	25	52
50/54	47	29	45	121	47.8	23	34	32	89	47	8	20	12	40	47.2
45/49	49	15	35	99	43.5	33	42	41	116	42.6	15	32	22	69	42.8
40/44	33	3	18	54	39.2	36	31	35	102	38.5	22	33	31	86	38.5
35/39	26	1	11	38	35.3	43	25	38	106	34.2	38	50	49	137	34.4
30/34	11		2	13	31.1	40	13	28	81	29.7	53	38	49	140	30
25/29	1		0	1	26.8	21	4	10	35	25.1	43	25	34	102	25
20/24						8	1	4	13	20.5	23	10	18	51	20.4
15/19						4	0	2	6	16.4	18	10	12	40	16.1
10/14						1		0	1	11.1	10	5	7	22	11.1
5/9						0			0	7.2	5	1	3	9	6.4
0/4											2	1	1	4	1.5
-5/-1											1	1	0	2	-3.5
-10/-6											1	0	1	2	-7.8
-15/-11											0	0	0	0	-12.4
-20/-16															

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Figure 2-9 Sample Data Set Page 9

Dry-Bulb Temperature Hours For An Average Year

	Annual				
Temperature Range (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	MCWB (°F)
105/109		0	0	0	71.3
100/104		5	1	6	76.5
95/99		40	6	46	77.7
90/94	0	150	37	187	76.2
85/89	4	216	75	295	73.7
80/84	36	309	174	519	71.2
75/79	162	297	280	739	69.2
70/74	317	248	319	884	66.1
65/69	263	176	236	675	61.8
60/64	302	213	250	765	57.3
55/59	254	197	229	680	52.1
50/54	236	188	218	642	47.4
45/49	233	197	216	646	42.7
40/44	198	162	186	546	38.4
35/39	253	189	228	670	34.3
30/34	254	146	202	602	29.8
25/29	178	86	123	387	24.9
20/24	88	40	57	185	20.3
15/19	66	33	43	142	15.9
10/14	38	18	25	81	10.8
5/9	22	7	10	39	6.1
0/4	9	2	3	14	1.2
-5/-1	2	1	1	4	-3.2
-10/-6	2	0	1	3	-7.6
-15/-11	1	0	0	1	-12.6
-20/-16	0			0	-15.5

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

2-7 DATA SET PAGE 10: ANNUAL TEMPERATURE SUMMARY.

Figure 2-10 is an example of Data Set Page 10. This chart shows a week-by-week summary of dry bulb temperatures for the given site. The observations are grouped into 7-day periods (approximate calendar weeks). For example, observations from January 1 through 7 from all years are grouped, observations from January 8 through 14 from all years are grouped, and so on, overlapping the end of one month and beginning of the next month where necessary. The following statistics are shown for each of the 7-day periods:

- *1% Dry Bulb Temp* is the dry bulb temperature that is exceeded 1% of the time during that calendar week.
- *MCWB (1% Dry Bulb)* is the mean of wet bulb temperatures coincident with 1% dry bulb temperatures during the same week.
- *Mean Max Temp* is the daily maximum dry bulb temperature, averaged by week over the POR.
- *Mean Min Temp* is the daily minimum dry bulb temperature, averaged by week over the POR.
- *99% Min Dry Bulb Temp* is the daily dry bulb temperature that is at or above this value 99% of the time, or below this value 1% of the time.

NOTE: The information in this chart is calculated on a weekly basis; information on a climate summary (Data Set Page 1) is calculated on an annual basis.

2-7.1 Suggestions for Use.

The weekly 1% and 99% temperatures are useful for understanding the probable temperature extremes that can occur during a given week of the year. The weekly dry bulb temperatures are useful for understanding the change of seasons at a given location. The display is helpful for mission planning and construction project planning.

2-7.2 Special Considerations.

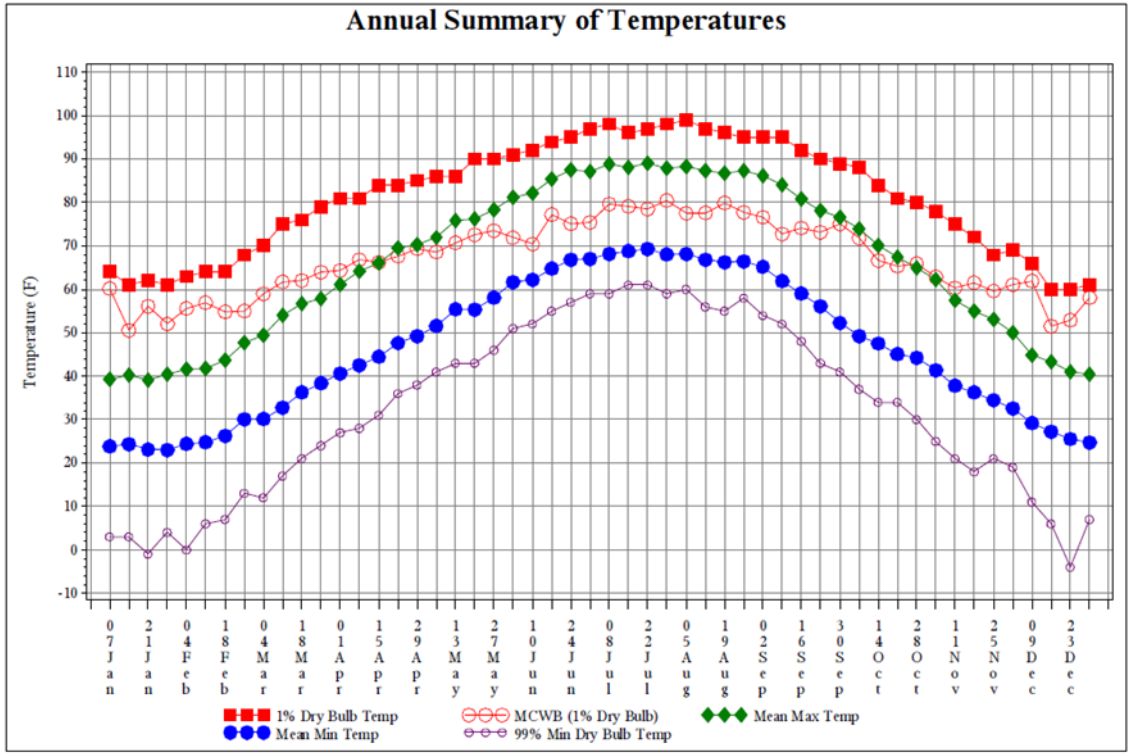
2-7.2.1 Designers.

The values displayed here are based on the 30-year record. It is important that designers **not** base equipment selection on the “highest” or “lowest” recorded temperature at the station. That error would result in selecting equipment extremely costly to install, which would operate inefficiently for all but the very hottest or coldest single hour in 30 years. See the Design Criteria Data section on Sample Data Set Page 1 (see Figure 2-1) in this document for appropriate maximum and minimum temperatures for sizing equipment.

2-7.2.2 Construction and Operation Planners.

The mean maximum and minimum temperatures shown for each week seldom occur in the same year. Keep in mind that these are mean values that are useful for understanding the **typical** range of temperatures in a given week. The difference does **not** represent the **actual** day-night temperature swing in a given week.

Figure 2-10 Sample Data Set Page 10



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2-8 DATA SET PAGE 11: ANNUAL HUMIDITY SUMMARY.

Figure 2-11 is an example of Data Set Page 11. Similar to the annual temperature summary (see Sample Data Set Page 10, Figure 2-10), this chart depicts mean maximum and minimum values of humidity ratio, plus the 1% maximum humidity ratio, along with its mean coincident dry bulb temperature, summarized by calendar week. The chart uses two vertical axes: on the left are the humidity ratio values and on the right is a temperature scale for the mean coincident dry bulb temperature.

2-8.1 Suggestions for Use.

Weekly humidity ratios are useful for understanding the change of seasons at a given location and the probable high and low moisture levels during a given week of the year. The display is helpful for planning humidity- controlled storage projects and for understanding factors contributing to atmospheric corrosion. Humidity also affects the deterioration rate of building materials and the weathering of military equipment and structures exposed to the elements.

2-8.2 Special Considerations.

2-8.2.1 Designers.

The values displayed here are based on the 30-year record. It is important that designers **not** base equipment selection on the “highest” or “lowest” recorded humidity at the station. That error would result in selecting oversized equipment, which would increase costs and might result in control problems at other than extreme conditions. Use design values on Data Set Page 1 (Figure 2-1) for equipment sizing.

2-8.2.2 Construction and Operation Planners.

The high and low humidity ratios shown for each week seldom occur in the same year. Keep in mind that these are mean values that are useful for understanding the typical range of humidity ratio in a given week. The difference does **not** represent the **actual** day-night humidity ratio swing in a given week.

2-9 DATA SET PAGE 12: ANNUAL DRY BULB TEMPERATURE AND HUMIDITY SUMMARY TABLES.

Figure 2-12 is an example of Data Set Page 12. Data Set Page 12 consists of tables containing the values used to plot the charts on Data Set Page 10 and Data Set Page 11. The left half of the table uses Data Set Page 10 and the right half uses Data Set Page 11.

Figure 2-11 Sample Data Set Page 11

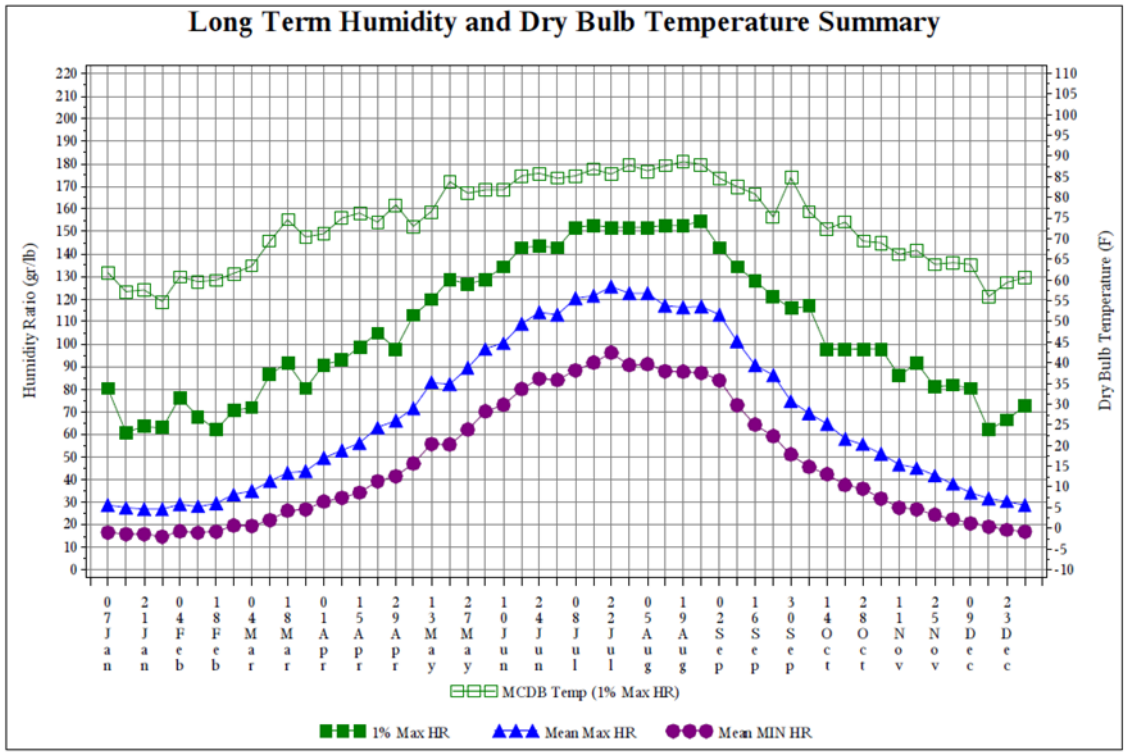

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Figure 2-12 Sample Data Set Page 12

Long Term Humidity and Dry Bulb Temperature Summary

Week Ending	1.0% Temp (°F)	MCWB@ 1% Temp (°F)	Mean Max Temp (°F)	Mean Min Temp (°F)	99% Temp (°F)	1.0% HR (gr/lb)	MCDB@ 1% HR (°F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	64	60.2	39.2	23.8	3	80.5	61.8	28.9	16.6
14-Jan	61	50.5	40.2	24.3	3	60.9	57.2	27.5	15.8
21-Jan	62	56.1	39	23.1	-1	63.7	57.6	26.9	15.8
28-Jan	61	52	40.5	23	4	63	54.8	27	14.8
4-Feb	63	55.6	41.6	24.4	0	76.3	60.9	29.1	17.2
11-Feb	64	56.9	41.7	24.8	6	67.9	59.6	28.2	16.5
18-Feb	64	54.8	43.6	26.2	7	62.3	60.1	29.5	17
25-Feb	68	55	47.7	30	13	70.7	61.6	33.4	19.7
4-Mar	70	58.9	49.5	30.1	12	72.1	63.5	35	19.5
11-Mar	75	61.7	54	32.7	17	86.8	69.5	39.3	22.1
18-Mar	76	62	56.7	36.3	21	91.7	74.7	43.1	26.3
25-Mar	79	63.9	57.9	38.4	24	80.5	70.5	43.7	26.9
1-Apr	81	64.3	61.1	40.6	27	91	71.3	49.7	30.3
8-Apr	81	66.8	64.2	42.5	28	93.1	75.1	52.9	32
15-Apr	84	66.2	66.1	44.5	31	98.7	76.2	56.1	34.3
22-Apr	84	67.6	69.6	47.6	36	105	74	63.1	39.3
29-Apr	85	69.4	70.3	49.2	38	98	78.2	66.1	41.5
6-May	86	68.6	71.9	51.6	41	112.7	73	71.7	47.2
13-May	86	70.7	75.9	55.4	43	119.7	76.6	83.2	55.9
20-May	90	72.5	76.2	55.3	43	128.8	83.8	82.3	55.6
27-May	90	73.5	78.3	58.1	46	126.7	81.1	89.7	62.3
4-Jun	91	71.9	81.1	61.6	51	128.8	81.9	97.9	70.3
10-Jun	92	70.4	82.2	62.2	52	134.4	81.9	100.5	73.3
17-Jun	94	77.2	85.3	64.8	55	142.8	85.2	109.1	80.2
24-Jun	95	75.1	87.5	66.8	57	143.5	85.8	114.1	84.8
1-Jul	97	75.4	87.2	67	59	142.8	84.7	113.1	84.3
8-Jul	98	79.6	88.9	68.1	59	151.9	85.2	120.3	88.4
15-Jul	96	79.1	88	68.8	61	152.6	86.9	121.6	91.9
22-Jul	97	78.5	89.1	69.3	61	151.9	85.7	125.5	96.3
29-Jul	98	80.5	87.8	68	59	151.9	87.8	122.5	90.9
5-Aug	99	77.5	88.3	68.1	60	151.9	86.4	122.5	91.2
12-Aug	97	77.6	87.3	66.8	56	152.6	87.7	117	88.1
19-Aug	96	79.9	86.8	66.2	55	152.6	88.7	116.3	87.9
26-Aug	95	77.7	87.3	66.4	58	154.7	88	116.8	87.3
2-Sep	95	76.6	86.2	65.2	54	142.8	84.6	113.1	84.1
9-Sep	95	72.7	84	61.9	52	134.4	82.6	101.4	73.1
16-Sep	92	74.1	80.8	59	48	128.1	80.8	90.8	64.5
23-Sep	90	73.1	78.1	56.1	43	121.1	75.3	86.4	59.3
30-Sep	89	75	76.5	52.2	41	116.2	84.8	74.8	51.2
7-Oct	88	71.8	74	49.2	37	116.9	76.7	69.6	45.8

14-Oct	84	66.6	70	47.5	34	98	72.4	64.7	42.4
21-Oct	81	65.3	67.4	45.1	34	97.7	74.1	58.2	37.7
28-Oct	80	65.9	65	44.2	30	98	69.5	55.7	36.1
4-Nov	78	62.9	62.2	41.3	25	98	69	51.4	31.7
11-Nov	75	60.3	57.4	37.8	21	86.1	66.3	46.7	27.6
18-Nov	72	61.5	54.9	36.3	18	91.7	67.2	45.1	26.8
25-Nov	68	59.6	53.1	34.4	21	81.2	63.9	41.8	24.5
2-Dec	69	61	50	32.5	19	81.9	64.2	38.1	22.4
9-Dec	66	61.9	44.8	29.2	11	80.5	63.8	34.2	20.7
16-Dec	60	51.5	43.2	27.2	6	62.3	56	31.7	19.1
23-Dec	60	52.9	41	25.5	-4	66.5	59.5	30.4	17.8
31-Dec	61	58.1	40.4	24.7	7	72.8	60.7	28.9	17

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2-10 DATA SET PAGE 13: BUILDING ENVELOPE LOADS.

Figure 2-13 is an example of Data Set Page 13. Data Set Page 13 consists of charts summarizing a site's mean heating and cooling degree days.

2-10.1 Explanation of Charts.

2-10.1.1 Calculation of Cooling Degree-Days.

Cooling degree-days are derived by multiplying the number of hours that the outdoor temperature is above the base temperature of 65 °F (18 °C) times the number of degrees of that temperature difference. For example, if 1 hour was observed at a temperature of 78 °F, that observation adds 13 degree-hours to the annual total. The sum of the degree-hours is divided by 24 to yield degree-days.

2-10.1.2 Calculation of Heating Degree-Days.

Heating degree-days are calculated similarly, against the base temperature of 65 °F, so a 1-hour outside temperature observation of 62 °F adds 3 degree-hours to the annual total. Heating degree-days are summed separately from the cooling degree-days. Heating and Cooling degree-hours do not cancel each other out, since both heating and cooling conditions may occur over the course of a given day.

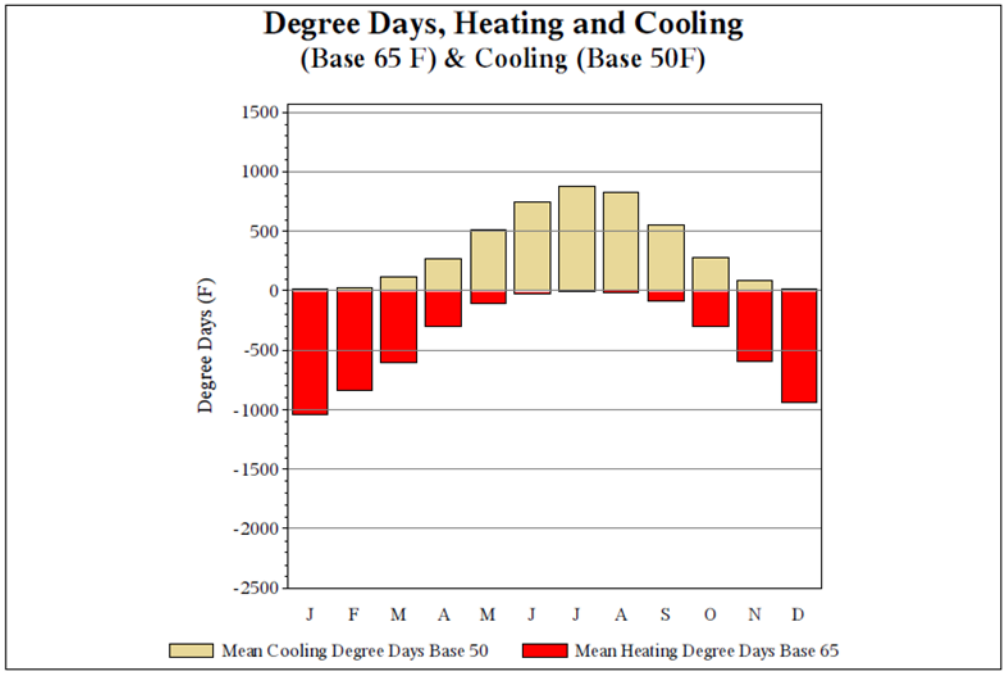
2-10.1.3 Alternate Cooling Degree-Days Calculation.

A separate file has been added to the 14 WS Web site to include the cooling degree-days based upon a base temperature of 50 °F. This file is located on the Engineering Weather Data page under the Standard EWD Package file. This data is intended to allow selection of the proper Building Envelope Requirements table from within **1**\ ASHRAE Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings* (Refer to UFC 1-200-02, for applicable publication date) /**1**/ for energy conservation design. The cooling degree-days based on 65 °F tabulated and graphed here are historically used to estimate loads as suggested in paragraph 2-10.2 below.

2-10.2 Suggestions for Use.

Degree-days are used to estimate the sensible heat and sensible cooling loads on the building envelope. Degree-day loads can be used to estimate the annual energy consumption of a building, provided that the loads from ventilation and infiltration air are also considered (see paragraph 2-11).

Figure 2-13 Sample Data Set Page 13



Month	Mean Cooling Degree Days (°F) Base 50	Mean Cooling Degree Days (°F) Base 65	Mean Heating Degree Days (°F) Base 65
JAN	16.6	0.4	1032.6
FEB	25	1.1	832.7
MAR	111.8	16.6	605.6
APR	271.4	56.8	298
MAY	516.1	154	110.3
JUN	747.3	316.5	19.2
JUL	875.4	415.9	5.6
AUG	819.6	366.6	12
SEP	556	188.9	88
OCT	275.9	56.4	306.5
NOV	90.3	8.3	592.6
DEC	18.7	0.4	940.5
ANN	4324.1	1581.9	4843.6

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2-11 DATA SET PAGE 14: VENTILATION AND INFILTRATION LOADS.

Figure 2-14 is an example of Data Set Page 14. Data Set Page 14 consists of a graph and table that display the independent loads imposed by heating, cooling, humidifying, and dehumidifying outside air as it is brought into a building. The calculation assumes that air inside the building is maintained at conditions between 68 °F (20 °C)/30% RH and 75 °F (24 °C)/60% RH. For the purposes of these calculations, when the outside air is within that range of temperature and moisture, any incoming air is assumed not to impose any load.

These values are calculated with the methodology used to calculate the annual VCLI on Data Set Page One, except that values on this page are computed by month and the result is displayed as British thermal units per cubic foot per minute (Btu/cfm) rather than as ton-hours per CFM per year. The heating and humidifying loads are shown as negative values. Cooling and dehumidifying loads are displayed as positive values.

2-11.1 Suggestions for Use.

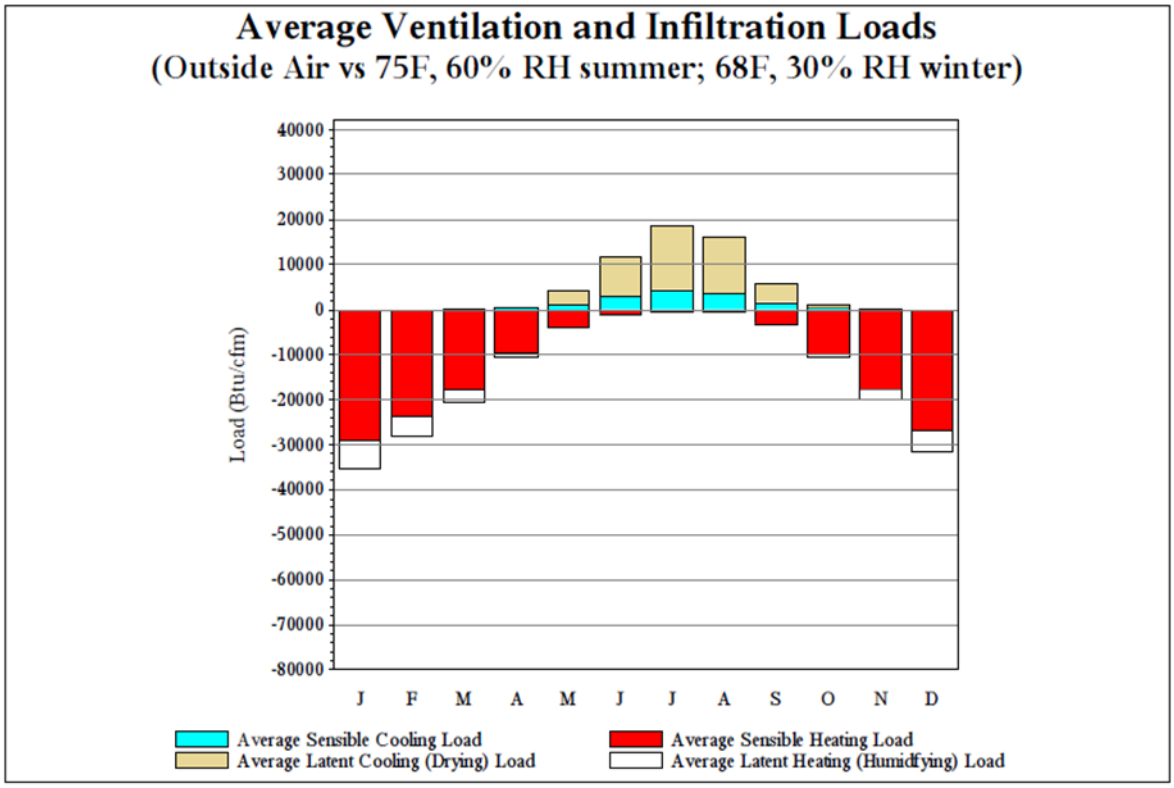
Bringing fresh ventilation air into a building or allowing air to infiltrate into buildings through cracks imposes heating, cooling, dehumidification, and humidification loads on the mechanical system. The information on this data set page helps the architect, engineers, and operating personnel understand the nature and magnitude of those loads on an annual basis. It also shows how the loads vary from month to month throughout the year.

2-11.2 Comments.

These calculations are based on the load created when 1 cubic foot of outside air is brought into the building each minute. The results of the calculation include the moisture load or deficit, and the sensible heat load or deficit created by that cubic foot of air during each month of the year. Note that most months have both a load and a deficit for temperature and moisture. The monthly deficit and load do not “cancel” from the perspective of the mechanical system, because temperature and moisture loads will often occur at different times of the day.

NOTE: The values displayed here assume that the inside air is maintained between 68 °F/30% RH and 75 °F/ 60% RH. If the inside conditions are held in a different range of temperature or moisture, the loads will be different. For example, in calculating loads for humidity-controlled but unheated storage, the loads vary according to the change in both temperature and humidity, since the inside temperature varies but the inside humidity is held constant. For estimating loads in that or similar applications, the engineer may obtain better results by using the average maximum weekly humidity data shown on Data Set Pages 11 and 12 (Figures 2-11 and 2-12).

Figure 2-14 Sample Data Set Page 14



Month	Average Sensible Cooling Load (Btu/cfm)	Average Sensible Heating Load (Btu/cfm)	Average Latent Cooling Load (Btu/cfm)	Average Latent Heating Load (Btu/cfm)
JAN	0	-29169	7	-5929
FEB	1	-23761	6	-4543
MAR	47	-17927	101	-2731
APR	267	-9536	420	-867
MAY	998	-4073	3315	-67
JUN	2894	-926	8717	-1
JUL	4255	-345	14237	0
AUG	3511	-629	12438	0
SEP	1434	-3287	4223	-21
OCT	266	-9831	745	-576
NOV	13	-17587	100	-2359
DEC	0	-26781	8	-4742
ANN	13686	-143852	44317	-21836

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2-12 DATA SET PAGES 15 AND 16: SOLAR RADIATION DATA.

Figures 2-15 and 2-16 are samples of Data Set Page 15 and Data Set Page 16, respectively.

2-12.1 Explanation of Charts.

2-12.1.1 Data Source.

This data is reproduced courtesy of the National Renewable Energy Laboratory (NREL). The data were first published in the NREL's *Solar Radiation Data Manual for Buildings* (1995). The user should refer to that publication for a complete description of how to use this data. The manual can be accessed online at http://www.osti.gov/bridge by searching for "NREL/TP--463-7904."

2-12.1.2 Site Location.

The site used in each station record is the nearest NREL-published site available within a 1.5° latitude radius from the requested location. Consequently, some sites may be several miles away, and in some cases, the NREL location may be in a neighboring state. Use caution when the nearest site available is not in the same city as the requested location, since significant differences in cloud climatology can exist over short distances.

2-12.1.3 Site Availability.

When this document was prepared, the only sites available from NREL were Puerto Rico, Guam, and the 50 states. For locations where solar radiation data is not available, Data Set Pages 15 and 16 are blank. For these locations, users may wish to contact NREL directly to obtain advice concerning data not published in the NREL solar radiation data manual.

2-12.2 Suggestions for Use.

The solar data presented here can be used for calculating solar radiation cooling loads on building envelopes, and also for estimating the value of solar illumination for daylighting calculations. Again, the user should refer to the *Solar Radiation Data Manual for Buildings* for a complete description of how to use this data.

NOTE: The data source for the NREL reports comes from the National Solar Radiation Database—not the data set used to calculate peak design values and other monthly temperature and moisture data in this document. The two data sets will differ for many reasons, including different POR, measurement locations, sampling methodology and frequency, and differences in calculation methodology. Consequently, the user should expect differences in degree-days, minimum and maximum temperatures, and humidity values between this data and that calculated by the 14 WS. For design criteria, use the temperature and moisture values presented on the Design Criteria Data section of Data Set Page 1 (see Figure 2-1) of this document. These were calculated more recently and used a longer POR. Also, they are taken from records at DoD locations rather than from civilian locations near—but not always identical to—the military data collection points.

Figure 2-15 Sample Data Set Page 15

Average Annual Solar Radiation - Nearest Available Site
Source: National Renewable Energy Laboratory, Golden CO, 1995

Station Information		Shading Geometry in Dimensionless Units	
City, State, WBAN	ST.LOUIS, MO 13994	Window:	1.000
Lat, Lon, Elev	38.75N 90.38W 564ft	Overhang:	0.498
Press, Stn_Type	14.5psia Secondary	Vert Gap:	0.314

AVERAGE INCIDENT SOLAR RADIATION (Btu/sq.ft./day) Percentage Uncertainty = 9

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ.	Global	690	930	1230	1590	1860	2030	2020	1800	1460	1100	720	580	1340
	Std.Dev.	56	69	98	135	138	114	120	110	112	98	69	57	42
	Minimum	550	800	1060	1370	1550	1830	1750	1570	1190	870	590	490	1280
	Maximum	780	1070	1430	1930	2180	2350	2240	1960	1690	1250	870	710	1480
	Diffuse	340	460	590	710	810	840	810	730	600	430	350	300	580
Clear Day	Global	950	1300	1760	2230	2520	2630	2550	2290	1870	1400	1000	840	1780
NORTH	Global	210	280	360	440	550	630	600	490	380	290	220	190	390
	Diffuse	210	280	360	430	500	530	520	460	380	290	220	190	370
Clear Day	Global	190	250	330	430	580	680	630	470	360	270	200	170	380
EAST	Global	460	590	750	920	1060	1140	1130	1050	880	710	470	390	800
	Diffuse	260	340	440	530	600	640	620	570	470	360	270	230	440
Clear Day	Global	710	910	1150	1340	1440	1460	1430	1340	1170	940	730	640	1110
SOUTH	Global	1080	1110	1060	970	830	780	820	950	1110	1220	1020	940	990
	Diffuse	370	440	500	540	560	570	570	560	520	440	360	330	480
Clear Day	Global	1930	1970	1770	1380	1040	890	950	1210	1580	1840	1870	1860	1520
WEST	Global	470	600	740	920	1040	1110	1120	1030	880	700	480	390	790
	Diffuse	260	340	440	530	610	650	630	580	480	360	270	230	450
Clear Day	Global	710	910	1150	1340	1440	1460	1430	1340	1170	940	730	640	1110

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Figure 2-16 Sample Data Set Page 16

Average Annual Solar Radiation - Nearest Available Site
Source: National Renewable Energy Laboratory, Golden CO, 1995

AVERAGE TRANSMITTED SOLAR RADIATION (Btu/sq.ft./day) FOR DOUBLE GLAZING Percentage Uncertainty = 9														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ.	Unshaded	450	640	870	1150	1350	1480	1470	1300	1040	770	480	370	950
NORTH	Unshaded	150	190	250	300	370	410	390	330	260	200	150	130	260
	Shaded	130	170	220	270	330	370	350	300	240	180	140	110	230
EAST	Unshaded	320	410	530	660	750	810	810	750	620	500	320	270	560
	Shaded	290	370	470	570	650	700	700	650	550	450	290	240	490
SOUTH	Unshaded	810	810	740	630	510	470	490	600	750	870	760	700	680
	Shaded	790	750	590	420	350	360	360	390	550	770	730	680	560
WEST	Unshaded	320	420	520	650	740	790	800	740	620	490	330	270	560
	Shaded	290	370	460	570	640	680	690	640	550	440	300	240	490

AVERAGE INCIDENT ILLUMINANCE (klux-hr) FOR MOSTLY CLEAR AND MOSTLY CLOUDY CONDITIONS Percentage Uncertainty = 9											
				March					June		
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear	40	73	82	64	26	48	84	101	96	67
	M.Cloudy	23	45	52	40	16	32	61	76	71	49
NORTH	M.Clear	10	14	15	13	8	19	16	17	17	15
	M.Cloudy	9	16	17	14	7	15	18	19	19	16
EAST	M.Clear	75	56	15	13	8	78	72	31	17	15
	M.Cloudy	25	30	17	14	7	40	49	27	19	16
SOUTH	M.Clear	40	73	82	64	26	12	31	45	41	19
	M.Cloudy	17	36	43	32	12	12	26	37	33	18
WEST	M.Clear	10	14	24	67	64	12	16	17	53	78
	M.Cloudy	9	16	21	33	22	12	18	19	41	50
M.Clear	(% hrs)	32	28	27	28	29	43	39	32	29	34

				Sept					Dec		
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear	29	68	86	78	47	16	42	48	30	2
	M.Cloudy	17	42	58	53	31	9	25	28	17	2
NORTH	M.Clear	9	14	16	15	12	6	10	11	8	1
	M.Cloudy	7	15	18	17	12	4	10	11	7	1
EAST	M.Clear	65	70	28	15	12	42	39	11	8	1
	M.Cloudy	23	36	23	17	12	11	18	11	7	1
SOUTH	M.Clear	21	57	75	67	37	39	82	88	63	6
	M.Cloudy	11	31	45	41	21	10	29	32	20	2
WEST	M.Clear	9	14	16	54	74	6	10	22	50	9
	M.Cloudy	7	15	18	35	35	4	10	14	17	2
M.Clear	(% hrs)	47	47	41	41	43	31	30	30	30	32

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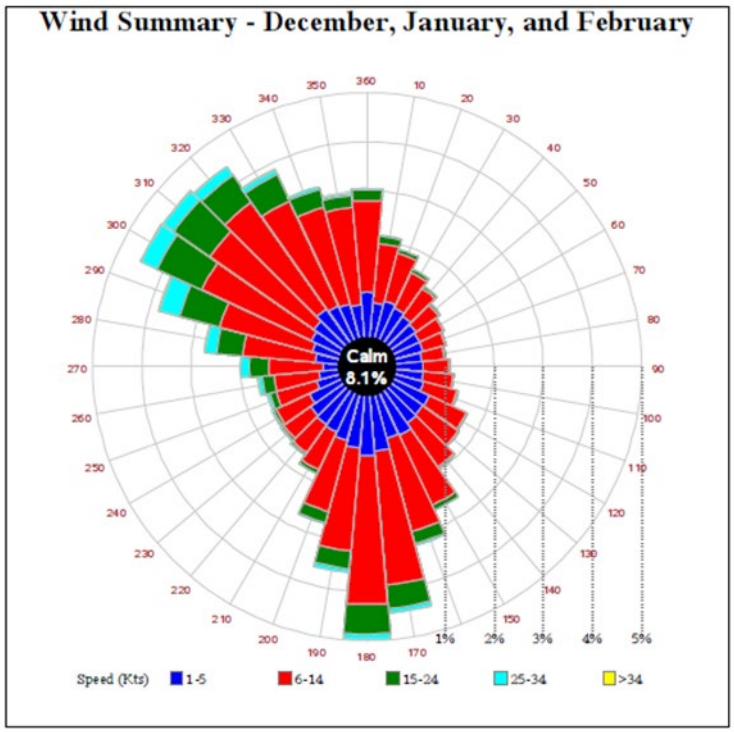
Figure 2-17 Sample Data Set Page 17



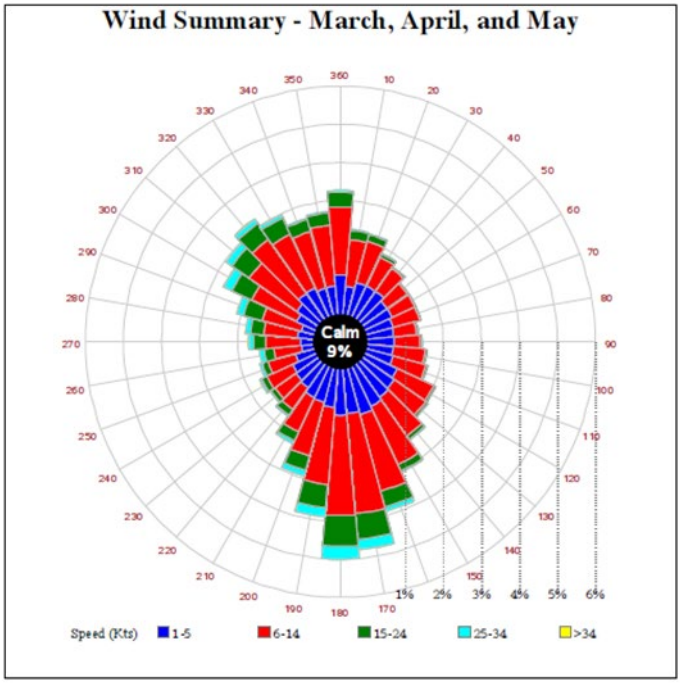


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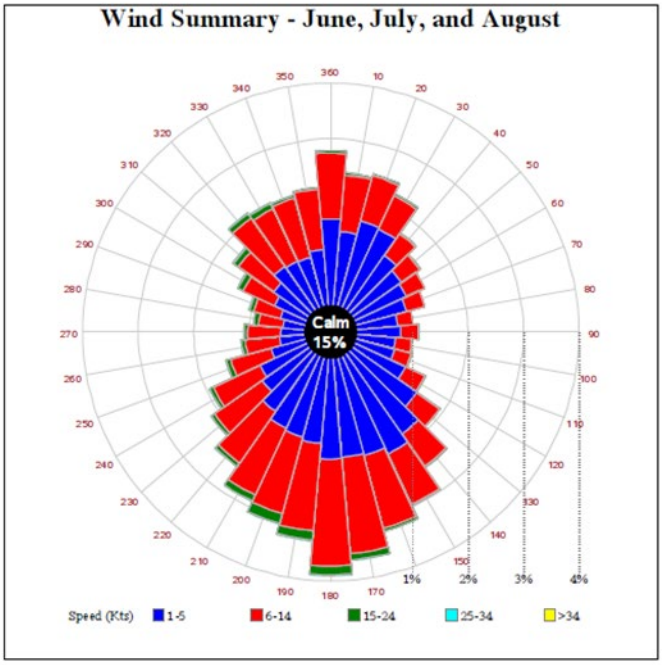
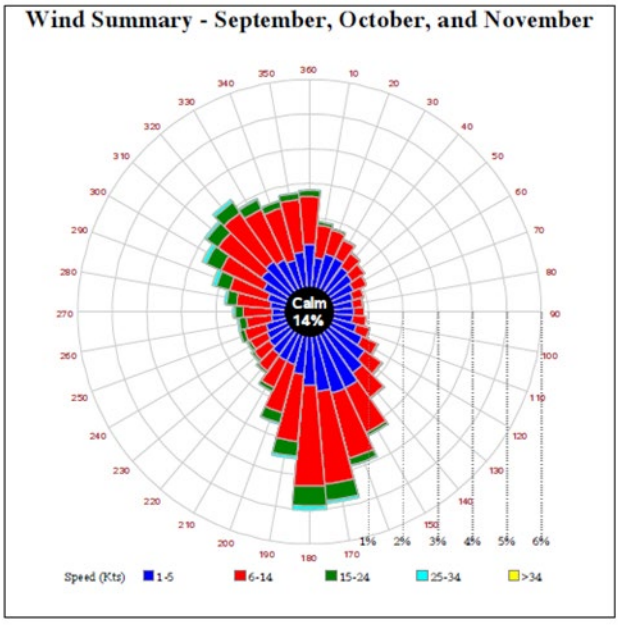
Figure 2-18 Sample Data Set Page 18





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2-13 DATA SET PAGES 17 AND 18: WIND SUMMARY.

Figures 2-17 and 2-18 are samples of Data Set Page 17 and Data Set Page 18, respectively.

2-13.1 Explanation of Charts.

2-13.1.1 Depiction.

These charts depict the frequency of different wind direction and wind speed combinations. The observations are binned into 36 compass directions and 5 speed categories (1 to 5 knots, 6 to 14 knots, 15 to 24 knots, 25 to 34 knots, and greater than 34 knots). The frequency of direction and the tick marks indicate that values lie along each “spoke” of the wind chart. The wind speed bins for each direction are color coded by the legend at the bottom of the chart.

2-13.1.2 Percent Frequency.

To determine the percent frequency of a particular wind direction, look for the tick mark bounding the outer edge of a colored (wind speed) area. In the case of the first wind speed bin (1 to 5 knots), the percent frequency is simply the value of the tick mark on the outer edge of the 1 to 5 knot region. For the higher speed bins (6 to 14 knots or greater), subtract the earlier spoke values from the value shown to get the frequency for the speed bin in question.

2-13.1.3 Total Percent Frequency.

The values for percent frequency have been summed by direction, so to determine the total percent frequency for all speeds from a particular direction, look up the tick mark (or interpolated value) bounding the outermost colored area along that spoke. That tick mark represents the total percent frequency of wind from that direction.

2-13.1.4 Calm Conditions.

Since the calm condition has no direction, the percent occurrence of calm conditions is displayed at the center of the chart.

2-13.2 Wind Summary Chart Example.

The wind summary charts are prepared by 3-month seasons, over all hours (e.g., December, January, February for northern hemisphere winter or southern hemisphere summer; March, April, May for northern hemisphere spring or southern hemisphere fall). See the December through February sample wind summary chart in Figure 2-17 for an example of determining percent frequencies.

2-13.2.1 December through February.

From the December through February sample wind summary chart, the percent frequency of wind between 1 to 5 knots and from the north (N) is about 1%. The percent

frequency of wind between 6 to 14 knots and from the south (S) is about 3% (~4.25% minus ~1.25%). The percent frequency of all wind speeds from the south (S) is about 5%. The percent frequency of all wind directions from the west through north (270° - 360°) is about 35% (2% + 2.75% + 3.875% + 4.5% + 4.5% + 4.25% + 3.875% + 3.25% + 3% + 3%, respectively – all values approximated). It is easy to determine that wind speeds greater than 34 knots almost never occur (or are such a small frequency from any direction) because the colored area (yellow) is not shown or is indistinguishable because it is extremely small.

2-13.2.2 Calm Wind.

The percent of time the wind is calm is indicated in the center of the chart—in this case, 8.1%. When the outermost value from each of the 36 directions are summed and added to the percent calm, the result is 100% (allowing for rounding). Occurrences of variable wind direction are omitted from the sample before computing percent frequency by direction.

2-13.3 Suggestions for Use.

Knowing the probable wind speed and direction in a particular month can be helpful in construction and mission planning as well as in designing structures that experience severe wind-driven rain or drifting snow. Engineers designing outside air intake and building exhaust vents for heating and air conditioning systems can use these data to minimize the potential for cross-contamination between supply and exhaust air streams. Also, when drifting snow accumulation on roofs is likely, the information on these data set pages can be helpful for locating inlet and exhaust ducts so they are less likely to be obstructed by snowdrifts.

NOTE: The wind currents around any building are strongly affected by the geometry of the building and the topography of the site as well as those of any surrounding buildings. The wind data used for these wind summaries are typical of flat and open airfields where there are no obstructions near the observation point.

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APPENDIX A REFERENCES

AMERICAN SOCIETY OF CIVIL ENGINEERS

http://www.asce.org/

2\ ASCE/SEI 7-16, *Minimum Design Loads and Associated Criteria for Buildings and Other Structures* /**2**/

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

http://www.ashrae.org/

1\ ASHRAE Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings* (Refer to UFC 1-200-02, for applicable publication date) /**1**/

INTERNATIONAL CODE COUNCIL

http://www.iccsafe.org/

International Plumbing Code, 2012

NATIONAL GROUND WATER RESEARCH AND EDUCATIONAL FOUNDATION

http://www.ngwa.org/

NATIONAL RENEWABLE ENERGY LABORATORY

http://www.osti.gov/bridge

Solar Radiation Data Manual for Buildings, 1995

UNITED STATES DEPARTMENT OF DEFENSE

http://www.dtic.mil/whs/directives/

DoD Directive 4715.21, *Climate Change Adaptation and Resilience*, 14 January 2016

UNIFIED FACILITIES CRITERIA

http://www.wbdg.org/ccb/browse_cat.php?o=29&c=4

UFC 1-200-01, *DoD Building Code (General Building Requirements)*

UFC 3-301-01, *Structural Engineering*

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APPENDIX B BEST PRACTICES

B-1 BEST PRACTICES.

No best practices are documented at this time.

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APPENDIX C GLOSSARY

C-1 ACRONYMS

AAF	Army Air Field
AB	Air Base
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFM	Air Force Manual
AFS	Air Force Station
ANGB	Air National Guard Base
ANGS	Air National Guard Station
ANSI	American National Standards Institute
ARB	Air Reserve Base
ARS	Air Reserve Station
ASHRAE/IESNA	American Society of Heating, Refrigerating, and Air Conditioning Engineers/Illuminating Engineering Society of North America
Btu	British thermal units
Btu/cfm	British thermal units per cubic foot per minute
Btu/lb	British thermal units per pound of air (enthalpy)
Btu/sq. ft./day	British thermal units per square foot per day (solar radiation)
C	Celsius
Cfm	Cubic foot per minute
DoD	Department of Defense
EWD	Engineering Weather Data
F	Fahrenheit
gr/lb	Grains per pound (humidity ratio, grains of water vapor per pound of air)

g/kg	Grams per kilogram (humidity ratio, grams of water vapor per kilogram of air)
in. Hg	Inches of mercury (atmospheric pressure)
in.	Inches (frost depth)
in./hr	Inches per hour (rain rate)
klux-hr	Thousands of lux-hours (average incident illuminance)
lb/ft2	pounds per square foot (snow load)
LST	Local Standard Time
MCAS	Marine Corps air station
MCB	Marine Corps base
MC Dewpt	Mean Coincident Dewpoint
MCDB	Mean of dry bulb temperatures
MCHR	Mean Coincident Humidity Ratio
MCWB	Mean of wet bulb temperatures
mph	Miles per hour (wind speed)
NAS	Naval Air Station
NAF	Naval Air Facility
NAVFAC	Naval Facilities Engineering Command
NCDC	National Climatic Data Center
NRC	Naval Reserve Center
NREL	National Renewable Energy Laboratory
NS	Naval Station
NSA	Naval Support Activity
POR	Period of record
RH	Relative humidity
ton-hr/cfm/yr	Ton-hours of load per cubic foot per minute per year (Btu÷12,000)

USACE	US Army Corps of Engineers
VCLI	Ventilation Cooling Load Index
WBAN No	Weather Bureau Army Navy number, an identification number for solar radiation data stations in NREL's *Solar Radiation Data Manual for Buildings*
WS	Weather Squadron
BIA	Bilateral Infrastructure Agreement
DoD	Department of Defense
HQUSACE	Headquarters, U.S. Army Corps of Engineers
HNFA	Host Nation Funded Construction Agreements
SOFA	Status of Forces Agreements
UFC	Unified Facilities Criteria
U.S.	United States

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APPENDIX D SAMPLE 14 WS SUPPORT ASSISTANCE REQUEST (SAR) FORM

14WS SUPPORT ASSISTANCE REQUEST (SAR)

SUBJECT

CONTACT INFORMATION

RANK/TITLE FULL NAME

TELEPHONE NUMBER E-MAIL

ORGANIZATION STATION

ORGANIZATION TYPE: LOCATION

Are you Meteorological or Oceanographic Personnel?

Are you a part of the Air Force Weather community?

REQUEST

When do you need your data?

Describe what you need, include specific locations, if applicable and all pertinent details:

Who will receive the information? What it will be used for? Include any tangible benefits or expected impacts. If classified, contact via classified email.

IF DOD CONTRACTOR MILITARY POINT OF CONTACT

RANK/TITLE FULL NAME

CONTACT TELEPHONE CONTRACT NUMBER

14 WS FORM 1, DEC 12 ***(EF-V2)*** PREVIOUS EDITIONS MAY BE USED. PAGE 1 OF 1 PAGES

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APPENDIX E LIST OF AVAILABLE EWD SITES

E-1 REGULARLY UPDATED SITES.

Table E-1 is a list that consists of the Site Name, 4-letter Station ID, Latitude/Longitude, and Country for each Engineering Weather Data (EWD) site available at the 14th Weather Squadron. Note that the sites are regularly updated and the latest list should be retrieved at https://www.climate.af.mil.

Table E-1 List of Available EWD Sites

Site Name	Station ID	Lat	Lon	Country
BAGRAM	KQSA	34.94	69.26	AFGHANISTAN
BASTION AIRFIELD/SHORABACK	OAZI	31.85	64.22	AFGHANISTAN
HERAT	OAHR	34.21	62.23	AFGHANISTAN
JALALABAD	KQL5	34.4	70.48	AFGHANISTAN
KABUL INTL	OAKB	34.57	69.21	AFGHANISTAN
KALAT	OAKT	32.12	66.9	AFGHANISTAN
KANDAHAR AIRPORT	40990	31.5	65.85	AFGHANISTAN
KUNDUZ	40913	36.67	68.92	AFGHANISTAN
MAZAR I SHARIF	OAMS	36.71	67.21	AFGHANISTAN
EL GOLEA	DAUE	30.57	2.86	ALGERIA
HOUARI BOUMEDIENE	DAAG	36.69	3.22	ALGERIA
TAMANRASSET	DAAT	22.81	5.45	ALGERIA
TINDOUF	DAOF	27.7	-8.17	ALGERIA
BASE MARAMBIO (CENTRO MET. ANTARTICO)	89055	-64.23	-56.72	ANTARCTICA
V C BIRD INTL	TAPA	17.14	-61.79	ANTIGUA AND BARBUDA
MINISTRO PISTARINI	SAEZ	-34.82	-58.54	ARGENTINA
POSADAS	SARP	-27.39	-55.97	ARGENTINA
RESISTENCIA	SARE	-27.45	-59.06	ARGENTINA
RIO GALLEGOS	SAWG	-51.61	-69.31	ARGENTINA
ROSARIO	SAAR	-32.9	-60.78	ARGENTINA
REINA BEATRIX INTL	TNCA	12.5	-70.02	ARUBA
ADELAIDE INTL	YPAD	-34.94	138.53	AUSTRALIA
ALICE SPRINGS	YBAS	-23.81	133.9	AUSTRALIA
BRISBANE AIRPORT	YBBN	-27.42	153.07	AUSTRALIA
CANBERRA	YSCB	-35.31	149.2	AUSTRALIA
DARWIN INTL	YPDN	-12.41	130.88	AUSTRALIA
LEARMONTH	YPLM	-22.24	114.09	AUSTRALIA
MELBOURNE INTL	YMML	-37.67	144.84	AUSTRALIA

Site Name	Station ID	Lat	Lon	Country
PERTH INTL	YPPH	-31.94	115.97	AUSTRALIA
SYDNEY INTL	YSSY	-33.95	151.18	AUSTRALIA
TOWNSVILLE	YBTL	-19.25	146.77	AUSTRALIA
SALZBURG	LOWS	47.79	13	AUSTRIA
NASSAU INTL	MYNN	25.04	-77.47	BAHAMAS
BAHRAIN INTL	OBBI	26.27	50.63	BAHRAIN
HAZRAT SHAHJALAL INTL	VGHS	23.84	90.4	BANGLADESH
ZHITCKOVICHI	33027	52.22	27.87	BELARUS
BRUSSELS NATL	EBBR	50.9	4.48	BELGIUM
CHIEVRES AB	EBCV	50.58	3.83	BELGIUM
FLORENNES	EBFS	50.24	4.65	BELGIUM
CADJEHOUN	DBBB	6.36	2.38	BENIN
BERMUDA INTL	TXKF	32.36	-64.68	BERMUDA
EL ALTO INTL	SLLP	-16.51	-68.19	BOLIVIA
TTE AV JORGE HENRICH ARAUZ	SLTR	-14.82	-64.92	BOLIVIA
VIRU VIRU INTL	SLVR	-17.64	-63.14	BOLIVIA
CONGONHAS	SBSP	-23.63	-46.66	BRAZIL
DEPUTADO LUIS EDUARDO MAGALHAES	SBSV	-12.91	-38.33	BRAZIL
EDUARDO GOMES INTL	SBEG	-3.04	-60.05	BRAZIL
GALEAO ANTONIO CARLOS JOBIM	SBGL	-22.81	-43.24	BRAZIL
GUARARAPES GILBERTO FREYRE INTL	SBRF	-8.13	-34.92	BRAZIL
PINTO MARTINS INTL	SBFZ	-3.78	-38.53	BRAZIL
PRESIDENTE JUSCELINO KUBITSCHEK	SBBR	-15.86	-47.91	BRAZIL
SALGADO FILHO	SBPA	-29.99	-51.17	BRAZIL
SANTOS DUMONT	SBRJ	-22.91	-43.16	BRAZIL
VAL DE CANS INTL	SBBE	-1.38	-48.48	BRAZIL
DIEGO GARCIA NSF	FJDG	-7.31	72.41	BRITISH INDIAN OCEAN TERRITORY
BURGAS	LBBG	42.57	27.52	BULGARIA
SOFIA	LBSF	42.7	23.41	BULGARIA
VARNA	LBWN	43.23	27.83	BULGARIA
OUAGADOUGOU	DFFD	12.35	-1.51	BURKINA FASO
MINGALADON	48096	16.9	96.18	BURMA
ARGENTIA (AUT)	71807	47.3	-53.98	CANADA
ARMSTRONG (AUT) ONT	71841	50.28	-88.9	CANADA
CALGARY INTL	CYYC	51.11	-114.02	CANADA
CAMBRIDGE BAY	CYCB	69.11	-105.14	CANADA
CAPE DYER	CWFD	66.65	-61.38	CANADA
CAPE PARRY A	CZCP	70.17	-124.72	CANADA
CHAPAIS	CYMT	49.77	-74.53	CANADA

Site Name	Station ID	Lat	Lon	Country
CHARLO AUTO NB	71315	47.98	-66.33	CANADA
CHURCHILL A UA MAN	71913	58.73	-94.07	CANADA
CHURCHILL FALLS	CZUM	53.57	-64.1	CANADA
COLD LAKE	CYOD	54.4	-110.28	CANADA
COMOX	CYQQ	49.71	-124.89	CANADA
EDMONTON/NAMAO(MIL)	CYED	53.67	-113.47	CANADA
ESTEVAN A	CYEN	49.22	-102.97	CANADA
FORT NELSON	CYYE	58.83	-122.6	CANADA
FORT SMITH	CYSM	60.02	-111.96	CANADA
FREDERICTON	CYFC	45.87	-66.53	CANADA
GANDER INTL	CYQX	48.94	-54.57	CANADA
GOOSE BAY	CYYR	53.32	-60.42	CANADA
GRANDE PRAIRIE	CYQU	55.18	-118.88	CANADA
HALIFAX INTL	CYHZ	44.88	-63.51	CANADA
HALL BEACH	CYUX	68.78	-81.24	CANADA
HOPEDALE (AUT) NFLD	71900	55.45	-60.22	CANADA
INUVIK MIKE ZUBKO	CYEV	68.3	-133.48	CANADA
IQALUIT	CYFB	63.76	-68.56	CANADA
KAMLOOPS	CYKA	50.7	-120.44	CANADA
KAPUSKASING	CYYU	49.41	-82.47	CANADA
KUGLUKTUK	CYCO	67.82	-115.14	CANADA
LESTER B PEARSON INTL	CYYZ	43.68	-79.63	CANADA
LYNN LAKE	CYYL	56.86	-101.08	CANADA
NORMAN WELLS	CYVQ	65.28	-126.8	CANADA
NORTH BAY	CYYB	46.36	-79.42	CANADA
OTTAWA MACDONALD CARTIER INTL	CYOW	45.32	-75.67	CANADA
PIERRE ELLIOTT TRUDEAU INTL	CYUL	45.47	-73.73	CANADA
POND INLET	CYIO	72.68	-77.97	CANADA
PORT HARDY	CYZT	50.68	-127.37	CANADA
PRINCE GEORGE	CYXS	53.89	-122.68	CANADA
RANKIN INLET	CYRT	62.81	-92.12	CANADA
RESOLUTE BAY	CYRB	74.72	-94.97	CANADA
SANDSPIT	CYZP	53.25	-131.81	CANADA
SASKATOON J G DIEFENBAKER INTL	CYXE	52.17	-106.7	CANADA
SEPT ILES	CYZV	50.22	-66.27	CANADA
SHEPHERD BAY A	CYUS	68.82	-93.43	CANADA
SHERBROOKE	CYSC	45.44	-71.69	CANADA
SIOUX LOOKOUT AIRPORT	CYXL	50.12	-91.9	CANADA
ST JOHNS INTL	CYYT	47.62	-52.75	CANADA
STEPHENVILLE A	CYJT	48.53	-58.55	CANADA

Site Name	Station ID	Lat	Lon	Country
SUDBURY	CYSB	46.63	-80.8	CANADA
SYDNEY A	CYQY	46.17	-60.05	CANADA
TERRACE	CYXT	54.47	-128.58	CANADA
THE PAS AIRPORT	CYQD	53.97	-101.1	CANADA
THUNDER BAY A	CYQT	48.37	-89.33	CANADA
TIMMINS VICTOR POWER A	CYTS	48.57	-81.38	CANADA
VANCOUVER INTL	CYVR	49.19	-123.18	CANADA
WHITEHORSE INTL	CYXY	60.71	-135.07	CANADA
WINNIPEG INTL	CYWG	49.91	-97.24	CANADA
YARMOUTH	CYQI	43.83	-66.09	CANADA
YELLOWKNIFE	CYZF	62.46	-114.44	CANADA
AMILCAR CABRAL INTL	GVAC	16.74	-22.95	CAPE VERDE
BANGUI M POKO	FEFF	4.4	18.52	CENTRAL AFRICAN REPUBLIC
NDJAMENA HASSAN DJAMOUS	FTTJ	12.13	15.03	CHAD
ARTURO MERINO BENITEZ INTL	SCEL	-33.39	-70.79	CHILE
CARRIEL SUR INTL	SCIE	-36.77	-73.06	CHILE
CERRO MORENO INTL	SCFA	-23.44	-70.45	CHILE
ANQING	58424	30.62	116.97	CHINA
ARXAN	50727	47.17	119.93	CHINA
BAITA	ZBHH	40.85	111.82	CHINA
BAYTIK SHAN	51288	45.37	90.53	CHINA
BEIJING - CAPITAL INTERNATIONAL AIRPORT	ZBAA	40.08	116.58	CHINA
BENGBU	58221	32.85	117.3	CHINA
BOXIAN	58102	33.78	115.73	CHINA
CHANGLE	ZSFZ	25.94	119.66	CHINA
DA-QAIDAM	52713	37.85	95.37	CHINA
EJIN QI	52267	41.95	101.07	CHINA
FUJIN	50788	47.23	131.98	CHINA
GAOPING	57411	30.75	106.13	CHINA
GARZE	56146	31.62	100	CHINA
HAIKOU	59758	20	110.25	CHINA
HAILAR	50527	49.25	119.7	CHINA
HALIUT	53336	41.57	108.52	CHINA
HARBIN	50953	45.93	126.57	CHINA
HECHI	59023	24.7	108.05	CHINA
HEZUO	56080	35	102.9	CHINA
HONGQIAO INTL	ZSSS	31.2	121.34	CHINA
HOTAN	51828	37.13	79.93	CHINA
HUADE	53391	41.9	114	CHINA

Site Name	Station ID	Lat	Lon	Country
HUOSHAN	58314	31.4	116.33	CHINA
JI'AN	57799	27.12	114.97	CHINA
KASHI	ZWSH	39.54	76.02	CHINA
KUQA	51644	41.72	82.95	CHINA
LANZHOU	52889	36.05	103.88	CHINA
LAOHEKOU	57265	32.43	111.73	CHINA
LIANGJIANG	ZGKL	25.22	110.04	CHINA
LIJING	56651	26.83	100.47	CHINA
LINDONG	54027	43.98	119.4	CHINA
LIUTING	ZSQD	36.27	120.37	CHINA
OTOG QI	53529	39.1	107.98	CHINA
RUOQIANG	51777	39.03	88.17	CHINA
SANJIAZI	ZYQQ	47.24	123.92	CHINA
SHENYANG	54342	41.73	123.52	CHINA
SHUANGLIU	ZUUU	30.58	103.95	CHINA
WUJIABA	ZPPP	24.99	102.74	CHINA
WUSU	ZBYN	37.75	112.63	CHINA
XIN BARAG YOUQI	50603	48.68	116.82	CHINA
YANCHI	53723	37.8	107.38	CHINA
YICHANG	57461	30.73	111.37	CHINA
ZHOUSHUIZI	ZYTL	38.97	121.54	CHINA
ALFONSO BONILLA ARAGON INTL	SKCL	3.54	-76.38	COLOMBIA
ELDORADO INTL	SKBO	4.7	-74.15	COLOMBIA
ERNESTO CORTISSOZ	SKBQ	10.89	-74.78	COLOMBIA
NDJILI INTL	FZAA	-4.39	15.44	CONGO, DEMOCRATIC REPUBLIC OF
JUAN SANTAMARIA INTL	MROC	9.99	-84.21	COSTA RICA
ABIDJAN FELIX HOUPHOUET BOIGNY INTL	DIAP	5.26	-3.93	COTE D'IVOIRE
GUANTANAMO BAY NS	MUGM	19.91	-75.21	CUBA
JOSE MARTI INTL	MUHA	22.99	-82.41	CUBA
LARNACA	LCLK	34.88	33.62	CYPRUS
PAFOS INTL	LCPH	34.72	32.49	CYPRUS
RUZYNE	LKPR	50.1	14.26	CZECH REPUBLIC
FLYVESTATION AALBORG	EKYT	57.09	9.85	DENMARK
KASTRUP	EKCH	55.62	12.66	DENMARK
CAMP LEMONNIER	KQRH	11.55	43.16	DJIBOUTI
DJIBOUTI AMBOULI	HDAM	11.55	43.16	DJIBOUTI
LAS AMERICAS INTL	MDSD	18.43	-69.67	DOMINICAN REPUBLIC
MARISCAL SUCRE INTL	SEQU	-0.14	-78.49	ECUADOR

Site Name	Station ID	Lat	Lon	Country
SIMON BOLIVAR INTL	SEGU	-2.16	-79.88	ECUADOR
ALEXANDRIA INTL	HEAX	31.18	29.95	EGYPT
CAIRO INTL	HECA	30.12	31.41	EGYPT
LUXOR INTL	HELX	25.67	32.71	EGYPT
ILOPANGO INTL	MSSS	13.7	-89.12	EL SALVADOR
CHUUK INTL	PTKK	7.46	151.84	FEDERATED STATES OF MICRONESIA
POHNPEI INTL	PTPN	6.99	158.21	FEDERATED STATES OF MICRONESIA
YAP INTL	PTYA	9.5	138.08	FEDERATED STATES OF MICRONESIA
NADI INTL	NFFN	-17.76	177.44	FIJI
HELSINKI VANTAA	EFHK	60.32	24.96	FINLAND
KAJAANI	EFKI	64.29	27.69	FINLAND
ARNAGE	LFRM	47.95	0.2	FRANCE
BRON	LFLY	45.73	4.94	FRANCE
CHATEAUBERNARD	LFBG	45.66	-0.32	FRANCE
COTE D AZUR	LFMN	43.66	7.22	FRANCE
LE TUBE	LFMI	43.52	4.92	FRANCE
MONT DE MARSAN	LFBM	43.91	-0.51	FRANCE
ORLY	LFPO	48.73	2.36	FRANCE
PROVENCE	LFML	43.44	5.21	FRANCE
ROCHAMBEAU	SOCA	4.82	-52.36	FRENCH GUIANA
TAHITI FAAA	NTAA	-17.55	-149.61	FRENCH POLYNESIA
LEON M BA	FOOL	0.46	9.41	GABON
BANJUL INTL	GBYD	13.34	-16.65	GAMBIA
TBILISI / LOCHINI AIRPORT	UGGG	41.75	44.77	GEORGIA
YEREVAN/YEREVAN-ARABKIR	37789	40.13	44.47	GEORGIA
ANSBACH AHP	ETEB	49.31	10.64	GERMANY
AUGSBURG	EDMA	48.43	10.93	GERMANY
BAD KREUZNACH AAF	ETEH	49.85	7.88	GERMANY
BAMBERG	10675	49.88	10.92	GERMANY
BREMEN	EDDW	53.05	8.79	GERMANY
BREMERHAVEN	10129	53.53	8.58	GERMANY
BUCHEL	ETSB	50.17	7.06	GERMANY
ERDING	ETSE	48.32	11.95	GERMANY
FRANKFURT HAHN	EDFH	49.95	7.26	GERMANY
FRANKFURT MAIN	EDDF	50.03	8.54	GERMANY
GARMISCH-PARTENKIRCHEN	10963	47.48	11.07	GERMANY
GEILENKIRCHEN	ETNG	50.96	6.04	GERMANY
GIESSEN-WETTENBERG	10532	50.6	8.65	GERMANY

Site Name	Station ID	Lat	Lon	Country
GRAFENWOHR AAF	ETIC	49.7	11.94	GERMANY
HANAU AAF	ETID	50.17	8.96	GERMANY
HANNOVER	EDDV	52.46	9.69	GERMANY
HEIDELBERG AHP	ETIE	49.39	8.65	GERMANY
IDAR-OBERSTEIN(MIL)	ETGI	49.7	7.33	GERMANY
KARLSRUHE	10727	49.03	8.37	GERMANY
KASSEL	10438	51.3	9.45	GERMANY
KITZINGEN AAF	ETIN	49.74	10.2	GERMANY
KITZINGEN(US ARMY)	10659	49.75	10.2	GERMANY
LAUTERTAL-OBERLAUTER	10671	50.3	10.97	GERMANY
LEUCHTTURM KIEL	10044	54.5	10.27	GERMANY
MANNHEIM CITY	EDFM	49.47	8.51	GERMANY
MUNCHEN	EDDM	48.35	11.79	GERMANY
NURNBERG	EDDN	49.5	11.08	GERMANY
OLDENBURG	10215	53.18	8.17	GERMANY
RAMSTEIN AB	ETAR	49.44	7.6	GERMANY
SEMBACH (USAFB)	ETAS	49.5	7.87	GERMANY
SPANGDAHLEM AB	ETAD	49.97	6.69	GERMANY
STOETTEN	10836	48.67	9.87	GERMANY
STUTTGART	EDDS	48.69	9.22	GERMANY
TEMPELHOF	EDDI	52.47	13.4	GERMANY
ULM	10838	48.38	9.95	GERMANY
WENDELSTEIN	10980	47.7	12.02	GERMANY
WIESBADEN AAF	ETOU	50.05	8.33	GERMANY
WUERZBURG	10655	49.77	9.95	GERMANY
ZWEIBRUCKEN	EDRZ	49.21	7.4	GERMANY
KOTOKA INTL	DGAA	5.61	-0.17	GHANA
AKTIO	LGPZ	38.93	20.77	GREECE
ANDRAVIDA	LGAD	37.92	21.29	GREECE
ATHINAI	LGAT	37.88	23.73	GREECE
DIAGORAS	LGRP	36.41	28.09	GREECE
ELEFSIS	LGEL	38.06	23.56	GREECE
IOANNIS KAPODISTRIAS INTL	LGKR	39.6	19.91	GREECE
LARISA	LGLR	39.65	22.47	GREECE
MAKEDONIA	LGTS	40.52	22.97	GREECE
NIKOS KAZANTZAKIS	LGIR	35.34	25.18	GREECE
SOUDA	LGSA	35.53	24.15	GREECE
SOUDA BAY (NEMOD)	EQYG	35.53	24.15	GREECE
NUUK (GODTHAAB)	4250	64.17	-51.75	GREENLAND
SONDRE STROMFJORD	BGSF	67.02	-50.69	GREENLAND

Site Name	Station ID	Lat	Lon	Country
TASIILAQ	BGAM	65.6	-37.63	GREENLAND
THULE AIR BASE	BGTL	76.53	-68.7	GREENLAND
ANDERSEN AFB	PGUA	13.58	144.93	GUAM
GUAM INTL	PGUM	13.48	144.8	GUAM
LA AURORA	MGGT	14.58	-90.53	GUATEMALA
TOUSSAINT LOUVERTURE INTL	MTPP	18.58	-72.29	HAITI
SOTO CANO AB	MHSC	14.38	-87.62	HONDURAS
TONCONTIN INTL	MHTG	14.06	-87.22	HONDURAS
HONG KONG INTL	VHHH	22.31	113.91	HONG KONG
FERIHEGY	LHBP	47.44	19.26	HUNGARY
KEFLAVIK NAS	BIKF	63.99	-22.61	ICELAND
REYKJAVIK	BIRK	64.13	-21.94	ICELAND
BEGUMPET AIRPORT	VOHY	17.45	78.46	INDIA
CHENNAI INTL	VOMM	12.99	80.18	INDIA
CHHATRAPATI SHIVAJI INTL	VABB	19.09	72.87	INDIA
NETAJI SUBHASH CHANDRA BOSE INTL	VECC	22.65	88.45	INDIA
SAFDARJUNG	VIDD	28.58	77.21	INDIA
DENPASAR NGURAH RAI	WRRR	-8.75	115.17	INDONESIA
MEHRABAD INTL	OIII	35.69	51.31	IRAN
BAGHDAD	KQTZ	33.25	44.23	IRAQ
BASRAH INTL	ORMM	30.55	47.66	IRAQ
DIWANIYA	40672	31.95	44.95	IRAQ
KIRKUK AB	ORKK	35.47	44.35	IRAQ
KUT-AL-HAI	40665	32.13	46.03	IRAQ
MOSUL	ORBM	36.31	43.15	IRAQ
NASIRIYA	40676	31.02	46.23	IRAQ
RUTBAH	40642	33.03	40.28	IRAQ
DUBLIN	EIDW	53.42	-6.27	IRELAND
SHANNON	EINN	52.7	-8.92	IRELAND
OVDA	LLOV	29.94	34.94	ISRAEL
RAMAT DAVID	LLRD	32.67	35.18	ISRAEL
SDE DOV	LLSD	32.11	34.78	ISRAEL
AVIANO AB	LIPA	46.03	12.6	ITALY
CAPODICHINO	LIRN	40.89	14.29	ITALY
CASALE	LIBR	40.66	17.95	ITALY
CIAMPINO	LIRA	41.8	12.59	ITALY
CIMONE MOUNTAIN	LIVC	44.2	10.7	ITALY
DECIMOMANNU	LIED	39.35	8.97	ITALY
ELMAS	LIEE	39.25	9.05	ITALY
GHEDI	LIPL	45.43	10.27	ITALY

Site Name	Station ID	Lat	Lon	Country
GRAZZANISE	LIRM	41.06	14.08	ITALY
LINATE	LIML	45.45	9.28	ITALY
PISA	LIRP	43.68	10.39	ITALY
RIMINI	LIPR	44.02	12.61	ITALY
SIGONELLA	LICZ	37.4	14.92	ITALY
SIGONELLA (NEMOD)	EQYS	37.4	14.9	ITALY
VENEZIA TESSERA	LIPZ	45.51	12.35	ITALY
VICENZA	LIPT	45.57	11.53	ITALY
VILLAFRANCA	LIPX	45.4	10.89	ITALY
NORMAN MANLEY INTL	MKJP	17.94	-76.79	JAMAICA
ASHIYA	RJFA	33.88	130.65	JAPAN
ATSUGI NAF	RJTA	35.45	139.45	JAPAN
FUKUOKA	47807	33.58	130.38	JAPAN
FUKUOKA	RJFF	33.59	130.45	JAPAN
FUTENMA MCAS	ROTM	26.27	127.76	JAPAN
IRUMA	RJTJ	35.84	139.41	JAPAN
IWAKUNI MCAS	RJOI	34.14	132.24	JAPAN
KADENA AB	RODN	26.36	127.77	JAPAN
MISAWA AB	RJSM	40.7	141.37	JAPAN
MORIOKA	47584	39.7	141.17	JAPAN
NAGASAKI	47817	32.73	129.87	JAPAN
NAGASAKI	RJFU	32.92	129.91	JAPAN
NAGOYA	RJNA	35.26	136.92	JAPAN
NAHA	ROAH	26.2	127.65	JAPAN
NARITA INTL	RJAA	35.76	140.39	JAPAN
NEW CHITOSE	RJCC	42.78	141.69	JAPAN
OSAKA INTL	RJOO	34.79	135.44	JAPAN
SAPPORO	47412	43.07	141.33	JAPAN
SAPPORO	RJCO	43.12	141.38	JAPAN
SASEBO	47812	33.17	129.73	JAPAN
TOKYO	RJTD	35.68	139.77	JAPAN
TOKYO INTL	RJTT	35.55	139.78	JAPAN
YOKOSUKA (NPMOF)	RJTX	35.28	139.67	JAPAN
YOKOTA AB	RJTY	35.75	139.35	JAPAN
JOHNSTON ATOLL	PJON	16.73	-169.53	JOHNSTON ATOLL
H4	OJHR	32.54	38.19	JORDAN
JERUSALEM AIRPORT	40290	31.87	35.22	JORDAN
MARKA INTL	OJAM	31.97	35.99	JORDAN
AKKUDUK	38232	42.97	54.12	KAZAKHSTAN
AKTAU	UATE	43.86	51.09	KAZAKHSTAN

Site Name	Station ID	Lat	Lon	Country
AKTYUBINSK	UATT	50.25	57.21	KAZAKHSTAN
BALHASH	35796	46.8	75.08	KAZAKHSTAN
CIRIK-RABAT	38049	44.07	62.9	KAZAKHSTAN
KOKSHETAY	28879	53.28	69.38	KAZAKHSTAN
KZYL-ORDA	UAOO	44.77	65.53	KAZAKHSTAN
NOVYJ USHTOGAN	34691	47.9	48.8	KAZAKHSTAN
SAM	35925	45.4	56.12	KAZAKHSTAN
SEMIPALATINSK	36177	50.42	80.3	KAZAKHSTAN
TAIPAK	35406	49.05	51.87	KAZAKHSTAN
TASTY	380810	44.8	69.12	KAZAKHSTAN
URALSK	UARR	51.15	51.54	KAZAKHSTAN
GARISSA	HKGA	-0.46	39.65	KENYA
MANDERA	HKMA	3.93	41.87	KENYA
MOMBASA MOI INTL	HKMO	-4.03	39.59	KENYA
NAIROBI JKIA	HKJK	-1.32	36.93	KENYA
CHONGJIN	47008	41.78	129.82	KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF
KANGGYE	47020	40.97	126.6	KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF
PYONGYANG INTL	ZKPY	39.22	125.67	KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF
SENBONG	47003	42.32	130.4	KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF
SINUIJU	47035	40.1	124.38	KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF
WONSAN	47055	39.18	127.43	KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF
A 511/PYEONGTAEK	RKSG	36.97	127.03	KOREA, REPUBLIC OF
ANMYEONDO	47132	36.52	126.32	KOREA, REPUBLIC OF
BAENGNYEONGDO	47102	37.97	124.63	KOREA, REPUBLIC OF
BUSAN	47159	35.1	129.03	KOREA, REPUBLIC OF
CAMP REDCLOUD/UIJD	RKSB	37.75	127.03	KOREA, REPUBLIC OF
CAMP STANLEY TMQ-53P	KQFA	37.72	127.1	KOREA, REPUBLIC OF
CHEONGJU INTL	RKTU	36.72	127.5	KOREA, REPUBLIC OF
CHUNCHEON	47101	37.9	127.73	KOREA, REPUBLIC OF
CHUPUNGNYEONG	47135	36.22	127.98	KOREA, REPUBLIC OF
DAEGU AB	RKTN	35.89	128.66	KOREA, REPUBLIC OF
GANGNEUNG	RKNN	37.75	128.94	KOREA, REPUBLIC OF

Site Name	Station ID	Lat	Lon	Country
GIMHAE INTL	RKPK	35.18	128.94	KOREA, REPUBLIC OF
GIMPO	RKSS	37.56	126.79	KOREA, REPUBLIC OF
GWANGJU	RKJJ	35.13	126.81	KOREA, REPUBLIC OF
INCHEON	47112	37.47	126.63	KOREA, REPUBLIC OF
KAESONG	47070	37.97	126.57	KOREA, REPUBLIC OF
KOREAN AF HQ	RKSF	37.5	126.92	KOREA, REPUBLIC OF
KUNSAN AB	RKJK	35.9	126.62	KOREA, REPUBLIC OF
MANGILSAN	47126	36.93	126.45	KOREA, REPUBLIC OF
MOSULPO (KOR-AFB)	RKPM	33.2	126.27	KOREA, REPUBLIC OF
OSAN AB	RKSO	37.09	127.03	KOREA, REPUBLIC OF
POHANG	RKTH	35.99	129.42	KOREA, REPUBLIC OF
SACHEON AB	RKPS	35.09	128.07	KOREA, REPUBLIC OF
SEOUL AB	RKSM	37.45	127.11	KOREA, REPUBLIC OF
SUWON	RKSW	37.24	127.01	KOREA, REPUBLIC OF
YECHEON	RKTY	36.63	128.35	KOREA, REPUBLIC OF
ALI AL SALEM	KQGV	29.33	47.52	KUWAIT
KUWAIT INTL	OKBK	29.23	47.97	KUWAIT
BISHKEK	38353	42.85	74.53	KYRGYZSTAN
GULBENE	26348	57.13	26.72	LATVIA
LIEPAJA INTL	EVLA	56.52	21.1	LATVIA
RAFIC HARIRI INTL	OLBA	33.82	35.49	LEBANON
BENINA AIRPORT	HLLB	32.1	20.27	LIBYA
TRIPOLI INTL	HLLT	32.66	13.16	LIBYA
VILNIUS INTL	EYVI	54.63	25.29	LITHUANIA
KOTA KINABALU INTL	WBKK	5.94	116.05	MALAYSIA
KUCHING INTL	WBGG	1.48	110.35	MALAYSIA
PENANG INTL	WMKP	5.3	100.28	MALAYSIA
SULTAN ABDUL AZIZ SHAH INTL	WMSA	3.13	101.55	MALAYSIA
BUCHOLZ AAF	PKWA	8.72	167.73	MARSHALL ISLAND
MARSHALL ISLANDS INTL	PKMJ	7.06	171.27	MARSHALL ISLAND
LE LAMENTIN	TFFF	14.59	-61	MARTINIQUE
NOUAKCHOTT	GQNN	18.1	-15.95	MAURITANIA
DZAOUDZI PAMANDZI	FMCZ	-12.8	45.28	MAYOTTE
LICENCIADO BENITO JUAREZ INTL	MMMX	19.44	-99.07	MEXICO
MIDWAY ATOLL	PMDY	28.2	-177.38	MIDWAY ISLANDS
CHISINAU	33815	47.02	28.98	MOLDOVA
DALANZADGAD	44373	43.58	104.42	MONGOLIA
MANDALGOBI	44341	45.77	106.28	MONGOLIA
TSETSERLEG	44282	47.45	101.47	MONGOLIA
UNDERKHAAN	44304	47.32	110.63	MONGOLIA

Site Name	Station ID	Lat	Lon	Country
PODGORICA / GOLUBOVCI	LYTI	42.37	19.25	MONTENEGRO
TIVAT	LYTV	42.4	18.72	MONTENEGRO
IBN BATOUTA	GMTT	35.73	-5.92	MOROCCO
MOHAMMED V	GMMN	33.37	-7.59	MOROCCO
SALE	GMME	34.05	-6.75	MOROCCO
MAPUTO	FQMA	-25.92	32.57	MOZAMBIQUE
HOEK VAN HOLLAND	6330	51.98	4.1	NETHERLANDS
LEEUWARDEN	EHLW	53.23	5.76	NETHERLANDS
SCHIPHOL	EHAM	52.31	4.76	NETHERLANDS
SOESTERBERG	EHSB	52.13	5.28	NETHERLANDS
VOLKEL	EHVK	51.66	5.71	NETHERLANDS
HATO	TNCC	12.19	-68.96	NETHERLANDS ANTILLES
CHRISTCHURCH INTL	NZCH	-43.49	172.53	NEW ZEALAND
WELLINGTON INTL	NZWN	-41.33	174.81	NEW ZEALAND
MANAGUA INTL	MNMG	12.14	-86.17	NICARAGUA
DIORI HAMANI	DRRN	13.48	2.18	NIGER
FRANCISCO C ADA SAIPAN INTL	PGSN	15.12	145.73	NORTHERN MARIANA ISLANDS
ANDOYA	ENAN	69.29	16.14	NORWAY
BANAK	ENNA	70.07	24.97	NORWAY
BODO	ENBO	67.27	14.37	NORWAY
FLESLAND	ENBR	60.29	5.22	NORWAY
HOYBUKTMOEN	ENKR	69.73	29.89	NORWAY
JAN MAYEN(NOR-NAVY)	ENJA	70.93	-8.67	NORWAY
ORLAND	ENOL	63.7	9.6	NORWAY
OSLO/FORNEBU	14882	59.9	10.62	NORWAY
SOLA	ENZV	58.88	5.64	NORWAY
MASIRAH	OOMA	20.68	58.89	OMAN
SEEB INTL	OOMS	23.59	58.28	OMAN
THUMRAIT	OOTH	17.67	54.02	OMAN
CHAKLALA	OPRN	33.62	73.1	PAKISTAN
JINNAH INTL	OPKC	24.91	67.16	PAKISTAN
PESHAWAR INTL	OPPS	33.99	71.51	PAKISTAN
PANAMA PACIFICO	MPPA	8.92	-79.6	PANAMA
TOCUMEN INTL	MPTO	9.07	-79.38	PANAMA
SILVIO PETTIROSSI INTL	SGAS	-25.24	-57.52	PARAGUAY
CAP FAP DAVID ABENZUR RENGIFO INTL	SPCL	-8.38	-74.57	PERU
CAPITAN MONTES	SPYL	-4.58	-81.25	PERU
CAPT JOSE A QUINONES GONZALES INTL	SPHI	-6.79	-79.83	PERU

Site Name	Station ID	Lat	Lon	Country
CORONEL FRANCISCO SECADA VIGNETTA INTL	SPQT	-3.78	-73.31	PERU
JORGE CHAVEZ INTL	SPJC	-12.02	-77.11	PERU
BAGUIO	RPUB	16.38	120.62	PHILIPPINES
CLARK INTL	RPLC	15.19	120.56	PHILIPPINES
MACTAN CEBU INTL	RPVM	10.31	123.98	PHILIPPINES
NINOY AQUINO INTL	RPLL	14.51	121.02	PHILIPPINES
SUBIC BAY INTL	RPLB	14.79	120.27	PHILIPPINES
LASK	EPLK	51.55	19.18	POLAND
OKECIE	EPWA	52.17	20.97	POLAND
LAJES	LPLA	38.76	-27.09	PORTUGAL
LISBOA	LPPT	38.78	-9.14	PORTUGAL
LUIS MUNOZ MARIN INTL	TJSJ	18.44	-66	PUERTO RICO
RAFAEL HERNANDEZ	TJBQ	18.49	-67.13	PUERTO RICO
ROOSEVELT ROADS NS	TJNR	18.25	-65.64	PUERTO RICO
AL UDEID	KQIR	25.12	51.32	QATAR
DOHA INTL	OTBD	25.26	51.57	QATAR
ST DENIS GILLOT	FMEE	-20.89	55.51	REUNION
AUREL VLAICU	LRBS	44.5	26.1	ROMANIA
CARANSEBES	LRCS	45.42	22.25	ROMANIA
CRAIOVA	LRCV	44.32	23.89	ROMANIA
DROBETA TURNU SEVERIN	15410	44.63	22.63	ROMANIA
FAGARAS	15235	45.83	24.93	ROMANIA
MIHAIL KOGALNICEANU	LRCK	44.36	28.49	ROMANIA
SATU MARE	LRSM	47.7	22.89	ROMANIA
APUKA	25956	60.43	169.67	RUSSIA
ARHARA	31594	49.42	130.08	RUSSIA
BOLSHOYE SAVINO	USPP	57.91	56.02	RUSSIA
BORZYA	30965	50.4	116.52	RUSSIA
CAPE VASILEVA	32217	50	155.38	RUSSIA
CHERNISHEVSKIJ	24724	63.03	112.48	RUSSIA
CHERTOVITSKOYE	UUOO	51.81	39.23	RUSSIA
CHOKURDAH	21946	70.62	147.88	RUSSIA
DARPIR	24598	64.17	148.03	RUSSIA
ERBOGACEN	24817	61.27	108.02	RUSSIA
GMO IM.E.K. FEDOROVA	20292	77.72	104.3	RUSSIA
HATANGA	20891	71.98	102.47	RUSSIA
ICA	32411	55.58	155.58	RUSSIA
ILYINSKIY	32121	47.98	142.2	RUSSIA
IRKUTSK	UIII	52.27	104.39	RUSSIA

Site Name	Station ID	Lat	Lon	Country
ISIT'	24951	60.82	125.32	RUSSIA
JAKUTSK	24959	62.02	129.72	RUSSIA
JUR'EVEC	27355	57.33	43.12	RUSSIA
JUZHNO-KURIL'SK	32165	44.02	145.87	RUSSIA
KALAC	34247	50.42	41.05	RUSSIA
KAMYSIN	34363	50.07	45.37	RUSSIA
KANIN NOS	22165	68.65	43.3	RUSSIA
KARASUK	29814	53.73	78.02	RUSSIA
KAZAN	UWKD	55.61	49.28	RUSSIA
KHANTY MANSIYSK	USHH	61.03	69.09	RUSSIA
KHOMUTOVO	UHSS	46.89	142.72	RUSSIA
KINGISEPP	26059	59.37	28.6	RUSSIA
KIRENSK	UIKK	57.77	108.07	RUSSIA
KLJUCHI	32389	56.32	160.83	RUSSIA
KOJNAS	22583	64.75	47.65	RUSSIA
KOLTSOVO	USSS	56.74	60.8	RUSSIA
KOTLAS	ULKK	61.23	46.72	RUSSIA
KRASNOSCEL'E	22235	67.35	37.05	RUSSIA
KYRA	30949	49.57	111.97	RUSSIA
LENSK	24923	60.72	114.88	RUSSIA
MAHACHKALA	37472	43	47.5	RUSSIA
MALYE KARMAKULY	20744	72.37	52.7	RUSSIA
MARIINSK	29551	56.18	87.68	RUSSIA
MEDVEZEGORSK	22721	62.92	34.43	RUSSIA
MUKHINO	UIUU	51.81	107.44	RUSSIA
MURMANSK	ULMM	68.78	32.75	RUSSIA
NIKOLAEVSK-ON-AMUR	UHNN	53.15	140.7	RUSSIA
NIZNE-UDINSK	UINN	54.88	99.03	RUSSIA
NJANDOMA	22854	61.67	40.18	RUSSIA
NJURBA	24639	63.28	118.33	RUSSIA
NOVY	UHHH	48.53	135.19	RUSSIA
OHOTSK	31088	59.37	143.2	RUSSIA
OLEKMINSK	24944	60.37	120.42	RUSSIA
OMSK	UNOO	54.97	73.31	RUSSIA
OSTROV DIKSON	20674	73.5	80.4	RUSSIA
PASHKOVSKIY	URKK	45.03	39.17	RUSSIA
PECHORA	23418	65.13	57.13	RUSSIA
POLARGMO IM. E.T. KRENKELJA	20046	80.62	58.05	RUSSIA
PORONAJSK	32098	49.22	143.1	RUSSIA
REMONTNOE	34759	46.57	43.67	RUSSIA

Site Name	Station ID	Lat	Lon	Country
RJAZAN'	27731	54.62	39.72	RUSSIA
SHEREMETYEVO	UUEE	55.97	37.41	RUSSIA
SKOVORODINO	30692	54	123.97	RUSSIA
SOCHI	URSS	43.45	39.96	RUSSIA
SOKOL	UHMM	59.91	150.72	RUSSIA
TAMBOV	27947	52.8	41.33	RUSSIA
TIHVIN	26094	59.65	33.55	RUSSIA
TOLMACHEVO	UNNT	55.01	82.65	RUSSIA
TROICKO-PECHERSKOE	23711	62.7	56.2	RUSSIA
TURUHANSK	23472	65.78	87.93	RUSSIA
UGOLNY	UHMA	64.73	177.74	RUSSIA
UST'-KAMCHATSK	32408	56.22	162.72	RUSSIA
VANZIL'-KYNAK	23966	60.35	84.08	RUSSIA
VERHNEE PENZINO	25538	64.22	164.23	RUSSIA
VERHOJANSK	24266	67.57	133.4	RUSSIA
VILJUJSK	24641	63.77	121.62	RUSSIA
VITIM	30054	59.45	112.58	RUSSIA
VLADIKAVKAZ	37228	43.03	44.68	RUSSIA
VLADIVOSTOK	31960	43.12	131.93	RUSSIA
ZEJA	31300	53.7	127.3	RUSSIA
ZHIGANSK	24343	66.77	123.4	RUSSIA
AL JOUF	OESK	29.79	40.1	SAUDI ARABIA
ARAR	OERR	30.91	41.14	SAUDI ARABIA
GASSIM	OEGS	26.3	43.77	SAUDI ARABIA
HAIL	OEHL	27.44	41.69	SAUDI ARABIA
KING ABDULAZIZ AB	OEDR	26.27	50.15	SAUDI ARABIA
KING ABDULAZIZ INTL	OEJN	21.68	39.16	SAUDI ARABIA
KING KHALED AB	OEKM	18.3	42.8	SAUDI ARABIA
KING KHALED INTL	OERK	24.96	46.7	SAUDI ARABIA
QAISUMAH	OEPA	28.34	46.13	SAUDI ARABIA
RAFHA	OERF	29.63	43.49	SAUDI ARABIA
RIYADH AB	OERY	24.71	46.73	SAUDI ARABIA
TABUK	OETB	28.37	36.62	SAUDI ARABIA
TURAIF	OETR	31.69	38.73	SAUDI ARABIA
WEJH	OEWJ	26.2	36.48	SAUDI ARABIA
YENBO	OEYN	24.14	38.06	SAUDI ARABIA
LEOPOLD SEDAR SENGHOR INTL	GOOY	14.74	-17.49	SENEGAL
BEOGRAD	LYBE	44.82	20.31	SERBIA
SEYCHELLES INTL	FSIA	-4.67	55.52	SEYCHELLES
PAYA LEBAR	WSAP	1.36	103.91	SINGAPORE

Site Name	Station ID	Lat	Lon	Country
BLOEMFONTEIN INTL	FABL	-29.09	26.3	SOUTH AFRICA
DURBAN INTL	FADN	-29.97	30.95	SOUTH AFRICA
JOHANNESBURG INTL	FAJS	-26.14	28.25	SOUTH AFRICA
UPINGTON	FAUP	-28.4	21.26	SOUTH AFRICA
ALICANTE	LEAL	38.28	-0.56	SPAIN
BARAJAS	LEMD	40.49	-3.57	SPAIN
BARCELONA	LEBL	41.3	2.08	SPAIN
CORDOBA	LEBA	37.84	-4.85	SPAIN
MALAGA	LEMG	36.67	-4.5	SPAIN
MENORCA	LEMH	39.86	4.22	SPAIN
MORON AB	LEMO	37.17	-5.62	SPAIN
ROTA NS	LERT	36.65	-6.35	SPAIN
SEVILLA	LEZL	37.42	-5.89	SPAIN
TORREJON	LETO	40.5	-3.45	SPAIN
VALENCIA	LEVC	39.49	-0.48	SPAIN
ZARAGOZA AB	LEZG	41.67	-1.04	SPAIN
ASCENSION AUX AF	FHAW	-7.97	-14.39	ST. HELENA
JOHAN A PENGEL INTL	SMJP	5.45	-55.19	SURINAME
ARLANDA	ESSA	59.65	17.92	SWEDEN
BROMMA	ESSB	59.35	17.94	SWEDEN
UMEA	ESNU	63.79	20.28	SWEDEN
GENEVA COINTRIN	LSGG	46.24	6.11	SWITZERLAND
ZURICH	LSZH	47.46	8.55	SWITZERLAND
ABUKMAL	40072	34.42	40.92	SYRIA
ALEPPO INTL	OSAP	36.18	37.22	SYRIA
DAMASCUS INTL	OSDI	33.41	36.52	SYRIA
CHIAYI	RCKU	23.46	120.39	TAIWAN
CHING CHUAN KANG AB	RCMQ	24.26	120.62	TAIWAN
SUNGSHAN	RCSS	25.07	121.55	TAIWAN
TAICHUNG	RCLG	24.19	120.65	TAIWAN
TAINAN	RCNN	22.95	120.21	TAIWAN
DUSHANBE	UTDD	38.54	68.83	TAJIKISTAN
KHUDJANT	38599	40.22	69.73	TAJIKISTAN
MWALIMU JULIUS K NYERERE INTL	HTDA	-6.88	39.2	TANZANIA
BANGKOK INTL	VTBD	13.91	100.61	THAILAND
CHIANG MAI INTL	VTCC	18.77	98.96	THAILAND
KHORAT	VTUN	14.93	102.08	THAILAND
NAKHON PHANOM	48357	17.42	104.78	THAILAND
UBON RATCHATHANI	VTUU	15.25	104.87	THAILAND
UDON THANI	VTUD	17.39	102.79	THAILAND

Site Name	Station ID	Lat	Lon	Country
SKOPJE	LWSK	41.96	21.62	The Former Yugoslav Republic of Macedonia
PIARCO	TTPP	10.6	-61.34	TRINIDAD AND TOBAGO
BABELTHUAP / KOROR AIRPORT	PTRO	7.37	134.54	TRUST TERRITORY OF THE PACIFIC ISLANDS (PALAU)
CARTHAGE	DTTA	36.85	10.23	TUNISIA
ANTALYA	LTAI	36.9	30.8	TURKEY
ATATURK	LTBA	40.98	28.82	TURKEY
BALIKESIR	LTBF	39.62	27.93	TURKEY
CIGLI	LTBL	38.51	27.01	TURKEY
DIYARBAKIR	LTCC	37.89	40.2	TURKEY
ERHAC	LTAT	38.44	38.09	TURKEY
ESENBOGA	LTAC	40.13	33	TURKEY
ESKISEHIR	LTBI	39.78	30.58	TURKEY
GOLCUK/DUMLUPINAR	17067	40.67	29.83	TURKEY
INCIRLIK AB	LTAG	37	35.43	TURKEY
KONYA	LTAN	37.98	32.56	TURKEY
SAMSUN	17030	41.28	36.3	TURKEY
SINOP	17026	42.03	35.17	TURKEY
TRABZON	LTCG	41	39.79	TURKEY
VAN	LTCI	38.47	43.33	TURKEY
ASHGABAT	UTAA	37.99	58.36	TURKMENISTAN
BAJRAMALY	38895	37.6	62.18	TURKMENISTAN
CHARDZHEV	38687	39.08	63.6	TURKMENISTAN
DARGANATA	38545	40.47	62.28	TURKMENISTAN
DASHKHOVUZ	38392	41.83	59.98	TURKMENISTAN
EKEZHE	38388	41.03	57.77	TURKMENISTAN
ESENGULY	38750	37.47	53.97	TURKMENISTAN
GYSHGY	38987	35.28	62.35	TURKMENISTAN
KERKI	38911	37.83	65.2	TURKMENISTAN
TURKMENBASHI	38507	40.03	52.98	TURKMENISTAN
IZIUM	34415	49.18	37.3	UKRAINE
KONOTOP	33261	51.23	33.2	UKRAINE
KRYVYI RIH	33791	48.03	33.22	UKRAINE
ODESA INTL	UKOO	46.43	30.68	UKRAINE
YALTA	33990	44.48	34.17	UKRAINE
ZHULIANY INTL	UKKK	50.4	30.45	UKRAINE
ABU DHABI INTL	OMAA	24.43	54.65	UNITED ARAB EMIRATES

Site Name	Station ID	Lat	Lon	Country
DUBAI INTL	OMDB	25.25	55.36	UNITED ARAB EMIRATES
BENSON	EGUB	51.62	-1.1	UNITED KINGDOM
BENTWATERS RAF	EGVJ	52.13	1.43	UNITED KINGDOM
BRIZE NORTON	EGVN	51.75	-1.58	UNITED KINGDOM
CHURCH LAWFORD	3544	52.37	-1.33	UNITED KINGDOM
DYCE	EGPD	57.2	-2.2	UNITED KINGDOM
EDINBURGH	EGPH	55.95	-3.37	UNITED KINGDOM
FAIRFORD	EGVA	51.68	-1.79	UNITED KINGDOM
FYLINGDALES	3281	54.37	-0.67	UNITED KINGDOM
GATWICK	EGKK	51.15	-0.19	UNITED KINGDOM
HEATHROW	EGLL	51.48	-0.46	UNITED KINGDOM
LAKENHEATH	EGUL	52.41	0.56	UNITED KINGDOM
LEUCHARS	EGQL	56.37	-2.87	UNITED KINGDOM
MILDENHALL	EGUN	52.36	0.49	UNITED KINGDOM
NORTHOLT	EGWU	51.55	-0.42	UNITED KINGDOM
PRESTWICK	EGPK	55.51	-4.59	UNITED KINGDOM
WOODBRIDGE RAF	EGVG	52.08	1.4	UNITED KINGDOM
ALAMEDA/NAS CA.	74506	37.78	-122.32	UNITED STATES
BRAINERD BRAINERD-CROW WING COU	KBRD	46.4	-94.13	UNITED STATES
CAPE HATTERAS NC.	72304	35.27	-75.55	UNITED STATES
FT. RICHARDSON/BRYANT AHP AK	70270	61.27	-149.65	UNITED STATES
GOODLAND/RENNER FIELD/GOODLAND/MUN. KS.	72465	39.37	-101.68	UNITED STATES
RUMFORD ME.	72618	44.53	-70.53	UNITED STATES
SAN CLEMENTE NAVAL AUXILIARY LA	KNUC	33.02	-118.58	UNITED STATES
ADAK	PADK	51.88	-176.65	UNITED STATES - AK
ALLEN AAF	PABI	63.99	-145.72	UNITED STATES - AK
ANIAK	PANI	61.58	-159.54	UNITED STATES - AK
ANNETTE ISLAND	PANT	55.04	-131.57	UNITED STATES - AK
BARTER ISLAND LRRS	PABA	70.13	-143.58	UNITED STATES - AK
BETHEL	PABE	60.78	-161.84	UNITED STATES - AK
BETTLES	PABT	66.91	-151.53	UNITED STATES - AK
CAPE LISBURNE LRRS	PALU	68.88	-166.11	UNITED STATES - AK
CAPE NEWENHAM LRRS	PAEH	58.65	-162.06	UNITED STATES - AK
CAPE ROMANZOF LRRS	PACZ	61.78	-166.04	UNITED STATES - AK
COLD BAY	PACD	55.21	-162.72	UNITED STATES - AK
DEADHORSE	PASC	70.19	-148.47	UNITED STATES - AK
EARECKSON AS	PASY	52.71	174.11	UNITED STATES - AK
EDWARD G PITKA SR	PAGA	64.74	-156.94	UNITED STATES - AK
EIELSON AFB	PAEI	64.67	-147.1	UNITED STATES - AK

Site Name	Station ID	Lat	Lon	Country
ELMENDORF AFB	PAED	61.25	-149.81	UNITED STATES - AK
FAIRBANKS INTL	PAFA	64.82	-147.86	UNITED STATES - AK
FORT YUKON	PFYU	66.57	-145.25	UNITED STATES - AK
GULKANA	PAGK	62.15	-145.46	UNITED STATES - AK
HOMER	PAHO	59.65	-151.48	UNITED STATES - AK
ILIAMNA	PAIL	59.75	-154.91	UNITED STATES - AK
INDIAN MOUNTAIN LRRS	PAIM	65.99	-153.7	UNITED STATES - AK
JUNEAU INTL	PAJN	58.35	-134.58	UNITED STATES - AK
KENAI MUNI	PAEN	60.57	-151.24	UNITED STATES - AK
KING SALMON	PAKN	58.68	-156.65	UNITED STATES - AK
KODIAK	PADQ	57.75	-152.49	UNITED STATES - AK
MCGRATH	PAMC	62.97	-155.62	UNITED STATES - AK
MERLE K MUDHOLE SMITH	PACV	60.49	-145.48	UNITED STATES - AK
MERRILL FLD	PAMR	61.21	-149.84	UNITED STATES - AK
MIDDLETON ISLAND	PAMD	59.45	-146.31	UNITED STATES - AK
NENANA MUNI	PANN	64.55	-149.07	UNITED STATES - AK
NOME	PAOM	64.51	-165.45	UNITED STATES - AK
NORTHWAY	PAOR	62.96	-141.93	UNITED STATES - AK
PORT HEIDEN	PAPH	56.96	-158.63	UNITED STATES - AK
RALPH WIEN MEM	PAOT	66.88	-162.6	UNITED STATES - AK
SITKA ROCKY GUTIERREZ	PASI	57.05	-135.36	UNITED STATES - AK
SPARREVOHN LRRS	PASV	61.1	-155.57	UNITED STATES - AK
ST PAUL ISLAND	PASN	57.17	-170.22	UNITED STATES - AK
TATALINA LRRS	PATL	62.89	-155.98	UNITED STATES - AK
TED STEVENS ANCHORAGE INTL	PANC	61.17	-150	UNITED STATES - AK
TIN CITY LRRS	PATC	65.56	-167.92	UNITED STATES - AK
UNALAKLEET	PAUN	63.89	-160.8	UNITED STATES - AK
UNALASKA	PADU	53.9	-166.54	UNITED STATES - AK
WAINWRIGHT AAF	PAFB	64.83	-147.62	UNITED STATES - AK
WHITTIER	PAWR	60.77	-148.68	UNITED STATES - AK
WILEY POST WILL ROGERS MEM	PABR	71.29	-156.77	UNITED STATES - AK
YAKUTAT	PAYA	59.5	-139.65	UNITED STATES - AK
ANNISTON METRO	KANB	33.59	-85.86	UNITED STATES - AL
BIRMINGHAM INTL	KBHM	33.56	-86.75	UNITED STATES - AL
CAIRNS AAF	KOZR	31.28	-85.71	UNITED STATES - AL
DOTHAN RGNL	KDHN	31.32	-85.45	UNITED STATES - AL
HUNTSVILLE INTL CARL T JONES FLD	KHSV	34.64	-86.78	UNITED STATES - AL
MAXWELL AFB	KMXF	32.38	-86.37	UNITED STATES - AL
MOBILE DOWNTOWN	KBFM	30.63	-88.07	UNITED STATES - AL
MOBILE RGNL	KMOB	30.69	-88.24	UNITED STATES - AL

Site Name	Station ID	Lat	Lon	Country
MONTGOMERY RGNL	KMGM	32.3	-86.39	UNITED STATES - AL
NORTHWEST ALABAMA RGNL	KMSL	34.75	-87.61	UNITED STATES - AL
TUSCALOOSA RGNL	KTCL	33.22	-87.61	UNITED STATES - AL
ARKANSAS INTL	KBYH	35.96	-89.94	UNITED STATES - AR
BOONE CO	KHRO	36.26	-93.15	UNITED STATES - AR
DRAKE FLD	KFYV	36.01	-94.17	UNITED STATES - AR
FORT SMITH RGNL	KFSM	35.34	-94.37	UNITED STATES - AR
GRIDER FLD	KPBF	34.17	-91.94	UNITED STATES - AR
LITTLE ROCK AFB	KLRF	34.92	-92.15	UNITED STATES - AR
MEMORIAL FLD	KHOT	34.48	-93.1	UNITED STATES - AR
SOUTH ARKANSAS RGNL AT GOODWIN FLD	KELD	33.22	-92.81	UNITED STATES - AR
TEXARKANA RGNL WEBB FLD	KTXK	33.45	-93.99	UNITED STATES - AR
DAVIS MONTHAN AFB	KDMA	32.17	-110.88	UNITED STATES - AZ
FLAGSTAFF PULLIAM	KFLG	35.14	-111.67	UNITED STATES - AZ
LUKE AFB	KLUF	33.53	-112.38	UNITED STATES - AZ
PHOENIX SKY HARBOR INTL	KPHX	33.43	-112.01	UNITED STATES - AZ
SIERRA VISTA MUNI LIBBY AAF / FT HUACHUCA	KFHU	31.58	-110.35	UNITED STATES - AZ
TUCSON INTL	KTUS	32.12	-110.94	UNITED STATES - AZ
WINSLOW LINDBERGH RGNL	KINW	35.02	-110.72	UNITED STATES - AZ
YUMA MCAS YUMA INTL	KYUM	32.66	-114.61	UNITED STATES - AZ
ARCATA	KACV	40.98	-124.11	UNITED STATES - CA
BARSTOW DAGGETT	KDAG	34.85	-116.79	UNITED STATES - CA
BEALE AFB	KBAB	39.14	-121.44	UNITED STATES - CA
BLUE CANYON NYACK	KBLU	39.27	-120.71	UNITED STATES - CA
CAMP PENDLETON MCAS	KNFG	33.3	-117.36	UNITED STATES - CA
CASTLE	KMER	37.38	-120.57	UNITED STATES - CA
CHINA LAKE NAWS	KNID	35.69	-117.69	UNITED STATES - CA
EDWARDS AFB	KEDW	34.92	-117.87	UNITED STATES - CA
EL TORO MCAS	KNZJ	33.67	-117.73	UNITED STATES - CA
FRESNO YOSEMITE INTL	KFAT	36.78	-119.72	UNITED STATES - CA
HAYWARD HAYWARD AIR TERMINAL	KHWD	37.66	-122.12	UNITED STATES - CA
IMPERIAL CO	KIPL	32.83	-115.58	UNITED STATES - CA
JACK MC NAMARA FLD	KCEC	41.78	-124.24	UNITED STATES - CA
JOHN WAYNE ARPT ORANGE CO	KSNA	33.68	-117.87	UNITED STATES - CA
LAKE TAHOE	KTVL	38.9	-120	UNITED STATES - CA
LEMOORE NAS	KNLC	36.33	-119.95	UNITED STATES - CA
LONG BEACH	KLGB	33.82	-118.15	UNITED STATES - CA
LOS ANGELES INTL	KLAX	33.94	-118.41	UNITED STATES - CA

Site Name	Station ID	Lat	Lon	Country
MARCH ARB	KRIV	33.88	-117.26	UNITED STATES - CA
MARINA MUNI	KOAR	36.68	-121.76	UNITED STATES - CA
MCCLELLAN AFLD	KMCC	38.67	-121.4	UNITED STATES - CA
MEADOWS FLD	KBFL	35.43	-119.06	UNITED STATES - CA
METROPOLITAN OAKLAND INTL	KOAK	37.72	-122.22	UNITED STATES - CA
MOFFETT FEDERAL AFLD	KNUQ	37.42	-122.05	UNITED STATES - CA
MONTEREY PENINSULA	KMRY	36.59	-121.84	UNITED STATES - CA
NORMAN Y MINETA SAN JOSE INTL	KSJC	37.36	-121.93	UNITED STATES - CA
NORTH ISLAND NAS	KNZY	32.7	-117.22	UNITED STATES - CA
ONTARIO INTL	KONT	34.06	-117.6	UNITED STATES - CA
OXNARD AIRPORT	KOXR	34.2	-119.21	UNITED STATES - CA
PASO ROBLES MUNI	KPRB	35.67	-120.63	UNITED STATES - CA
POINT MUGU NAS	KNTD	34.12	-119.12	UNITED STATES - CA
POINT PIEDRAS BLANCA	K87Q	35.67	-121.28	UNITED STATES - CA
RED BLUFF MUNI	KRBL	40.15	-122.25	UNITED STATES - CA
SACRAMENTO EXECUTIVE	KSAC	38.51	-121.49	UNITED STATES - CA
SACRAMENTO MATHER AIRPORT	KMHR	38.56	-121.3	UNITED STATES - CA
SAN BERNARDINO INTL	KSBD	34.1	-117.23	UNITED STATES - CA
SAN DIEGO INTL	KSAN	32.73	-117.19	UNITED STATES - CA
SAN DIEGO/MIRAMAR NAS CA.	72293	32.83	-117.12	UNITED STATES - CA
SAN FRANCISCO INTL	KSFO	37.62	-122.37	UNITED STATES - CA
SANDBERG	KSDB	34.74	-118.72	UNITED STATES - CA
SANTA BARBARA MUNI	KSBA	34.43	-119.84	UNITED STATES - CA
SISKIYOU CO	KSIY	41.78	-122.47	UNITED STATES - CA
SOUTHERN CALIFORNIA LOGISTICS	KVCV	34.6	-117.38	UNITED STATES - CA
STOCKTON METROPOLITAN	KSCK	37.89	-121.24	UNITED STATES - CA
TRAVIS AFB	KSUU	38.26	-121.93	UNITED STATES - CA
TUSTIN MCAS	KNTK	33.7	-117.83	UNITED STATES - CA
TWENTYNINE PALMS EAF	KNXP	34.3	-116.16	UNITED STATES - CA
USMC MTN WARFARE TRAINING CENTER	KBAN	38.35	-119.52	UNITED STATES - CA
VANDENBERG AFB	KVBG	34.74	-120.58	UNITED STATES - CA
BUCKLEY AFB	KBKF	39.7	-104.75	UNITED STATES - CO
BUTTS AAF	KFCS	38.68	-104.76	UNITED STATES - CO
CITY OF COLORADO SPRINGS MUNI	KCOS	38.81	-104.7	UNITED STATES - CO
DENVER/STAPLETON INT	72469	39.75	-104.87	UNITED STATES - CO
LA JUNTA MUNI	KLHX	38.05	-103.51	UNITED STATES - CO
PERRY STOKES	KTAD	37.26	-104.34	UNITED STATES - CO
PUEBLO MEM	KPUB	38.29	-104.5	UNITED STATES - CO
WALKER FLD	KGJT	39.12	-108.53	UNITED STATES - CO
BRADLEY INTL	KBDL	41.94	-72.68	UNITED STATES - CT

Site Name	Station ID	Lat	Lon	Country
GROTON NEW LONDON	KGON	41.33	-72.05	UNITED STATES - CT
HARTFORD BRAINARD	KHFD	41.74	-72.65	UNITED STATES - CT
IGOR I SIKORSKY MEM	KBDR	41.16	-73.13	UNITED STATES - CT
RONALD REAGAN WASHINGTON NATL	KDCA	38.85	-77.04	UNITED STATES - DC
WASHINGTON DULLES INTL	KIAD	38.94	-77.46	UNITED STATES - DC
DOVER AFB	KDOV	39.13	-75.47	UNITED STATES - DE
NEW CASTLE	KILG	39.68	-75.61	UNITED STATES - DE
APALACHICOLA MUNI	KAAF	29.73	-85.03	UNITED STATES - FL
CAPE CANAVERAL AFS SKID STRIP	KXMR	28.47	-80.57	UNITED STATES - FL
CRAIG MUNI	KCRG	30.34	-81.51	UNITED STATES - FL
DAYTONA BEACH INTL	KDAB	29.18	-81.06	UNITED STATES - FL
EGLIN AFB	KVPS	30.48	-86.53	UNITED STATES - FL
FORT LAUDERDALE HOLLYWOOD INTL	KFLL	26.07	-80.15	UNITED STATES - FL
GAINESVILLE RGNL	KGNV	29.69	-82.27	UNITED STATES - FL
HOMESTEAD ARB	KHST	25.49	-80.38	UNITED STATES - FL
HURLBURT FLD	KHRT	30.43	-86.69	UNITED STATES - FL
JACKSONVILLE CECIL FIELD AIRPORT	KVQQ	30.22	-81.88	UNITED STATES - FL
JACKSONVILLE INTL	KJAX	30.49	-81.69	UNITED STATES - FL
JACKSONVILLE NAS	KNIP	30.24	-81.68	UNITED STATES - FL
KENDALL TAMIAMI EXECUTIVE	KTMB	25.65	-80.43	UNITED STATES - FL
KEY WEST INTL	KEYW	24.56	-81.76	UNITED STATES - FL
KEY WEST NAS	KNQX	24.58	-81.69	UNITED STATES - FL
MACDILL AFB	KMCF	27.85	-82.52	UNITED STATES - FL
MAYPORT NS	KNRB	30.39	-81.42	UNITED STATES - FL
MELBOURNE INTL	KMLB	28.1	-80.65	UNITED STATES - FL
MIAMI INTL	KMIA	25.79	-80.29	UNITED STATES - FL
NASA SHUTTLE LANDING FACILITY	KTTS	28.61	-80.69	UNITED STATES - FL
ORLANDO INTL	KMCO	28.43	-81.31	UNITED STATES - FL
PAGE FLD	KFMY	26.59	-81.86	UNITED STATES - FL
PALM BEACH INTL	KPBI	26.68	-80.1	UNITED STATES - FL
PATRICK AFB	KCOF	28.25	-80.62	UNITED STATES - FL
PENSACOLA NAS	KNPA	30.35	-87.32	UNITED STATES - FL
PENSACOLA RGNL	KPNS	30.47	-87.19	UNITED STATES - FL
ST PETERSBURG CLEARWATER INTL	KPIE	27.91	-82.69	UNITED STATES - FL
TALLAHASSEE RGNL	KTLH	30.4	-84.35	UNITED STATES - FL
TAMPA INTL	KTPA	27.98	-82.53	UNITED STATES - FL
TYNDALL AFB	KPAM	30.07	-85.58	UNITED STATES - FL
VERO BEACH MUNI	KVRB	27.66	-80.42	UNITED STATES - FL
WHITING FLD NAS NORTH	KNSE	30.72	-87.02	UNITED STATES - FL
AUGUSTA RGNL AT BUSH FLD	KAGS	33.37	-81.96	UNITED STATES - GA

Site Name	Station ID	Lat	Lon	Country
COLUMBUS METROPOLITAN	KCSG	32.52	-84.94	UNITED STATES - GA
DOBBINS ARB	KMGE	33.92	-84.52	UNITED STATES - GA
HARTSFIELD JACKSON ATLANTA INTL	KATL	33.64	-84.43	UNITED STATES - GA
HUNTER AAF	KSVN	32.01	-81.15	UNITED STATES - GA
LAWSON AAF	KLSF	32.34	-84.99	UNITED STATES - GA
MALCOLM MCKINNON	KSSI	31.15	-81.39	UNITED STATES - GA
MIDDLE GEORGIA RGNL	KMCN	32.69	-83.65	UNITED STATES - GA
MOODY AFB	KVAD	30.97	-83.19	UNITED STATES - GA
RICHARD B RUSSELL	KRMG	34.35	-85.16	UNITED STATES - GA
ROBINS AFB	KWRB	32.64	-83.59	UNITED STATES - GA
SAVANNAH HILTON HEAD INTL	KSAV	32.13	-81.2	UNITED STATES - GA
SOUTHWEST GEORGIA RGNL	KABY	31.54	-84.19	UNITED STATES - GA
WRIGHT AAF	KLHW	31.89	-81.56	UNITED STATES - GA
HILO INTL	PHTO	19.72	-155.05	UNITED STATES - HI
HONOLULU INTL	PHNL	21.32	-157.92	UNITED STATES - HI
KAHULUI	PHOG	20.9	-156.43	UNITED STATES - HI
KALAELOA	PHJR	21.31	-158.07	UNITED STATES - HI
KANEOHE BAY MCAF	PHNG	21.45	-157.77	UNITED STATES - HI
LIHUE	PHLI	21.98	-159.34	UNITED STATES - HI
WHEELER AAF	PHHI	21.48	-158.04	UNITED STATES - HI
DES MOINES INTL	KDSM	41.53	-93.66	UNITED STATES - IA
FORT DODGE RGNL	KFOD	42.55	-94.19	UNITED STATES - IA
MASON CITY MUNI	KMCW	43.16	-93.33	UNITED STATES - IA
SIOUX GATEWAY COL BUD DAY FLD	KSUX	42.4	-96.38	UNITED STATES - IA
SOUTHEAST IOWA RGNL	KBRL	40.78	-91.13	UNITED STATES - IA
THE EASTERN IOWA	KCID	41.88	-91.71	UNITED STATES - IA
WATERLOO RGNL	KALO	42.56	-92.4	UNITED STATES - IA
BOISE AIR TERMINAL	KBOI	43.56	-116.22	UNITED STATES - ID
COEUR D ALENE AIR TERMINAL	KCOE	47.77	-116.82	UNITED STATES - ID
IDAHO FALLS RGNL	KIDA	43.51	-112.07	UNITED STATES - ID
LEWISTON NEX PERCE CO	KLWS	46.37	-117.02	UNITED STATES - ID
MOUNTAIN HOME AFB	KMUO	43.04	-115.87	UNITED STATES - ID
POCATELLO RGNL	KPIH	42.91	-112.6	UNITED STATES - ID
ABRAHAM LINCOLN CAPITAL	KSPI	39.84	-89.68	UNITED STATES - IL
CHICAGO MIDWAY INTL	KMDW	41.79	-87.75	UNITED STATES - IL
CHICAGO OHARE INTL	KORD	41.98	-87.9	UNITED STATES - IL
DECATUR	KDEC	39.83	-88.87	UNITED STATES - IL
DUPAGE	KDPA	41.91	-88.25	UNITED STATES - IL
GLENVIEW NAS	KNBU	42.08	-87.82	UNITED STATES - IL
GREATER PEORIA RGNL	KPIA	40.66	-89.69	UNITED STATES - IL

Site Name	Station ID	Lat	Lon	Country
QUAD CITY INTL	KMLI	41.45	-90.51	UNITED STATES - IL
SCOTT AFB MIDAMERICA	KBLV	38.55	-89.84	UNITED STATES - IL
UNIV OF ILLINOIS WILLARD	KCMI	40.04	-88.28	UNITED STATES - IL
EVANSVILLE RGNL	KEVV	38.04	-87.53	UNITED STATES - IN
FORT WAYNE INTL	KFWA	40.98	-85.2	UNITED STATES - IN
GRISSOM ARB	KGUS	40.65	-86.15	UNITED STATES - IN
INDIANAPOLIS INTL	KIND	39.72	-86.29	UNITED STATES - IN
SOUTH BEND RGNL	KSBN	41.71	-86.32	UNITED STATES - IN
TERRE HAUTE INTL HULMAN FLD	KHUF	39.45	-87.31	UNITED STATES - IN
CHANUTE MARTIN JOHNSON	KCNU	37.67	-95.49	UNITED STATES - KS
DODGE CITY RGNL	KDDC	37.76	-99.97	UNITED STATES - KS
FORBES FLD	KFOE	38.95	-95.66	UNITED STATES - KS
HUTCHINSON MUNI	KHUT	38.07	-97.86	UNITED STATES - KS
MARSHALL AAF	KFRI	39.06	-96.76	UNITED STATES - KS
MCCONNELL AFB	KIAB	37.62	-97.27	UNITED STATES - KS
PHILIP BILLARD MUNI	KTOP	39.07	-95.62	UNITED STATES - KS
SALINA MUNI	KSLN	38.79	-97.65	UNITED STATES - KS
WICHITA MID CONTINENT	KICT	37.65	-97.43	UNITED STATES - KS
BLUE GRASS	KLEX	38.04	-84.61	UNITED STATES - KY
CAMPBELL AAF	KHOP	36.67	-87.5	UNITED STATES - KY
CINCINNATI NORTHERN KENTUCKY INTL	KCVG	39.05	-84.67	UNITED STATES - KY
GODMAN AAF	KFTK	37.91	-85.97	UNITED STATES - KY
LOUISVILLE INTL STANDIFORD FLD	KSDF	38.17	-85.74	UNITED STATES - KY
ALEXANDRIA INTL	KAEX	31.33	-92.55	UNITED STATES - LA
BARKSDALE AFB	KBAD	32.5	-93.66	UNITED STATES - LA
BATON ROUGE METRO RYAN FLD	KBTR	30.53	-91.15	UNITED STATES - LA
ESLER RGNL	KESF	31.39	-92.3	UNITED STATES - LA
LAFAYETTE RGNL	KLFT	30.21	-91.99	UNITED STATES - LA
LAKE CHARLES RGNL	KLCH	30.13	-93.22	UNITED STATES - LA
LAKEFRONT	KNEW	30.04	-90.03	UNITED STATES - LA
LOUIS ARMSTRONG NEW ORLEANS INTL	KMSY	29.99	-90.26	UNITED STATES - LA
MONROE RGNL	KMLU	32.51	-92.04	UNITED STATES - LA
NEW ORLEANS NAS JRB	KNBG	29.83	-90.03	UNITED STATES - LA
POLK AAF	KPOE	31.04	-93.19	UNITED STATES - LA
SHREVEPORT RGNL	KSHV	32.45	-93.83	UNITED STATES - LA
BARNES MUNI	KBAF	42.16	-72.72	UNITED STATES - MA
GENERAL EDWARD LAWRENCE LOGAN INTL	KBOS	42.36	-71.01	UNITED STATES - MA
LAURENCE G HANSCOM FLD	KBED	42.47	-71.29	UNITED STATES - MA
NANTUCKET MEM	KACK	41.25	-70.06	UNITED STATES - MA

Site Name	Station ID	Lat	Lon	Country
OTIS AIR NATIONAL GUARD BASE	KFMH	41.65	-70.52	UNITED STATES - MA
SOUTH WEYMOUTH NAS	KNZW	42.15	-70.93	UNITED STATES - MA
WESTOVER ARB METROPOLITAN	KCEF	42.19	-72.53	UNITED STATES - MA
WORCESTER RGNL	KORH	42.27	-71.88	UNITED STATES - MA
ANDREWS AFB	KADW	38.81	-76.87	UNITED STATES - MD
BALTIMORE WASHINGTON INTL	KBWI	39.18	-76.67	UNITED STATES - MD
HAGERSTOWN RGNL RICHARD A HENSON FLD	KHGR	39.71	-77.73	UNITED STATES - MD
PATUXENT RIVER NAS	KNHK	38.29	-76.41	UNITED STATES - MD
AUGUSTA STATE	KAUG	44.32	-69.8	UNITED STATES - ME
BANGOR INTL	KBGR	44.81	-68.83	UNITED STATES - ME
BRUNSWICK NAS	KNHZ	43.89	-69.94	UNITED STATES - ME
LORING INTL	ME16	46.95	-67.89	UNITED STATES - ME
PORTLAND INTL JETPORT	KPWM	43.65	-70.31	UNITED STATES - ME
ALPENA CO RGNL	KAPN	45.08	-83.56	UNITED STATES - MI
BISHOP INTL	KFNT	42.97	-83.74	UNITED STATES - MI
CAPITAL CITY	KLAN	42.78	-84.59	UNITED STATES - MI
CHERRY CAPITAL	KTVC	44.74	-85.58	UNITED STATES - MI
COLEMAN A YOUNG MUNI	KDET	42.41	-83.01	UNITED STATES - MI
GERALD R FORD INTL	KGRR	42.88	-85.52	UNITED STATES - MI
HOUGHTON CO MEM	KCMX	47.17	-88.49	UNITED STATES - MI
JACKSON CO REYNOLDS FLD	KJXN	42.26	-84.46	UNITED STATES - MI
MARQUETTE CO. ARPT	KMQT	46.53	-87.55	UNITED STATES - MI
MUSKEGON CO	KMKG	43.17	-86.24	UNITED STATES - MI
OSCODA WURTSMITH	KOSC	44.45	-83.39	UNITED STATES - MI
PELLSTON RGNL ARPT OF EMMET CO	KPLN	45.57	-84.8	UNITED STATES - MI
ROSCOMMON CO	KHTL	44.36	-84.67	UNITED STATES - MI
SAULT STE MARIE MUNI SANDERSON FLD	KANJ	46.48	-84.37	UNITED STATES - MI
SAWYER INTL	KSAW	46.35	-87.4	UNITED STATES - MI
SELFRIDGE ANGB	KMTC	42.61	-82.83	UNITED STATES - MI
W K KELLOGG	KBTL	42.31	-85.25	UNITED STATES - MI
BEMIDJI RGNL	KBJI	47.51	-94.93	UNITED STATES - MN
DULUTH INTL	KDLH	46.84	-92.19	UNITED STATES - MN
FALLS INTL	KINL	48.57	-93.4	UNITED STATES - MN
MINNEAPOLIS ST PAUL INTL	KMSP	44.88	-93.22	UNITED STATES - MN
ROCHESTER INTL	KRST	43.91	-92.5	UNITED STATES - MN
COLUMBIA RGNL	KCOU	38.82	-92.22	UNITED STATES - MO
JEFFERSON CITY MEM	KJEF	38.59	-92.16	UNITED STATES - MO
JOPLIN RGNL	KJLN	37.15	-94.5	UNITED STATES - MO
KANSAS CITY INTL	KMCI	39.3	-94.71	UNITED STATES - MO

Site Name	Station ID	Lat	Lon	Country
LAMBERT ST LOUIS INTL	KSTL	38.75	-90.36	UNITED STATES - MO
RICHARDS-GEBAUR AP	KGVW	38.85	-94.55	UNITED STATES - MO
ROSECRANS MEM	KSTJ	39.77	-94.91	UNITED STATES - MO
SPIRIT OF ST LOUIS	KSUS	38.66	-90.65	UNITED STATES - MO
SPRINGFIELD BRANSON RGNL	KSGF	37.25	-93.39	UNITED STATES - MO
WAYNESVILLE RGNL ARPT AT FORNEY FLD	KTBN	37.74	-92.14	UNITED STATES - MO
WHITEMAN AFB	KSZL	38.73	-93.55	UNITED STATES - MO
COLUMBUS AFB	KCBM	33.65	-88.45	UNITED STATES - MS
GULFPORT BILOXI INTL	KGPT	30.41	-89.07	UNITED STATES - MS
HATTIESBURG LAUREL RGNL	KPIB	31.47	-89.34	UNITED STATES - MS
JACKSON EVERS INTL	KJAN	32.31	-90.08	UNITED STATES - MS
KEESLER AFB	KBIX	30.41	-88.92	UNITED STATES - MS
KEY FLD	KMEI	32.33	-88.75	UNITED STATES - MS
MCCOMB PIKE CO JOHN E LEWIS FLD	KMCB	31.18	-90.47	UNITED STATES - MS
MERIDIAN NAS	KNMM	32.55	-88.56	UNITED STATES - MS
TUPELO RGNL	KTUP	34.27	-88.77	UNITED STATES - MS
BERT MOONEY	KBTM	45.95	-112.5	UNITED STATES - MT
BILLINGS LOGAN INTL	KBIL	45.81	-108.54	UNITED STATES - MT
CUT BANK MUNI	KCTB	48.61	-112.38	UNITED STATES - MT
FRANK WILEY FLD	KMLS	46.43	-105.89	UNITED STATES - MT
GLACIER PARK INTL	KGPI	48.31	-114.26	UNITED STATES - MT
GREAT FALLS INTL	KGTF	47.48	-111.37	UNITED STATES - MT
HAVRE CITY CO	KHVR	48.54	-109.76	UNITED STATES - MT
HELENA RGNL	KHLN	46.61	-111.98	UNITED STATES - MT
LEWISTOWN MUNI	KLWT	47.05	-109.47	UNITED STATES - MT
MALMSTROM AFHP	KGFA	47.5	-111.19	UNITED STATES - MT
MISSOULA INTL	KMSO	46.92	-114.09	UNITED STATES - MT
WOKAL FLD GLASGOW INTL	KGGW	48.21	-106.61	UNITED STATES - MT
ALBERT J ELLIS	KOAJ	34.83	-77.61	UNITED STATES - NC
ASHEVILLE RGNL	KAVL	35.44	-82.54	UNITED STATES - NC
CHARLOTTE DOUGLAS INTL	KCLT	35.21	-80.94	UNITED STATES - NC
CHERRY POINT MCAS	KNKT	34.9	-76.88	UNITED STATES - NC
MACKALL AAF	KHFF	35.04	-79.5	UNITED STATES - NC
NEW RIVER MCAS	KNCA	34.71	-77.44	UNITED STATES - NC
PIEDMONT TRIAD INTL	KGSO	36.1	-79.94	UNITED STATES - NC
POPE FIELD	KPOB	35.17	-79.01	UNITED STATES - NC
RALEIGH DURHAM INTL	KRDU	35.88	-78.79	UNITED STATES - NC
SEYMOUR JOHNSON AFB	KGSB	35.34	-77.96	UNITED STATES - NC
SIMMONS AAF	KFBG	35.13	-78.94	UNITED STATES - NC
BISMARCK MUNI	KBIS	46.77	-100.75	UNITED STATES - ND

Site Name	Station ID	Lat	Lon	Country
DICKINSON THEODORE ROOSEVELT RGNL	KDIK	46.8	-102.8	UNITED STATES - ND
GRAND FORKS AFB	KRDR	47.96	-97.4	UNITED STATES - ND
HECTOR INTL	KFAR	46.92	-96.82	UNITED STATES - ND
MINOT AFB	KMIB	48.42	-101.36	UNITED STATES - ND
CENTRAL NEBRASKA RGNL	KGRI	40.97	-98.31	UNITED STATES - NE
EPPLEY AFLD	KOMA	41.3	-95.89	UNITED STATES - NE
LINCOLN	KLNK	40.85	-96.76	UNITED STATES - NE
NORTH PLATTE RGNL ARPT LEE BIRD FLD	KLBF	41.13	-100.68	UNITED STATES - NE
OFFUTT AFB	KOFF	41.12	-95.91	UNITED STATES - NE
WESTERN NEB RGNL WILLIAM B HEILIG FLD	KBFF	41.87	-103.6	UNITED STATES - NE
CONCORD MUNI	KCON	43.2	-71.5	UNITED STATES - NH
LEBANON MUNI	KLEB	43.63	-72.3	UNITED STATES - NH
MANCHESTER	KMHT	42.93	-71.44	UNITED STATES - NH
MOUNT WASHINGTON	KMWN	44.27	-71.3	UNITED STATES - NH
PEASE INTL TRADEPORT	KPSM	43.08	-70.82	UNITED STATES - NH
ATLANTIC CITY INTL	KACY	39.46	-74.58	UNITED STATES - NJ
LAKEHURST NAES	KNEL	40.03	-74.35	UNITED STATES - NJ
MCGUIRE AFB	KWRI	40.02	-74.59	UNITED STATES - NJ
NEWARK LIBERTY INTL	KEWR	40.69	-74.17	UNITED STATES - NJ
TETERBORO	KTEB	40.85	-74.06	UNITED STATES - NJ
TRENTON MERCER	KTTN	40.28	-74.81	UNITED STATES - NJ
ALBUQUERQUE INTL	KABQ	35.04	-106.61	UNITED STATES - NM
CANNON AFB	KCVS	34.39	-103.31	UNITED STATES - NM
CAVERN CITY AIR TERMINAL	KCNM	32.34	-104.26	UNITED STATES - NM
FOUR CORNERS RGNL	KFMN	36.74	-108.23	UNITED STATES - NM
GALLUP MUNI	KGUP	35.51	-108.79	UNITED STATES - NM
HOLLOMAN AFB	KHMN	32.85	-106.11	UNITED STATES - NM
ROSWELL INTL AIR CENTER	KROW	33.3	-104.53	UNITED STATES - NM
TUCUMCARI MUNI	KTCC	35.18	-103.6	UNITED STATES - NM
WHITE SANDS NM.	72269	32.38	-106.48	UNITED STATES - NM
DESERT ROCK	KDRA	36.62	-116.03	UNITED STATES - NV
ELKO RGNL	KEKO	40.82	-115.79	UNITED STATES - NV
ELY ARPT YELLAND FLD	KELY	39.3	-114.84	UNITED STATES - NV
MCCARRAN INTL	KLAS	36.08	-115.15	UNITED STATES - NV
NELLIS AFB	KLSV	36.24	-115.03	UNITED STATES - NV
RENO TAHOE INTL	KRNO	39.5	-119.77	UNITED STATES - NV
TONOPAH	KTPH	38.06	-117.09	UNITED STATES - NV
WINNEMUCCA MUNI	KWMC	40.9	-117.81	UNITED STATES - NV
ALBANY INTL	KALB	42.75	-73.8	UNITED STATES - NY

Site Name	Station ID	Lat	Lon	Country
BUFFALO NIAGARA INTL	KBUF	42.94	-78.73	UNITED STATES - NY
CHAUTAUQUA CO JAMESTOWN	KJHW	42.15	-79.26	UNITED STATES - NY
DUTCHESS CO	KPOU	41.63	-73.88	UNITED STATES - NY
FLOYD BENNETT MEM	KGFL	43.34	-73.61	UNITED STATES - NY
GREATER BINGHAMTON EDWIN A LINK FLD	KBGM	42.21	-75.98	UNITED STATES - NY
GREATER ROCHESTER INTL	KROC	43.12	-77.67	UNITED STATES - NY
GRIFFISS AFB/ROME	KRME	43.23	-75.41	UNITED STATES - NY
JOHN F KENNEDY INTL	KJFK	40.64	-73.78	UNITED STATES - NY
LA GUARDIA	KLGA	40.78	-73.87	UNITED STATES - NY
LONG ISLAND MAC ARTHUR	KISP	40.8	-73.1	UNITED STATES - NY
NIAGARA FALLS INTL	KIAG	43.11	-78.95	UNITED STATES - NY
ONEIDA CO	KUCA	43.15	-75.38	UNITED STATES - NY
PLATTSBURGH AFB	KPBG	44.65	-73.47	UNITED STATES - NY
STEWART INTL	KSWF	41.5	-74.1	UNITED STATES - NY
SYRACUSE HANCOCK INTL	KSYR	43.11	-76.11	UNITED STATES - NY
WATERTOWN INTL	KART	43.98	-76.02	UNITED STATES - NY
WESTCHESTER CO	KHPN	41.07	-73.71	UNITED STATES - NY
WHEELER SACK AAF	KGTB	44.06	-75.72	UNITED STATES - NY
AKRON CANTON RGNL	KCAK	40.92	-81.44	UNITED STATES - OH
CINCINNATI MUNI LUNKEN FLD	KLUK	39.1	-84.42	UNITED STATES - OH
CLEVELAND HOPKINS INTL	KCLE	41.41	-81.85	UNITED STATES - OH
JAMES M COX DAYTON INTL	KDAY	39.9	-84.22	UNITED STATES - OH
MANSFIELD LAHM RGNL	KMFD	40.82	-82.52	UNITED STATES - OH
PORT COLUMBUS INTL	KCMH	40	-82.89	UNITED STATES - OH
RICKENBACKER INTL	KLCK	39.81	-82.93	UNITED STATES - OH
TOLEDO EXPRESS	KTOL	41.59	-83.81	UNITED STATES - OH
WRIGHT PATTERSON AFB	KFFO	39.83	-84.05	UNITED STATES - OH
YOUNGSTOWN WARREN RGNL	KYNG	41.26	-80.68	UNITED STATES - OH
ZANESVILLE MUNI	KZZV	39.94	-81.89	UNITED STATES - OH
ALTUS AFB	KLTS	34.67	-99.27	UNITED STATES - OK
HENRY POST AAF	KFSI	34.65	-98.4	UNITED STATES - OK
MCALESTER RGNL	KMLC	34.88	-95.78	UNITED STATES - OK
TINKER AFB	KTIK	35.41	-97.39	UNITED STATES - OK
TULSA INTL	KTUL	36.2	-95.89	UNITED STATES - OK
VANCE AFB	KEND	36.34	-97.92	UNITED STATES - OK
WILL ROGERS WORLD	KOKC	35.39	-97.6	UNITED STATES - OK
ASTORIA RGNL	KAST	46.16	-123.88	UNITED STATES - OR
BURNS MUNI	KBNO	43.59	-118.96	UNITED STATES - OR
EASTERN OREGON RGNL AT PENDLETON	KPDT	45.7	-118.84	UNITED STATES - OR

Site Name	Station ID	Lat	Lon	Country
KLAMATH FALLS	KLMT	42.16	-121.73	UNITED STATES - OR
MAHLON SWEET FLD	KEUG	44.12	-123.21	UNITED STATES - OR
MCNARY FLD	KSLE	44.91	-123	UNITED STATES - OR
NORTH BEND MUNI	KOTH	43.42	-124.25	UNITED STATES - OR
PORTLAND INTL	KPDX	45.59	-122.6	UNITED STATES - OR
ROBERTS FLD AIRPORT	KRDM	44.25	-121.15	UNITED STATES - OR
ROGUE VALLEY INTL MEDFORD	KMFR	42.37	-122.87	UNITED STATES - OR
SEXTON SUMMIT	KSXT	42.6	-123.36	UNITED STATES - OR
ALTOONA BLAIR CO	KAOO	40.3	-78.32	UNITED STATES - PA
DU BOIS JEFFERSON CO	KDUJ	41.18	-78.9	UNITED STATES - PA
HARRISBURG INTL	KMDT	40.19	-76.76	UNITED STATES - PA
JOHN MURTHA JOHNSTOWN CAMBRIA CO	KJST	40.32	-78.83	UNITED STATES - PA
LEHIGH VALLEY INTL	KABE	40.65	-75.44	UNITED STATES - PA
NORTHEAST PHILADELPHIA	KPNE	40.08	-75.01	UNITED STATES - PA
PHILADELPHIA INTL	KPHL	39.87	-75.24	UNITED STATES - PA
PITTSBURGH INTL	KPIT	40.49	-80.23	UNITED STATES - PA
WILKES BARRE SCRANTON INTL	KAVP	41.34	-75.72	UNITED STATES - PA
WILLIAMSPORT RGNL	KIPT	41.24	-76.92	UNITED STATES - PA
WILLOW GROVE NAS JRB	KNXX	40.2	-75.15	UNITED STATES - PA
QUONSET STATE	KOQU	41.6	-71.41	UNITED STATES - RI
THEODORE FRANCIS GREEN STATE	KPVD	41.73	-71.42	UNITED STATES - RI
BEAUFORT MCAS	KNBC	32.48	-80.72	UNITED STATES - SC
CHARLESTON AFB INTL	KCHS	32.9	-80.04	UNITED STATES - SC
COLUMBIA METROPOLITAN	KCAE	33.94	-81.12	UNITED STATES - SC
FLORENCE RGNL	KFLO	34.19	-79.72	UNITED STATES - SC
GREENVILLE SPARTANBURG INTL	KGSP	34.9	-82.22	UNITED STATES - SC
MCENTIRE JNGB	KMMT	33.92	-80.8	UNITED STATES - SC
MYRTLE BEACH INTL	KMYR	33.68	-78.93	UNITED STATES - SC
ORANGEBURG MUNI	KOGB	33.46	-80.86	UNITED STATES - SC
SHAW AFB	KSSC	33.97	-80.47	UNITED STATES - SC
ABERDEEN RGNL	KABR	45.45	-98.42	UNITED STATES - SD
ELLSWORTH AFB	KRCA	44.15	-103.1	UNITED STATES - SD
HURON RGNL	KHON	44.39	-98.23	UNITED STATES - SD
JOE FOSS FLD	KFSD	43.58	-96.74	UNITED STATES - SD
PIERRE RGNL	KPIR	44.38	-100.29	UNITED STATES - SD
RAPID CITY RGNL	KRAP	44.05	-103.06	UNITED STATES - SD
LOVELL FLD	KCHA	35.04	-85.2	UNITED STATES - TN
MCGHEE TYSON	KTYS	35.81	-83.99	UNITED STATES - TN
MCKELLAR SIPES RGNL	KMKL	35.6	-88.92	UNITED STATES - TN

Site Name	Station ID	Lat	Lon	Country
MEMPHIS INTL	KMEM	35.04	-89.98	UNITED STATES - TN
MEMPHIS NAS	723345	35.35	-89.87	UNITED STATES - TN
NASHVILLE INTL	KBNA	36.12	-86.68	UNITED STATES - TN
TRI CITIES RGNL TN VA	KTRI	36.48	-82.41	UNITED STATES - TN
ABILENE RGNL	KABI	32.41	-99.68	UNITED STATES - TX
ANGELINA CO	KLFK	31.23	-94.75	UNITED STATES - TX
AUSTIN BERGSTROM INTL	KAUS	30.19	-97.67	UNITED STATES - TX
BERGSTROM AFB/AUSTI	KBSM	30.2	-97.68	UNITED STATES - TX
BROWNSVILLE SOUTH PADRE ISLAND INTL	KBRO	25.91	-97.43	UNITED STATES - TX
CHASE NAS/BEEVILLE	KNIR	28.37	-97.67	UNITED STATES - TX
CORPUS CHRISTI INTL	KCRP	27.77	-97.5	UNITED STATES - TX
CORPUS CHRISTI NAS	KNGP	27.69	-97.29	UNITED STATES - TX
DALLAS (NAS)	KNBE	32.73	-96.97	UNITED STATES - TX
DALLAS FORT WORTH INTL	KDFW	32.9	-97.04	UNITED STATES - TX
DALLAS LOVE FLD	KDAL	32.85	-96.85	UNITED STATES - TX
DEL RIO INTL	KDRT	29.37	-100.93	UNITED STATES - TX
DYESS AFB	KDYS	32.42	-99.85	UNITED STATES - TX
EL PASO INTL	KELP	31.81	-106.38	UNITED STATES - TX
ELLINGTON FLD	KEFD	29.61	-95.16	UNITED STATES - TX
FORT WORTH NAS JRB	KNFW	32.77	-97.44	UNITED STATES - TX
GEORGE BUSH INTCNTL HOUSTON	KIAH	29.98	-95.34	UNITED STATES - TX
HOOD AAF	KHLR	31.15	-97.72	UNITED STATES - TX
KINGSVILLE NAS	KNQI	27.51	-97.81	UNITED STATES - TX
LACKLAND AFB KELLY FLD ANNEX	KSKF	29.38	-98.58	UNITED STATES - TX
LAUGHLIN AFB	KDLF	29.36	-100.78	UNITED STATES - TX
LUBBOCK PRESTON SMITH INTL	KLBB	33.66	-101.82	UNITED STATES - TX
MIDLAND INTL	KMAF	31.94	-102.2	UNITED STATES - TX
RANDOLPH AFB	KRND	29.53	-98.28	UNITED STATES - TX
REESE AFB/LUBBOCK	KREE	33.6	-102.05	UNITED STATES - TX
RICK HUSBAND AMARILLO INTL	KAMA	35.22	-101.71	UNITED STATES - TX
ROBERT GRAY AAF	KGRK	31.07	-97.83	UNITED STATES - TX
SAN ANGELO RGNL MATHIS FLD	KSJT	31.36	-100.5	UNITED STATES - TX
SAN ANTONIO INTL	KSAT	29.53	-98.47	UNITED STATES - TX
SCHOLES INTL AT GALVESTON	KGLS	29.27	-94.86	UNITED STATES - TX
SHEPPARD AFB WICHITA FALLS MUNI	KSPS	33.99	-98.49	UNITED STATES - TX
SOUTHEAST TEXAS RGNL	KBPT	29.95	-94.02	UNITED STATES - TX
TYLER POUNDS RGNL	KTYR	32.35	-95.4	UNITED STATES - TX
WACO RGNL	KACT	31.61	-97.23	UNITED STATES - TX
CEDAR CITY RGNL	KCDC	37.7	-113.1	UNITED STATES - UT
HILL AFB	KHIF	41.12	-111.97	UNITED STATES - UT

Site Name	Station ID	Lat	Lon	Country
PROVO MUNI	KPVU	40.22	-111.72	UNITED STATES - UT
SALT LAKE CITY INTL	KSLC	40.79	-111.98	UNITED STATES - UT
WENDOVER	KENV	40.72	-114.03	UNITED STATES - UT
CHARLOTTESVILLE ALBEMARLE	KCHO	38.14	-78.45	UNITED STATES - VA
DANVILLE RGNL	KDAN	36.57	-79.34	UNITED STATES - VA
DAVISON AAF	KDAA	38.72	-77.18	UNITED STATES - VA
FELKER AAF	KFAF	37.13	-76.61	UNITED STATES - VA
LANGLEY AFB	KLFI	37.08	-76.36	UNITED STATES - VA
NEWPORT NEWS WILLIAMSBURG INTL	KPHF	37.13	-76.49	UNITED STATES - VA
NORFOLK INTL	KORF	36.89	-76.2	UNITED STATES - VA
NORFOLK NS	KNGU	36.94	-76.29	UNITED STATES - VA
OCEANA NAS	KNTU	36.82	-76.03	UNITED STATES - VA
QUANTICO MCAF	KNYG	38.5	-77.31	UNITED STATES - VA
RICHMOND INTL	KRIC	37.51	-77.32	UNITED STATES - VA
ROANOKE RGNL WOODRUM FLD	KROA	37.33	-79.98	UNITED STATES - VA
WALLOPS FLIGHT FACILITY	KWAL	37.94	-75.47	UNITED STATES - VA
BURLINGTON INTL	KBTV	44.47	-73.15	UNITED STATES - VT
BELLINGHAM INTL	KBLI	48.79	-122.54	UNITED STATES - WA
BOEING FLD KING CO INTL	KBFI	47.53	-122.3	UNITED STATES - WA
BREMERTON NATIONAL	KPWT	47.49	-122.76	UNITED STATES - WA
FAIRCHILD AFB	KSKA	47.62	-117.66	UNITED STATES - WA
FELTS FLD	KSFF	47.68	-117.32	UNITED STATES - WA
GRAY AAF	KGRF	47.08	-122.58	UNITED STATES - WA
HANFORD	KHMS	46.57	-119.6	UNITED STATES - WA
KELSO LONGVIEW	KKLS	46.12	-122.9	UNITED STATES - WA
MCCHORD FIELD	KTCM	47.13	-122.48	UNITED STATES - WA
OLYMPIA	KOLM	46.97	-122.9	UNITED STATES - WA
PANGBORN MEM	KEAT	47.4	-120.21	UNITED STATES - WA
QUILLAYUTE	KUIL	47.94	-124.56	UNITED STATES - WA
SEATTLE TACOMA INTL	KSEA	47.45	-122.31	UNITED STATES - WA
SNOHOMISH CO	KPAE	47.91	-122.28	UNITED STATES - WA
SPOKANE INTL	KGEG	47.62	-117.53	UNITED STATES - WA
WALLA WALLA RGNL	KALW	46.09	-118.29	UNITED STATES - WA
WHIDBEY ISLAND NAS	KNUW	48.35	-122.66	UNITED STATES - WA
WILLIAM R FAIRCHILD INTL	KCLM	48.12	-123.5	UNITED STATES - WA
YAKIMA AIR TERMINAL MC ALLISTER FLD	KYKM	46.57	-120.54	UNITED STATES - WA
AUSTIN STRAUBEL INTL	KGRB	44.49	-88.13	UNITED STATES - WI
CHIPPEWA VALLEY RGNL	KEAU	44.87	-91.48	UNITED STATES - WI
DANE CO RGNL TRUAX FLD	KMSN	43.14	-89.34	UNITED STATES - WI
GENERAL MITCHELL INTL	KMKE	42.95	-87.9	UNITED STATES - WI

Site Name	Station ID	Lat	Lon	Country
LA CROSSE MUNI	KLSE	43.88	-91.26	UNITED STATES - WI
EASTERN WV RGNL SHEPHERD FLD	KMRB	39.4	-77.98	UNITED STATES - WV
HARRISON MARION RGNL	KCKB	39.3	-80.23	UNITED STATES - WV
MERCER CO	KBLF	37.3	-81.21	UNITED STATES - WV
MID OHIO VALLEY RGNL	KPKB	39.35	-81.44	UNITED STATES - WV
MORGANTOWN MUNI WALTER L BILL HART FLD	KMGW	39.64	-79.92	UNITED STATES - WV
RALEIGH CO MEM	KBKW	37.79	-81.12	UNITED STATES - WV
TRI STATE MILTON J FERGUSON FLD	KHTS	38.37	-82.56	UNITED STATES - WV
WHEELING OHIO CO	KHLG	40.17	-80.65	UNITED STATES - WV
YEAGER	KCRW	38.37	-81.59	UNITED STATES - WV
CHEYENNE RGNL JERRY OLSON FLD	KCYS	41.16	-104.81	UNITED STATES - WY
EVANSTON UINTA CO BURNS FLD	KEVW	41.27	-111.03	UNITED STATES - WY
HUNT FLD	KLND	42.82	-108.73	UNITED STATES - WY
NATRONA CO INTL	KCPR	42.91	-106.46	UNITED STATES - WY
ROCK SPRINGS SWEETWATER CO	KRKS	41.59	-109.07	UNITED STATES - WY
SHERIDAN CO	KSHR	44.77	-106.98	UNITED STATES - WY
CARRASCO INTL	SUMU	-34.84	-56.03	URUGUAY
KARSHI	38812	38.8	65.72	UZBEKISTAN
SAMARKAND	UTSS	39.7	66.98	UZBEKISTAN
TERMEZ	UTST	37.29	67.31	UZBEKISTAN
YUZHNY	UTTT	41.26	69.28	UZBEKISTAN
ALBERTO CARNEVALLI	SVMD	8.58	-71.16	VENEZUELA
BARQUISIMETO INTL	SVBM	10.04	-69.36	VENEZUELA
GENERAL JOSE ANTONIO ANZOATEGUI INTL	SVBC	10.11	-64.69	VENEZUELA
SAN ANTONIO DEL TACHIRA	SVSA	7.84	-72.44	VENEZUELA
SIMON BOLIVAR INTL	SVMI	10.6	-66.99	VENEZUELA
DANANG INTL	VVDN	16.04	108.2	VIETNAM
NOIBAI INTL	VVNB	21.22	105.81	VIETNAM
TANSONNHAT INTL	VVTS	10.82	106.65	VIETNAM
WAKE ISLAND AFLD	PWAK	19.28	166.64	WAKE ISLAND
HARARE INTL	FVHA	-17.93	31.09	ZIMBABWE