

User's Guide for Daymet Single-Point Data Extraction

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Input specification:

User specifies a single geographic point by latitude and longitude, in decimal degrees. ****Note****: latitude values are positive for north, negative for south, while longitude values are positive for east, negative for west. All valid data points within the U.S. region will therefore have positive latitude and negative longitude.

Output process:

When user clicks "submit", a routine is executed on the Daymet server to translate the (lon,lat) coordinates into projected (x,y) coordinates, using the Generalized Cartographic Transformation Package (GCTP). These coordinates are used to access the Daymet database of daily interpolated surface weather variables. Daily data from the nearest 1km x 1km Daymet gridcell are extracted from the database and formatted as a table with one column for each output variable and one row for each day. All daily data for the years 1980-2003 are returned as a single (long) table, formatted for displayed in the browser window. At the top of this table is a link to the same data in a simple text format, suitable for import into a spreadsheet or other data analysis software.

Output format:

The output table consists of 4 header lines, followed by daily data records (one per line).

Header lines:

Line 1 – Requested longitude and latitude (decimal degrees) as well as the elevation (meters above mean sea level) for that location. Elevation is as recorded in the 1 km resolution Daymet digital elevation dataset.

Line 2 – File (x,y) coordinates within the Daymet U.S. data grid corresponding to the gridcell nearest to the requested (lon,lat) location. These coordinates are given as base-zero values, referenced from the upper left (NW corner) of the Daymet grid. These coordinates can be used to locate the requested point within the gridded datasets (climatological summaries), available elsewhere on the Daymet website.

Line 3 – Names for the daily data columns (see descriptions below).

Line 4 – Units for the daily data columns (see descriptions below).

Header example:

The following four lines are an example based on user request for latitude = 40.0, longitude = -110.0:

```
Lon = -110.00000 Lat = 40.00000 Elev = 1630 m
File (x,y) = (1200,1256)
year yday Tmax Tmin Tday prcp VPD srad daylen
      (deg C) (deg C) (deg C) (cm) (Pa) (W m-2) (s)
```

Variables and units:

Each daily record consists of 9 values, described below in order of appearance from left to right.

1. **year** (no units): Year, repeated for each day in the year. Values currently range from 1980-2003.
2. **yday** (no units): Integer representing day of year, values ranging from 1-365, where 1 = Jan 1. NOTE: The Daymet database includes leap-days, but this extraction tool is customized to return 365 days per year, even for leap-years (the required format for input into the Biome-BGC ecosystem process model). Values for Dec. 31 are discarded from leap-years to maintain 365 days per year.
3. **Tmax** (degrees C): Daily maximum temperature.
4. **Tmin** (degrees C): Daily minimum temperature.
5. **Tday** (degrees C): Daytime average temperature. This is estimated using the algorithm published for the MT-CLIM model (Hungerford, R. D., et al., 1989. *MT-CLIM: A mountain microclimate simulation model*, U.S. Forest Service Research Paper, INT-414).
6. **prcp** (cm/day): Daily total precipitation, sum of all forms converted to water-equivalent.
7. **VPD** (Pa): Vapor pressure deficit. This metric of humidity depends on temperature, and here VPD is calculated at Tday.
8. **srad** ($W m^{-2}$): Incident shortwave radiation flux density, taken as an average over the daylight period of the day. Total daily incident shortwave flux (J/day) would be calculated as $srad * daylen$.
9. **daylen** (s): Duration of the daylight period for the day. This calculation is based on the period of the day during which the sun is above a hypothetical flat horizon.

Questions/Comments: Contact Peter Thornton (thorntonpe@ornl.gov)