Recap Exercise: Australia

- Create the following map:
  - Mercator map of Australia
  - Coastlines as black, continental fill as green and ocean as blue.
  - Rivers plotted
  - Sydney to be plotted as a big red star and Melbourne as a small black circle
  - Annotations every 10 degrees, tickmarks very 1 degree and no gridlines. I only want the annotations and ticks on the Western and Southern borders
  - Title of the map to be "Great Southern Land"

Postscript files

- Postscript is a programming language for describing how a page is to be printed or displayed
- Plain text files that contain postscript code
- Have a .ps or .eps termination
- Can be opened with a texteditor and manipulated

Postscript files

```
 %!PS-Adobe-3.0 EPSF-3.0
%%BoundingBox: 0 0 340 340
%%Title: GMT v3.0 Document from pscoast
%%Creator: Username Gaina
%%DocumentNeededResources: font Times-Roman
%%CreationDate: Mon Feb 15 12:30:19 1999
%%Orientation: Portrait
%%EndComments

%%BeginProlog
.......................................................
% End of basemap
S 0 A
%%Trailer
% Reset translations and scale and call showpage
S -353 -353 T 4.97417 4.97417 scale showpage

end
```

Building valid PostScript files

HEADER —**O** ommits the header.

BODY$_1$

2nd through n−1'th overlays
require both −**O** and −**K**.

BODY$_n$

TRAILER —**K** ommits the trailer.

shell script template

- Use <u>scripts</u> when more than 1–2 commands are required

- Allows comments to be added

- Executable scripts behave like any other command

- It is faster to edit a script and rerun it than typing from scratch or doing copy/paste on the command line

Text editor

- To write scripts we need a text editor
  e.g. vi, textmate, notepad

- Depending on which text editor you use you
  may need to change format to UNIX

The ksh/bash template

- type echo $SHELL in your terminal
- In your text editor, type
    - #!/bin/bash
    - # Project:
    - # Date:
    - # Author: ‹Your Name›
- Save it as template.sh
- Make it executable:
    - chmod +x template.sh
- Use as template for future scripts

Exercise 11: Seismicity Script

🔵 We want to plot the epicenters of earthquakes over a background Mercator coastline map. We will use data from the tutorial directory we just copied over (data set quakes.ngdc and colour table quakes.cpt).

🔵 In particular, our map should have circles whose:

  🔵 size scale with earthquake magnitude

  🔵 color reflect hypocenter depth.

quakes.ngdc

- Historical tsunamigenic earthquakes from NGDC
- Plain ASCII data table with 3 header records:

```
Historical Tsunami Earthquakes from the
  NGDC Database

 Year Mo Da Lat+N Long+E    Dep Mag
 1987 01 04   49.77   149.29 489 4.1
 1987 01 09   39.90   141.68 067 6.8
 1987 01 09   39.82   141.64 084 4.0
...
```

Converting quakes.ngdc

- We want input records with lon lat depth size
- We choose size = 0.04 * magnitude
- The UNIX tool awk can do this for us:

```
awk `{if (NR > 3) print $5, $4, $6,
  0.04*$7}' quakes.ngdc > quakes.d
```

Output now looks like:

```
149.29 49.77 489 0.082
141.68 39.90 067 0.136
...
```

Assigning quake colors

- Typical seismicity color scheme is:
  - Red for shallow quakes (0–100 km)
  - Green for middle depths (100–300 km)
  - Blue for deep quakes (> 300 km)

```
# color palette for seismicity
#z0   start-color      z1    end-color
0      red              100         red
100    green            300         green
300    blue             1000        blue
```

Exercise 11: Seismicity Script cont...

Task: Write a script that plots historical seismicity on top of a Mercator geographic map as specified above. Pick contrasting colors for your map. Add a map scale (**-L**). Choose reasonable gmt defaults so that your annotations are the right size.

```
pscoast -R130/150/35/50 -JM12 -B5WSne -P -Ggray -K
   -Lf134/49/42.5/500 > seis.ps
psxy -R -J -O -Cquakes.cpt quakes.d -Sc -W0.25p >>
   seis.ps
```

- Select another symbol
- Let deep earthquakes be cyan instead

Exercise 12: Sealevel

- Create a graph showing various sea-level curves using the ASCII files in the tutorial directory
  - Plot all sealevel curves as different coloured lines on the same plot
  - x axis to be sea-level (m) and the y axis to be Age (Ma)
  - Check the min/max of each file to make sure you get the frame right

Positioning maps on the page

- **–X**xoff and **–Y**yoff relocates the origin
- Default is (1, 1) for start of new plot
- Default is (0, 0) for overlays.
- Relative (default) or absolute positioning is possible
- **–X**c and **–Y**c centers a plot on the page
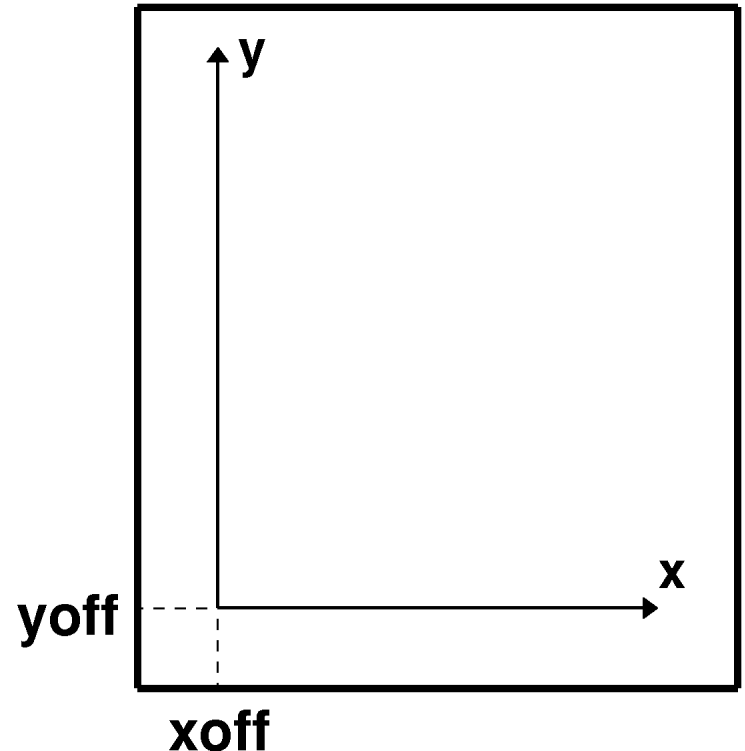
Exercise: Compare Sea-level 1

- More on sea-level curves:
  - Change the origin of the graph to be in the top right hand corner
  - The y-axis should start at 0 and move down to 140 Ma
  - Tip: to change the direction of an axis, place a negative sign before the width of scale for the axis you would like to reverse
  - e.g. -JX0.01/-0.14

Exercise: Compare Sea-level 2

- More on sea-level curves:
    - Plot a graph to the right of the sea-level curve showing spreading rate
    - Plot another graph to the right of that showing ridge length
    - When you plot them, notice that they are not very smooth. Plot the data points from each file as circles to see where the data is located.

Exercise 13: Three Maps on Page

- Task: Plot a three-map panel vertically on the same page:
  - Each global map should be centered on the Americas
  - Use Hammer, Robinson, and Sinusoidal
  - You choose colors and pens
  - Use crude coastlines and -A10000