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$_1$

BODY$_n$

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

TRAILER

−**K** ommits the trailer.

3

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

- We will be using NotePad++ in windows

- Go to Start – Programs – NotePad++

- Go to Settings – Preferences – New Document/Default Directory – Change format to UNIX

The ksh template

- In NotePad++ document, type
  - #!/bin/bash
  - # Project:
  - # Date:
  - # Author: ‹Your Name›
- Save it as template.sh
- Run dos2unix template.sh
- Make it executable:
  - chmod +x template.sh
- Use as template for future scripts

Exercise: 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: 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**).

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

- Select another symbol
- Let deep earthquakes be cyan instead

Exercise: 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

Hints

- Use psxy

- Projection is −JX

- Remember your −K and −O assignments

- Only want a line plotted, so we only need −W option e.g. −W1/blue

- The frame should be the same for all because we only want one basemap with all curves plotted on one graph

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
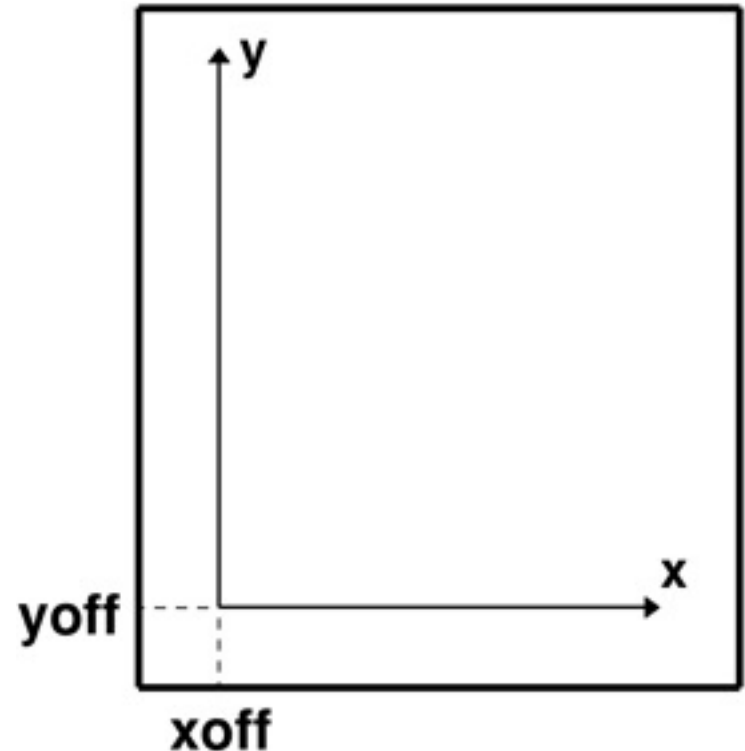
Exercise: Compare Sea-level 1

- 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: 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

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"

Month Name Formatting

- Month abbreviation selected with parameter

- **TIME_FORMAT_PRIMARY|SECONDARY**

- Result depends on setting of the parameter **TIME_LANGUAGE**

Format	Effect on name
f|Full	January (or JANUARY)
a|Abbreviated	Jan (or JAN)
c|Character	J (or J)

Interval units

Flag	Unit	Description
Y	Year	Plot using all 4 digits
y	Year	Plot using last 2 digits
O	Month	Format annotation using PLOT_DATE_FORMAT
o	Month	Plot as 2-digit integer (1-12)
U	ISO week	Format annotation using PLOT_DATE_FORMAT
u	ISO week	Plot as 2-digit integer (1-53)
r	Gregorian week	7-day stride from start of week (TIME_WEEK_START)
K	ISO weekday	Plot name of weekday (TIME_LANGUAGE)
k	Weekday	Plot as integer (1-7) (TIME_WEEK_START)
D	Date	Format annotation using PLOT_DATE_FORMAT
d	Day	Plot day if month (1-31) or year (1-366) (PLOT_DATE_FORMAT)
R	Day	Same as d, aligned with week (TIME_WEEK_START
H	Hour	Format annotation using PLOT_CLOCK_FORMAT
h	Hour	Plot as 2-digit integer (0-24)
M	minute	Format annotation using PLOT_CLOCK_FORMAT
m	Minute	Plot as 2-digit integer (0-60)
C	second	Format annotation using PLOT_CLOCK_FORMAT

Using **PLOT_DATE_FORMAT**

- Controls how dates are plotted
- Gregorian calendar:
  - Combine yyyy (or yy), mm, and dd
  - For day of year use yyyy (or yy) and jjj
  - Optionally separate items with delimiters
  - o instead of mm plots month names
- ISO calendar:
  - Use template yyyy[-]W[-]ww[-]d
  - u instead of W[-]ww gives "Week ##"
- Start with leading – to avoid leading zeros

Examples of **PLOT_DATE_FORMAT**

- yyyy-mm-dd [Default]
- mm/dd/yy
- mmyyyydd
- yyyyWxx – ISO calendar
- dd/mm-yyyy
- o yyyy – month as name not number

Using **PLOT_CLOCK_FORMAT**

- Controls how time is plotted

- Combine hh, mm, and ss

- For decimals, append .xxx

  - Applies to smallest specified unit only

  - Number of x indicates desired precision

- Optionally separate items with delimiters

- For 12–hour clocks, append am, AM, a.m., or A.M.

- Start with leading – to avoid leading zeros

Examples of **PLOT_CLOCK_FORMAT**

- hh:mm:ss [Default]

- hhmm

- hh:mm:ss.xxx – seconds with decimals

- hha.m. – uses 12 hour clock

- hh

Exercise: Plots with Dates

Task: Plot a single x–axis for interval April 1 to May 25, 2000, annotate with month name and the date of the start of each week.

```
gmtset PLOT_DATE_FORMAT -o ANNOT_FONT_SIZE +9p
psbasemap -R2000-4-1T/2000-5-25T/0/1 -JX12T \
-Bpa7Rf1d -Bsa1OS -P > plot.ps
```

- Try a different time interval
- Let the y–axis be the time axis instead

Exercise: Plots with Dates cont...

Task: Plot a single x-axis for interval September 15 to September 17, 2008, annotate with 6 hour intervals and the daily date.

```
gmtset PLOT_CLOCK_FORMAT hh:mm \
    PLOT_DATE_FORMAT mm/dd
psbasemap -R2008-9-15T/2008-9-17T/0/1 -JX12T \
-Bpa6Hf1h -Bsa1DS -P > plot2.ps
```

- 🟡 Plot the weekday instead of date
- 🟡 Let the y-axis be the time axis instead