Neil Berg | October 18th, 2013

The wonderful world of NCO

Net**C**DF **O**perators

Q: What is NCO?
A: Collection of command-line based tools specifically for analyzing, processing, viewing, and manipulating netcdf data/files.

Q: Who uses NCO?
A: Anyone working with netcdf data and wants to make their life easier.

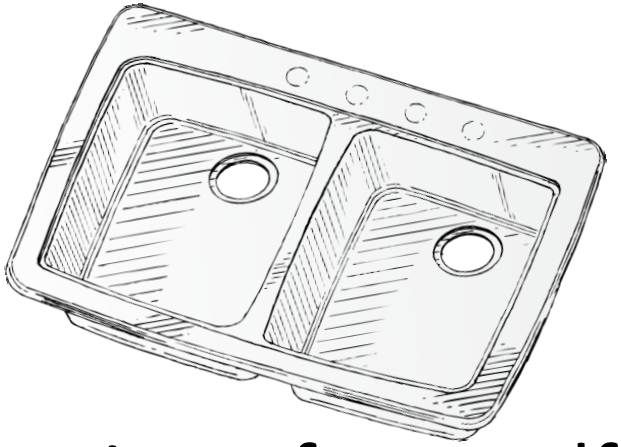
Q: Why use NCO when I already know python, matlab, IDL, grads, and CDAT?
A: Because I said so! Kidding…NCO is FREE, easy to learn, has a simple syntax, and was designed specifically for netcdf users by atmospheric scientists at UC-Irvine.

Q: How do I get NCO?
A: Depends on where you want NCO:

- On a Mac: use Fink or Macports for easy installation and set up
- On a non-Mac: go get a Mac, otherwise check out http://nco.sourceforge.net/#Binaries
- On a lab cluster: tell your system administrator or someone with sudo powers to install NCO on the cluster

Net**C**DF **O**perators - ncks

ncks – netcdf kitchen sink



- overview of a netcdf file
- extract certain variables
- extract certain dimensions
- manipulate record dimension

ncks – just view the darn file

Example filename: pr_Amon_CCSM4_historical_r1i1p1_185001-200512.nc

View the contents of a netcdf file

```
>> ncks myfilename.nc | more
>> ncks pr_Amon_CCSM4_historical_r1i1p1_185001-200512.nc | more
```

View only one variable

```
>> ncks -v variable_name myfilename.nc | more
>> ncks -v lat pr_Amon_CCSM4_historical_r1i1p1_185001-200512.nc | more
```

View two variables

```
>> ncks -v variable1_name,variable2_name myfilename.nc | more
>> ncks -v lat,lon, pr_Amon_CCSM4_historical_r1i1p1_185001-200512.nc | more
```

View one variable but over a dimension subset

```
>> ncks -v var_name -d dim_name,dim_strt_idx,dim_end_idx myfilename.nc | more
>> ncks -v pr -d lat,0,10 pr_Amon_CCSM4_historical_r1i1p1_185001-200512.nc | more
```

ncks – output stuff into a new file

Output data from input_file into output_file

```
>> ncks -v var input_filename -O output_filename
>> ncks -v lat,lon pr_Amon_CCSM4_historical_r1i1p1_185001-200512.nc -O ccsm4_grid.nc
```

ncks – output (more) stuff into a new file

Example file: wrfout_d01_1999-02-28_00_00_00

Output data from input_file into output_file

```
>> ncks -v var -d dim,strt_idx,end_idx input_filename -O output_filename
>> ncks -v HFX -d south_north,5,25 -d west_east,5,25 wrfout_d01_1999-02-28_00_00_00
-O hyperslabbed_hfx.nc
```

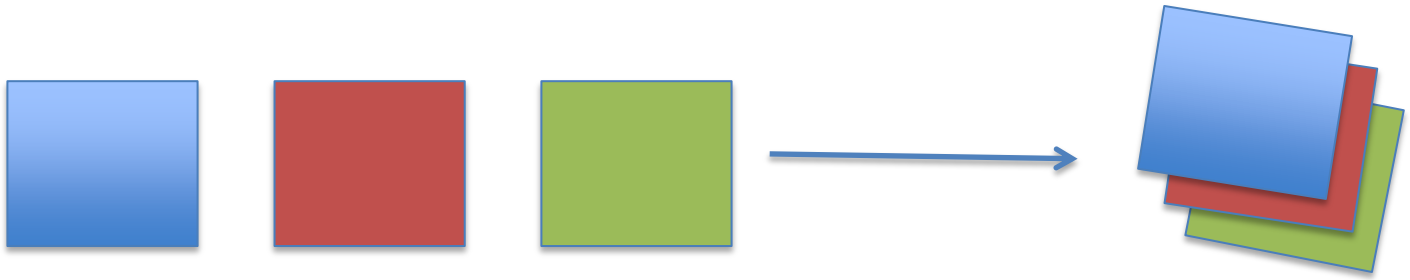
Net**C**DF **O**perators – ncecat/ncrcat

ncrcat – netcdf *record* concatenator

ncecat – netcdf *ensemble* concatenator

- concatenate multiple files together into a single file

concatenate |kən katn āt|verb [trans.] formal or technical link (things) together in a chain or series *: some words may be concatenated, such that certain sounds are omitted.*



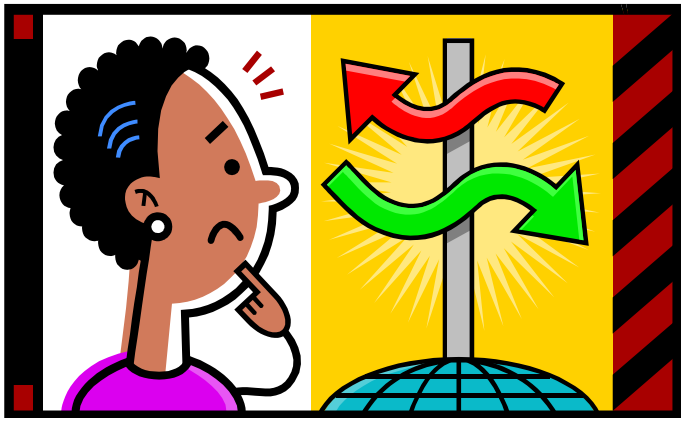
Net**C**DF **O**perators – ncecat/ncrcat

ncrcat vs ncecat

Use ncrcat when there is a record dimension

Use ncecat when there is no record dimension, a new record dimension will be created

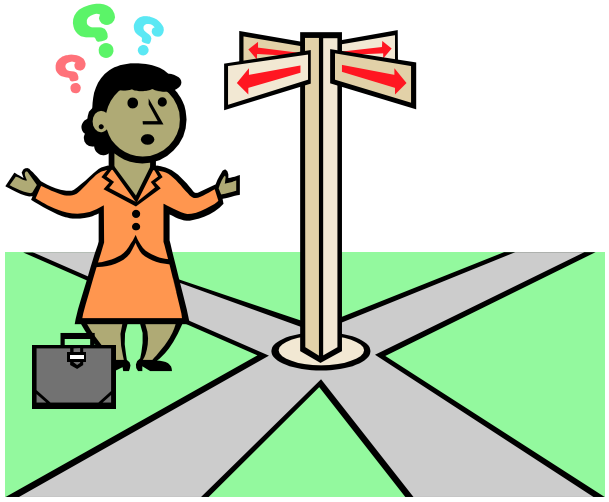
NetCDF Operators – ncecat/ncrcat



I have some monthly files and I just want them to be in one, seasonal file!

```
>> ncrcat file1 file2 -O outfile
>> ncrcat 1982-01_precip.nc 1982-02_precip.nc 1982-
03_precip.nc -O 1982-JFM_precip.nc
```

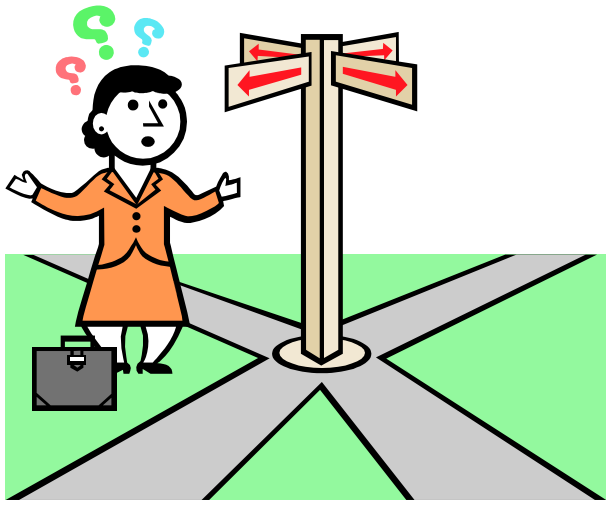
NetCDF Operators – ncra

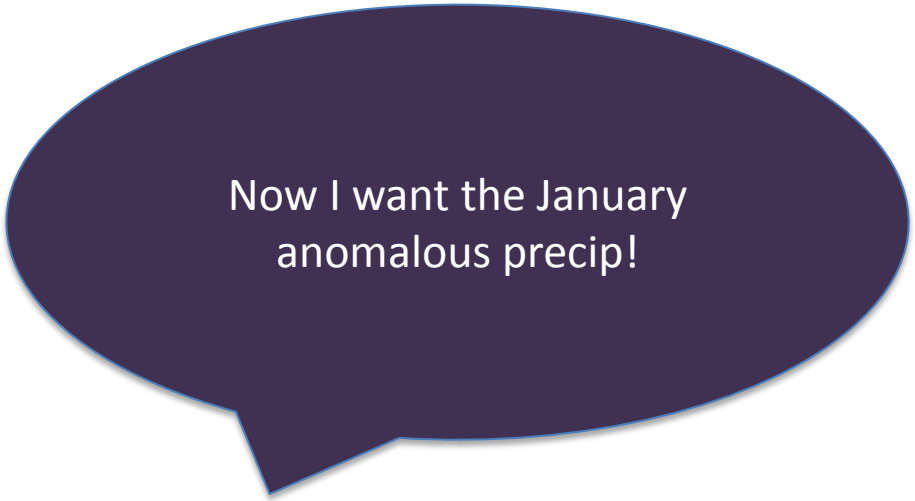


ncra - netcdf record averager

```
>> ncra infile -O outfile
>> ncra 1982-JFM_precip.nc -O 1982-JFM_precip_avg.nc
```

NetCDF Operators – ncdiff





ncdiff - netcdf differencing

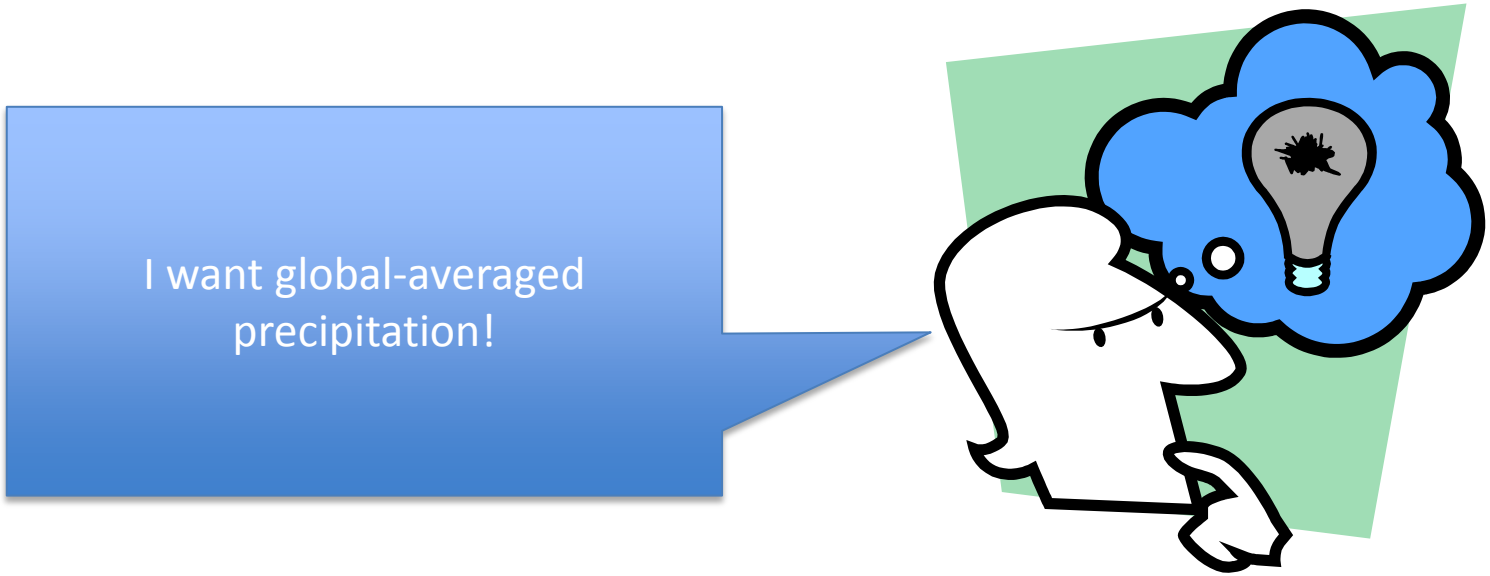
```
>> ncdiff infile1 infile2 -O outfile
>> ncdiff 1982-01_precip.nc 1982-JFM_precip_avg.nc -O 1982-01_precip_anom.nc
```

Net**C**DF **O**perators – ncwa

ncwa – netcdf weighted averaging (i.e. over any dimension, not just the record dimension)

- great for domain (global) averages
- great for latitudinal-band averages

NetCDF Operators – ncwa



Example filename: pr_Amon_CCSM4_historical_r1i1p1_185001-200512.nc

Check dimensions:

```
>> ncks pr_Amon_CCSM4_historical_r1i1p1_185001-200512.nc | more
```

Average over lat/lon and a particular time:

```
>> ncwa -d time,25 -a lat,lon
pr_Amon_CCSM4_historicaL_r1i1p1_185001-200512.nc -O global_avg_pr.nc
```

Net**C**DF **O**perators – advanced techniques

ncks – changing record dimension

ncpdq – unpack file/manipulate dimension order

ncrename – change the names of dims/variables

Take your programming to the next level with NCO