Descriptions of PRISM Spatial Climate Datasets for the Conterminous United States

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Summary of January 2024 revisions since last document release in December 2022:

- Release of 1991-2020 **daily normals** for ppt, tmax, tmin, tdmean, vpdmax, and vpdmin, version D1. These are daily versions of the monthly normals.

- A limited update to the 1991-2020 PRISM monthly and annual normals (M5) for tmax, tmin, tdmean, vpdmax, and vpdmin has been made (ppt monthly normals remain version M4). Changes made to the previous 1991-2020 normals (M4) released in November 2021 include:
  - Revisions made to a limited number of grid cells along the US West Coast to align with the recently-developed daily normals.

The PRISM Climate Group works on a range of projects, some of which support the development of spatial climate datasets. The resulting array of datasets reflects the range of project goals, requiring differing station networks, modeling techniques, and spatial and temporal resolutions. Whenever possible, we offer these datasets to the public, either free of charge, or for a fee, depending on the size and difficulty of delivering the dataset and funding for the activity. In order for users to make informed decisions about which dataset is most appropriate for their needs, this document provides information on the PRISM spatial climate datasets currently available. We start with an overview of the array of PRISM datasets, then discuss each in turn. Summary tables are provided for quick reference.

It should be noted up front that these datasets are not static entities but are in a constant state of change. New networks are being added regularly to many datasets. Even those designed for long-term consistency experience changes due to improvements in data handling and quality control procedures. We will endeavor to keep this documentation current, but inconsistencies are bound to arise.

Overview

PRISM datasets provide estimates of seven primary climate elements: precipitation (ppt), minimum temperature (tmin), maximum temperature (tmax), mean dew point (tdmean), minimum vapor pressure deficit (vpdmin), maximum vapor pressure deficit (vpdmax), and total global shortwave solar radiation on a horizontal surface (soltotal; available only as normals at this time). Mean temperature (tmean) is derived as the average of tmax and tmin. Three ancillary solar radiation variables are provided in the normals dataset: total global solar radiation on a horizontal surface under clear sky conditions (solclear), effective cloud transmittance (soltrans), and total global solar radiation on a sloped surface (solslope). Descriptions of the climate elements and derived/ancillary variables are summarized in Table 1.

Table 1. Descriptions of climate elements available from PRISM datasets. Basic descriptions are for the daily time interval, with additional monthly time interval information given in brackets.

Abbreviation	Status	Description
Ppt	Primary	Daily [monthly] total precipitation (rain+melted snow)
Tmax	Primary	Daily maximum temperature [averaged over all days in the month]
Tmin	Primary	Daily minimum temperature [averaged over all days in the month]
Tmean	Derived	Daily mean temperature, calculated as (tmax+tmin)/2
Tdmean	Primary	Daily mean dew point temperature [averaged over all days in the month]
Vpdmin	Primary	Daily minimum vapor pressure deficit [averaged over all days in the month]
Vpdmax	Primary	Daily maximum vapor pressure deficit [averaged over all days in the month]
Soltotal	Primary (normals only)	Total daily global shortwave solar radiation received on a horizontal surface [averaged over all days in the month]
Solslope	Ancillary (normals only)	Total daily global shortwave solar radiation received on a sloped surface [averaged over all days in the month]
Solclear	Ancillary (normals only)	Total daily global shortwave solar radiation received on a horizontal surface under clear sky conditions [averaged over all days in the month]
Soltrans	Ancillary (normals only)	Atmospheric transmittance (cloudiness) [monthly average daily soltotal/monthly average daily solclear]

A summary of the PRISM datasets is given in Table 2. There are two main classes of PRISM datasets: long-term averages and time series. Long-term averages, or "normals," abbreviated "Norm" in Table 2, are 30-year averages for periods with years ending in 0, such as 1981-2010 and 1991-2020. A "91" represents a 1991-2020 average and is the current normals dataset. An "m" denotes that the dataset has a monthly time step. A "d" denotes that the dataset has a daily time step.

Time series datasets are abbreviated with an "LT" or "AN" (Table 2). LT, which stands for long term, refers to time series focused on temporal consistency. AN, which stands for all networks, refers to time series focused on providing the best estimate possible, at the expense of temporal consistency. For time series datasets, an 81 refers to the start year of the climatology used in the CAI (Climatologically-Aided Interpolation) process; see Time Series Datasets section. An "81" or "91" mean that it is based on the 1981-2010 or 1991-2020 climatologies, respectively. A "d" denotes a daily time step. An "m" denotes a monthly time step.

When an analysis or re-analysis of a dataset is released, it is given a version number, preceded by an "M" for monthly data, or "D" for daily data; for example, a daily dataset may be denoted as version D2. These version numbers are imbedded in the names of the downloadable zip files.

Table 2. Summary of the PRISM spatial climate datasets active as of January 2024. See Table 1 for descriptions of climate elements and derived variables.

Dataset	Time Period	Climate Elements	Time Step	Modeling Resolution	Output Resolution	Modeling Method	Latest Version and Release Date
			Long-Term Averages				
Norm91m	1991-2020	Ppt, tmin, tmax, tmean, tdmean, vpdmin, vpdmax, soltotal, solslope, solclear, soltrans	Monthly, annual average	30 sec	30 sec, 2.5 min (~4km)	DEM and CAI	Soltotal, solslope, solclear, soltrans: M3, Nov 2021 Ppt: M4, Dec 2022 Tmin, tmax, tmean, tdmean, vpdmin, vpdmax: M5, Jan 2024
Norm91d	1991-2020	Ppt, tmin, tmax, tmean, tdmean, vpdmin, vpdmax	Daily	30 sec	30 sec, 2.5 min (~4km)	Combination of Norm91m and AN91d	Ppt, tmin, tmax, tmean, tdmean, vpdmin, vpdmax: D1, Jan 2024
			Time Series				
LT81m	Jan 1895 - ongoing	Ppt, tmin, tmax, tmean, tdmean, vpdmin, vpdmax	Monthly, annual time series	30 sec	30 sec	Norm81m CAI	Ppt: M2, Aug 2013 Tmin, tmax, tmean, tdmean, vpr, vpdmin, vpdmax: M3 Oct 2019
AN81m (1895-2020) AN91m (2021-present)	Jan 1895 - ongoing	Ppt, tmin, tmax, tmean, tdmean, vpdmin, vpdmax	Monthly, annual time series	30 sec	30 sec, 2.5 min	1895-2020: Norm81m CAI 2021-present: Norm91m CAI CAI/AHPS (ppt, 2002-present)	1981-present ppt: M3, Jul 2015 1895-1980 ppt: M2, Aug 2013 Tmin, tmax, tmean, tdmean, vpdmin, vpdmax: M3 Oct 2019
AN81d (1981-2020) AN91d (2021-present)	1 Jan 1981 - ongoing	Ppt, tmin, tmax, tmean, tdmean, vpdmin, vpdmax	Daily time series	30 sec	30 sec, 2.5 min	1895-2020: Norm81m CAI 2021-present:	Ppt: D2, Jul 2015 Tmin, tmax, tmean, tdmean,

						Norm91m CAI CAI/AHPS (ppt, 2002-present)	vpdmin, vpdmax: D2 Oct 2019

Long-Term Average "Normals" Datasets

Normals datasets are available at monthly and daily time steps. These are discussed separately below.

Monthly Normals

Monthly normals are baseline datasets describing average monthly and annual conditions over the most recent three full decades and are our most popular datasets (Table 3). The most recent PRISM normals are for the period 1991-2020. Long-term average datasets for ppt, tmax, and tmin were modeled with PRISM using a digital elevation model (DEM) as the predictor grid. Tdmean was modeled with PRISM in the form of dew point depression (tmin – tdmean), using CAI with tmin as the predictor grid. Vpdmin and vpdmax were modeled with PRISM using CAI with tdmean, in combination with tmin and tmax, respectively, as the predictor grids. The normals are used in the interpolation of the time series datasets (see CAI discussion in the Time Series Datasets section). Given their importance, the normals are carefully developed and subjected to peer review whenever possible. A description of the PRISM modeling system, the process used to create the previous 1971-2000 temperature and precipitation normals, and an uncertainty analysis are available from Daly et al. (2008). The 1981-2010 and 1991-2020 normals for temperature and precipitation were prepared using similar methods to those used in the 1971-2000 normals, but with additional station networks and data handling improvements. Methods used to develop 1991-2020 normals for tdmean, vpdmin, and vpdmax were similar to those of the 1981-2010 normals, described in Daly et al. (2015), again with additional station networks and data handling improvements. Monthly solar radiation normals for 1991-2020 were added in November 2021. Methods are described in Rupp et al. (2022).

An updated version (M4) of the 1991-2020 PRISM monthly and annual normals for ppt, tmax, tmin, tmean, tdmean, vpdmax, and vpdmin was released in December 2022. Improvements over the previous 1991-2020 normals released in November 2021 feature a more stable method for adjusting short-period-of-record station averages to reflect the 1991-2020 period. The original 1991-2020 normals relied on a long-standing method for adjusting the period-of-record averages for stations that do not have the full 30-year period of record. This method, described in Daly et al. (2008), selects three nearby long-term "anchor" stations that have the highest PRISM weights, and have data that overlaps that of the short-term station, to develop adjustments to the short-term averages. This method works well in most instances. However, there are occasional short-term stations that have highly intermittent periods of record which can cause the choice of anchor stations with overlapping data to vary among closely-spaced short-term stations, resulting in differing adjustments over short distances. Our remedy was to use the PRISM AN91 monthly time series grid cell containing a short-term station as the "anchor" from which to make the adjustment. The result is a generally smoother and more consistent spatial variation in the adjustments. These newly adjusted normals were subject to quality control procedures that included visual examination to ensure reasonableness and spatial consistency.

A further update to the monthly normals (M5) for tmax, tmin, tmean, tdmean, vpdmax, and vpdmin was released in January 2024 (ppt remains M4). Minor changes were made to align the monthly normals with the newly-created daily normals. Grid cells affected were confined to the US West Coast, and most were located offshore (i.e., not on land).

Daily Normals

Daily normals grids (Norm91d) were developed for ppt, tmax, tmin, tmean, tdmean, vpdmax, and vpdmin for the period 1991-2020. The overall methodology was to use the daily time series grids from 1991-2020 (AN91d) to provide daily time step information but reconcile the daily data with the 1991-2020 monthly normals (Norm91m) so that the monthly averages (or totals in the case of ppt) match up. The strategy was to invoke a "nudge and smooth" sequence so that through a series of passes, the dailies are nudged to match the monthlies, the resulting time series is smoothed, and the process is repeated with successively smaller smoothing windows. Specifically, the raw 30-year daily values from the AN91d dataset were first nudged to match the monthlies, then smoothed with a 15-day moving average. This smoothed dataset was again nudged to match the monthlies, followed by a 5-day moving average.   The process was completed with a nudging pass followed by a 3-day moving average, then a final nudging pass without a smoothing pass to ensure consistency with the monthly normals. Once the process was complete, data for Feb 29 was calculated as the average of Feb 28 and Mar 1, and tmean daily normals were calculated as the average of tmax and tmin daily normals.

As indicated in the previous paragraph, a few of the monthly normals grid cells along the West Coast were modified to align with the daily averages. These were typically locations where the daily normals benefitted from cleaner transitions from month to month through adjustments to the monthlies.

Table 3. Summary of the station data used in the PRISM Norm91m dataset. Descriptions of the station networks are given in appendix Table A1.

Element	Norm91m Data Sources
Tmax, tmin	AGRIMET, AGWXNET, ARLFRD, ASOS/ISH, AZMET, CDEC, CEMP, CIMIS, COAGMET, COOP, DEOS, EC, FAWN, HJA, KSTATE, KYMESONET, LCRA, LUKEAFB, MAWN, MEXICO, NCECONET, NDAWN, NDBC, NEMESO, NEVCAN, NJWXNET, OKMESONET, RAWS, SCAN, SNOTEL, UCC-AGNET, UGA, UPPERAIR, USA, USCRN, USLTER, UTAHCLIMATECENTER, UUNET, WBAN, WRCC, WTEXAS
Ppt	AGRIMET, AGWXNET, CDEC, COCORAHS, COOP, EC, HDSC, HJA, MEXICO, MN, NDSWC, NVDWR, OKMESONET, SFWMD, SNOTEL, SNOWCOURSE, STORAGE, USCRN, USLTER, WBAN, WRCC
Tdmean, vpdmin, vpdmax	AGRIMET, AGWXNET, ARLFRD, ASOS/ISH, AZMET, CEMP, CIMIS, COAGMET, COOP, DRI, FAWN, HJA, KSTATE, KYMESONET, LCRA, LUKEAFB, MAWN, NCECONET, NDAWN, NDBC, NEMESO, NEVCAN, NJWXNET, OKMESONET, RAWS, SCAN, SNOTEL, UCC-AGNET, UGA, UPPERAIR, USA, USCRN, USLTER, UTAHCLIMATECENTER, UUNET, WBAN, WTEXAS
Soltotal, solslope, solclear, soltrans	AGRIMET, AGWXNET, AIRNOW, ARLFRD, ARLSORD, ASOS, AZMET, CEMP, CIMIS, COAGMET, CWOP, DEOS, DRI, DTN, FAWN, FGNET, HADS, HJA, KSTATE, KYMESONET, LUKEAFB, MAWN, NCECONET, NDAWN, NEMESO, NEVCAN, NJWXNET, NMAQ, NMCC, NSRDB, OKMESONET, RAWS, SCAN, SD-MESONET, SNOTEL, SRP, SURFRAD, TWDB, UCC-AGNET, UGA, UOREGON, USA, USCRN, USLTER, UTAHCLIMATECENTER, UUNET, VCAPCD, VTWAC, WTEXAS

Norm91m

Climate elements: tmin, tmax, tmean (derived), ppt, tdmean, vpdmin, vpdmax, soltotal, solslope, solclear, soltrans

Units and scaling: tmin, tmax, tmean, tdmean (deg C); ppt (mm); vpdmin, vpdmax (hPa); soltotal, solslope, solclear (MJ m^{-2} day^{-1}); soltrans (dimensionless, 0-1); all values are floating point

Description: Monthly 30-year "normal" dataset covering the conterminous US, averaged over the period 1991-2020. Interpolation method for tmin, tmax, and ppt used PRISM with a DEM (digital elevation model) as the predictor grid. Interpolation of tdmean used PRISM with tmin as the predictor grid. Interpolation of vpdmin and vpdmax used PRISM with tdmean, in combination with tmin and tmax, respectively, as the predictor grids.

Solclear was estimated with the IPW/TOPORAD model (Marks et al. 1998) and MERRA-2. Interpolation of soltrans used PRISM, with minimum relative humidity (derived from tmax and tdmean) as the predictor grid. Soltotal is a product of TOPORAD, using soltrans and solclear as inputs. Solslope is similar to soltotal, except calculated for a sloped surface as defined by a 30-arc-sec DEM (see Rupp et al., 2022, for details on solar methods). Approximate number of stations used in mapping ppt, tmax/tmin, tdmean, vpdmin/vpdmax, and soltrans was 26,600, 19,500, 6,400, 6,400, and 8,500, respectively.

Status: The most recent Norm91m analysis for tmax/tmin, tdmean, vpdmin/vpdmax was released in January 2024 (version M5); ppt continues to be version M4 (released in December 2022) and solar continues to be version M3 (released in November 2021).

Availability: 800m and 4km versions available at https://prism.oregonstate.edu/normals/

Caveats: Norm91m cannot be compared directly to PRISM normals from previous time periods (e.g., Norm81m) to assess climatic changes between different periods. Station networks and data values are not consistent between the datasets. Each time the normals are created, we try to include new and better sources of data so that the product continues to reflect the state of knowledge regarding climatic values and spatial patterns. Dataset uses all stations, regardless of time of observation, which means that stations with morning observation times could exhibit slight cool biases for tmin, and stations with afternoon observation times could exhibit slight warm biases for tmax.

Norm91d

Climate elements: tmin, tmax, tmean (derived), ppt, tdmean, vpdmin, vpdmax

Units and scaling: tmin, tmax, tmean, tdmean (deg C); ppt (mm); vpdmin, vpdmax (hPa); all values are floating point

Description: Daily 30-year "normal" dataset covering the conterminous US, averaged over the period 1991-2020. This dataset was created through a series of calculations using existing grids, namely the Norm91m monthly normals and the AN91d daily time series.

Status: The initial Norm91d analysis for all elements (except solar) was released in January 2024 (version D1).

Availability: 800m and 4km versions available at https://prism.oregonstate.edu/normals/

Caveats: Station networks and data values are not consistent between the Norm91m and AN91d datasets. The levels of smoothing applied to create the Norm91d dataset were thought to strike a reasonable balance between showing as much temporal detail as possible, while still filtering out what could be non-climatic noise. This involved subjective decisions that may not be appropriate for all elements and locations.

Time Series Datasets

The long-term monthly and annual average precipitation and temperature datasets discussed above are modeled with PRISM using a DEM as the predictor grid. In contrast, the time series datasets (as well as long-term average humidity and solar variables) are modeled using a method called climatologically-aided interpolation (CAI). In CAI, the long-term average datasets, or combinations of them, serve as the predictor grids. The idea behind CAI is that the best first guess of the spatial pattern of climatic conditions for a given month or day is the long-term average pattern. CAI is robust to wide variations in station data density, which is necessary when modeling century-long time series.

There are two types of time series datasets: those created to provide the best possible estimates at a given time step, and those created with long-term consistency in mind. Table 4 summarizes the types of station networks used in each type of time series dataset. A more detailed description of the station data networks used is given in Appendix A. Time series datasets providing the best possible estimates, abbreviated "AN" (all networks), use all the relevant station networks and data sources ingested by the PRISM Climate Group. Time series datasets focusing on long-term consistency, abbreviated "LT" (long term), do not use all available station networks, but instead focus on a subset of networks that have been in existence for at least twenty years. The goal of the LT datasets is to provide better temporal consistency than the AN datasets. However, even the LT datasets still must be used with caution when calculating multi-decadal climate trends. Although longer-term networks are used, grids still contain non-climatic variations due to station equipment and location changes, stations openings and closings, and varying observation times.

Table 4. Summary of the PRISM time series datasets. Methodological details are provided in the Time Series Datasets section. Descriptions and time histories of the station networks are given in appendix Tables A1-A4.

	AN81m/AN91m	**AN81d/AN91d**	**LT81m**
Focus	Best estimate	Best estimate	Temporal consistency
Data Sources - Overview	All stations included, regardless of observation time	All stations included, but with time of observation constraint	Only "long-term" networks having at least some stations with ≥ 20 years of data included. All stations included, regardless of observation time.
Tmax, tmin data sources	See appendix Table A2 for included networks	Same as AN81m, except non-PRISM Day observations are excluded; PRISM Day COOP observations day-shifted if needed	See appendix Table A2 for included networks
Tdmean, vpdmin, vpdmax data sources	See appendix Table A4 for included networks	Same as AN81m, except non-PRISM Day observations are excluded	See appendix Table A4 for included networks
Ppt data sources	See appendix Table A3 for included networks; AHPS RADAR Stage 2 and 4 and MRMS grids; non-PRISM Day COOP stations re-apportioned	Same as AN81m	See appendix Table A3 for included networks
Solar data sources	Time series not yet available	Time series not yet available	Time series not yet available
Calculating multi-decadal climate trends must be done carefully. See Caveats sections in the dataset descriptions.			

LT - Monthly Time Series (LT81m)

Climate elements: tmin, tmax, tmean (derived), ppt, tdmean, vpdmin, vpdmax

Units and scaling: tmin, tmax, tmean, tdmean (deg C); ppt (mm); vpdmin, vpdmax (hPa); all values are floating point

Description: Monthly dataset covering the conterminous US, starting on January 1895 and ending on the most recently completed month. Emphasis is on long-term consistency and uses only station networks having at least some stations with ≥ 20 years of data. Interpolation method for all elements is CAI, using 1981-2010 monthly climatologies as the predictor grids.

Given that station data for tdmean, vpdmin, and vpdmax extend back to the 1930s at the earliest (most start in the 1940s), data for these climate elements were extended back to 1895 at a subset of approximately 250 long-term stations by estimating their values based on temperature and precipitation. Specifically, monthly tdmean was estimated by multiple linear regression functions with precipitation, tmin, and trange (tmax-tmin) as the independent variables. Vpdmin and vpdmax were estimated in two steps: (1) calculating "first-guess" vpdmin using tmin and the estimated tdmean, and first-guess vpdmax using tmax and the estimated tdmean; and (2) estimating vpdmin and vpdmax by second-order polynomial regression functions with their respective first-guess values as the independent variables.

Status: The most recent re-analysis was completed in Oct 2019 (full period of record) for all elements except ppt and updated with new data for subsequent months (version M3). The LT81m version of ppt became available in August 2013 (M2).

Availability: LT monthly datasets are only available at 800m resolution for a fee; contact prism_orders@nacse.org

Caveats: Calculating multi-decadal climate trends must be done carefully. Although longer-term networks are used, grids still contain non-climatic variations due to station equipment and location changes, station openings and closings, and varying observation times.

AN - Monthly Time Series (AN81m/AN91m)

Climate elements: tmin, tmax, tmean (derived), ppt, tdmean, vpdmin, vpdmax

Units and scaling: tmin, tmax, tmean, tdmean (deg C), ppt (mm); vpdmin, vpdmax (hPa); all values are floating point

Description: Monthly dataset covering the conterminous US, starting on January 1895 and ending on the most recently completed month. Emphasis is on arriving at the best estimate regardless of temporal consistency and uses all available station networks.

Interpolation method for tmin and tmax is CAI, using Norm81m (1895-2020) and Norm91m (2021-present) climatologies as the predictor grids.

For ppt, the latest version is M3 for 1981-present only. For 1895-1980, the latest version of ppt continues to be M2. Differences between M2 and M3 are summarized in Table 5; the main difference between the two versions is that in M3, the monthly and daily grids are post-processed to be equal to each other at the end of each month. The M3 dataset uses the CAI interpolation method in the western US (Rockies westward) for all years. East of the Rockies, the monthly values are forced to equal the sum of the AN daily version D2 values for 1981-present. Thus, the interpolation method in the central and east is effectively the same as AN daily, which is CAI from 1981-2001, and a combination of CAI and RADAR from 2002-present. See the AN daily time series description for details on M3/D2 interpolation methods and station data handling. The previous M2 ppt dataset used the monthly time step CAI interpolation method in all areas for all years.

New AN monthly versions of tmax, tmin tmean, tdmean, vpdmin, and vpdmax were completed in October 2019 (M3). This version included a number of improvements. Several new station networks were added, and NCAR/NCEP Reanalysis grid points of temperature and relative humidity (converted to tdmean) were added to improve high-elevation estimates. A day-shifting algorithm was applied to daily COOP tmin and tmax observations made in the morning (qualifying as PRISM Day), to better align data that appeared to be on the wrong day, creating spatial anomalies in the resulting grids; the result was a dramatic decrease in the number of spatial anomalies identified and rejected by the PRISM spatial QC system. The PRISM parameterization was modified to allow a wider range of relationships between the station data and the climatological grid (in the CAI procedure); the result was a more detailed rendition of unusual temperature inversions that are not present in the normals. Finally, an adjustment was made to SNOTEL temperature data for stations employing the YSI Extended Range temperature sensor; it was discovered that the NRCS had used an erroneous equation to transform voltage to temperature.

In some western agricultural areas, starting in the 1980s, the AN monthly version of tdmean, vpdmin, and vpdmax may be very different than those of LT monthly version. AN monthly includes several networks that have stations sited in irrigated fields (e.g., AGRIMET, CIMIS, COAGMET). These locations can have relatively high tdmean (low vpd) values compared to surrounding areas, especially in summer. These networks are not used in LT, because they do not represent natural climatic variations, but are used in AN, because they provide accurate information at their time and location. See Daly et al. (2015) for details.

Given that station data for tdmean, vpdmin, and vpdmax extend back to the 1930s at the earliest (most start in the 1940s), data for these climate elements were extended back to 1895 at a subset of approximately 250 long-term stations by estimating their values based on temperature and precipitation. Specifically, monthly tdmean was estimated by multiple linear regression functions with precipitation, tmin, and trange (tmax-tmin) as the independent variables. Vpdmin and vpdmax were estimated in two steps: (1) calculating "first-guess" vpdmin using tmin and the estimated tdmean, and first-guess vpdmax using tmax and the estimated tdmean; and (2) estimating vpdmin and vpdmax by second-order polynomial regression functions with their respective first-guess values as the independent variables.

Status: The most recent re-analysis of tmin, tmax, tmean, tdmean, vpdmin, and vpdmax is M3, which was released in October 2019 (full period of record). This version, denoted by the M3 file name identifier, is the active version and is updated with data from subsequent months. The most recent re-analysis of ppt is also M3, which was released on 1 July 2015 for the period January 1981- December 2014; an additional update was released on 15 July 2015 for January-June 2015. M3 is the active version and is updated with new data for subsequent months. Version M2 up through June 2015 continue to be available via FTP (see data_archive directory), but updates to this version ended on 1 July 2015. Before 1981, the most recent ppt re-analysis continues to be M2, which was released in July 2013.

<u>Note</u>: In mid-January 2022, the AN monthly time series datasets for all elements commenced using the Norm91m (1991-2020) normals (M3) as predictor grids (replacing the Norm81m 1981-2010 grids – M2). The changes were made retroactively 12 months back to January 2021 to coincide with the start of the new decade. The new active time series dataset was termed AN91m and began in January 2021; AN81m ended in December, 2020. An updated version of the 1991-2020 normals (M4) was recently released and replaced the M3 version in January 2023. Since the length of the moving time window for PRISM time series mapping is six months, this change affected time series data from July 2022 forward.

New station networks are being added periodically, which means that the station listings may be out of date for the most recent months. However, historical data from new networks are not incorporated until a new version is created.

Availability: 4km version available at http://prism.oregonstate.edu. 800m dataset available for a fee; contact prism_orders@nacse.org

Caveats: Calculating multi-decadal climate trends must be done carefully. Grids may contain non-climatic variations due to station equipment and location changes, openings and closings, and varying observation times, and the use of relatively short-term networks.

Table 5. Comparison of M3 (monthly) and D2 (daily) ppt versions with previous M2 and D1 versions.

	M3/D2	**M2/D1**
Release Date	Monthly (M3): Jul 2015 Daily (D2): Jul 2015	Monthly (M2): Aug 2013 Daily (D1): Jun 2013
Time Period Covered	Monthly (M3): Jan 1981-present Daily (D2): 1 Jan 1981-present	Monthly (M2): Jan 1895- Jun 2015 Daily (D1): 1 Jan 1981-30 Jun 2015
Station Data	*<u>Summary</u>: Input station data for monthly and daily interpolations are the same* Non-PRISM Day and multi-day accumulations at COOP stations are re-apportioned and included in both daily and monthly interpolations Stations are subjected to the monthly data completeness criterion (<= 2 missing days per month) for both daily and monthly interpolations	*<u>Summary</u>: Input station data for monthly and daily interpolations are different* Non-PRISM Day and multi-day accumulations at COOP stations are omitted from daily interpolation, but accepted for monthly interpolation Stations are subjected to the monthly data completeness criterion (<= 2 missing days per month) for monthly interpolation, but not for daily interpolation
Daily/monthly grid reconciliation	*<u>Summary</u>: At the end of each month, the daily values sum to the monthly values* Mountain areas of western US: Daily grid values are forced to sum to monthly grid values at the end of each month Central and Eastern US and flat areas of West: Monthly grid values are forced to equal the sum of the daily grid values at the end of each month	*<u>Summary</u>: At the end of each month, the daily values do not necessarily sum to the monthly values* Monthly and daily grids are not reconciled
Interpolation Method	*<u>Summary</u>: Owing to the grid reconciliation, monthly and daily interpolation methods are effectively the same* Monthly: CAI 1895-2001 over entire domain; CAI 1895-present western US; CAI+RADAR in central and eastern US 2002-present	*<u>Summary</u>: Monthly and daily interpolation methods are not necessarily the same* Monthly: CAI over entire domain, entire period

	Daily: CAI 1981-2001 over entire domain; CAI 1981-present western US; CAI+RADAR in central and eastern US 2002-present	Daily: CAI over entire domain, entire period in western US; CAI+RADAR in central and eastern US 2002-2015

AN - Daily Time Series (AN81d/AN91d)

Climate elements: tmin, tmax, tmean (derived), tdmean, ppt, vpdmin, vpdmax

Units and scaling: tmin, tmax, tmean, tdmean (deg C); ppt (mm); vpdmin, vpdmax (hPa); all values are floating point

Description: Daily dataset covering the conterminous US, starting on 1 January 1981 and ending yesterday. Emphasis is on arriving at the best estimate, regardless of temporal consistency, and uses all station networks ingested by the PRISM Climate Group.

Interpolation method for tmin and tmax is CAI, using Norm81m (1895-2020) and Norm91m (2021-present) climatologies as the predictor grids.

For ppt, the latest version is D2. Differences between D1 and D2 are summarized in Table 5. Starting on 1 January 2002, both D1 and D2 ppt versions use a combination of CAI and RADAR interpolation in the central and eastern US (Daly et al. 2021). The RADAR version is created using the National Weather Service Stage 2 unbiased (ST2un) and 4 (ST4) 4km gridded radar products from the Advanced Hydrometeorological Prediction System (AHPS). On a pixel-by-pixel basis, a "besting" process compares the R^2 values from the PRISM regressions of climate vs. station ppt (CAI) and ST2un vs. station ppt (RADAR). ST2un, rather than ST4, is used to estimate the predictive power of RADAR, because ST2un does not have individual station observations incorporated, which makes for a fairer comparison to CAI than ST4, which has station data assimilated into the grid estimates. Based on this comparison, a RADAR weighting factor (0-1) is calculated. The weighting factor is then applied to the ST4 AHPS grid when averaging it with the CAI grid, to form a hybrid estimate. *Note*: The ST2un analysis used to weight the RADAR analyses in the besting process was discontinued in July 2020. At that time, we replaced ST2un with the 24-hour radar-only MRMS (Multi-Radar Multi-Sensor) product from the National Centers for Environmental Prediction for the period 1200-1200 UTC. We have been archiving MRMS products since late 2014 in anticipation of eventually also replacing the AHPS ST4 product with MRMS.

Over the entire conterminous US, the daily ppt amounts from AN daily version D2 and monthly AN version M3 are processed to equal each other at the end of each month (Daly et al. 2021). In mountainous terrain areas of the western US (Rockies westward), the AN daily grid values are forced to sum to the AN monthly grid values. AN monthly uses the CAI interpolation method in these areas. The AN monthly grids are believed to be superior to the daily grids in mountainous areas because the interpolation of longer time-step data better captures persistent orographic precipitation patterns than daily interpolation. To match the monthly values at the end of a month, the daily values are increased or decreased on a constant percentage basis. In the case where the monthly ppt value is measurable (>= 0.01" or 2.54 mm), and the sum of the daily ppt grids is below measurable but non-zero, new wet days may be added, selected from the wettest ppt days available from the daily grids. An inverse-distance weighted grid of the number of wet days as reported by stations provides the number of wet days that should be added. In the case where the daily grid values sum to zero, i.e., there are no days where non-zero precipitation occurred, no wet days are added and the monthly value is set to zero.

The previous ppt version D1 also used CAI in the western US but it was performed on a daily, rather than monthly, time step and there was no attempt to reconcile the monthly and daily values.

Station data used in AN daily are screened for adherence to a "PRISM day" criterion (Daly et al. 2021). A PRISM day is defined as 1200 UTC-1200 UTC (e.g., 7 AM-7AM EST), which is the same as the AHPS day definition. Once-per day observation times must fall within +/- 4 hours of the PRISM day to be included in the AN81d tmax and tmin datasets. Stations without reported observation times in the NCEI GHCN-D database are currently assumed to adhere to the PRISM day criterion. The dataset uses a day-ending naming convention, e.g., a day ending at 1200 UTC on 1 January is labeled 1 January.

Ppt version D1 does not use stations that fail to meet the PRISM Day criterion or report multi-day accumulations. In contrast, version D2 takes advantage of an in-house algorithm that estimates PRISM Day station values from non-PRISM Day values at COOP stations and also disaggregates COOP multi-day accumulations (Daly et al. 2021). This is done by creating initial daily ppt grids using PRISM Day stations only, identifying discrete ppt events of one day or more at the station locations, and re-apportioning the non-PRISM Day stations and multi-day accumulations to match the relative ppt amounts taken from the initial gridded PRISM Day ppt events. These re-apportioned daily station values are then added to the daily ppt station dataset and used in a second interpolation run.

In D2, given that the monthly and daily ppt values are reconciled, station values must pass both daily and monthly QC checks to be used in either the daily or monthly interpolation (Daly et al. 2021). For example, stations must pass a monthly data completeness check before being used in monthly mapping; if more than two days are missing, the station is rejected for that month. In version D2, stations failing the monthly data completeness check are omitted from the daily interpolation for all days in the month. In version D1, the daily interpolation did not require that the monthly data completeness check be passed.

Status: The most recent re-analysis of tmin, tmax, tmean, tdmean, vpdmin, and vpdmax is D2, which was released in October 2019 (full period of record). This version, denoted by the "D2" file name identifier, is the active version and is updated with data from subsequent months. The most recent re-analysis of ppt is D2, which was released on 1 July 2015 for the period 1 January 1981- 31 December 2014; an additional update was released on 15 July 2015 for 1 January – 30 June 2015. D2 is the active version and is updated with new data for subsequent days. Version D1 up through June 2015 continues to be available via FTP (see data_archive directory), but updates to this version ended on 1 July 2015.

Note: In mid-January 2022, the AN daily time series datasets for all elements commenced using the Norm91m (1991-2020) normals (M3) as predictor grids (replacing the Norm81m 1981-2010 grids – M2). The changes were made retroactively 12 months back to January 1, 2021 to coincide with the start of the new decade. The new active time series dataset was termed AN91d and began on January 1, 2021; AN81d ended on December 31, 2020. An updated version of the 1991-2020 normals (M4) was recently released and replaced the M3 version in December 2022. The M4 normals will begin to be used as predictor grids for AN91d in January 2023. Since the length of the moving time window for PRISM time series mapping is six months, this change will affect time series data from July 1, 2022 forward.

New station networks are being added periodically, which means Table 4 may be out of date for the most recent months. However, historical data from new networks are not incorporated until a new version of AN daily is developed.

Availability: 4km version available at http://prism.oregonstate.edu. 800m dataset available for a fee; contact prism_orders@nacse.org

Caveats: Calculatin

g multi-decadal climate trends must be done carefully. Grids may contain non-climatic variations due to station equipment and location changes, openings and closings, and the use of RADAR data for ppt starting in 2002.

Screening stations for adherence to a "PRISM day" criterion does help to minimize time of tmin and tmax observation bias. However, the downside is that this results in the exclusion of a large percentage of stations from the analysis, especially early in the record. For example, in 1981, non-PRISM day COOP temperature stations outnumbered PRISM day stations by about 2 to 1. The two groups were about equal in size in 1990. By 2010, PRISM day COOP stations outnumbered non-PRISM day stations by about 3 to 1.

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Appendices

Table A1. Descriptions of Station Networks Used in PRISM Spatial Climate Datasets

Table A2. History of station networks used in PRISM daily and monthly time series datasets: Tmax/Tmin

Table A3. History of station networks used in PRISM daily and monthly time series datasets: Precipitation

Table A4. History of station networks used in PRISM daily monthly time series datasets: Tdmean, Vpdmin, Vpdmax

Table A1. Descriptions of station networks used in PRISM spatial climate datasets.

		Dataset Usage			
Network Abbreviation	**Description**	**Tmax, Tmin**	**Ppt**	**Tdmean, Vpdmin, Vpdmax**	**Solar**
AGRIMET	Bureau of Reclamation Agricultural Weather Network	All	All	Norm91m AN91m AN91d	Norm91m
AGWXNET	Washington State University's Agricultural Weather Network (AgWeatherNet)	Norm91m AN91m AN91d	AN91m[1] AN91d[1]	Norm91m AN91m AN91d	Norm91m
AIRNOW	US government air quality partnership *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	Norm91m
AQ	Utah Department of Air Quality *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
ARDOT	Arkansas Department of Transportation *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
ARLFRD	NOAA Air Resources Laboratory Field Research Division – SE Idaho *Notes*: Accessed via Mesowest data feed	Norm91m AN91m AN91d		Norm91m AN91m AN91d	Norm91m
ARLSORD	NOAA Air Resources Laboratory / Special Operations and Research Division – S Nevada *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	Norm91m
ASOS/ISH	Automated Surface Observing System and related networks (e.g., AWOS), and Integrated Surface Hourly (ISH) network *Notes*: ASOS network began installation in 1996, with poor instrumentation for measuring snowfall.	All	AN91m[1] AN91d[1]	All	Norm91m[2]
AZALERT	Maricopa County Flood Control District	AN91m AN91d		AN91m AN91d	

	Notes: Accessed via Mesowest data feed				
AZMET	Arizona Meteorological Network, operated by Univ. of Arizona *Notes*: Accessed via Mesowest data feed	Norm91m AN91m AN91d	AN91m AN91d	Norm91m AN91m AN91d	Norm91m
CCU	Coastal Carolina University *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
CDEC	California Data Exchange Center *Notes*: A collection of stations from various networks operating in California.	Norm91m AN91m AN91d	Norm91m AN91m AN91d		
CEMP	Desert Research Institute Community Environmental Monitoring Program – Nevada *Notes*: Accessed via Mesowest data feed	Norm91m AN91m AN91d		AN91m AN91d	Norm91m
CIMIS	California Irrigation Management Information System, operated by Univ. California, Davis	Norm91m AN91m AN91d	AN91m[1] AN91d[1]	Norm91m AN91m AN91d	Norm91m
COAGMET	Colorado Agricultural Meteorological Network, operated by Colorado State University	Norm91m AN91m AN91d	AN91m[1] AN91d[1]	Norm91m AN91m	Norm91m
COCORAHS	Community Collaborative Rain, Hail and Snow Network, operated by Colorado State University *Notes*: Currently the largest ppt observing network in the US.		Norm91m AN91m AN91d		
COOP	National Weather Service Cooperative Observer Program *Notes*: These stations are part of the GHCN-D database. COOP is the longest-running climate network in the US.	All	All	Norm91m	
CWOP	Citizens Weather Observing Program *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	Norm91m

DEDOT	Delaware Department of Transportation *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
DEOS	Delaware Environmental Observing System, operated by Univ. of Delaware	Norm91m AN91m AN91d	AN91m[1] AN91d[1]	AN91m AN91d	Norm91m
DRI	Desert Research Institute *Notes*: Accessed via Mesowest data feed	AN91m AN91d		Norm91m	Norm91m
DTN	Data Transmission Network *Notes*: Accessed via Mesowest data feed	AN91m AN91d			Norm91m
EAA	Edwards Aquifer Authority *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
EC	Environment Canada	Norm91m AN91m AN91d	All		
FAWN	Florida Automated Weather Network, operated by Univ. of Florida	Norm91m AN91m AN91d	AN91m AN91d	Norm91m AN91m AN91d	Norm91m
FGNET	Utah Fruit Growers Network *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	Norm91m
HADS	Hydrometeorological Automated Data System *Notes*: Accessed via Mesowest data feed	AN91m AN91d			Norm91m
HDSC	NOAA Hydrometeorological Design Studies Center *Notes*: A collection of ppt stations in California used by HDSC and PRISM to produce the NOAA Atlas 14 ppt frequency maps. Period of record ends in 2010.		Norm91m AN91m		
HJA	HJ Andrews Experimental Forest, Oregon, NSF Long Term Ecological Research Site (LTER); benchmark sites, reference stands, cold air transects *Notes*: Data lag time is currently longer than 6	All Exceptions: Tmin only at reference stands, thermograph sites, and cold air transects;	All	Norm91m LT81m AN91m (tdmean only)	Norm91m

	months, which is our cutoff for operational inclusion; this means that at present, HJA data can be included only when new versions of the datasets are created.	Cold air transects used in AN91 datasets only			
HYD	Advanced Hydrologic Prediction Service River Forecast Centers *Notes*: Selected stations from a combination of many different networks. Stations available from networks for which we have direct feeds are excluded (difficulties identifying the source networks in HYD produce occasional duplications).		AN91m AN91d		
ICN	Illinois Climate Network, operated by Univ. of Illinois	AN91m AN91d	AN91m AN91d	AN91m AN91d	
KSTATE	Kansas Mesonet, operated by Kansas State University	Norm91m AN91m AN91d	AN91m[1] AN91d[1]	Norm91m AN91m AN91d	Norm91m
KYMESONET	Kentucky Mesonet, operated by Western Kentucky University	Norm91m AN91m AN91d	AN91m AN91d	Norm91m AN91m AN91d	Norm91m
LCRA	Lower Colorado River Authority Network (Texas) *Notes*: Accessed via Mesowest data feed	Norm91m AN91m AN91d	AN91m[1] AN91d[1]	Norm91m AN91m AN91d	
LSU-AGNET	Louisiana State University AgCenter *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
LUKEAFB	Luke Air Force Base network, SW Arizona	Norm91 AN91m AN91d	AN91m AN91d	Norm91m AN91m AN91d	Norm91m
MAWN	Michigan Automated Weather Network, operated by Michigan State University *Notes*: Currently known as the Enviro-weather Automated Weather Station Network; accessed via the Mesowest data feed	Norm91m AN91m AN91d		Norm91m	Norm91m
MEXICO	Global Historical Climate Network – Mexico	All	Norm91m LT81m	AN91m	

	Notes: These stations are part of the GHCN-D database		AN91m AN91d		
MN	Minnesota Climatology Working Group, previously called Minnesota HiDen, now called MNGage		Norm91m LT81m AN91m AN91d		
MNDOT	Minnesota Department of Transportation *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
MS-DELTA	Mississippi Delta Agricultural Weather Center *Notes*: Accessed via Mesowest data feed	AN91m AN91d			
MT-MESO	Montana Mesonet, operated by Univ. of Montana *Notes*: Accessed via Mesowest data feed	AN91m AN91d			
NCECONET	North Carolina Environment and Climate Observing Network, operated by North Carolina State University	Norm91m AN91m AN91d	AN91m[1] AN91d[1]	Norm91m AN91m AN91d	Norm91m
NDAWN	North Dakota Agricultural Weather Network, operated by North Dakota State University *Notes*: Data accessed via the High Plains Regional Climate Center	Norm91m AN91m AN91d	AN91m[1] AN91d[1]	Norm91m AN91m AN91d	Norm91m
NDDOT	North Dakota Department of Transportation *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
NDBC	National Data Buoy Center *Notes*: Used to characterize near-coastal air temperature and humidity	Norm91m AN91m		Norm91m AN91m	
NDSWC	North Dakota State Water Commission		Norm91m LT81m AN91m AN91d		
NEMESO	Nebraska Mesonet, operated by Univ. of Nebraska	Norm91m AN91m AN91d	AN91m[1] AN91d[1]	Norm91m	Norm91m

	Notes: Data accessed via the High Plains Regional Climate Center				
NEVCAN	Nevada Climate-Ecohydrological Assessment Network	Norm91m AN91m AN91d	AN91m AN91d	Norm91m AN91m AN91d	Norm91m
NJWXNET	New Jersey Weather and Climate Network, operated by Rutgers University	Norm91m AN91m AN91d	AN91m[1] AN91d[1]	Norm91m AN91m AN91d	Norm91m
NMAQ	New Mexico Environment Department *Notes*: Accessed via Mesowest data feed	AN91m AN91d			Norm91m
NMCC	New Mexico Climate Center *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	Norm91m
NSRDB	National Solar Radiation Database				Norm91m[3]
NVDWR	Nevada Division of Water Resources *Notes*: Collection of ppt gauges in western Nevada.		Norm91m		
NWAC	Northwest Avalanche Center *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
OKMESO-NET	Oklahoma Mesonet, operated by Univ. of Oklahoma	Norm91m AN91m AN91d	Norm91m AN91m AN91d	Norm91m AN91m AN91d	Norm91m
PEMN	Pennsylvania Environmental Monitoring Network *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
RAINWISE	Rainwise weather stations *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
RAWS	U.S. Forest Service and Bureau of Land Management Remote Automated Weather Stations	All	All[1]	Norm91m LT81m AN91m AN91d	Norm91m
SCAN	USDA NRCS Soil Climate Analysis Network	Norm91m AN91m AN91d		Norm91m AN91m AN91d	Norm91m
SC-EDISON	Southern California Edison				

SDGE	San Diego Gas and Electric *Notes*: Accessed via Mesowest data feed	Norm91m AN91m AN91d		Norm91m AN91m AN91d	Norm91m
SD-MESONET	South Dakota Mesonet, operated by South Dakota State University				Norm91m
SFWMD	South Florida Water Management District		Norm91m AN91m AN91d	n/a	
SNOTEL	Natural Resources Conservation Service Snowpack Telemetry *Notes*: The main high elevation network in western mountains.	All	All	Norm91m	Norm91m
SNOW-COURSE	Natural Resources Conservation Service Snow Course *Notes*: An algorithm was developed to relate April 1 snow water equivalent at the snow courses to winter ppt. Useful in remote mountain areas lacking actual ppt measurements.		Norm91m		
SRP	Salt River Project, AZ *Notes*: Accessed via Mesowest data feed	AN91m AN91d	AN91m AN91d	AN91m AN91d	Norm91m
STORAGE	Miscellaneous Long-Term Precipitation Storage Gage Stations *Notes*: Storage gauges from various agencies in remote areas of the western US that are checked monthly to yearly.		Norm91m		
SURFRAD	Surface Radiation Budget Network				Norm91m
TWDB	Texas Water Development Board *Notes*: Accessed via Mesowest data feed	AN91m AN91d	AN91m AN91d	AN91m AN91d	Norm91m
UCC-AGNET	Utah State University Agricultural Weather Network *Notes*: Accessed via Mesowest data feed	Norm91m		Norm91m	Norm91m
UGA	Georgia Mesonet, operated by Univ. of Georgia	Norm91m AN91m	AN91m[1] AN91d[1]	Norm91m AN91m	Norm91m

		AN91d		AN91d	
UOREGON	University of Oregon Solar Radiation Monitoring Laboratory				Norm91m
UPPERAIR	National Centers for Environmental Prediction/National Center for Atmospheric Research *Notes*: Used to represent mean temperature and relative humidity at high elevations in free-air topographic positions.	Norm91m LT81m AN91m AN91d	n/a	Norm91m LT81m AN91m AN91d	
UPR	Union Pacific Railroad *Notes*: Accessed via Mesowest data feed	AN91m AN91d			
USA	University of South Alabama Mesonet	Norm91m AN91m AN91d	AN91m[1] AN91d[1]	Norm91m AN91m AN91d	Norm91m
USCRN	US Climate Reference Network *Notes*: High-quality NOAA network designed to monitor long-term climatic variations in the US	Norm91m AN91m AN91d	AN91m AN91d	Norm91m AN91m AN91d	Norm91m
USLTER	Selected stations from NSF Long Term Ecological Research Sites: Hubbard Brook, Coweeta, Sevietta, Niwot Ridge	Norm91m	Norm91m	Norm91m	Norm91m
UTAHCLIMATECENTER	Utah Climate Center *Notes*: Accessed via Mesowest data feed	Norm91m		Norm91m	Norm91m
UTAHDOT	Utah Department of Transportation *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
UUNET	University of Utah *Notes*: Accessed via Mesowest data feed	Norm91m AN91m AN91d		Norm91m AN91m AN91d	Norm91m
VCAPCD	Vermont Air Pollution Control District *Notes*: Accessed via Mesowest data feed				Norm91m
VTWAC	Vermont Electric Power Company *Notes*: Accessed via Mesowest data feed				Norm91m

WACNET	Wyoming Agricultural Climate Network *Notes*: Accessed via Mesowest data feed	AN91m AN91d	AN91m AN91d	AN91m AN91d	
WBAN	Weather Bureau, Army, Navy *Notes*: These stations are part of the GHCN-D database. In 1996, many WBAN stations converted to ASOS instrumentation.	All	All[1]	Norm91m (tdmean only) LT81m AN91m AN91d	
WSMR	U.S. Army White Sands Missile Range *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
VCAPCD	Ventura County Air Pollution Control District *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
VTWAC	Vermont Weather Analytics Center *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
WEATHERSTEM	WeatherSTEM stations *Notes*: Accessed via Mesowest data feed	AN91m AN91d		AN91m AN91d	
WRCC	Western Regional Climate Center	All	All		
WTEXAS	West Texas Mesonet, operated by Texas Tech University	Norm91m AN91m AN91d		Norm91m AN91m AN91d	Norm91m

[1]Network primarily uses gauges which are not suited for measuring precipitation during freezing conditions. Therefore, precipitation data are used during May-Sep only.

[2]Network reports cloud heights and amounts from a ceilometer, which are used to estimate soltrans (cloud transmittance).

[3]Network consists primarily of modeled (estimated) solar radiation.

Table A2. History of station networks used in PRISM daily/monthly time series datasets: Tmax/Tmin. (Full period of record may not be included in the PRISM grids).

	AN and LT
	AN only

	Decade Ending Year													
Network	**1900**	**1910**	**1920**	**1930**	**1940**	**1950**	**1960**	**1970**	**1980**	**1990**	**2000**	**2010**	**2020**	**2030**
AGRIMET										AN and LT	AN and LT	AN and LT	AN and LT	AN and LT
AGWXNET													AN only	AN only
AIRNOW													AN only	AN only
AQ														AN only
ARDOT														AN only
ARLFRD													AN only	AN only
ARLSORD													AN only	AN only
ASOS/ISH													AN only	AN only
AZALERT												AN only	AN only	AN only
AZMET													AN only	AN only
CCU													AN only	AN only
CDEC														
CEMP													AN only	AN only
CIMIS									AN only	AN only	AN only	AN only	AN only	AN only
COAGMET													AN only	AN only
COCORAHS														
COOP	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT
CWOP													AN only	AN only
DEDOT													AN only	AN only
DEOS													AN only	AN only
DRI													AN only	AN only
DTN													AN only	AN only
DUGWAY												AN only	AN only	AN only
EAA													AN only	AN only
EC	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT
FAWN										AN only	AN only	AN only	AN only	AN only
FGNET												AN only	AN only	AN only
HADS														AN only
HDSC														
HJA							AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT
HYD														
ICN														AN only
KSTATE												AN only	AN only	AN only

KYMESONET														
LCRA														
LSU-AGNET														
LUKEAFB														
MAWN														
MEXICO														
MN														
MNDOT														
MS-DELTA														
MT-MESO														
NCECONET														
NDAWN														
NDDOT														
NDBC														
NDSWC														
NEMESO														
NEVCAN														
NJWXNET														
NMAQ														
NMCC														
NSRDB														
NVDWR														
NWAC														
OKMESONET														
PEMN														
RAINWISE														
RAWS														
SCAN														
SC-EDISON														
SDGE														
SD-MESONET														
SFWMD														
SNOTEL														
SNOWCOURSE														
SRP														
STORAGE														
SURFRAD														
TWDB														
UCC-AGNET														
UGA														

UOREGON														
UPPERAIR														
UPR														
USA														
USCRN														
USLTER														
UTAHCLIMAT														
UTAHDOT														
UUNET														
WSMR														
VCAPCD														
VTWAC														
WACNET														
WBAN														
WRCC														
WTEXAS														

Table A3. History of station networks used in PRISM monthly time series datasets: Precipitation. (Full period of record may not be included in the PRISM grids).

	AN and LT
	AN only

Network	Decade Ending Year													
	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020	2030
AGRIMET														
AGWXNET														
AIRNOW														
AQ														
ARDOT														
ARLFRD														
ARLSORD														
ASOS/ISH														
AZALERT														
AZMET														
CCU														
CDEC														
CEMP														
CIMIS														
COAGMET														
COCORAHS														
COOP														
CWOP														
DEDOT														
DEOS														
DRI														
DTN														
DUGWAY														
EAA														
EC														
FAWN														
FGNET														
HADS														
HDSC														
HJA														
HYD														
ICN														
KSTATE														
KYMESONET														

LCRA														
LSU-AGNET														
LUKEAFB														
MAWN														
MEXICO														
MN														
MNDOT														
MS-DELTA														
MT-MESO														
NCECONET														
NDAWN														
NDDOT														
NDBC														
NDSWC														
NEMESO														
NEVCAN														
NJWXNET														
NMAQ														
NMCC														
NSRDB														
NVDWR														
NWAC														
OKMESONET														
PEMN														
RAINWISE														
RAWS														
SCAN														
SC-EDISON														
SDGE														
SD-MESONET														
SFWMD														
SNOTEL														
SNOWCOURSE														
SRP														
STORAGE														
SURFRAD														
TWDB														
UCC-AGNET														
UGA														
UOREGON														

UPPERAIR														
USA														
USCRN														
USLTER														
UTAHCLIMAT														
UTAHDOT														
UUNET														
WSMR														
VCAPCD														
VTWAC														
WBAN														
WRCC														
WTEXAS														

Table A4. History of station networks used in PRISM monthly time series datasets: Tdmean, Vpdmin, Vpdmax. (Full period of record may not be included in the PRISM grids).

(green)	AN and LT
(orange)	AN only

Network	Decade Ending Year													
	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020	2030
AGRIMET										AN and LT	AN and LT	AN and LT	AN and LT	AN and LT
AGWXNET													AN only	AN only
AIRNOW													AN only	AN only
AQ														AN only
ARDOT														AN only
ARLFRD													AN only	AN only
ARLSORD													AN only	AN only
ASOS/ISH					AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT
AZALERT												AN only	AN only	AN only
AZMET														AN only
CCU													AN only	AN only
CDEC														AN only
CEMP										AN only	AN only	AN only	AN only	AN only
CIMIS										AN only	AN only	AN only	AN only	AN only
COAGMET										AN only	AN only	AN only	AN only	AN only
COCORAHS														
COOP														
CWOP													AN only	AN only
DEDOT													AN only	AN only
DEOS													AN only	AN only
DRI														
DTN														
DUGWAY												AN only	AN only	AN only
EAA													AN only	AN only
EC														
FAWN										AN only	AN only	AN only	AN only	AN only
FGNET														
HADS														
HDSC														
HJA							AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT	AN and LT
HYD														
ICN														
KSTATE												AN only	AN only	AN only

KYMESONET														
LCRA														
LSU-AGNET														
LUKEAFB														
MAWN														
MEXICO														
MN														
MNDOT														
MS-DELTA														
MT-MESO														
NCECONET														
NDAWN														
NDDOT														
NDBC														
NDSWC														
NEVCAN														
NJWXNET														
NMAQ														
NMCC														
NSRDB														
NVDWR														
NWAC														
OKMESONET														
PEMN														
RAINWISE														
RAWS														
SCAN														
SC-EDISON														
SD-MESONET														
SFWMD														
SNOTEL														
SNOWCOURSE														
SRP														
STORAGE														
SURFRAD														
TWDB														
UCC-AGNET														
UGA														
UOREGON														

UPPERAIR															
UPR															
USA															
USCRN															
USLTER															
UTAHCLIMAT															
UTAHDOT															
UUNET															
WSMR															
VCAPCD															
VTWAC															
WACNET															
WBAN															
WRCC															
WTEXAS															