

Worksheet 1: File locations and pre-processing



The following exercises demonstrate some of the tools available for data analysis, and how to prepare PRECIS output for analysis. This can be time consuming for large amounts of data, so in this worksheet a small subset is used to demonstrate the steps involved. In the worksheets that follow, data that has already been processed will be used.

PRECIS output data tables are in PP format, a Met Office binary data format. This worksheet converts data to NetCDF format (a standard format in climate science) in order that it can be used in post processing packages such as CDO.

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Note: Please ignore the % sign when typing the commands.

1.1 Data locations and file names

Identify and list the names of PRECIS output data in PP format using standard Linux commands.

The dataset used here is a three year subset of monthly PRECIS data over south east Asia driven by the HadCMQ0 GCM.

1. a) Firstly set the name of the file path where the data is located. Change this for your computer.

```
% DATA=[data_for_your_computer]/bangkok
```

1. b) Move to the directory (i.e. folder) called `$DATA/practise_ppfiles/cahpa`. This directory contains **monthly** output data from experiment with RUNID `cahpa`.

`cd` stands for 'change directory' and `pwd` stands for 'print working directory'. If you are not sure where in your directory tree you are, `pwd` will tell you.

```
% cd $DATA/practise_ppfiles/cahpa
% pwd
```

1. c) List the contents of this directory; `ls` stands for 'list' and using the `-l` option gives a 'longer' listing with more information, such as file and size and modification date.

```
% ls
% ls -l
```

2. a) List all the files containing data for September.

```
% ls *sep*
% ls
```

Note: The character `*` translates as 'any characters'

2. b) List all the files containing data from 1982 (i.e. all files which begin `cahpaa.pmi2`.)

```
% ls cahpaa.pmi2???.pp
```

Note: The character `?` translates as 'any single character'

3.) Move up two levels in the directory tree and list the directories.

```
% cd ..
% cd ..
% pwd
% ls
```

The directories **daily** and **monthly** contain data used in the worksheets which follow this one.

1.2 Visualization

Panoply is visualisation software NetCDF fields to be visualized very quickly. It is easy to use and more information can be found at <http://www.giss.nasa.gov/tools/panoply/>.

1.) View the contents of the monthly PRECIS file for July 1983 (`i3jul`.) What variables does it contain? What are the latitude and longitude dimensions (in number of grid boxes)?

```
% cd $DATA/practise_ppfiles/cahpa
% xconv -i cahpaa.pmi3jul.pp # Monthly file
```

Variables:

Latitude and longitude dimensions:

Note: Anything after the character `#` is just a comment and does not affect the command being

1.3 Remove the rim from PP fields

The initial portion of a simulation is biased as the model reaches equilibrium. This period is called the '**spin up**' period, and for climate length simulations of the atmosphere and the land surface is at least one annual annual cycle. The spin up section of the data needs to be excluded from any analysis. In the seasonal forecasts, effort is made to ensure an accurate as possible initialisation. Generally, the first years worth of data from a simulation is not used.

The edges (or rim) of RCM outputs are biased due to the linear relaxation used on certain variables to apply the GCM lateral boundary conditions. This rim of 8 grid points from each edge needs to be excluded from any analysis.

1a.) Remove the 8-point rim from all data in the `practise_ppfiles/cahpa` directory (with the option of automatically deleting the original full-sized files).

prrr removes a rim from PP fields. A number of grid boxes will be removed from each edge and different edges may have different numbers of grid boxes removed. Type `prrr -helpx` for its full functionality.

Note: The `-x` option to `prrr` allows files with particular names to be ignored. The `-d` option to `prrr` deletes the original full sized files, prompting for confirmation. **Use with the `-d` option with caution!**

```
% ./setvars # set this to use pptools
% cd $DATA/practise_ppfiles
% prrr -d -r 8 -X ".rr8.pp" cahpa
```

Type `yes` when prompted for file deletion (you will be asked this twice.)

1b.) What are the latitude and longitude dimensions (in number of grid boxes) of July 1983 now?

```
% ls cahpa/*
% xconv -i cahpa/cahpa.pmi3jul.rr8.pp
```

Latitude and longitude dimensions:

Note: In all further exercises, it is assumed that the 8-point rim has been removed from all of the data being used and that the original, full-sized fields are no longer present.

1.4 Select variables and convert PP files to NetCDF

The monthly data we are using has multiple variables in each file, we can use a pptool to separate the variables. The rest of the worksheets use CDO, a post processing package which needs files to be in NetCDF format. This means it is necessary for us to convert our PP files into NetCDF format using a pptool.

1a.) Separate the variables in the all of the monthly files into separate directories.

ppss splits the PP fields in input PP files into subdirectories based on each field's STASH code and processing code. Type `ppfile -helpx` for its full functionality.

```
% cd $DATA/practise_ppfiles/cahpa
% ppss cahpaa.pm?????.rr8.pp
```

1b.) Change into the directory containing temperature at 1.5m files and view the December 1981 file.

```
% stash 03236
% ls
% cd 03236
% xconv -i cahpaa.pmi1dec.rr8.03236.pp
```

Note: *03236 is the STASH code of temperature at 1.5m.*

2.) Put the monthly temperature files into a single file. This process is necessary for later CDO commands to function properly.

```
% cat cahpaa.pm?????.rr8.03236.pp > cahpaa.pm.1981_1983.rr8.03236.pp
% ls -lrt
```

Note: *the `cat` command concatenates multiple files together.*

3.) Convert the 1981-1983 temperature file to NetCDF format so that we may carry out analysis with CDO.

pp2cf converts a PP file to NetCDF format (a standard format in climate science,) see <http://www.met.reading.ac.uk/~david/pp2cf.html> for further details.

```
% pp2cf cahpaa.pm.1981_1983.rr8.03236.pp
% xconv -i cahpaa.pm.1981_1983.rr8.03236.nc
```