NATIONAL WEATHER SERVICE INSTRUCTION 10-1004
JUNE 5, 2025

Operations and Services
Climate Services, NWSPD 10-10

CLIMATE RECORDS

NOTICE: This publication is available at: https://www.weather.gov/directives/

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Type of Issuance: Correction

SUMMARY OF REVISIONS: This instruction supersedes National Weather Service Instruction 10-1004, dated October 1, 2024 and contains this change:

- Removes reference to surface.qc@noaa.gov email address in Section 4.3, so data QC issues are only to be submitted via Datzilla

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May 22, 2025

Allison Allen
Director, Analyze, Forecast and Support Office

Date

Climate Records

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1 Introduction

This instruction describes surface station climatological data from observing stations and the principles to promote the integrity of the climatological data record. The instruction also discusses station long term normals, means, and extremes; national and state extremes; and station climatological reports.

The National Centers for Environmental Information (NCEI) (https://www.ncei.noaa.gov) determines station long term normals, means, and extremes from observing station sites. The Climate Prediction Center (CPC) (https://www.cpc.ncep.noaa.gov) provides forecast means and outlook classes as referenced in their climate outlooks.

Please note that all data are preliminary until they have been subject to all levels of NCEI quality control. Once they have passed this quality control, the data are considered "final data." Also note, do not use the term "official data" as it is generally perceived that all data produced by the National Weather Service (NWS) is "official." This is stated in NWSI 10-1003, Climate Data Services (https://www.weather.gov/media/directives/010_pdfs/pd01010003curr.pdf).

2 Surface Station Observation Data

Observational climate data may include the values, totals, or averages of the following (Table 1) for seconds, minute(s), hour, day, month, season, year, and/or other time period, as appropriate.

High temperature (°F)	Low temperature (°F)	Average temperature (°F)
Heating Degree days (°F)	Cooling Degree Days (°F)	Precipitation (0.01 inches or T)
Snowfall (0.1 inches or T)	Snow depth (whole inches or T)	Relative Humidity (%)
Average 2-min wind speed (mph)	Highest 2-min wind speed (mph)	Mean wind direction (degrees)
Highest 3-sec wind gust (mph)	Direction of highest gust (degrees)	Average detected cloud cover (oktas or tenths)
Visibility (statute miles)	Sunshine (minutes)	Sunshine (% of possible)

***Table 1**. Surface Station Observations. (T=trace, mph=miles per hour)*

The (NWS) manages its weather/climate monitoring systems through compliance with the "Ten Principles of Climate Monitoring" (see Appendix A). To protect and enhance the integrity of climate records, Weather Forecast Offices (WFO) and Weather Service Offices (WSO) should apply these principles within their capability for surface observing stations in their area of responsibility. Further reference to WFO will mean WFO and WSO. NWS Instruction 10-1305 (Observational Quality Control – General) (https://www.weather.gov/media/directives/010_pdfs/pd01013005curr.pdf) provides additional information and procedures for WFOs to protect and enhance the integrity of climate records.

2.1 Surface Station Data Correction

At times, it may become necessary to correct certain values within the official archive at NCEI. This is done through the use of Datzilla. General information on Datzilla can be found in NWSI 10-1003, Climate Data Services (https://www.weather.gov/media/directives/010_pdfs/pd01010003curr.pdf).

To expedite the resolution of a pending ticket, it is asked that you use the spreadsheets when providing corrected data, which are found at;

https://drive.google.com/drive/folders/0B4Vu1xdtjSiCbEJ5NHRMOWZQaHc?resourcekey=0-SqyLyo3lc5qcynMJxYp19w&usp=sharing

Instructions are found within the spreadsheet named "Datzilla_NotesFromNCEIForExcelEntries.xlsx." Simply download the appropriate spreadsheet, fill in the pertinent data, and attach the spreadsheet to the Datzilla ticket. It is important to follow the formatting as described in the instructions.

3 Surface Station Long Term Normals, Means, and Extremes

NCEI provides these statistics for temperature, precipitation, snowfall, and heating and cooling degree days for use with NWS Automated Surface Observing System (ASOS) data sites and published NWS Cooperative Observing Program (COOP) stations.

3.1 Definitions

The definitions used for these statistics are consistent with World Meteorological Organization (WMO) (https://wmo.int/)) terminology.

Period of Record (or Record Period): The full length of a station's records from beginning of observations to the most recent observation (the present if the station is active).

Record Mean: The computed mean for a given element for the station's period of record, without regard to changes in a station's location.

Adjusted Record Mean: The computed mean for a given element for the station's period of record, after adjusting the data for inhomogeneity introduced by changes in station location.

Period Mean: A period mean is a mean computed for any period of at least 10 years starting on January 1 of a year ending with the digit 1. One such period is 01/01/1991 through 12/31/2000.

Normal: A normal is a period mean computed by NCEI for an observing station from a period comprising of three consecutive 10-year decadal periods (for example, 1991-2020). For cases of sensor instrumentation change and/or relocation, NCEI will make appropriate adjustments to the observational record for the observing station. See Section 3.4 for details.

Extreme: An extreme is the maximum, minimum, or longevity value of an element for a specific calendar day or month, all time, or other specific reference time frame for a station's period of record.

Primary Local Climatological Data (PLCD) site. A PLCD site, formerly known simply as a Local Climatological Data (LCD) site, is an ASOS or manual observation station for which NCEI conducts manual quality control that also involves regular communication with NWS WFOs to correct/resolve data quality issues. Summary of the day and summary of the month data are provided for elements that include temperature, degree days, weather type, precipitation, pressure, and wind (as available). PLCDs also include hourly precipitation and abbreviated 3-hourly weather observations. Most PLCD sites are located at major airports.

Secondary Local Climatological Data (SLCD) site. An SLCD site is an automated station, usually an ASOS or Automatic Weather Observing Station (AWOS) station for which NCEI conducts automated quality control. The data for ASOS stations includes summary of the day and summary of the month for elements that include temperature, degree days, weather type, precipitation, pressure, and wind (as available) as well as hourly precipitation data. Hourly precipitation data and observations taken every 20 minutes are provided for AWOS stations.

Note: Unless separate distinction is required, both PLCD and SLCD will be referred to as LCD in the remainder of this document.

Climatological Data (CD) site. A CD site includes all stations within the NWS Cooperative Observer Program Network (COOP) that have an archive flag set to "Distribute," the PLCD sites, and other ASOS stations designated for inclusion in CD publications. Designation is set through the Station Information System (SIS) of the COOP Program for an ASOS site by setting the archive flag to "Distribute." The data include monthly summary information and a daily summary of all observed parameters at that location which may include temperature, precipitation, snowfall and snow depth, soil temperature, and pan evaporation, where available.

3.2 Final Source of Normals

NCEI no longer issues standard publications for normals. All normals can be retrieved via internet at: https://www.ncei.noaa.gov/products/land-based-station/us-climate-normals and https://www.ncei.noaa.gov/maps/normals/

3.3 Effective Date of Normals

Normals become effective as soon as NCEI provides public access to the normals from the NCEI web page. For major updates that occur every decade, new normals are usually available by the middle of the following calendar year. Every attempt will be made to upload the new normals dataset to the individual field office AWIPS on or about the same date. This is coordinated by the NWS Analyze, Forecast, and Support (AFS) Climate Services Branch (CSB).

3.4 Calculation of Normals

The science and methodologies used to generate official climate normals for the United States were well established during the creation of the 1981–2010 U.S. Climate Normals. A team of NCEI researchers spent considerable time and effort improving and automating these processes, particularly for daily and hourly normals. These methods are documented in a series of five peer-reviewed publications (Applequist et al. 2012; Arguez et al. 2012; Arguez and Applequist 2013; Durre et al. 2013; Durre and Squires 2015).

The 1991–2020 Normals calculation software was updated to incorporate feedback and recommendations from WMO Guidelines on the Calculation of Climate Normals. These changes are summarized in the Normals Calculation Methodology 2020 document (https://www.ncei.noaa.gov/data/normals-annualseasonal/1991-2020/doc/Normals_Calculation_Methodology_2020.pdf), along with additional technical documentation released with 1981–2010 Normals.

3.4.1 2023 Update

Version 1.0.1 reflects changes in the daily, monthly, seasonal, and annual normals at a total of 23 stations. Hourly and agricultural normals remain unchanged.

During the year following the initial release of the 1991-2020 station-based U.S. Climate Normals in May 2021, National Weather Service Forecast Offices submitted inquiries regarding the Normals at a total of 60 stations. Staff at NCEI carefully adjudicated each inquiry in collaboration with its NWS partners. At 21 stations, NWS staff were able to provide data additions and corrections, and NCEI staff recalculated or added the affected normals parameters based on the updated data records. In most cases, changes in the monthly normals were <0.5°C for temperature, <0.1 in for precipitation, and <0.5 in for snowfall. At two additional sites, certain normals parameters were removed because they were judged to be inaccurate, and no correction to the underlying data was feasible.

3.4.2 Effect on Normals from Changes in Observing Conditions

If temperature sensors or precipitation gauges are relocated and/or replaced by new equipment, the NWS will collect comparative data to be used as the basis for revising the normals. For details, see NWS Instructions 10-2101 (General Instructions for Terrestrial-Based In-Situ Instrument and Algorithm Intercomparisons for the Purpose of Climate Data Continuity) https://www.weather.gov/media/directives/010_pdfs/pd01021001curr.pdf and 10-1302 (Instrument Requirements and Standards for the NWS Surface Observing Program [Land])

https://www.weather.gov/media/directives/010_pdfs/pd01013002curr.pdf. Revised normals for a site become final as soon as they are distributed to the WFO.

3.4.3 Normals and Observations for February 29

NCEI does not provide daily normals for February 29. WFOs will handle normals and observations related to February 29 in leap years in the following manner:

- February 29 (Daily) Normals: For temperature and heating/cooling degree days, WFOs will use the average value of the element calculated from the values on February 28 and March 1 and rounded to the nearest tenth for precipitation and nearest whole, positive number or zero for heating/cooling degree days. Round will be done using the Banker's rounding[1] method. For precipitation and snowfall, the values for February 28 will be used.

- February Monthly Normals: No change will be made in leap years for normal temperatures, precipitation, snowfall, or heating/cooling degree days. The leap day has been incorporated in the monthly contributions to February normals during 1991-2020.

- Seasonal and Annual Normals: No alterations will be required for leap years.

When new normals are received for use in the AWIPS Climate Perspective, values for February 29 will already be calculated and inserted into the database.

3.5 Extremes

NCEI provides station extremes for each calendar day, month, and the period of record (i.e. "all time"). To address the challenge of having consistent climate extremes for LCD stations with numerous relocations during the period of record (especially in large metropolitan areas), NCEI developed a methodology to establish multi-location combined (or threaded) station data sets under the "ThreadEx" project (as described in detail in Appendix B).

4 Climatological Data Reports

WFOs will issue the following products for all PLCD sites (see Appendix C) in their area of responsibility. These reports contain information in accordance with Sections 2 and 3.

- Climatological Report - Daily (CLI)
- Climatological Report - Monthly (CLM)
- Preliminary Local Climatological Data Report (CF6)
- Record Event Report (RER)

WFOs may optionally issue climate reports for the week, season, year, or other period of time under the AWIPS product category of MIS (Miscellaneous Local Product), PNS (Public Information Statement), OPU (Other Public Products), or another specified PIL (e.g. CLA [annual], CLS [seasonal], and CLQ [quarterly]) on a case-by-case basis (by a request through the WFO's regional office).

1 With Banker's rounding, values below 0.5 go down and values above 0.5 go up. Values of exactly 0.5 go to the nearest even number.

The data in these products are preliminary since the products are issued before all levels of NCEI QC makes the data final. See the climate data disclaimer in NWS Instruction 10-1003 (Climate Data Services) (https://www.weather.gov/media/directives/010_pdfs/pd01010003curr.pdf). Sunrise, sunset and sunshine in these reports is not official since the U.S. Naval Observatory is the source for official astronomical records. See astronomical disclaimer also in NWS Instruction 10-1003 (Climate Data Services).

To add or remove PLCD designation from ASOS sites in its area of responsibility, a WFO will coordinate with its region and NCEI and reach a consensus, considering such factors as data quality, frequency, reliability, length of record; and historical, cultural, business, public interest, and any other factor(s) of significance. To add or remove CD designation from ASOS sites, only data quality and reliability need be taken into account. With both PLCD and CD designation changes, the proper documentation (Station Profile Request and Station Profile) will need to be filed within the Station Information System (SIS). All active PLCD and CD ASOS sites are required to have accurate Station Profiles within SIS.

WFOs may also optionally issue any or all these products for other sites (i.e. NCEI archived non-PLCD sites), whether published or not, of major interest in their area, in concurrence with their regional climate services program manager. WFOs should consider user interest; length of climate record; and quality, frequency, and reliability of current observations when considering optional non-PLCD site products. It is preferred, however, that WFO climate products are produced primarily for published sites (either PLCD, SLCD, or CD).

WFOs should compose these products with the Advanced Weather Interactive Processing System (AWIPS) Climate Program or a text editor if the program is not available. For service backup procedures, see NWS Instruction 10-2201 (Backup Operations) https://www.weather.gov/media/directives/010_pdfs/pd01022001curr.pdf. Be advised, at this time, the AWIPS Climate Program does not have service backup functionality. Any backups done for climate products are completed with manual updates. WFOs will first report operational problems with the AWIPS Climate Program to the AWIPS Network Control Facility (NCF) (anytime – "24/7"). NCF will open a trouble ticket and attempt to solve the problem directly. If NCF cannot solve the problem, WFOs should report the problem to their regional climate services program manager for referral to CSB. This reporting process does not include requests to change output, format, or calculation methods, which are handled through the established policy coordination process for the directive system.

WFOs will only use backup observation sites when valid observation data at the primary site are not available and when all the following four conditions for backup sources are met:

- The backup site is sited near the observing location in an area of similar exposure (as determined by the WFO).
- The data from the backup site are received, accepted, and archived by NCEI.
- Sensors and methods meet NWS instrument standards (NWS Instruction 10-1302 – Instrument Requirements and Standards for the NWS Surface Observing Programs (Land), Appendix D) (https://www.weather.gov/media/directives/010_pdfs/pd01013002curr.pdf).

- There is a Completed Station Profile in SIS that includes a backup site/sensor metadata permanent remarks section in accordance with the SIS User's Guide.

WFOs will **not** estimate values for missing elements with the exception of snow measurements. Snow measurements may be estimated during certain situations as described in the NWS Snow Measurement Guidelines (https://www.weather.gov/media/coop/Snow_Measurement_Guidelines-2014.pdf), paragraph 3.1.2. Follow the Snow Measurement Guidelines for reporting a snow measurement estimate.

WFOs will indicate data as missing (as described in Sections 4.1.3, 4.2.3, and 4.3.3) when the following circumstances apply:

- There are no data or inaccurate data due to a power outage, sensor malfunction, or other deficiency due to inadequate sensor performance (in the judgment of the WFO).
- There are no established backup sources available nearby.

WFOs will document the use of backup sources in the remarks Section of the Preliminary Local Climatological Data Report (CF6), as described in Section 4.3.3. Due to current limitations in the AWIPS Climate Program, it is recommended that the WFO maintain a list of remarks and enter these in the remarks section of the CF6 prior to sending the final version for the month.

4.1 Climatological Report – Daily (CLI)

4.1.1 Mission Connection

The CLI provides climatological data for each day.

4.1.2 Issuance Guidelines

Issuance Time: The CLI will be issued at least twice daily. The first mandatory issuance will be between 12:30 a.m. and 5:00 a.m. local time to capture the previous calendar day's (midnight-to-midnight Local Standard Time [LST]) data. The second mandatory issuance will be in the late afternoon/early evening (typically between 3:00 p.m. and 5:30 p.m. local time), before local newscast times, to capture data for the current day. Other optional issuances may be made to meet local user requirements (e.g., a late morning report to capture the current day morning low temperature, an early evening report to capture the final high daily temperature, etc.)

Valid Time: The CLI is valid from the time of release until the next issuance.

Product Expiration Time: The CLI does not have a product expiration time.

4.1.3 Technical Description

MND Product Type Line: The CLI MND is "CLIMATE REPORT."

Content: The CLI contains the standardized data shown in Section 4.1.3.c. All data shown in Section 4.1.3.c are required for both mandatory daily issuances, except as

identified in Note 3 at the end of Section 4.1.3.c, for all CLIs year-round. Data to be included in the optional CLIs may be adapted to meet local needs. “MM” should be used to indicate missing data, as appropriate (as explained in Section 4). To ensure consistency with NCEI routines, one or more missing daily values will result in a “MM” for the preliminary monthly value. WFOs may append specialized data to the end of the standard fixed-fields to meet local user needs.

Format: The CLI is a tabular product. However, supplemental narrative information may be included to meet local user needs. When specialized or additional information is appended to the standard format, it will be separated from the standard fixed-fields by double ampersands (&&). Double dollar signs ($$) will be used to signify the end of the product.

```
(WMO Heading)
(AWIPS ID)

CLIMATE REPORT
NATIONAL WEATHER SERVICE <WFO> <STATE>
<HHMM> AM <LT> <DAY MMM DD YYYY>
.....................................

...THE <CITY NAME> CLIMATE SUMMARY FOR <MONTH DD YEAR>...

CLIMATE NORMAL PERIOD YYYY TO YYYY
CLIMATE RECORD PERIOD YYYY TO YYYY

WEATHER ITEM   OBSERVED  TIME   RECORD YEAR NORMAL DEPARTURE LAST
                VALUE    (LST)  VALUE       VALUE  FROM      YEAR
                                                   NORMAL
.....................................................................

TEMPERATURE (F)
 YESTERDAY
  MAXIMUM        000    0000 PM 000    YYYY 000    000       000
  MINIMUM        000    0000 AM 000    YYYY 000    000       000
  AVERAGE        000                        000    000       000

PRECIPITATION (IN)
 YESTERDAY        00.00          00.00 YYYY  00.00  00.00     00.00
 MONTH TO DATE    00.00                      00.00  00.00     00.00
 SINCE <SEASON>   00.00                      00.00  00.00     00.00
 SINCE JAN  1    000.00                      00.00  00.00     00.00

SNOWFALL (IN)
 YESTERDAY        00.0           00.0  YYYY  00.0   00.0      00.0
 MONTH TO DATE   000.0                      00.0  000.0     000.0
 SINCE <SEASON>  000.0                     000.0 0000.0    0000.0
 SINCE JUL  1   0000.0                     000.0 0000.0    0000.0
 SNOW DEPTH      000

DEGREE DAYS
 HEATING
  YESTERDAY      000                         00    000       000
  MONTH TO DATE 0000                       0000   0000      0000
  SINCE <SEASON>0000                       0000  00000      0000
  SINCE JUL  1 00000                      00000  00000     00000

 COOLING
  YESTERDAY       00                         00    000        00
  MONTH TO DATE 0000                        000   0000      0000
  SINCE <SEASON>0000                       0000   0000      0000
  SINCE JAN  1  0000                       0000   0000      0000

.....................................................................
WIND (MPH)
 HIGHEST WIND SPEED    000    HIGHEST WIND DIRECTION <DIR> (000)
 HIGHEST GUST SPEED    000    HIGHEST GUST DIRECTION <DIR> (000)
 AVERAGE WIND SPEED     00.0
```

```
SKY COVER
 POSSIBLE SUNSHINE 000 PERCENT
 AVERAGE SKY COVER 0.0

WEATHER CONDITIONS
 THE FOLLOWING WEATHER WAS RECORDED YESTERDAY.
 <W1>
 <W2>
 <W3>
 <ETC.>

RELATIVE HUMIDITY (PERCENT)
 HIGHEST 000   0000 PM
 LOWEST  000   0000 AM
 AVERAGE 000
.................................................................

THE <CITY1 NAME> CLIMATE NORMALS FOR TODAY
                          NORMAL    RECORD    YEAR
 MAXIMUM TEMPERATURE (F)  000       000      YYYY
 MINIMUM TEMPERATURE (F)  000       000      YYYY
SUNRISE AND SUNSET
<MONTH DD YEAR>.........SUNRISE  0000 AM <LT>  SUNSET  0000 PM <LT>(today)
<MONTH DD YEAR>.........SUNRISE  0000 AM <LT>  SUNSET  0000 PM <LT>(tomorrow)

-  INDICATES NEGATIVE NUMBERS.
R  INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T  INDICATES TRACE AMOUNT.

&&    (Standard Format end indicator entered locally)
-----------------------------------------------------------------
(<any additional local specialized climate data>

$$
```

Note 1: Note: The “xxx” in this product is the three-letter data site identifier, or WFO site identifier for reports with multiple non-LCD data sites.

Note 2: <Season-to-date> may be locally set to alternate season/year-to-date.

Default <seasons> in northern Hemisphere are defined as:
Winter - December, January, February
Spring - March, April, May
Summer - June, July, August
Fall - September, October, November

For American Samoa (in the Southern Hemisphere), the default seasons are reversed.

Note 3: WFOs may report only observed values for snowfall. However, if a WFO elects to report any other snowfall field (i.e., record value, year, normal value, departure from normal, or last year), then all snowfall fields will be reported.

4.1.4 Updates, Amendments, and Corrections

These will be done as needed.

4.1.5 The Supporting Software

AWIPS Climate Program uses the ASOS Daily Summary Message (DSM) to produce the CLI. The DSM is an automated coded message primarily for use by the NWS National Centers for Environmental Prediction (NCEP), NCEI, and WFOs. The DSM is not subject to WFO quality control. If some data entries are not available from the DSM, other sources, such as the METARs (Transmitted Aviation Weather Reports) may be used to fill in data resulting from gaps in the DSM. WFOs should correct erroneous data in the CLI. The "PRIMARY DSM XMIT TIME" will be set to 00:15 a.m. LST for each ASOS site. Intermediate DSMs may be generated and transmitted at any time to meet local needs. The ASOS Users Guide provides detailed guidance regarding the DSM.

4.2 Climatological Report - Monthly (CLM)

4.2.1 Mission Connection

The CLM provides climatological data for a monthly basis.

4.2.2 Issuance Guidelines

Issuance Criteria: CLMs will be issued with a separate product for each ASOS LCD site (i.e., unique AWIPS ID for each ASOS LCD site [CLMxxx; xxx for the site] under the WFO's WMO heading [CXaa5i CCCC] for the CLM product category). CLMs for non-LCD sites may be sent as separate products (using the xxx for non-LCD site) or grouped together within an LCD product separated by "&&."

Issuance Time: The CLM will be issued at least monthly, no later than the 5th day of the following month. A monthly product can be generated using the AWIPS Climate Program any time after the last mandatory CLI issuance between 12:30 a.m. and 5:00 a.m. local time for the last day of the past month.

Valid Time: CLMs are valid from the time of release until the next issuance.

Product Expiration Time: The CLM does not have a product expiration time.

4.2.3 Technical Description

MND Product Type Line: The CLM MND is "CLIMATE REPORT."

Content: The CLM contains the standardized data shown that follows. These data are required for all CLMs year-round except as noted by "*" in the generic format in Section "4.2.3.c" MM will be used to indicate missing data, as appropriate (i.e. one or more missing daily values result in "MM" for the preliminary monthly value). WFOs may append specialized data to the end of the standard fixed-fields to meet the needs of local users.

Format: The CLM is a tabular product. However, supplemental narrative information may be included to meet local user needs. When specialized or additional information is appended to the standard format, it will be separated from the standard fixed-fields by double ampersands (&&). Double dollar signs ($$) will be used to signify the end of the product.

Product Format — Description of Entry

```
                                    (WMO Heading)
                                                (AWIPS ID)

CLIMATE REPORT
NATIONAL WEATHER SERVICE <WFO> <ST>
<HMM> AM <LT> <DAY MMM DD YYYY>

.................................

...THE <CITY NAME> CLIMATE SUMMARY FOR THE MONTH OF <MONTH> <YEAR>...

CLIMATE NORMAL PERIOD YYYY TO YYYY
CLIMATE RECORD PERIOD YYYY TO YYYY

WEATHER     OBSERVED                NORMAL      DEPART      LAST YEAR'S
            VALUE       DATE(S)     VALUE       FROM        VALUE DATE(S)
                                                NORMAL
.....................................................................
TEMPERATURE (F)
RECORD
 HIGH             00    MO/DD/YYYY
 LOW              00    MO/DD/YYYY
HIGHEST           00    MO/DD       00*         00*         00    00
LOWEST            00    MO/DD       00*         00*         00    00
AVG. MAXIMUM      00.0                00.0        0.0         00
AVG. MINIMUM      00.0                00.0        0.0         00
MEAN              00.0                00.0        0.0         00
DAYS MAX >= 90    00                  0.0         0.0         00
DAYS MAX <= 32    00                  0.0         0.0         00
DAYS MIN <= 32    00                  0.0         0.0         00
DAYS MIN <= 0     00                  0.0         0.0         00

PRECIPITATION (INCHES)
RECORD
 MAXIMUM          0.00  YYYY
 MINIMUM          0.00  YYYY
TOTALS            0.00                0.00        0.00        00
DAILY AVG.        0.00                0.00        0.00        00
DAYS >= .01       00                  0.0         0.0         00
DAYS >= .10       00                  0.0         0.0         00
DAYS >= .50       00                  0.0         0.0         00
DAYS >= 1.00      00                  0.0         0.0         00
GREATEST
 24 HR. TOTAL     0.00  MO/DD TO MO/DD                          00

SNOWFALL (INCHES)
RECORDS
 TOTAL            0.0   YYYY
```

```
TOTALS            0.0               0.0         0.0         00
SINCE 7/1         0.0               0.0         0.0         00
SNOWDEPTH AVG.    0                 0           0           00
DAYS >= 1.0       0                 0.0         0.0         00
GREATEST
 SNOW DEPTH       0     MM                                  00    00
 24 HR TOTAL      0.0   MM/DD TO MM/DD                      00

DEGREE_DAYS
HEATING TOTAL     000               00          00          00
 SINCE 7/1        0000              00          00          00
COOLING TOTAL     00                00          00          00
 SINCE 1/1        00                00          00          00

WIND (MPH)
AVERAGE WIND SPEED                  0.0
HIGHEST WIND SPEED/DIRECTION        00/000      DATE  MO/DD
HIGHEST GUST SPEED/DIRECTION        00/000      DATE  MO/DD

SKY COVER
POSSIBLE SUNSHINE (PERCENT)   00
AVERAGE SKY COVER             0.00
NUMBER OF DAYS FAIR           00
NUMBER OF DAYS PC             00
NUMBER OF DAYS CLOUDY         00

AVERAGE RH (PERCENT)          00

WEATHER CONDITIONS. NUMBER OF DAYS WITH
THUNDERSTORM            00    MIXED PRECIP            00
HEAVY RAIN              00    RAIN                    00
LIGHT RAIN              00    FREEZING RAIN           00
LT FREEZING RAIN        00    HAIL                    00
HEAVY SNOW              00    SNOW                    00
LIGHT SNOW              00    SLEET                   00
FOG                     00    FOG W/VIS <= 1/4 MILE   00
HAZE                    00

-  INDICATES NEGATIVE NUMBERS.
R  INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T  INDICATES TRACE AMOUNT.

&&    (Standard Format end indicator entered locally)
-------------------------------------------------------------------
(<any additional local specialized climate data>
$$
```

* optional – these are means and departure from means for the period of record.

4.2.4 Updates, Amendments, and Corrections

These are issued as needed, based upon user needs

4.2.5 Supporting Software

The AWIPS Climate Program usually uses the WFO's own database of monthly values (which were mainly derived from the ASOS DSMs) to produce the CLM. The WFOs, however, may optionally use ASOS Monthly Summary Message (MSM) to produce the CLM. The MSM is an automated coded message primarily for use by NCEP, NCEI, and WFOs. The MSM is not subject to WFO quality control. WFOs should correct erroneous or missing data in the CLM. The "MSM XMIT TIME" will be set to a time between 12:30 a.m. and 05:00 a.m. LST for each ASOS site. The ASOS Users Guide provides detailed guidance regarding the MSM.

4.3 Preliminary Local Climatological Data Report (CF6)

4.3.1 Mission Connection

NCEI uses the CF6 (also called the F-6) as a data source to resolve discrepancies with ASOS LCD and CD Publication data reports when preparing the final climate record for each ASOS LCD and CD Publication site. In addition CF6s are used by NCEI as a primary source of climate data for other ASOS sites. CF6s are also used by the public. WFOs will provide NCEI the name, e-mail address, and telephone number of a point of contact for questions relating to the CF6 data. The WFO CF6 web page will include the disclaimer stating that the data is "preliminary." See NWS Instruction 10-1003 for the disclaimer.

4.3.2 Issuance Guidelines

WFOs will at a minimum post online the CF6 data and any remarks for the entire preceding calendar month no later than the 3rd day of the following month. CF6s should be posted to the standardized WFO climate web pages by sending (through AWIPS) a separate product for each ASOS site (i.e., unique CF6 AWIPS ID for each ASOS site [CF6xxx] under the WFO's WMO heading [CXaa5i CCCC] for the CF6 product category).

Any requests to add snowfall and/or snow depth data to an LCD or CD Publication at NCEI will take place by submission of a Datzilla report (https://datzilla.srcc.tamu.edu). Also ensure that the online CF6 has the correct data.

WFOs should post the CF6 data and any remarks more frequently (i.e. daily data postings for month to date along with the needed remarks, such as backup sensor information.)

WFO's should indicate the "final posting" with a note in the CF6 remarks section (i.e. "FINAL MM-YY for month [MM] and year [YY]). This does ***not*** mean the data are "final," as defined in section 1.

Other remarks will be posted in the "remarks" section of the CF6.

If the WFO makes corrections to any value(s) in a previously reported "final posting" of a CF6, NCEI will be notified of the change and the updated "final posting" will be sent to NCEI via submission of a Datzilla report (https://datzilla.srcc.tamu.edu). Ensure you include what day, what was changed, and the corrected CF6 for updating of all relevant NCEI data sets and products.

4.3.3 Technical Description

Content: The CF6 will contain a row of data for each day and summary information of average and cumulative data. Missing data will be indicated with an "M" as appropriate (Section 4). To ensure consistency with NCEI routines, one or more missing daily values will result in an “M” for the corresponding preliminary monthly average or cumulative data value.

WFOs will document the following in the REMARKS section of the CF6.

- Data from backup sensor site and dates.
- Location of the backup site in reference to the ASOS site using eight point compass direction and distance in Statute miles (in tenths of a mile).

Format: WFOs posting CF6s will use the standard format following the key below. All data are for midnight to midnight LST except where otherwise noted.

KEY to CF6:

Column 1 - Day of month.

Column 2 - Maximum temperature for the day (nearest whole degree Fahrenheit).

Column 3 - Minimum temperature for the day (nearest whole degree Fahrenheit).

Column 4 - Average daily temperature (nearest whole degree Fahrenheit using columns 2 and 3).

Column 5 - Departure of the average temperature from normal (whole degrees Fahrenheit).

Column 6A - Heating Degree Days (HDD) using 65°F base, in whole degrees Fahrenheit.

Column 6B - Cooling Degree Days (CDD) using 65°F base, in whole degrees Fahrenheit.

Column 7 - Precipitation amount for the day (liquid equivalent, in hundredths of inches or trace).

Column 8 - Snowfall amount (including ice pellets and hail) for the day, in tenths of inches or trace. If snowfall information comes from a supplemental source such as a nearby COOP station, this should be noted in remarks on the FINAL version for the month using the name of the station, distance and direction from this station and time of observation. A remark of “Hail” is noted in the remarks section if some or all of the precipitation is recorded as hail.

Column 9 - Snow depth (including ice pellets, glaze, and hail) to nearest whole inch (or trace)

(taken at 1200 Universal Coordinated Time). If snow depth information comes from a supplemental source such as a nearby COOP station, this should be noted in remarks on the FINAL version for the month using the name of the station, distance and direction from this station and time of observation. A remark of “Hail” is noted in the remarks section if some or all of the precipitation is recorded as hail.

Column 10 - Average daily wind speed in miles per hour.

Column 11 - Fastest two-minute sustained (or average) wind speed in miles per hour.

Column 12 - Direction of fastest wind speed; degrees clockwise from true north.

Column 13 - Minutes of sunshine

Column 14 - Percent of possible sunshine.

Column 15 - Cloud cover from sunrise to sunset in tenths.

Column 16 - Weather codes (from weather key on CF6 form).

Column 17 - Peak wind gust in miles per hour.

Column 18 - Direction of peak wind gust in degrees clockwise from true north.

STANDARD FORMAT to CF6:

```
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                        STATION:
                                        MONTH:
                                        YEAR:
                                        LATITUDE:
                                        LONGITUDE:

  TEMPERATURE IN F:       :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                        AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S  WX   SPD DR
================================================================================
...for each day of month... ...see column key on preceding page...
================================================================================
SM ...summations for columns 2, 3, 6A, 6B, 7, 8, 10, 13 and 15...
================================================================================
AV (for columns 2, 3)                        FASTST  PSBL  %        MAX(MPH)
                                MISC ----->  #                  (and direction)
================================================================================

NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2
                                        STATION:
                                        MONTH:
                                        YEAR:
                                        LATITUDE:
                                        LONGITUDE:

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY:        TOTAL FOR MONTH:           1 = FOG OR MIST
DPTR FM NORMAL:         DPTR FM NORMAL:            2 = FOG REDUCING VISIBILITY
HIGHEST:       ON       GRTST 24HR       ON            TO 1/4 MILE OR LESS
LOWEST:        ON                                  3 = THUNDER
                        SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                        TOTAL MONTH:               5 = HAIL
                        GRTST 24HR       ON        6 = FREEZING RAIN OR DRIZZLE
GRTST DEPTH:     ON        7 = BLOWING DUST OR SAND:
                                                       VSBY 1/2 MILE OR LESS
                                                   8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                   X = TORNADO
MAX 32 OR BELOW:        0.01 INCH OR MORE:
```

```
MAX 90 OR ABOVE:        0.10 INCH OR MORE:
MIN 32 OR BELOW:        0.50 INCH OR MORE:
MIN  0 OR BELOW:        1.00 INCH OR MORE:

[HDD (BASE 65) ]
TOTAL THIS MO.         CLEAR  (SCALE 0-3)
DPTR FM NORMAL          PTCLDY (SCALE 4-7)
TOTAL FM JUL 1          CLOUDY (SCALE 8-10)
DPTR FM NORMAL

[CDD (BASE 65) ]
TOTAL THIS MO.
DPTR FM NORMAL          [PRESSURE DATA]
TOTAL FM JAN 1          HIGHEST SLP   ON
DPTR FM NORMAL          LOWEST  SLP   ON

[REMARKS]
```

4.3.4 Updates, Amendments, and Corrections

WFOs will perform a quality control check of the CF6 data before final posting for the month.

4.3.5 Supporting Software

At AWIPS sites, the AWIPS Climate Program produces the CF6.

4.4 Record Event Report (RER)

4.4.1 Mission Connection

The RER contains meteorological and hydrological events that equal or exceed existing extreme records. The RER will be used to report occurrences relating to both maximum and minimum extreme records.

4.4.2 Issuance Guidelines

Issuance Criteria: The RER is an event driven product.

Issuance Time: The RER will be issued on an as needed basis whenever an existing record value is met or exceeded.

Valid Time: The RER does not have a valid time.

Product Expiration Time: The RER does not have a product expiration time.

4.4.3 Technical Description

MND Product Type Line: The RER MND is “RECORD EVENT REPORT.”

Content: The RER should be used to report record occurrences of the following meteorological or hydrological events (Table 2, next page), as data availability allows. At AWIPS sites, events identified with an “*” should be automatically identified by the AWIPS Climate Program. “All time” in Table 2 means for the station’s period of record.

It is suggested that WFOs producing RERs may optionally add the following statement to RERs for non ASOS LCD sites without the latest 30-year decadal records. The statement should be added after using && below the body text and be followed by $$ indicating the end of the message.

“Record reports for this station may not be as meaningful as those for stations with 30-year decadal normals (1991-2020) as the period of record at this site spans from XXXX through XXXX covering only XX years."

Record Variable	Extreme For:
Temperature	
maximum	day*, month, season, all time
minimum	day*, month, season, all time
highest so early	spring
highest so late	fall
lowest so late	spring
lowest so early	fall
lowest maximum	day, month, season, all time
highest minimum	day, month, season, all time
Sea level pressure	
highest	all time
lowest	all time
Wind	
highest speed	all time
highest gust	all time
Largest hail size	all time
Most/least precipitation or snowfall/ snow depth	
within calendar day	day*, month, season, all time
within 24-hour period	month, season, all time
"storm" total	month, season, all time
Greatest snow depth	month, season, all time

Table 2*. Station Extremes.*

Format: The RER is a text product.

Description of Entry

```
(WMO Heading)
(AWIPS ID)

(MND)
(Issuing Office)
(Issuing time and date)
[TEXT]

$$
```

4.4.4 Updates, Amendments, and Corrections

As needed based upon user needs.

4.4.5 Supporting Software

The RER is automatically composed whenever the AWIPS Climate Program is run and an existing record value (which AWIPS CLIMAT monitors) is met or exceeded. Alternatively, the RER may be composed using the AWIPS text editor or any other text editor.

5 Surface National Climate Extremes

There is a National Climate Extremes Committee (NCEC) to assess the scientific merit of potentially new national extreme climate record events reported from the field. See Appendix D for details on the NCEC. The following list (Table 3) contains parameters that are monitored under the scope of NCEC for the final national climate extremes.

Temperature (°F) Maximum Minimum Maximum 24 hour change	**Snow (inches)** Maximum 24 hour Maximum seasonal (July-June) Maximum Depth	**Rain (inches)** Maximum 24 hour Minimum annual Maximum annual **Longest Dry Period (days)**
Hail Size (inches & lbs/oz) Largest diameter Largest circumference Heaviest	**Pressure (millibars/inches Hg)** Lowest Highest	**Wind (miles per hour)** Maximum gust

Table 3*. National Extremes*

6 Surface State Climate Extremes

State Climate Extremes Committees (SCEC) may be formed to assess the scientific merit of potentially new state extreme climate record events reported from the field. See Appendix E for detailed guidance on SCECs. Should an SCEC be formed for a state, the guidance in Appendix E will be a requirement for a WFO to participate.

7 Base Period Means and Outlook Class Limits for Climate Outlooks

CPC provides this information for surface air temperature, precipitation, sea surface temperature, and 500 millibar heights as reference in their climate outlooks. The information applies to the valid times of the various outlooks. CPC and the Climate Services Division will announce the effective date of the new base period means and class limits at least 30 days in advance. These graphics are available on the CPC web page at http://www.cpc.ncep.noaa.gov/products/predictions/90day under the “NORM” column.

7.1 Definitions

Base Period Mean: CPC computes base period means for each of the 102 climate outlook divisional areas in the conterminous U.S. and selected observing stations from a period comprising three consecutive 10 year periods ending in a decadal year (e.g. 1981-2010).

Outlook Class Limits: CPC provides three climatologically equally likely classes: above, near, and below normal (for temperature) or median (for precipitation). The upper and lower limits of the middle class are defined, thereby defining the lower limits of the above class and upper limits of the below class, respectively.

7.2 Temperature and Precipitation Base Period Means and Outlook Classes

CPC calculates the information for each of 102 CONUS, 13 Alaska, and 6 Hawaii climate outlook divisions.

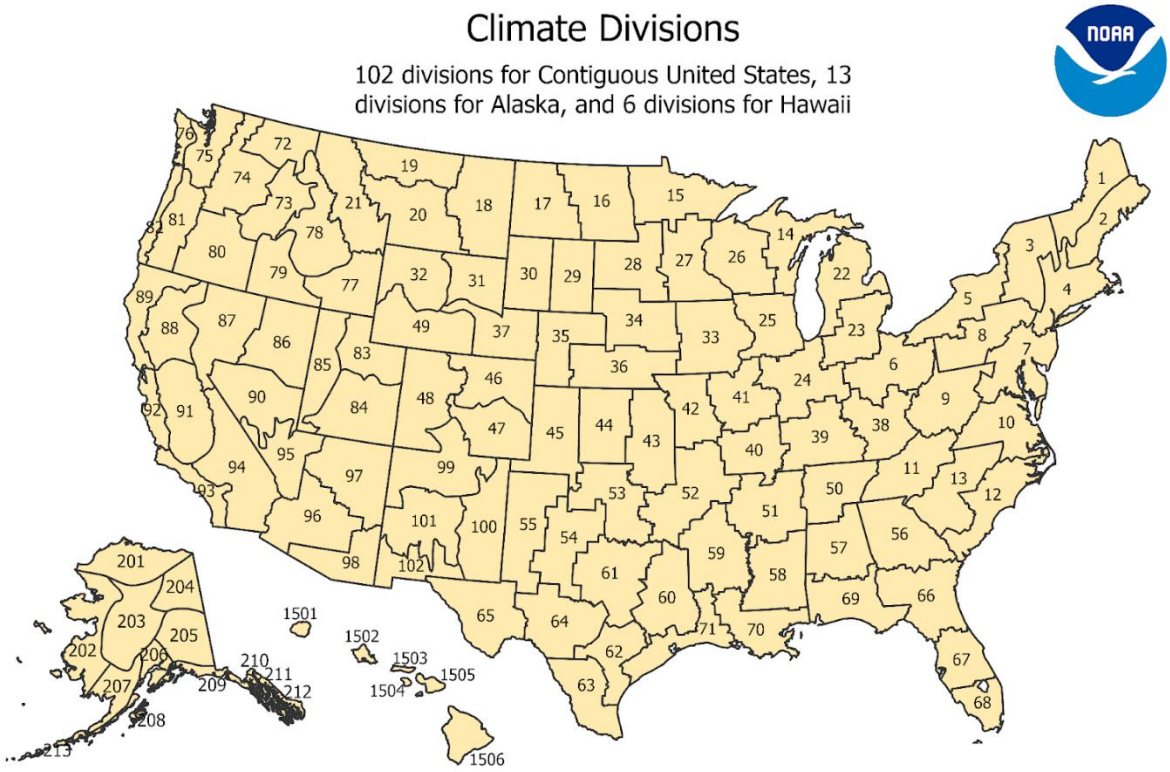

Figure 1. *CPC Climate Outlook Divisions for contiguous U.S. (Note: Long Island NY is in division 4).*

Base Period Means and Class Limits are calculated for the following valid times (Table 4). This information is available in both graphic and text formats on CPC's web site. CPC may post just a subset of the valid time calculations for the 6- to 10-day and 8- to 14-day Outlooks (one or two valid times per month).

For Three-Month Outlooks:	**For One-Month Outlooks:**
January through March	January
February through April	February
March through May	March
April through June	April
May through July	May
June through August	June
July through September	July
August through October	August
September through November	September
October through December	October
November through January	November
December through February	December

For 8- to 14-day Outlooks:	**For 6- to 10-Day Outlooks:**
January 1 through January 7	January 1 through January 5
January 2 through January 8	January 2 through January 6
etc.	etc.
December 31 through January 6	December 31 through January 4

Table 4*. Valid Times for Climate Outlooks.*

The following are some examples of CPC base period mean maps available on their web site.

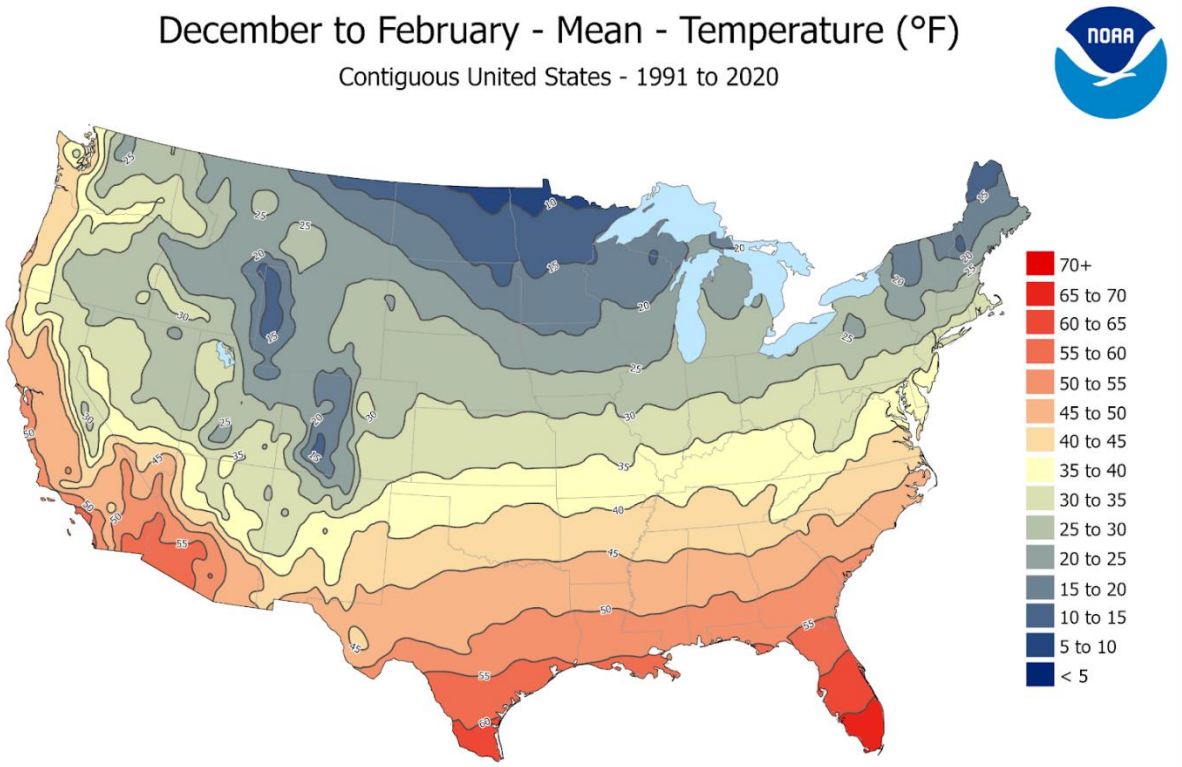

Figure 2. *Map of CPC 1991-2020 base period mean total precipitation (inches) for December through February.*

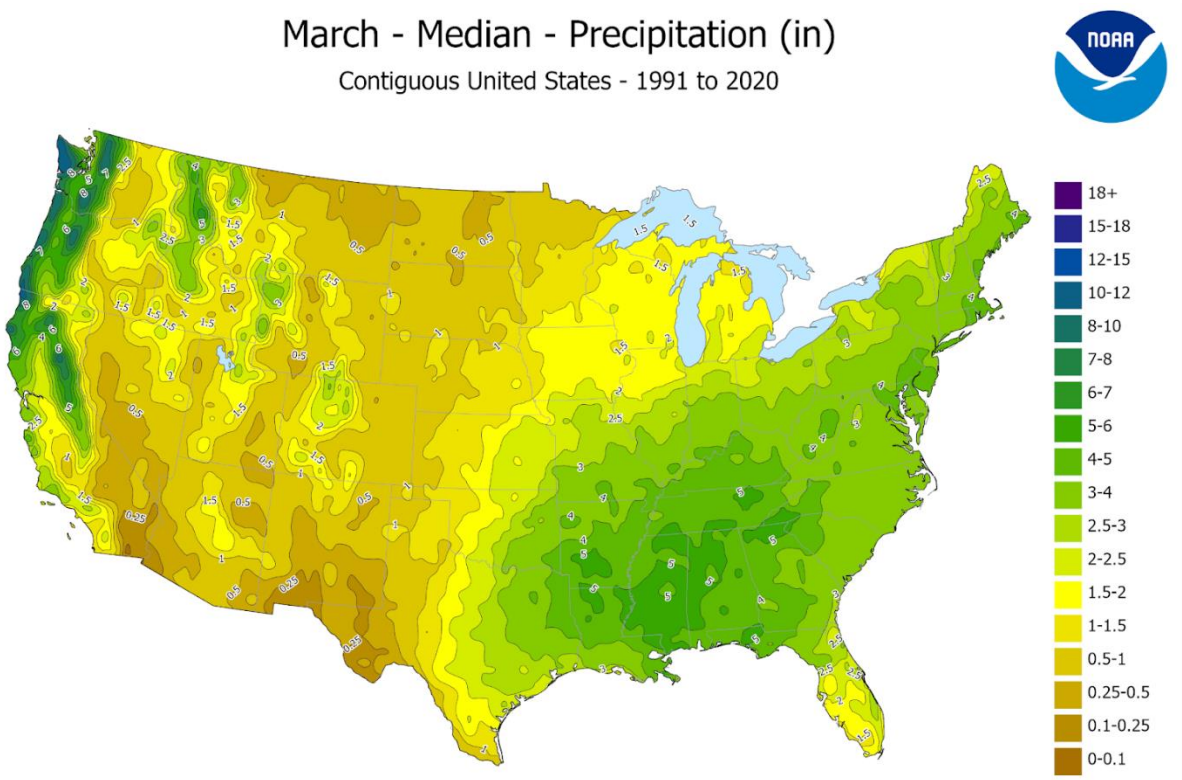

Figure 3. *Map of CPC 1991-2020 base period median precipitation for March.*

7.3 Base Period Means for Mean 500 millibar heights

CPC has calculated mean Northern Hemisphere 500 millibar heights for the 6-to 10-day and 8-to 14-day valid times listed in Table 4 in Section 7.2. The following is an example of base period mean 500 millibar chart.

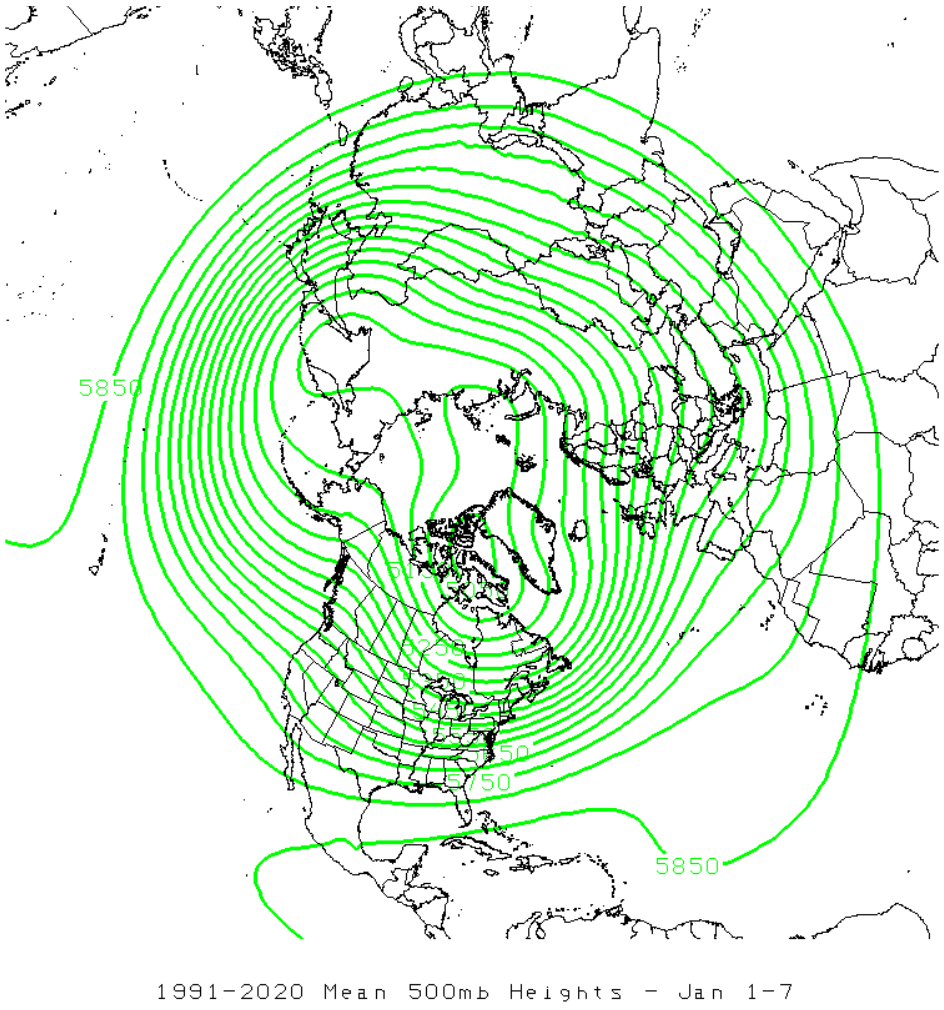

Figure 4. *CPC 1991-2020 base period mean Northern Hemisphere 500 millibar height chart (in decameters) for January 1 through 7 (to be used to determine height anomalies in the 8- to 14-day 500 mb height outlook issued December 24).*

7.4 Sea Surface Temperature (SST) Base Period Means

CPC has calculated SST means for each month as reference to the official Tropical Pacific SST Outlook (for the Pacific Niño 3.4 area [5°N to 5°S and 120°W to 170°W]). The CPC web site provides global maps of the base period SST means and charts for critical "Niño" subsections of the Tropical Pacific Ocean. Since the SST outlooks are valid for three-month periods, CPC averages the base period SST means of the three months as a reference to calculate the predicted three-month anomaly.

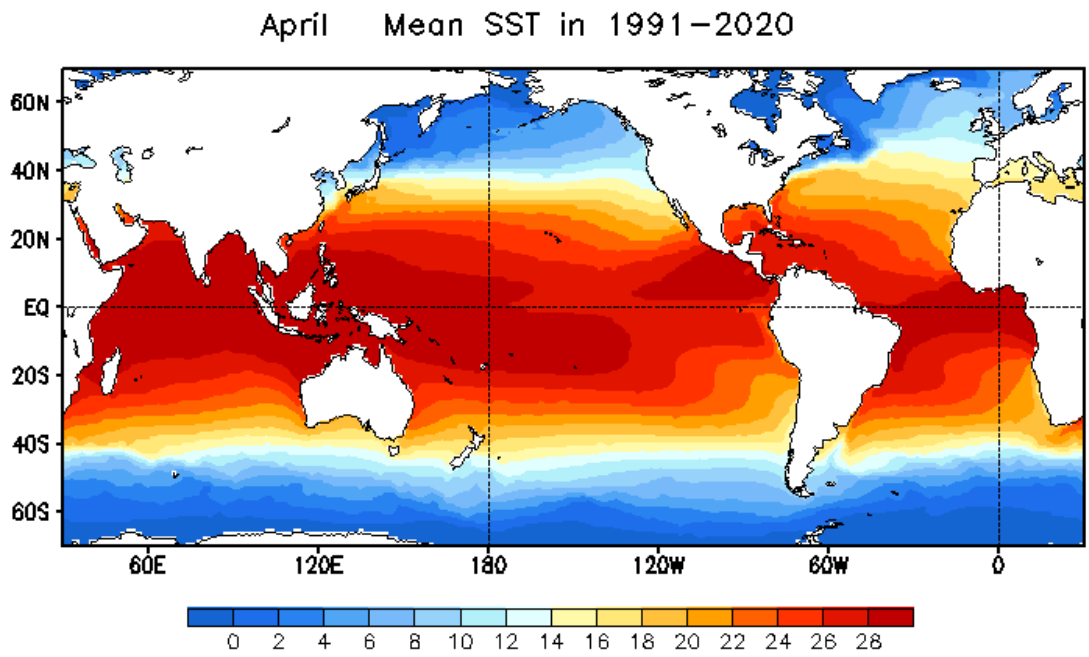

Figure 5. *April 1991-2020 base period mean sea surface temperature map. Temperatures are in Celsius*

References:

Arguez, A., I. Durre, S. Applequist, R.S. Vose, M.F. Squires, X. Yin Jr., R.R.H. and Owen, T.W. NOAA's 1981–2010 US climate normals: An overview. Bull. Am. Meteorol. Soc., 93 (11) (2012), pp. 1687-1697.

Durre, I., M. J. Menne, B. E. Gleason, T. G. Houston, and R. S. Vose, 2010: Comprehensive automated quality assurance of daily surface observations. *J. Appl. Meteor. Climatol.*, **49**, 1615–1633.

Menne, M. J., and C. N. Williams, Jr., 2009: Homogenization of temperature series via pairwise comparisons. *J. Climate*, **22**, 1700–1717.

Menne, M. J., and C. N. Williams, Jr., 2009: Homogenization of temperature series via pairwise comparisons. *J. Climate*, **22**, 1700–1717.

Menne, M.J., I. Durre, R.S. Vose, B.E. Gleason, T.G. Houston. An overview of the global historical climatology network-daily database. J. Atmos. Ocean. Technol., 29 (7) (2012), pp. 897-910

APPENDIX A — **Ten Principles of Climate Monitoring**

The National Research Council (NRC 1999) recommended that the following ten climate monitoring principles, proposed by Karl *et al.* (1995), should be applied to climate monitoring systems:

1. **Management of Network Change:** Assess how and the extent to which a proposed change could influence the existing and future climatology obtainable from the system, particularly with respect to climate variability and change. Changes in observing times will adversely affect time series. Without adequate transfer functions, spatial changes and spatially dependent changes will adversely affect the mapping of climatic elements.

2. **Parallel Testing:** Operate the old system simultaneously with the replacement system over a sufficiently long time period to observe the behavior of the two systems over the full range of variation of the climate variable observed. This testing should allow the derivation of a transfer function to convert between climatic data taken before and after the change. When the observing system is of sufficient scope and importance, the results of parallel testing should be documented in peer-reviewed literature.

3. **Metadata:** Fully document each observing system and its operating procedures. This is particularly important immediately prior to and following any contemplated change. Relevant information includes: instruments, instrument sampling time, calibration, validation, station location, exposure, local environmental conditions, and other platform specifics that could influence the data history. The recording should be a mandatory part of the observing routine and should be archived with the original data. Algorithms used to process observations need proper documentation. Documentation of changes and improvements in the algorithms should be carried along with the data throughout the data archiving process.

4. **Data Quality and Continuity:** Assess data quality and homogeneity as a part of routine operating procedures. This assessment should focus on the requirements for measuring climate variability and change, including routine evaluation of the long-term, high-resolution data capable of revealing and documenting important extreme weather events.

5. **Integrated Environmental Assessment:** Anticipate the use of data in the development of environmental assessments, particularly those pertaining to climate variability and change, as a part of a climate observing system's strategic plan. National climate assessments and international assessments (e.g., international ozone or IPCC) are critical to evaluating and maintaining overall consistency of climate data sets. A system's participation in an integrated environmental monitoring program can also be quite beneficial for maintaining climate relevancy. Time series of data achieve value only with regular scientific analysis.

6. **Historical Significance:** Maintain operation of observing systems that have provided homogeneous data sets over a period of many decades to a century or more. A list of protected sites within each major observing system should be developed, based on their prioritized contribution to documenting the long-term climate record.

7. **Complementary Data:** Give the highest priority in the design and implementation of new sites or instrumentation within an observing system to data-poor regions, poorly observed variables, regions sensitive to change, and key measurements with inadequate temporal resolution. Data sets archived in non-electronic format should be converted for efficient electronic access.

8. **Climate Requirements:** Give network designers, operators, and instrument engineers climate monitoring requirements at the outset of network design. Ensure instruments have adequate accuracy with biases sufficiently small to resolve climate variations and changes of primary interest. Ensure modeling and theoretical studies identify spatial and temporal resolution requirements.

9. **Continuity of Purpose:** Maintain a stable, long-term commitment to these observations, and develop a clear transition plan from serving research needs to serving operational purposes.

10. **Data and Metadata Access:** Develop data management systems that facilitate access, use, and interpretation of data and data products by users. Freedom of access, low cost mechanisms that facilitate use (directories, catalogs, browse capabilities, availability of meta data on station histories, algorithm accessibility and documentation, etc.), and quality control should be an integral part of data management. International cooperation is critical for successful data management.

References:

Karl, T.R., V.E. Derr, D.R. Easterling, C.K. Folland, D.J. Hoffman, S. Levitus, N.Nicholls, D.E. Parker, and G.W. Withee, 1995: Critical issues for long-term climate monitoring. ***Climatic Change***, **31**, 185-221.

National Research Council (NRC), 1999: **Adequacy of Climate Observing Systems**, National Academy Press, Washington, D.C.

APPENDIX B — Accessing NOAA Daily Temperature and Precipitation Extremes Based on Combined/Threaded Station Records

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ABSTRACT
Daily records of both temperature and precipitation are of great interest to the public and many data users and are beneficial in climate perspectives. However, numerous station relocations over the years has resulted in inconsistent approaches to combining multi-location data sets, resulting in disparate reporting of record and extreme values at many prominent large metropolitan observing sites. To address this challenge, the methodology for establishing multi-location combined (or threaded) station data sets under the so-called "***ThreadEx***" project is presented.

1. INTRODUCTION

In the interest of ensuring consistent reporting of climatological data, NOAA's National Climatic Data Center (NCDC), in partnership with the Northeast Regional Climate Center (NRCC), NOAA's National Weather Service/Climate Services Division (NWS/CSD), and numerous data users, has established a data set of combined (or threaded) period of record daily temperature and precipitation values at 255 NOAA published *Local Climatological Data (LCD)* locations that generally correspond to most medium- and large-sized cities in the United States. This new ThreadEx data set provides a consistent basis for the reporting of daily extremes for the longest period of time meaningful. The development of this data set is especially timely given the increasing availability of historic daily values in digital form for the first half of the 20th century (and earlier in some cases) (Kunkel *et al*., 1998; Guttman, 2002).

Many research applications rely on using a variety of homogenization techniques to account for non-climatic shifts resulting from station relocations, changes in instrument type, and variations in the time of observations (DeGaetano *et al.*, 2002). The ThreadEx project aims to report the *actual* values for a given region mapped to a given published LCD site for the express purpose of conveying general climate perspectives information. Thus, the daily values are preserved in spite of siting changes.

2. METHODOLOGY

Threads for a given published LCD will be developed as follows. The record of a currently active station will be the starting point for a station thread. This station's current record will be used as far back in time as possible, taking precedence over a closed station's record during any periods of overlap (for Automated Surface Observing System (ASOS) locations, this period of record is generally very short – no more than 12 years). A search will be conducted to identify other weather stations in the region that can be used to extend the thread further back in time. In this process, preference will be given to Weather Service/Bureau stations over volunteer COOP stations. The thread will be extended back in time as far as possible using NOAA daily data available in digital form.

For historic overlaps, all else being equal, the station with a more recent record will take precedence, unless partner input (*e.g.*, NWS field offices, State Climatologists, *etc*.) with compelling documentation determines otherwise. An attempt will be made to fill any gaps larger than six months in a station record with data from another station. Partner input will be sought during the development of this data set through a survey.
The period of record used for each portion of a thread will be clearly denoted in the station meta-data.

An example of a station thread for the Chicago area would be:

Chicago O'Hare AP	*11/1/1958 - present*		
Chicago Midway AP	*1/1/1942 - 10/31/1958*		
Chicago University	*1/1/1926 - 12/31/1941*		
Chicago (COOP)	*1/1/1896-12/31/1925*	*Chicago (CRB)*	*10/9/1871-12/31/1895*

2 * *Corresponding author address:* Timothy W. Owen, National Climatic Data Center, 151 Patton Avenue, Asheville, NC 28801; e-mail: Tim.Owen@noaa.gov.

3. DATA SET ACCESS

The threaded data will be available in two formats:

- On xmACIS (the NWS interface for climate record queries) and other systems using the ACIS database (http://www.rcc-acis.org/), the threaded data station daily values will be fully available for query; thus, all data summaries currently available in xmACIS can be applied to this data set. These stations will be clearly identified as threaded stations.

  The benefit of an extended record is illustrated using xmACIS output in Table 1. Presently, the Washington, DC record at National Airport, extends back to 1948. With ThreadEx, daily extremes will be extended back to the 1890s using pre-1948 Weather Bureau station observations, allowing climate perspectives inquiries such as determining the coldest/warmest/wettest Inauguration Day for a substantially longer period of record.

- Another data set containing summary tables for extremes will be produced. This will consist of the top 3 records per calendar day for maximum temperature (highest and lowest), minimum temperature (highest and lowest) and precipitation (highest). Metadata will consist of station information for the station fragments composing the thread. The period of analysis will consist of the earliest data available in digital form through the end of 2004.

Table 1. Sample xmACIS Output

```
WASHINGTON REAGAN NATIONAL AP (KDCA)
Extremes
Lowest Average Minimum Temperature
Days: 1/20 - 1/20
Length of period: 1 day
Years: 1948-2004


Rank  Value  Ending Date
  1    -2.0  1/20/1985
  2     8.0  1/20/1994
  3     9.0  1/20/1984
  4    16.0  1/20/1983
```

4. FUTURE DEVELOPMENT AND UPDATE

A national oversight committee will be established to oversee future updates to the Threaded Extremes Data Set. This committee will seek to include members representing the Regional Climate Centers, AASC, NCDC, NWS field offices, NWS regional offices and NWS Headquarters. This committee will also be charged with making determinations in situations where a partner requests an exception be made to the methodology outlined above.

Both the xmACIS and table derivatives of the data set will be updated on an annual basis to include calendar year updates and extension of period of record based upon digitized daily data rescued from NOAA archives and offices as they are documented (including metadata such as latitude, longitude, elevation, station/instrument and other siting characteristics, *etc*.), quality assured, and made available.

5. CONCLUSION

NOAA's commitment to excellence in climate services is punctuated by its synergies with partners in developing data feedback, quality assurance, and dissemination infrastructure. With the ThreadEx effort, maximized, consistent, updated daily extremes will be available for government, partner, and general public (especially media) use. The consistent use of such information will make clear regional extremes and lay the foundation for the expansion of this technique to additional locations and parameters.

6. REFERENCES

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APPENDIX C — **Primary Local Climatological Data Stations**

ALASKA

ANC	ANCHORAGE INTL AP
BRW	BARROW POST-ROGERS AP
BET	BETHEL AIRPORT
CDB	COLD BAY AP
FAI	FAIRBANKS INTL AP
JNU	JUNEAU AP
KTN	KETCHIKAN
AKN	KING SALMON AP
ADQ	KODIAK STATE CG BASE
OTZ	KOTZEBUE RALPH WEIN
MCG	MCGRATH
OME	NOME MUNICIPAL AP
SNP	ST PAUL ISLAND AP
YAK	YAKUTAT STATE AP

ALABAMA

BHM	BIRMINGHAM INTL AP
HSV	HUNTSVILLE INTL AP
MOB	MOBILE REGIONAL AP
MGM	MONTGOMERY DANNELLY

ARKANSAS

FSM	FT SMITH MUNICIPL AP
LIT	LITTLE ROCK ADAMS FD
LZK	NORTH LITTLE ROCK

AMERICAN SAMOA

NSTU	TAFUNA PAGO PAGO INTL AP

ARIZONA

FLG	FLAGSTAFF AP
PHX	PHOENIX INTL AP
TUS	TUCSON INTL AP
INW	WINSLOW AP

CALIFORNIA

BFL	BAKERSFIELD AP
BIH	BISHOP AP
EKA	EUREKA WSO CITY
FAT	FRESNO AIR TERMINAL
LGB	LONG BEACH AP
CQT	LOS ANGELES DOWNTOWN AP
LAX	LOS ANGELES INTL AP
RDD	REDDING MUNICIPAL AP
SAC	SACRAMENTO EXEC AR
SAN	SAN DIEGO LINDBERGH
SFO	SAN FRANCISCO INTL AP
SFOC	SAN FRANCISCO CITY
SMX	SANTA MARIA PBLC AP
SCK	STOCKTON METRO AP

COLORADO

ALS	ALAMOSA BERGMAN FLD
COS	COLORADO SPRGS MUNI
DEN	DENVER INTL AP
GJT	GRAND JUNCTION WLKR
PUB	PUEBLO MEMORIAL AP

CONNECTICUT

BDR	BRIDGEPORT SIKORSKY
BDL	HARTFORD BRADLEY INTL AP

DELAWARE

ILG	WILMINGTON AIRPORT

FLORIDA

DAB	DAYTONA BEACH INTL AP
FMY	FORT MYERS PAGE FLD AP
GNV	GAINESVILLE MUNI AP
JAX	JACKSONVILLE INTL AP
EYW	KEY WEST INTL AP
MLB	MELBOURNE
MIA	MIAMI INTL AP
MCO	ORLANDO INTL AP
PNS	PENSACOLA REGIONL AP
TLH	TALLAHASSEE MUNI AP
TPA	TAMPA INTL AP
VRB	VERO BEACH MUNI AP
PBI	W PALM BEACH INTL AP

GEORGIA

AHN	ATHENS MUNI AP
ATL	ATLANTA HARTSFIELD INTL
AGS	AUGUSTA BUSH FIELD
CSG	COLUMBUS METRO AP
MCN	MACON REGIONAL AP
SAV	SAVANNAH INTL AP

GUAM

PGUM	GUAM INTL APRT

HAWAII

ITO	HILO INTL AP
HNL	HONOLULU INTL AP
OGG	KAHULUI AP
LIH	LIHUE AP

IOWA

DSM	DES MOINES INTL AP
DBQ	DUBUQUE MUNI AP
SUX	SIOUX CITY MUNI AP
ALO	WATERLOO MUNI AP

IDAHO

BOI	BOISE AIR TERMINAL
LWS	LEWISTON NEZ PERCE CO. AP
PIH	POCATELLO MUNICIPAL AP

ILLINOIS

ORD	CHICAGO OHARE INTL AP
MLI	MOLINE QUAD CITY AP
PIA	PEORIA GTR PEORIA AP
RFD	GREATER ROCKFORD AP
SPI	SPRINGFIELD CAPTL AP

INDIANA

EVV	EVANSVILLE REG AP
FWA	FORT WAYNE INTL AP
IND	INDIANAPOLIS INTL AP
SBN	SOUTH BEND ST JOSEPH AP

KANSAS

CNK	CONCORDIA BLOSSER MUNI AP
DDC	DODGE CITY REG AP
GLD	GOODLAND RENNER FLD
TOP	TOPEKA MUNI AP
ICT	WICHITA MID-CNTNT AP

KENTUCKY

JKL	JACKSON J CARROLL AP
LEX	LEXINGTON BLUEGRASS FLD
SDF	LOUISVILLE STANDIFRD
PAH	PADUCAH BARKLEY FLD

LOUISIANA

BTR	BATON ROUGE RYAN AP
LCH	LAKE CHARLES MUNI AP
MSY	NEW ORLEANS INTL AP
SHV	SHREVEPORT REGIONAL AP

MASSACHUSETTS

BOS	BOSTON LOGAN INTL AP
MQE	MILTON – BLUE HILL OBS
ORH	WORCESTER MUNI AP

MARYLAND

BWI	BALT-WASHGTN INTL AP

MAINE

BGR	BANGOR INTL AP
CAR	CARIBOU MUNI AP
PWM	PORTLAND INTL JETPRT

MICHIGAN

APN	ALPENA PHELPS COL AP
DTW	DETROIT METRO AP
FNT	FLINT BISHOP AP
GRR	GRAND RAPIDS INTL AP
HTL	HOUGHTON LAKE ROSCMN AP
LAN	LANSING CAPITAL CITY AP
MKG	MUSKEGON CO AP
MQT	MARQUETTE CTY AP FAA
ANJ	SAULT STE. MARIE AP

MINNESOTA

DLH	DULUTH INTL AP
INL	INTERNATL FALLS INTL AP
MSP	MINNEAPOLIS/ST PAUL INTL
RST	ROCHESTER INTL AP
STC	ST CLOUD MUNI AP

MISSOURI

COU	COLUMBIA MUNI AP
MCI	KANSAS CITY INTL AP
SGF	SPRINGFIELD REG AP
STL	ST LOUIS LAMBERT INTL

MISSISSIPPI

JAN	JACKSON INTL AP
MEI	MERIDIAN KEY FLD
TUP	TUPELO C D LEMONS AP

MONTANA

BIL	BILLINGS LOGAN INTL AP
GGW	GLASGOW INTL AP
GTF	GREAT FALLS INTL AP
HVR	HAVRE CITY/COUNTY AP
HLN	HELENA AP
GPI	KALISPELL GLACIER AP
MSO	MISSOULA JOHNSN-BELL

NORTH CAROLINA

AVL	ASHEVILLE REGIONL AP
HSE	HATTERAS BILLY MITCHELL
CLT	CHARLOTTE DOUGLAS INTL
GSO	GREENSBORO REG AP
RDU	RALEIGH DURHAM AP
ILM	WILMINGTON NEW HANVR

NORTH DAKOTA

BIS	BISMARCK MUNI AP
FAR	FARGO AP
GFK	GRAND FORKS INTL AP

NEBRASKA

GRI	GRAND ISLAND AP
LNK	LINCOLN MUNI AP
OFK	NORFOLK STEFAN AP
LBF	NORTH PLATTE L BRD FLD
OMA	OMAHA EPPLEY AIRFLD
BFF	SCOTTSBLUFF CNTY AP
VTN	VALENTINE MILLER FLD

NEW HAMPSHIRE

CON	CONCORD MUNI AP
MWN	MT. WASHINGTON

NEW JERSEY

ACY	ATLANTIC CITY INTL AP
ATLN	ATLANTIC CITY MARINA
EWR	NEWARK INTL AP

NEW MEXICO

ABQ	ALBUQUERQUE INTL AP
CAO	CLAYTON MUNI ARPK
ROW	ROSWELL INDSTRL ARPK

NEVADA

EKO	ELKO REGIONAL AP
ELY	ELY YELLAND FIELD
LAS	LAS VEGAS MCCRN INTL
RNO	RENO CANNON INTL AP
WMC	WINNEMUCCA MUNI AP

NEW YORK

ALB	ALBANY INTL AP
BGM	BINGHAMTON LINK FLD
BUF	BUFFALO GR BUFFLO INTL
ISP	ISLIP L I MACARTHUR
NYC	NEW YORK CITY R
JFK	NEW YORK J F KENNEDY
LGA	NEW YORK LAGUARDIA
ROC	ROCHESTER INTL AP
SYR	SYRACUSE HANCOCK INTL

OHIO

CAK	AKRON-CANTON REG AP
CLE	CLEVELAND HOPKINS INTL
CMH	COLUMBUS INTL AP
CVG	CINCI-NORTHERN KY AP
DAY	DAYTON INTL ARPT
MFD	MANSFIELD LAHM AP
TOL	TOLEDO EXPRESS AP
YNG	YOUNGSTOWN MUNI AP

OKLAHOMA

OKC	OKLA. CITY ROGERS INTL
TUL	TULSA INTL AP

OREGON

AST	ASTORIA CLATSOP AP
BNO	BURNS MUNICIPAL AP
EUG	EUGENE MAHLON SWEET
MFR	MEDFORD ROUGE VLY INTL
PDT	PENDLETON MUNICPL AP
PDX	PORTLAND INTL AP
SLE	SALEM MCNARY FIELD

PENNSYLVANIA

ABE	ALLENTOWN A-B-E INTL
AVP	AVOCA WILKES-BARRE SCRN
ERI	ERIE INTL AP
MDT	MIDDLETOWN HARRISBRG
PHL	PHILADELPHIA INTL AP
PIT	PITTSBURGH INTL AP
IPT	WILLIAMSPRT-LYCOMING AP

PACIFIC ISLANDS

PKWA	KWAJALEIN RMI
PKMR	WSO MAJURO, RMI
PTTP	WSO POHNPEI, FSM
PTKK	CHUUK INTL APRT FSM
PTYA	YAP INTL APRT FSM

PUERTO RICO

SJU	ISLA VERDE INTL AP

RHODE ISLAND

PVD	PROVIDENCE GREEN ST AP

SOUTH CAROLINA

CHS	CHARLESTON INTL ARPT
CHLS	CHARLESTON CITY
CAE	COLUMBIA METRO AP
GSP	GREER GREENV'L-SPART

SOUTH DAKOTA

ABR	ABERDEEN REGIONAL AP
HON	HURON REGIONAL AP
RAP	RAPID CITY REGINL AP
FSD	SIOUX FALLS FOSS FLD

TENNESSEE

TRI	BRISTOL TRI CITY AP
CHA	CHATTANOOGA LOVELL
TYS	KNOXVILLE MCG TYSON
MEM	MEMPHIS INTL AP
BNA	NASHVILLE METRO AP
OQT	OAK RIDGE, TN

TEXAS

ABI	ABILENE MUNI AP
AMA	AMARILLO INTL AP
AUS	AUSTIN BERGSTROM INTL
ATT	AUSTIN/CAMP MABRY ANG
BPT	BEAUMONT/P. ARTHUR REG
BRO	BROWNSVILLE INTL AP
CDS	CHILDRESS MUNI AP
CRP	CORPUS CHRISTI INTL
DAL	DALLAS-LOVE FIELD
DFW	DALLAS-FT WORTH AP
DRT	DEL RIO INTL AP
ELP	EL PASO INTL AP
IAH	HOUSTON INT'CNTNL AP
LBB	LUBBOCK REGIONAL AP

MAF	MIDLAND-ODESSA INTL AP
SJT	SAN ANGELO MATHIS FD
SAT	SAN ANTONIO INTL AP
VCT	VICTORIA REGIONAL AP
ACT	WACO MADISN COOPR AP
SPS	WICHITA FALLS MUN AP

UTAH

SLC	SALT LK CITY INTL AP

VIRGINIA

LYH	LYNCHBURG MUNI AP
ORF	NORFOLK INTL AP
RIC	RICHMOND BYRD AP
ROA	ROANOKE WOODRUM AP
WAL	WALLOPS ISLAND FLGT FAC
DCA	WASHINGTON DC NATL AP
IAD	WASHINGTON DC DULLES

VERMONT

BTV	BURLINGTON INTL AP

WASHINGTON

OLM	OLYMPIA AP
UIL	QUILLAYUTE AP
SEA	SEATTLE-TACOMA AP
SEW	SEATTLE SAND POINT
GEG	SPOKANE INTL AP
YKM	YAKIMA AIR TERMINAL

WISCONSIN

GRB	GREEN BAY AUSTIN STR
LSE	LA CROSSE MUNI AP
MSN	MADISON DANE CNTY AP
MKE	MILWAUKEE MTCHLL FLD

WEST VIRGINIA

BKW	BECKLEY RALEIGH AP
CRW	CHARLESTON KNWA AP
EKN	ELKINS RNDLPH CO AP
HTS	HNTNGTN TRI-STATE

WYOMING

CPR	CASPER NATRONA CO AP
CYS	CHEYENNE MUNI AP
LND	LANDER HUNT FIELD
SHR	SHERIDAN COUNTY AP

APPENDIX D — Request for National Climatic Extremes Committee (NCEC) Activation for Potential Extreme Events

The NOAA policy source for the following is provided at
https://www.ncei.noaa.gov/access/monitoring/ncec

When the possibility that a new national climate extreme has occurred, the NCEC will consider requests for activation to evaluate and decide the validity of the event using the following procedures**.**

1. NCEC chair (NCEI) will accept direct requests for activation only from the following official requesting contacts. Observers (or reporters of automated events) can report to any one of these contacts for forwarding to NCEC except all WFO observations or WFO received reports will be forwarded through one of their NWS Regional Headquarters.

- State climatologists
- Regional Climate Center directors
- NWS Regional Headquarters (any one of the following; Regional Climate Services Program Managers, Regional Warning Coordination Meteorologist, or Regional COOP Program Manager).
- NWS Climate Services Branch (W/AFS23)
- NWS Office of Observations, Program Management Branch (W/OBS31)
- NCEI Climate Science and Services Division (E/NE3)

2. Official requesters can make activation requests by email to the NCEC chairman with cc to the other NCEC members or by a telephone call to the NCEC chair. If the chair is not unavailable via telephone, other NCEC members may be called. Requests should include the following:

- Name and affiliation of requester and address, e-mail, telephone, etc.
- Observer or reporter name and affiliation (COOP, FAA or NWS contractor, WFO, etc.) and address, e-mail, telephone, etc.
- Station and instrument types; COOP, ASOS, snowboards, stakes, rulers, etc.
- Type of event being requested for evaluation as per list of existing records
- Time of event (date, month, year, and time of day)
- Place of event (distance and direction from known landmark, city, etc.) (e.g. 30 miles west of Sioux Falls, 2 miles south of Mt. Rushmore)

3. Official requesters should screen the observation or report to ensure that the event falls under the charter of the NCEC's authority (i.e., a national climate record is in question as per list of existing records).

4. Requests for NCEC activation will receive a response from the chair or backup member as soon as possible. NCEC should expedite responses to requests with "perishable" evidence such as hail or snow.

APPENDIX E — State Climate Extremes Committees

1. Purpose

The formation of a State Climate Extremes Committee (SCEC) addresses the consideration of potentially record-setting extreme meteorological elements observed at the statewide level. The purpose of the SCEC is to mirror the activities of the National Climate Extremes Committee (NCEC) (https://www.ncei.noaa.gov/access/monitoring/ncec/records), but for observations challenging state records, rather than national ones. The SCEC serves as a panel that will make determinations regarding state records, ultimately referred to the Climate Monitoring Chief of the National Oceanic and Atmospheric Administration's (NOAA's) National Centers for Environmental Information (NCEI). With the acknowledgment of the NCEI Climate Monitoring Chief, such records will become officially sanctioned, and recognized by the meteorological and climatological community.

2. Scope

The SCEC is to provide counsel and a recommendation regarding the status of an observation of a meteorological element (*e.g.*, maximum temperature) that challenges the existing, official record value for that element for a given state. If such observations also challenge a national record, the involvement of the SCEC will be to render a recommendation regarding the state record only. The case will be forwarded and considered separately by the NCEC.

While many aspects of meteorological elements may be tracked, and record extremes determined, officiating and tracking many of the elements that are of extremely limited interest or use to the public would unnecessarily burden the SCEC. Therefore, the SCEC has compiled a list of elements that are to be tracked. The list can be found at https://www.ncei.noaa.gov/access/monitoring/scec/elements-tracked. These elements have demonstrated a strong public interest, and the historical data for these elements are readily available for a large number of observation stations across the United States.

Additionally, NCEI's state and regional partners have expressed a repeated desire to vet state records for other meteorological parameters. These records will be adjudicated, resources permitting among SCEC members, with the following guidelines:

- The records are for single-station or single-point phenomena (i.e., not regional or statewide averages)
- Based on resource constraints, records for specific months (e.g., the coolest temperature observed in June) are not considered by the SCEC. All-time monthly records (e.g., the coolest month observed by any station during any month) are considered within scope. However, due to resource constraints, these adjudications are uncommon.

3. Composition and convening

The SCEC will be an *ad hoc* committee comprised of the following five voting members:

- A representative from NOAA's National Weather Service (NWS) Weather Forecast Office (WFO) holding jurisdiction over the station recording a potential record. The Meteorologist in charge (MIC), or the climate focal point is preferred.
- The State Climatologist (SC) for the state in which the record is being challenged. If the state does not have an SC, the SC from a neighboring state will be asked to serve.
- A representative from the NWS Regional Headquarters. Preferably this will be the NWS Regional Climate Services Program Manager (CSPM) or the Regional COOP Program Manager.
- A representative from the relevant Regional Climate Center (RCC). Preferably this will be the Regional Climatologist or the RCC Director.
- A representative from NCEI. The NCEI National Partnership Liaison will facilitate this selection.

Additional non-voting members may be asked to participate. This is often the case where the input of a particular subject matter expert is desirable. A quorum of the committee is considered to be three of the five voting members.

The committee may be called by any member, but in general, it will be expected that either the relevant WFO or the SC for the affected state will call for the committee to convene. The committee will dissolve once a recommendation has been reached regarding a challenged record value, or when the challenge has been withdrawn. The SCEC will strive for consensus determinations. In the event that a unanimous determination cannot be reached, determinations will carry with at least three votes, and dissenting opinions will be included in its decision report. This decision report will be compiled by the NCEI representative serving on the SCEC and will be accessible on the NCEI SCEC website.

It is expected that most discussion and voting of the committee will take place via either E-mail or teleconference (see Section 4). Occasionally, it may be necessary for the committee to meet in person. If the in-person meeting is to discuss a particular state record, the meeting should occur in the state in question (as a site visit may be necessary). Such a meeting should be arranged by a member based in that state.

4. Record Recognition Process

The SCEC compiled an initial list of records listed in Table 1 for each state of the United States. These records were reviewed to determine their validity and, if found to be acceptable, were recommended to the NCEI Monitoring Section Chief for inclusion in the statewide records data set. In the mid-2000s, NCEI reviewed and updated the statewide extremes tables for all-time maximum and minimum temperature, 24-hr precipitation and snowfall, and all-time greatest snow depth. Remaining tables of the tracked elements have been subsequently updated.
Here forward, the challenge of an SCEC officially recognized statewide record is expected to follow the following guidelines:

If the WFO or the SC thinks a statewide record may have been set, a representative from the WFO or SC office (preferably the WFO) should visit the site of the record within 2 days of notification of the record and take the following action.

- Test equipment to ensure proper working order (if applicable).
- Examine and describe exposure and take pictures.

After the site visit, the WFO representative or SC should send an E-mail to all members of the SCEC (see Section 3) informing them of a challenge to the record. Information/photos from the site visit should be attached to the E-mail or a common access location determined and shared with the SCEC members for proper review of the evidence.

At this point, the WFO should transmit a preliminary Record Event Report (RER). The RER should clearly indicate that the record is under review, and final determination will be forthcoming.

Once the WFO or SC sends the initial SCEC E-mail, they should set up a teleconference call that includes all members of the SCEC.

- The teleconference should take place within the soonest practical timeframe after the E-mail from the WFO or SC is received.
- If any member of the SCEC is unavailable, they should notify the committee of their absence. They may provide input via E-mail, but their vote would either be abstained, or cast by their alternate or other proxy acceptable to the committee.

Each SCEC member will review the validity of the proposed record value, using all tools available to them, prior to the teleconference. They should be prepared to discuss and vote on the validity of the record during the conference call. A second call may be needed if new information is brought to light in the first call.

The SCEC will vote for or against determining that the record be updated. A majority (at least three votes) will carry the vote.

The NCEI Monitoring Section Chief will be informed of the challenge to the record, and will be given the determination of the SCEC. The chief, or their officially designated proxy, will render an official decision on the record. The decision of the NCEI Monitoring Section Chief or proxy will be final. The decisional report will be drafted by the SCEC's NCEI representative and made available on the SCEC website (https://www.ncei.noaa.gov/access/monitoring/scec).

NWS Instruction 10-1004 limits recognition of statewide climate records to those values originating from official NOAA-sanctioned weather stations. However, it has become evident that limiting the recognition of official climatological records to only official observations (e.g., NOAA weather stations) may result in legitimate meteorological observations being dismissed on non-scientific grounds. Therefore, the SCEC has taken the informal stance that a meteorological observation being considered for a statewide record may come from any legitimate meteorological observation platform, provided the value has first been vetted by either

the State Climatologist or a local NWS representative. When evaluating a value that has come from a source external to NOAA's officially sanctioned weather observing network, the SCEC requires that:

- The observation is meteorologically sound and climatologically representative of the climate of the region (*e.g.*, not biased by micro-climatological, anthropogenic, geologic, or combustion factors).
- The observing platform meets or exceeds instrument and siting standards set forth by the World Meteorological Organization (WMO), the Office of the Federal Coordinator for Meteorology (OFCM), and NOAA.
- The instrument/sensor has operational parameters which support the observation. If an observation is beyond the operational envelope of the instrument, the instrument may be forwarded to a standards facility for testing.
- The data collected by the instrument is archived indefinitely, along with any quality control and metadata information pertaining to the data, sensor, platform or network.
- Public access to the data and all accompanying metadata is unrestricted (although the access may be fee-based).

5. Erroneous Records

If upon future examination, it comes to the attention of a member of an organization represented on the SCEC that an officially recognized statewide record may be in error or otherwise invalid, that member of the SCEC should send an E-mail to the committee, informing them of the questionable record, and including documentation in support of the challenge.

The challenging member should then invite all members to a teleconference, where the record will be discussed and a determination regarding validity voted upon.

If a challenge to the validity of an existing official statewide record is made by someone outside the committee structure, the challenge should be directed toward the relevant WFO or SC, who will review the challenge and, if the evidence warrants it, forward the challenge to the committee as per the steps outlined in the previous paragraph.

6. Public Visibility

NCEI, NWS, State Climatologists, and/or the American Association of State Climatologists (AASC) may wish to publish a table of state records and/or post them on the web. The table may include the officially sanctioned record values, the date on which the records were set, and the stations at which they were set. Web postings may also describe the SCEC mission, the records it tracks, the steps for reporting potential records or challenging existing records and decisional reports issued by the SCEC. This SCEC website contains all of the aforementioned information.