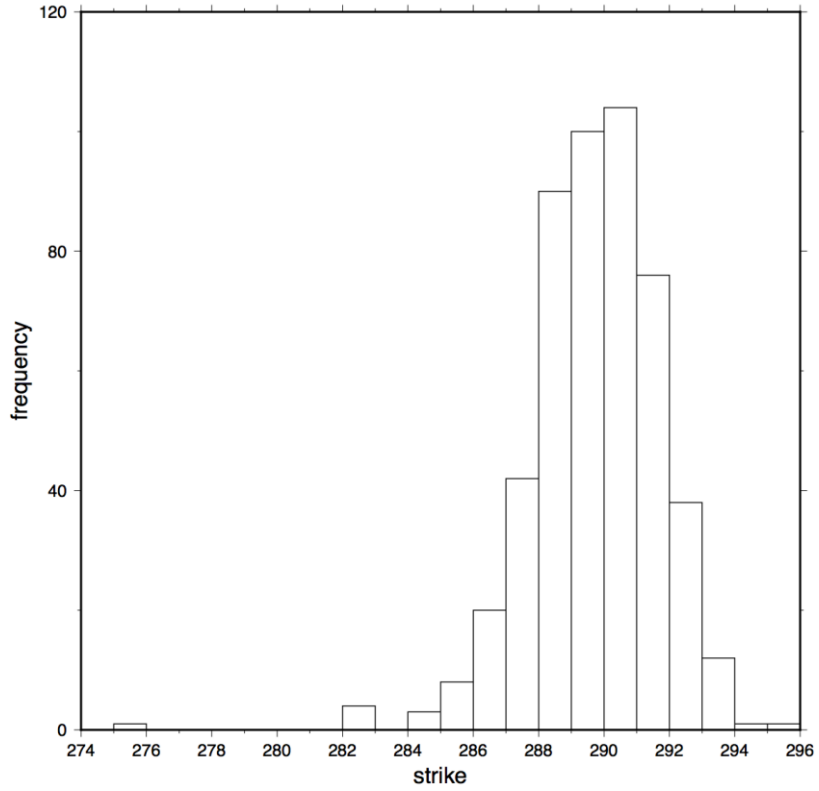
GEO 242: Numerical methods and modeling in the geosciences



Plotting graphs and histograms in GMT

Outline

Pen attributes in GMT5
Color-coded plots and color palettes in GMT
Adding text annotations
Plotting histograms with pshistogram

Pen attributes in GMT

Many commands, notably psxy and pscoast, allow you to specify pen attributes that control how lines are drawn.

This is usually administered by the -W option (although recall the other lines drawn by, say, pscoast)

Pen attributes in GMT

Pen attributes are defined as a comma-separated list:

`-W<width>`

specify width, use default color and style

`-W<width>,<color>`

specify width and color, use default style

`-W<width>,<color>,<style>`

specify everything

Pen attributes in GMT

In GMT 5, line widths are in points by default, but you can be explicit to be sure, e.g.

```
gmt psxy <infile> -JX -R -W1p -O  -K >>
<outfile>
```

You can also use word descriptions such as ‘default’ (0.25p), ‘thick’ (1p), ‘thickest’ (2p), ‘fat’ (3p), ‘fatter’ (6p), if you prefer. (Full list is in the manual.)

Pen attributes in GMT

Color information can be provided as R/G/B values, color names, grayscale values, as before, e.g.

```
-Wthin,red

-Wpurple

-Wfat,0/0/128

-Wthick,200
```

Pen attributes in GMT

If you don’t want a solid line, line styles can be specified numerically, symbolically or qualitatively

```
-Wthin,black,dotted
```

gives a dotted line

```
-Wthin,black,.-
```

gives a dot-dash line

```
-Wthin,black,4p_2p
```

gives 4-point dashes separated with 2-point spaces

Color-coding plots in GMT

Color coded plots are useful for showing progression with time, different sizes, etc

In order to generate a color coded plot in GMT, you need to have your data formatted appropriately and a color palette file

makecpt

generates a color palette file

```
gmt makecpt -C<color_palette> -T<min>/<max>/<ival> [-I]
  [-Z] [-D] > <col_pal_file>
```

Run `gmt makecpt` without arguments to get the list of potential color palettes (try ‘rainbow’ and ‘jet’)

‘min’ and ‘max’ are the limits of the color palette, ‘ival’ is the interval for the palette (i.e. the steps in a ‘stepped’ palette).

`-I` reverses the color order

`-Z` makes it a ‘continuous’ palette

`-D` saturates the palette at the maximum and minimum values

psxy with a color palette

```
gmt psxy <infile> -J<options> -R<region> -C<col_pal_file>
  -S<options> -O -K >> <outfile>
```

A third column is needed in ‘infile’ containing the values that will be color coded

In that case, the fill color of the symbols is dictated by the color palette ‘col_pal_file’

psxy with a color palette

```
gmt psxy <infile> -J<options> -R<region> -C<col_pal_file>
  -L -O -K >> <outfile>
```

This will plot polygons filled with the colors specified in ‘col_pal_file’, if the ‘infile’ data are formatted appropriately

A `-Z<value>` statement needs to be added to each ‘>’ separator in the data file, to assign that value to the subsequent polygon, i.e.

```
> -Z<value1>
<xpos1> <ypos1>
<xpos2> <ypos2>
…
> -Z<value2>
…
```

psscale

plots a color scale for a plot

```
gmt psscale -C<cptfile> -Ba<annots>f<ticks>
  -Dg<xpos>/<ypos>+w<length>/<width> -O -K >>
  <outfile>
```

Makes a plot color scale, of the specified size at the specified location (check the man page for all of the details of the options…)

pstext

plots a text string at a specified location

```
pstext <infile> -J<proj> -F<options> -R -O -K >>
  <outfile>
```

format of text file is (usually):

x y text

full description of the -F options, which control text size/font/color, text justification, and more can be found on the manpage

the list of available fonts can be viewed on the GMT website

pshistogram

plots a histogram from column-formatted data

```
gmt pshistogram <infile> -Jx<scale> -W<bin_width>
  -B<axes> -G<params> >> <outfile>
```

plots a histogram from the data in the first column of <infile>, separated into bins of width <bin_width>

you must specify at least one of `-G`, `-L` or `-C`

pshistogram

plots a histogram from column-formatted data

```
gmt pshistogram <infile> -Jx<scale> -W<bin_width>
  -B<axes> -L<pen> -G<fill> >> <outfile>
```

- `-L` allows you to specify outlines for the bars of the histogram using pen attributes
- `-G` allows you to specify fill colors for the bars

pshistogram

plots a histogram from column-formatted data

```
gmt pshistogram <infile> -Jx<scale> -W<bin_width>
  -B<axes> -L<pen> -C<palette> >> <outfile>
```

`-C` instructs pshistogram to look up fill colors from a color palette (.cpt) file

Exercise

You are supplied with a ten column file of model parameter results from inversions of InSAR data (representing strike, dip, rake, slip, xpos, ypos, length, top depth, bottom depth and moment)

Plot histograms of each column, on a single page, appropriately labeled and scaled