Please use the following stepwise guideline as a checklist when uploading a dataset for comparative analysis.

1. Obtain observed climate dataset for region of interest. A sample resource is the POWER Data Access Viewer: https://power.larc.nasa.gov/data-access-viewer/ (POWER, 2021).
2. The downloaded dataset can be a maximum of 11 columns and a minimum of 4 columns. The columns must compose of 3 columns for date (year, month and day), and one column for the climate variable.
3. The WARM tool provides analysis abilities for the year range 1986-2005 inclusive therefore the downloaded dataset can be at maximum 7306 rows (including a header row).
4. The WARM tool only provides analysis for 8 climate variables, other variables will not appear as options if present in the dataset.
5. The headers and units of each of the columns must be as follows:

Description	**Header Name**	**Units**
Year	YEAR	xxxx
Month	MO	xx
Day	DY	xx
Surface downwelling longwave radiation	ALLSKY_SFC_LW_DWN	$\frac{W}{m^2}$
Surface temperature	T2M	°C
Maximum surface temperature	T2M_MAX	°C
Minimum Surface Temperature	T2M_MIN	°C
Maximum surface wind speed	WS10M_MAX	$\frac{km}{h}$
Surface wind speed	WS10M	$\frac{km}{h}$
Surface pressure	PS	kPa
Precipitation	PRECTOTCORR	$\frac{mm}{day}$

6. The data quality of the dataset is not evaluated by the WARM tool. Therefore, the analysis and visualizations will reflect the data quality as is. Please check if your dataset contains nulls, blanks, or cells with the value -999.
7. The dataset must be in csv format and start with the header row (as row 1). Please remove any meta-data if present in the dataset.

The Prediction of Worldwide Energy Resources (POWER) Project. (2021). *FLASHFlux 4 Model Output.* [Data file]. Retrieved from: https://power.larc.nasa.gov/data-access-viewer/

A.2: Deriving Grid Cell Coordinates for CORDEX

In this stepwise guideline, the process of deriving the grid tile latitude and longitude values will be explained. The location for Toronto, Ontario, Canada is shown as an example.

1. Determine the latitude and longitude of the location of interest.

Toronto, Ontario, Canada has a latitude of 43.6532 N and 79.3832 W.

2. Use the online tool, Rotation of Coordinates Based On CORDEX Domains, to determine the rotated latitude and longitude (Kolsoumi & Salehnia, 2019). Link: https://agrimetsoft.com/Cordex%20Coordinate%20Rotation

Change the CORDEX domain to North America. Enter the latitude and longitude for Toronto and select the option to convert non-rotated to rotated. (The latitude and longitude of axis will be generated automatically based on the CORDEX domain). Enter the coordinates with North and East as + and South and West as -. Therefore the latitude will be 43.6532 and the longitude will be -79.3832. The converted latitude should be -2.43 and the converted longitude will be 12.48. These are known as the rotated latitude and longitude.

3. Download the software Panoply: https://www.giss.nasa.gov/tools/panoply/credits.html (Panoply, 2021).
4. Download any one CORDEX data model file and view it using Panoply. (CCCMA, 2020)

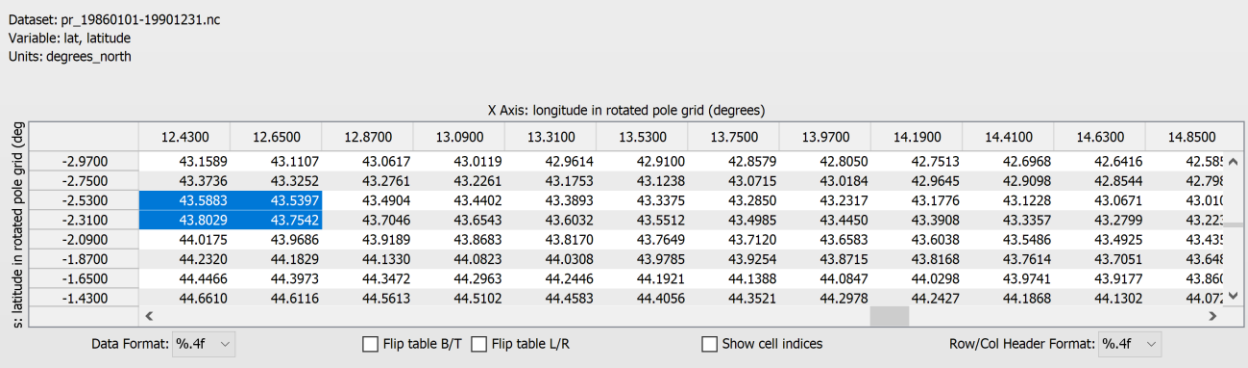
For this example, the 1950 data for the CanRCM4 model was downloaded for the surface temperature variable, which can be found at this link: https://climate-modelling.canada.ca/climatemodeldata/canrcm/CanRCM4/NAM-22_CCCma-CanESM2_historical/day/atmos/tas/index.shtml.

5. Open the file in Panoply by loading the .netcdf file. Use the Create Plot function to create 2 graphs. For the first graph, click on the latitude variable, then click Create Plot, then click georeferenced longitude-latitude colour contour plot. Repeat the same for the longitude variable.
6. In both plots, navigate to the Array 1 section. The y axis contains values for the rotated latitude and x axis contains values for the rotated longitude. Using the rotated coordinates from step 2, find the closest values on the x and y axes in both data tables.

For the Toronto example, the rotated latitude and rotated longitude are -2.43 and 12.48, respectively. The closest values on the y axes are -2.31 and -2.53 and the closest on the x axes are 12.43 and 12.65.

7. The intersection of the closest rotated latitude and longitude values contain decimal degree latitude and longitude. Create combinations of rotated latitude and longitude and their equivalent decimal degree value.

For Toronto, the 2 arrays are:

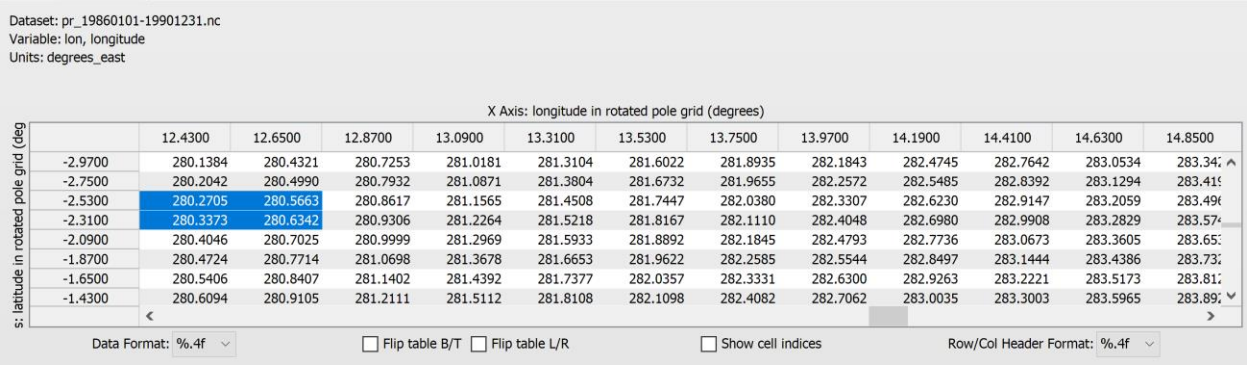


Dataset: pr_19860101-19901231.nc
Variable: lat, latitude
Units: degrees_north

X Axis: longitude in rotated pole grid (degrees)

s: latitude in rotated pole grid (deg	12.4300	12.6500	12.8700	13.0900	13.3100	13.5300	13.7500	13.9700	14.1900	14.4100	14.6300	14.8500
-2.9700	43.1589	43.1107	43.0617	43.0119	42.9614	42.9100	42.8579	42.8050	42.7513	42.6968	42.6416	42.58
-2.7500	43.3736	43.3252	43.2761	43.2261	43.1753	43.1238	43.0715	43.0184	42.9645	42.9098	42.8544	42.79
-2.5300	43.5883	43.5397	43.4904	43.4402	43.3893	43.3375	43.2850	43.2317	43.1776	43.1228	43.0671	43.01
-2.3100	43.8029	43.7542	43.7046	43.6543	43.6032	43.5512	43.4985	43.4450	43.3908	43.3357	43.2799	43.22
-2.0900	44.0175	43.9686	43.9189	43.8683	43.8170	43.7649	43.7120	43.6583	43.6038	43.5486	43.4925	43.43
-1.8700	44.2320	44.1829	44.1330	44.0823	44.0308	43.9785	43.9254	43.8715	43.8168	43.7614	43.7051	43.64
-1.6500	44.4466	44.3973	44.3472	44.2963	44.2446	44.1921	44.1388	44.0847	44.0298	43.9741	43.9177	43.86
-1.4300	44.6610	44.6116	44.5613	44.5102	44.4583	44.4056	44.3521	44.2978	44.2427	44.1868	44.1302	44.07

Data Format: %.4f Flip table B/T Flip table L/R Show cell indices Row/Col Header Format: %.4f



Dataset: pr_19860101-19901231.nc
Variable: lon, longitude
Units: degrees_east

X Axis: longitude in rotated pole grid (degrees)

s: latitude in rotated pole grid (deg	12.4300	12.6500	12.8700	13.0900	13.3100	13.5300	13.7500	13.9700	14.1900	14.4100	14.6300	14.8500
-2.9700	280.1384	280.4321	280.7253	281.0181	281.3104	281.6022	281.8935	282.1843	282.4745	282.7642	283.0534	283.34
-2.7500	280.2042	280.4990	280.7932	281.0871	281.3804	281.6732	281.9655	282.2572	282.5485	282.8392	283.1294	283.41
-2.5300	280.2705	280.5663	280.8617	281.1565	281.4508	281.7447	282.0380	282.3307	282.6230	282.9147	283.2059	283.49
-2.3100	280.3373	280.6342	280.9306	281.2264	281.5218	281.8167	282.1110	282.4048	282.6980	282.9908	283.2829	283.57
-2.0900	280.4046	280.7025	280.9999	281.2969	281.5933	281.8892	282.1845	282.4793	282.7736	283.0673	283.3605	283.65
-1.8700	280.4724	280.7714	281.0698	281.3678	281.6653	281.9622	282.2585	282.5544	282.8497	283.1444	283.4386	283.73
-1.6500	280.5406	280.8407	281.1402	281.4392	281.7377	282.0357	282.3331	282.6300	282.9263	283.2221	283.5173	283.81
-1.4300	280.6094	280.9105	281.2111	281.5112	281.8108	282.1098	282.4082	282.7062	283.0035	283.3003	283.5965	283.89

Data Format: %.4f Flip table B/T Flip table L/R Show cell indices Row/Col Header Format: %.4f

Therefore, there are 4 rotated latitude and longitude combinations. These are as follows (with the equivalent decimal degree values.

Rotated Lat/Lon	**Decimal Degree Lat/Lon**	**Converted Lat/Lon**
-2.53, 12.43	43.5883, 280.2705	43.5883, -79.7295
-2.31, 12.43	43.8029, 280.3373	43.8029, -79.6627
-2.53, 12.65	43.5397, 280.5663	43.5397, -79.4337
-2.31, 12.65	43.7542, 280.6342	43.7542, -79.3658

8. Use mapping software to determine the closest location (at minimum within 25km of distance) to the original location.

Using Google Maps, the location for Toronto (43.6532, -79.3832) was mapped to each of the 4 options in the table above. The option with the least distance was 43.5883, -79.7295. This maps to -2.53, 12.43 in rotated decimal degrees.

9. Convert the rotated decimal degrees to rotated pole grid values. Navigate to panoply and select the climate variable downloaded earlier. Choose the line plot using time for the horizontal axis graph. In the array section in the lower portion of the graph, there will be a dropdown for latitude and longitude. Choose the values found from step 8 from the dropdowns. The field will be populated with the grid values.

For Toronto, the grid values are 120 and 212 for latitude and longitude, respectively.

10. Use the grid values as input when using the WARM tool.