

# Climate Explorer Metadata

**Document Version:** 1

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**Notes:** This is the original document, describing data used in Climate Explorer tool, at [website]

**Contents:**

- Information for “Historical” portal
- Information for “Projected (Future)” portal

## Information for “Historical” portal

### Purpose

Graph and analyze year-to-year variations and longer-term trends in Minnesota’s climate. Creates a time series of climate data of one value per year, based on the area, range of months, range of years, and climate variable selected.

### Data background

Gridded datasets at 5 km or 4 km resolution, with geometrically-averaged values determined by area(s) selected for a given variable and monthly period, by year, for range of years selected. Two data sources:

**Temperature:** 5 km gridded monthly values (can be summarized as multi-month periods). Available as *Average*, *Maximum*, and *Minimum Temperature*, representing the monthly or multi-month mean of the daily average, daily high (maximum), or daily low (minimum) temperatures. Data from NOAA National Centers for Environmental Information (<https://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-divisions.php#grdd>).

**Precipitation:** 5 km gridded monthly values (can be summarized as multi-month periods), representing the monthly or multi-month sum (total) precipitation. Data from NOAA National Centers for Environmental Information (<https://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-divisions.php#grdd>)

**PDSI and SCPDSI (Palmer Drought Severity Index and “Self-Calibrating” Palmer Drought Severity Index):** 4 km gridded derived products based on monthly temperature and precipitation data produced by PRISM (<http://www.prism.oregonstate.edu/>), and accessed through the Western Regional Climate Center (<https://wrcc.dri.edu/wwdt/about.php>). Available only as single monthly value per year.

## Timeframes

**Temperature and precipitation:** single monthly value per year, or aggregated multiple-month values spanning durations of 2 - 12, 18, 24, 36, 48, and 60 months, plus annual and year-to-date values. All temperature values averaged and all precipitation values summed over selected months. Year-to-date is January through most-recent complete month, typically available by the 10<sup>th</sup> day of the present month. When selection overlaps end/beginning of year, value is plotted as belonging to the final year of range.

**PDSI and SCPDSI:** Available only as single monthly value per year; multi-month aggregations not available.

**Years and months available:** All variables available January 1895 through most recent month.

## Information for “Projected (Future)” portal

### Purpose

Graph and analyze climate projections for mid-century (2040-2059) and late-century (2080-2099; low and high emissions), and compare to the modeled recent-past (1980-1999). Graphs the average and range for each 20-year period/scenario and for each model, based on the area, portion of the year, and climate variable selected.

### Data background

General circulation global climate models obtained from CMIP5 (Coupled Model Intercomparison Project, Phase 5; see: <https://pcmdi.llnl.gov/mips/cmip5/>), and dynamically-downscaled to ~ 10 km resolution using Weather Forecasting & Research (WRF) model, at University of Minnesota, in service of project described at: <https://conservancy.umn.edu/handle/11299/209130>.

### Timeframes

Each downscaled model was run for three time frames, producing a total of four scenarios: Modeled Present (1980-99); Mid-Century (2040-2059) at Representative Concentration Pathway (RCP) 4.5; Late-Century (2080-2099) at RCP 4.5; and Late-Century (2080-2099) at RCP 8.5.

### Model Definitions

| Term    | Definition  |
|---------|---|
| RCP     | Representative Concentration Pathway: A greenhouse gas concentration scenario used by the Intergovernmental Panel on Climate Change in the fifth Assessment Report. |
| RCP 4.5 | An intermediate scenario in which emissions decline after peaking around 2040.  |

| Term    | Definition  |
|---------|---|
| RCP 8.5 | An extreme, or worst-case scenario in which emissions continue rising through the 21st century. |

## Originating General Circulation Model Information

| Model Name   | Description                                     | Institution   |
|--------------|---|---|
| Model Mean   | Average of all models listed below              | See below   |
| BCC-CSM1-1   | Climate System Model, Beijing Climate Center    | China Meteorological Administration (China)   |
| CCSM4        | Community Climate System Model                  | Department of Energy/University Corporation for Atmospheric Research (USA)  |
| CMCC-CM      | Coupled Ocean-Atmosphere Model                  | Centro Euro-Mediterraneo per Cambiamenti Climatici (Italy)  |
| CNRM-CM5     | Climate Model 5                                 | National Centre for Meteorological Research / Centre Europeen de Recherche et Formation Avancees en Calcul Scientifique (France)  |
| GFDL-ESM2M   | Earth System Model (Modular ocean)              | NOAA Geophysical Fluid Dynamics Laboratory (US)   |
| IPSL-CM5A-LR | Climate Model 5A, Low Resolution                | Institut Pierre-Simon Laplace (France)  |
| MIROC5       | Model for Interdisciplinary Research On Climate | Atmosphere and Ocean Research Institute (The University of Tokyo), National Institute for Environmental Studies, and Japan Agency for Marine-Earth Science and Technology (Japan) |
| MRI-CGCM3    | Coupled General Circulation Model 3             | Meteorological Research Institute (Japan)   |

## Graph and Data Definitions

| Term                       | Definition   |
|----------------------------|--|
| Lowerrange ("Lower Range") | The lowest value for of each 20-year period/scenario, given the area, variable, and month(s) selected. |

| <b>Term</b>                | <b>Definition</b>   |
|----------------------------|---|
| Mean                       | The average value of each 20-year period/scenario, given the area, variable, and month(s) selected.   |
| Median                     | The middle value of each 20-year period/scenario, given the area, variable, and month(s) selected. Because 20 is an even number, the median represents the average of the two middle values (i.e., the 10th smallest and 10th largest). |
| Upperrange ("Upper Range") | The highest value of each 20-year period/scenario, given the area, variable, and month(s) selected.   |