**Climate Model Downloading from CORDEX**

Link to download site:

<http://esgf-data.dkrz.de/esgf-web-fe/live>



Use the “Search Categories” to select through the things you’ll need.

Project: Cordex

Model: RCA4 - more information below

Experiment Family: Historical or RCP

Experiment: RCP26, RCP 45, or RCP 85 – Explanation Below

Time Frequency: Monthly (Mon)

Product: Output

Variable: TasMax or TasMin – Explanation Below

Domain: NAM-44 or NAM44i – Not really sure the difference between these, just be consistent.

Driving Model: CCCma-CanESM2 (Canadian) or ICHEC-EC-EARTH – Driving Model refers to the physics, math, and assumptions used (Global Climate Model). The “Model” above is what the Driving model is downscaled with.

What is currently downloaded and converted:

For the NW US Ag project, I have downloaded **TasMax and TasMin** for the Historical (2001 – 2005) data for both the Canadian and EC EARTH models. I have also downloaded EC Earth Model outputs for RCP26, RCP45, and RCP85 for 2006 – 2010, 2011 – 2020, 2041 – 2050, 2071 – 2080, and 2091 – 2100. This was done to get a range of outputs for different timestamps throughout 2000 – 2100. To have another model represented, the Canadian Model output for RCP45 and RCP85 was downloaded for the same timestamps. No output for RCP26 Scenario was available with the Canadian model.

It is very important not to use just one climate model or just one RCP scenario. Just two models doesn’t come close to being an “ensemble” approach to forecasting (which is ideal), but it does offer a variety of possibilities that is more scientifically sound.

The download is in NetCDF format and will need to be converted to GeoTiffs using the Python scripts in the “climatemodel” folder (uses DNPPY modules). The script is currently written to be “hard-coded” so you will need to input the proper filepaths for input and output. It is written to do one entire model at once (Historical, RCP26, RCP45, and RCP85 for each timestamp). For a less manual approach, you could work on looping these, but for simplicity of data management (making sure the outputs were where I wanted), I kept it as blocks of code.

More Information:

RCA 4:
<http://www.smhi.se/en/research/research-departments/climate-research-rossby-centre2-552/rossby-centre-regional-atmospheric-model-rca4-1.16562>

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**RCP Primary Characteristics**

**RCP 8.5** was developed using the  MESSAGE model and  the IIASA Integrated Assessment Framework by  the International  Institute  for  Applied  Systems  Analysis  (IIASA),  Austria.  This  RCP  is characterized by increasing greenhouse gas emissions over time, representative of scenarios in the literature that lead to high greenhouse gas concentration levels (Riahi et al. 2007).

**RCP6** was developed by the AIM modeling team at the National Institute for Environmental Studies (NIES) in Japan. It is a stabilization scenario in which total radiative forcing is stabilized shortly after 2100, without overshoot, by the application of a range of technologies and strategies for reducing greenhouse gas emissions (Fujino et al. 2006; Hijioka et al. 2008).

**RCP 4.5** was developed by the GCAM modeling team at the Pacific Northwest National Laboratory’s  Joint Global Change Research Institute (JGCRI) in the United States. It is a stabilization scenario in which total radiative forcing is stabilized shortly after 2100, without overshooting the long-run radiative forcing target level (Clarke et al. 2007; Smith and Wigley 2006; Wise et al. 2009).

**RCP2.6** was developed by the IMAGE modeling team of the PBL Netherlands Environmental Assessment Agency. The emission pathway is representative of scenarios in the literature that lead to very low greenhouse gas concentration levels. It  is a “peak-and-decline”  scenario; its radiative forcing level first reaches a value of around 3.1 W/m2  by mid-century, and returns to 2.6 W/m2  by 2100. In order to reach such radiative forcing levels, greenhouse gas emissions (and indirectly emissions of air pollutants) are reduced substantially, over time (Van Vuuren et al. 2007a).***(Characteristics quoted from van Vuuren et.al. 2011)***

Variable Table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Core:** | **monthly output (mon)** | **25-Mar-13** |  |
|  |  |  |  |  |
| **#** | **output variable name** | **long\_name** | **standard\_name** | **units** |
| 1 | **tas** | Near-Surface Air Temperature | air\_temperature | K |
| 2 | **tasmax** | Daily Maximum Near-Surface Air Temperature | air\_temperature | K |
| 3 | **tasmin** | Daily Minimum Near-Surface Air Temperature | air\_temperature | K |
| 4 | **pr** | Precipitation | precipitation\_flux | kg m-2 s-1 |
| 6 | **psl** | Sea Level Pressure | air\_pressure\_at\_sea\_level | Pa |
| 7 | **huss** | Near-Surface Specific Humidity | specific\_humidity | 1 |
| 8 | **sfcWind** | Near-Surface Wind Speed | wind\_speed | m s-1 |
| 9 | **sfcWindmax** | Daily Maximum Near-Surface Wind Speed | wind\_speed | m s-1 |
| 10 | **clt** | Total Cloud Fraction | cloud\_area\_fraction | % |
| 11 | **sund** | Duration Of Sunshine | duration\_of\_sunshine | s |
| 12 | **rsds** | Surface Downwelling Shortwave Radiation | surface\_downwelling\_shortwave\_flux\_in\_air | W m-2 |
| 13 | **rlds** | Surface Downwelling Longwave Radiation | surface\_downwelling\_longwave\_flux\_in\_air | W m-2 |
| 14 | **hfls** | Surface Upward Latent Heat Flux | surface\_upward\_latent\_heat\_flux | W m-2 |
| 15 | **hfss** | Surface Upward Sensible Heat Flux | surface\_upward\_sensible\_heat\_flux | W m-2 |
| 16 | **rsus** | Surface Upwelling Shortwave Radiation | surface\_upwelling\_shortwave\_flux\_in\_air | W m-2 |
| 17 | **rlus** | Surface Upwelling Longwave Radiation | surface\_upwelling\_longwave\_flux\_in\_air | W m-2 |
| 18 | **evspsbl** | Evaporation | water\_evaporation\_flux | kg m-2 s-1 |
| 20 | **mrfso** | Soil Frozen Water Content | soil\_frozen\_water\_content | kg m-2 |
| 21 | **mrros** | Surface Runoff | surface\_runoff\_flux | kg m-2 s-1 |
| 22 | **mrro** | Total Runoff | runoff\_flux | kg m-2 s-1 |
| 23 | **mrso** | Total Soil Moisture Content | soil\_moisture\_content | kg m-2 |
| 24 | **snw** | Snow Amount | surface\_snow\_amount | kg m-2 |
| 25 | **snm** | Surface Snow Melt | surface\_snow\_melt\_flux | kg m-2 s-1 |
| 28 | **rlut** | TOA Outgoing Longwave Radiation | toa\_outgoing\_longwave\_flux | W m-2 |
| 29 | **rsdt** | TOA Incident Shortwave Radiation | toa\_incoming\_shortwave\_flux | W m-2 |
| 30 | **rsut** | TOA Outgoing Shortwave Radiation | toa\_outgoing\_shortwave\_flux | W m-2 |
| 31 | **uas** | Eastward Near-Surface Wind Velocity | eastward\_wind | m s-1 |
| 32 | **vas** | Northward Near-Surface Wind Velocity | northward\_wind | m s-1 |
| 41 | **ua850** | Eastward Wind | eastward\_wind | m s-1 |
| 42 | **va850** | Northward Wind | northward\_wind | m s-1 |
| 43 | **ta850** | Air Temperature | air\_temperature | K |
| 44 | **hus850** | Specific Humidity | specific\_humidity | 1 |
| 45 | **ua500** | Eastward Wind | eastward\_wind | m s-1 |
| 46 | **va500** | Northward Wind | northward\_wind | m s-1 |
| 47 | **zg500** | Geopotential Height | geopotential\_height | m |
| 48 | **ta500** | Air Temperature | air\_temperature | K |
| 49 | **ua200** | Eastward Wind | eastward\_wind | m s-1 |
| 50 | **va200** | Northward Wind | northward\_wind | m s-1 |
| 51 | **ta200** | Air Temperature | air\_temperature | K |
| 52 | **zg200** | Geopotential Height | geopotential\_height | m |
| 56 | **snc** | Snow Area Fraction | surface\_snow\_area\_fraction | % |
| 57 | **snd** | Snow Depth | surface\_snow\_thickness | m |
| 58 | **sic** | Sea Ice Fraction | sea\_ice\_area\_fraction | % |