

Obtaining and Processing Daymet Data Using Python and ArcGIS

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U.S. Department of the Interior
U.S. Geological Survey

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By Stefanie Bohms

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By Stefanie Bohms¹

Purpose

The purpose of this document is to introduce a set of python scripts that automate the process of downloading and mosaicking daily Daymet data for the entire conterminous United States (CONUS). The scripts can be used for any number of Daymet tiles.

Data Sets

The data set used is the Daily Gridded Surface Data from the Daymet website (Thornton and others, <http://daymet.ornl.gov/gridded>). The provided 'Daymet_Scripts.zip' folder contains three python scripts, a readme file, and an example text file with all daymet TileIDs for the CONUS. The TileIDs refer to an identifier number for each 2 degree x 2 degree tile provided in the data set.

Data Processing

Step 1: Download Daymet tiles (netcdf files)

The first step is to download the required tiles in netcdf (.nc) format. The first script (1_DownloadTiles.py) downloads Daymet tiles; for example, the whole CONUS. One requirement is to have wget utility installed on the system. This utility is available for Microsoft Windows® at the GNU Wget website (Free Software Foundation, Inc., <http://gnuwin32.sourceforge.net/packages/wget.htm>). To help with a large number of tiles, a list of tiles is provided as a text file for use. The script will take the Daymet TileIDs in the text file and download the tiles. After executing the script, the following input parameters must be entered on prompt:

1. Output path (for example: D:/daymet).
2. Year (YYYY).
3. Output path for tile text file (for example: D:/daymet/tiles.txt).
4. Parameter type given by Daymet (for example: tmin, tmax, prcp).

Step 2: Convert netcdf file to raster file

After the individual tiles are downloaded, the second script (2_NetcdfToRaster.py) converts the netcdf file to raster (geotiff) format for each day. Either ArcGIS 10.0 or ArcGIS 10.1 are required. The script loops through each netcdf file and creates separate raster files using the SelectByDimension Tool from ArcGIS. After executing the script, the following input parameters must be entered on prompt:

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1. Output path (for example: D:/daymet).
2. Year (YYYY).
3. Output path for tile text file (for example: D:/daymet/tiles.txt).
4. Parameter type given by Daymet (for example: tmin, tmax, prcp).

Step 3: Mosaic raster files to needed extent

The last step is to mosaic the raster files together in order to create one file for the entire U.S. extent. ArcGIS 10.1 is required for the SetMosaicDatasetProperties_management tool to mosaic more than the default number of inputs. After executing the script, the following input parameters must be entered on prompt:

1. Output path (for example: D:/daymet).
2. Year (YYYY).
3. Output path for tile text file (for example: D:/daymet/tiles.txt).
4. Parameter type given by Daymet (for example: tmin, tmax, prcp).
5. A geodatabase name of your choice.
6. Start day number (day 1 = 0, day 2 = 1, and so on).

Tips

Most of the time is spent mosaicking the daily raster files; this is a factor to consider if there is a tight deadline. One year, with 365 days for all 325 tiles in the United States, is about 20 Gigabyte (GB) and reduces to around 2 GB when all mosaicked. It is also recommended to use the Command Prompt for running these scripts. When choosing an output path, make sure there are no spaces in the folder names, otherwise Python will not be able to read the file path and will crash. If step 3 produces a tif file with a small file size (approximately 5 Kilobyte), please run script again until the file size is appropriate. The reason is unknown at this point.

References

- Thornton, P.E., Thornton, M.M., Mayer, B.W., Wilhelmi, N., Wei, Y., and Cook, R.B., 2012, Daymet—Daily surface weather on a 1 km grid for North America, 1980–2011: Oak Ridge, Tennessee, Oak Ridge National Laboratory Distributed Active Archive Center, accessed December 14, 2012, at <http://daymet.ornl.gov/gridded>.
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