Modelling using CSIRO Mk3L
Part 3: Analyse your own experiment

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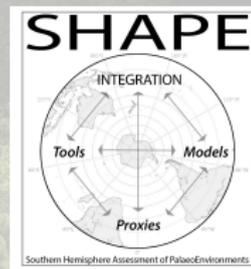
1. Working with Ferret

More Ferret commands

```
cancel mode logo        Turns off the Ferret logo
fill/title="My title"   Specifies a plot title
fill/lev=1d             Use a spacing of 1.0 between contour levels
fill/lev=1dc            Use a spacing of 1.0 and centre around zero
contour/over            Overlay contours
contour/over/nolab      Overlay contours without adding a label
go land                 Overlay continental boundaries
frame/file=file.gif     Save the image to the file file.gif
```

- Much, much, much more at:

  - http://ferret.pmel.noaa.gov/Ferret/documentation/users-guide

Exercise 1: More Ferret commands

- Change to the directory containing the course material for Part 2:

  cd ~/<NAME>/material

- Load and run Ferret:

  module load ferret
  ferret

- Within Ferret, load some atmosphere model output:

  yes? use stsc_exp01.nc

Exercise 1: More Ferret commands

- Type the following commands:

```
yes? cancel mode logo
yes? fill/title="Screen temperature (K)" tsc[k=@ave,l=@ave]
yes? go land
yes? frame/file=temperature.gif
```

- Now try generating some different plots...
- Save your plots by generating GIF images.

Even more Ferret commands

- Datasets and variable definitions:

```
use stsc_exp01.nc
use stsc_exp04.nc
let dt = tsc[d=2] - tsc[d=1]
```

- Setting up the plot window:

```
set window n              Send graphics to window n
set window/size=1.0       Resize window to 1.0 of full
set window/aspect=0.7     Change aspect ratio to 0.7
```

Even more Ferret commands

- Plot layout:

```
set viewport ll      Lower left of window [also: lr, ul, ur]
set viewport left    Left half of window [also: right]
set viewport upper   Upper half of window [also: lower]
```

- Colour palettes:

```
palette blue_darkred        User colour palette blue_darkred
spawn Fpalette '*'          List all available palettes
go try_palette blue_darkred Display palette blue_darkred
```

Even more Ferret commands

- Customising plots:

```
shade/set_up/options data    Set up a plot
ppl commands                 Customise the plot using ppl
ppl shade                    Generate the plot
```

- `fill`, `plot` and `shade` options:

```
shade/levels=2d        Use a spacing of 2 between levels
shade/levels=2dc       Ditto, with the levels centred around zero
shade/hlimits=0:10:1   Horizontal axis range and interval
shade/vlimits=0:10:1   Vertical axis range and interval
shade/title="..."      Set the plot title to ...
```

Even more Ferret commands

- `ppl` commands:

`ppl labset`	Sets character heights for labels
`ppl axlsze`	Sets axis label heights
`ppl shakey`	Controls the shade key
`ppl axlint`	Sets numeric label interval for axes
`ppl xfor`	Sets format of x-axis numeric labels
`ppl yfor`	Sets format of y-axis numeric labels
`ppl xlab`	Sets label of x-axis
`ppl ylab`	Sets label of y-axis

Even more Ferret commands

- Other commands:

```
go margins          Adjust the margins surrounding a plot
go remove_logo      Remove the Ferret logo
go unlabel n        Remove label n (n ≥ 4)
go land             Overlay continental boundaries
```

- Much, much, much more at:
  - http://ferret.pmel.noaa.gov/Ferret/documentation/users-guide

Ferret scripts

- It is not necessary to re-type Ferret commands every time you want to generate a plot.
- Instead, you can write a Ferret *script*.
- A script contains:
  - a series of Ferret commands
  - comment lines (lines beginning with !)
- A Ferret script can be identified by a file name ending in .jnl.
- To run a script, use the go command.
- For example, to run a script called plot.jnl you type:

  yes? go plot

Exercise 2: Ferret scripts and plotting

- Change back to the directory containing the course material:

  `cd ~/<NAME>/material`

- This contains three Ferret scripts.
- Load and run Ferret. Now run each script by typing e.g.

  `yes? go plot1`

- What happens?
- Examine each script using `less`. See how the new Ferret commands that you have learnt today are being used.

2. Analyse your own experiment

Exercise 1: Analyse your own experiment

- Yesterday, you ran your own experiment.
- Did it work? If not, why not?
- The output was saved in a directory called:

  `~/<NAME>/$run`

- Here, $run is the name of your experiment (exp01 etc).
- Now change to the directory for your experiment e.g.

  `cd ~/<NAME>/$run`

- Use Ferret to analyse and plot the data.

3. Next steps: where to from here?

Next steps: where to from here?

- Get a copy of CSIRO Mk3L. Apply for an account on the repository:

`http://www.tpac.org.au/resources/csiro-mk3l-source-code/`

- Run CSIRO Mk3L on katana, on a cluster at your own institution, on your PC, on your laptop, on your smartphone...
- Experiment with the model and get to know it.
- Subscribe to the mailing list:

`https://www.lists.unsw.edu.au/mailman/listinfo/mk3l-users`

Next steps: where to from here?

- Ask questions:

CSIRO Mk3L users mailing list   `mk3l-users@lists.unsw.edu.au`
Me   `s.phipps@unsw.edu.au`

- Share your experiences with other users.
- Share your enhancements to the model.
- Remember what a privilege it is to be a climate system modeller.
- Have fun!

With great power, comes great responsibility