

Introduction to clipping climate data saved in NetCDF files

This document provides guidance on the procedures required to clip climate model data in NetCDF file format (the common file format) for its use in a hydrological model. It is important to be aware that the variable names are often not consistent across all RCMs (e.g. some will use the word ‘lat’ while others will use ‘latitude’). This is also true in regards to an RCM’s calendar (e.g. some use a standard Gregorian calendar while others use a 360-day calendar). The reference starting date of the calendar, typically in the format of ‘1970/01/01’, can also be RCM-dependent.

Data and software requirements

1. Acquire the original NetCDF files - typically they cover a domain larger than needed (e.g. Europe), and only contain one variable (e.g. temperature) and one year of data.
2. Download the software CDO. This software is used to manipulate NetCDF files. Here is the homepage for CDO: <https://code.mpimet.mpg.de/projects/cdo/>
Here is the cdo manual: <https://code.zmaw.de/projects/cdo/embedded/cdo.pdf>
3. Download the software for Ncview. This software is used to visualize the content of the NetCDF files. It runs on UNIX platforms under X11, R4 or higher.
Here is the homepage for Ncview:
http://meteora.ucsd.edu/~pierce/ncview_home_page.html

Clipping of NetCDF files to smaller box domain

Due to the size of raw RCM NetCDF files, they often are too large to handle succinctly. Therefore, the data is often clipped in two different phases. This document describes the first where the data is clipped to a smaller box domain so that the time series can be merged together without overloading a personal computer. The second phase involves clipping the data further to the size of the catchment (not described within this document). The first phase is described below:

1. Clip the domain for each variable. An example is shown below for temperature:

```
cdo sellonlatbox lon1lon2 lat1 lat2 inputfile_tas_1980.nc outputfile'_tas_1980.nc
```

where lon1 lon2 lat1 lat2 designate the coordinates of the box containing the region of interest. The file ‘inputfile’ represents the original file with a large domain and ‘outputfile’ is the file you intend to create with a smaller domain.

2. Combine the clipped files for individual years into a single file. An example is shown below for temperature:

```
cdo mergetime inputfile_tas_*.nc outputfile_tas_allyears.nc
```

Check the clipped NetCDF files

Before producing input files for the hydrological model (second phase of clipping), make sure clipping and merging worked out fine. An easy step to check is to open the file using the program Ncview. This is a basic program that will generate a map of the domain using the values of the different variable(s) stored in the NetCDF file. Using Ncview, a quick check can be done on whether the spatial pattern of the field(s) makes sense. The program allows for the user to click on any point of the map and Ncview will open a separate window showing the time series for this specific point, so that the user can check the annual temperature cycle, for instance. For a basic introduction to Ncview, please see: http://cirrus.ucsd.edu/~pierce/software/ncview/quick_intro.html

In order to look at an overview of the content within a NetCDF file, a convenient command is 'ncdump'. This is a linux based command meant to be executed within the shell on the command line. For an introduction to working with the command line on Mac: https://developer.apple.com/library/content/documentation/OpenSource/Conceptual/ShellScripting/shell_scripts/shell_scripts.html

For instance, type `ncdump -h nameofyourfile.nc` and get a summary of the variables stored in the file. It is also possible to check whether the range of latitudes and longitudes are correct using `ncdump -v latitude`.