

# GMT introduction

# Part 1: Lines, Points and Area Fill

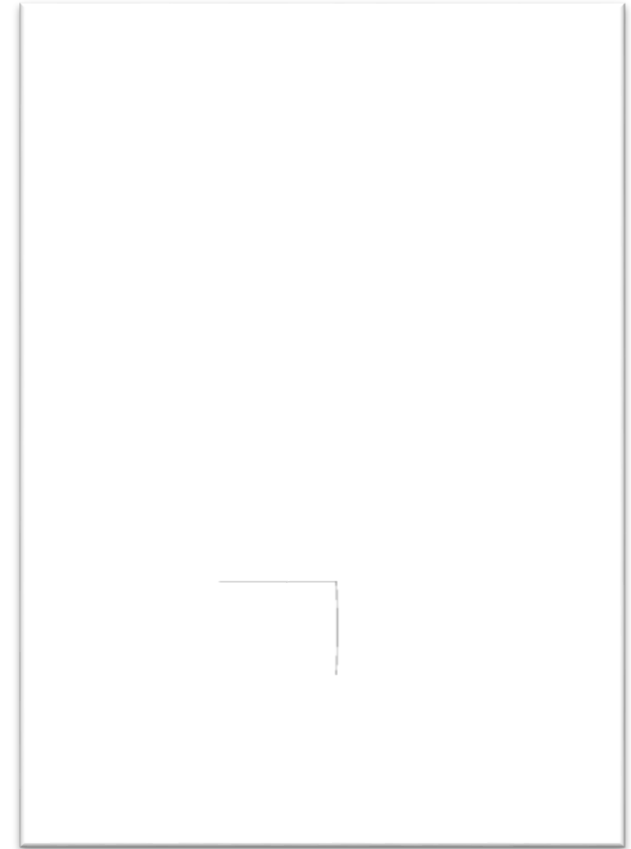
# PSXY points and lines

> test path saved as path.txt `>` separates paths

170 -40

175 -40

175 -35



**psxy -JM10c -R165/180/-48/-33 path.txt > plot.ps**

- -J is the projection. `man gmt` search for `-J`
- -R is the region of the plot. `man gmt` search for `-R`

# psconvert (ps -> png,jpg,pdf...)

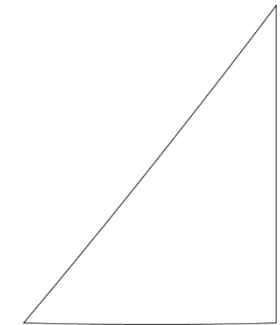
```
psconvert plot.ps -TG -A -P
```

man psconvert

- -T sets output format (G for png)
- -A crops whitespace ``-A+gwhite`` to have white background
- -P portrait (try this if your output is rotated)

```
psxy -JM10c -R165/180/-48/-33 -L path.txt > plot.ps  
&& psconvert plot.ps -TG -A -P
```

What does **-L** do?



# PSXY points

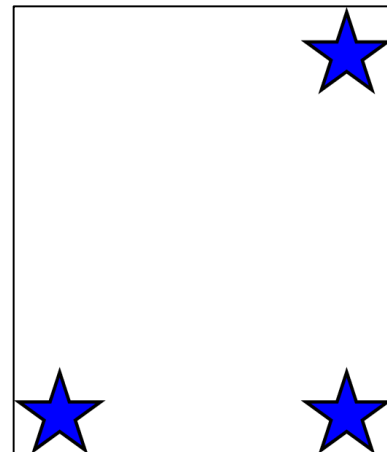
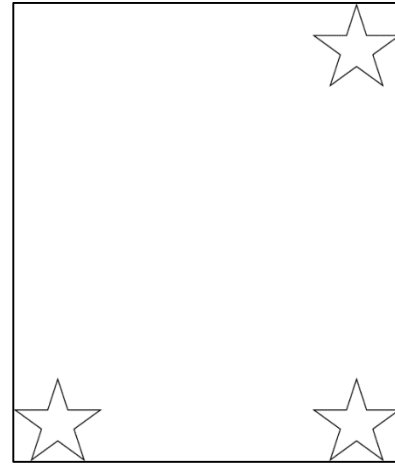
```
psxy -JM10c -R165/180/-48/-33 -Sa1c  
path.txt > plot.ps && psconvert plot.ps -TG  
-A+gwhite -P
```

- **-S** adds symbols (points)

- a: star
- 1c: 1cm diameter of circumscribed circle. Upper case 'a' instead for star with same area as circle of diameter 1cm.

```
psxy -J -R -Sa1c -Wthick -Gblue path.txt >  
plot.ps && psconvert plot.ps -TG -A+gwhite  
-P
```

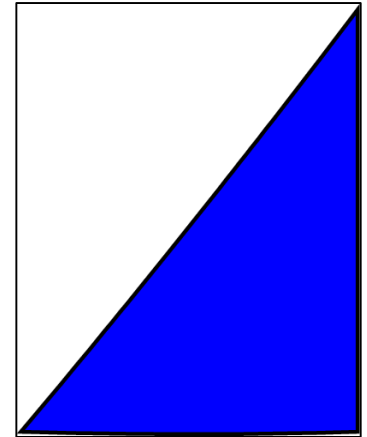
What does **-W** do? What does **-G** do?



# PSXY areas

```
psxy -J -R -Wthick -Gblue path.txt > plot.ps &&  
psconvert plot.ps -TG -A+gwhite -P
```

- (no -S symbols)
- -L (closed polygons) is implied by -G (fill)



# gmt.history

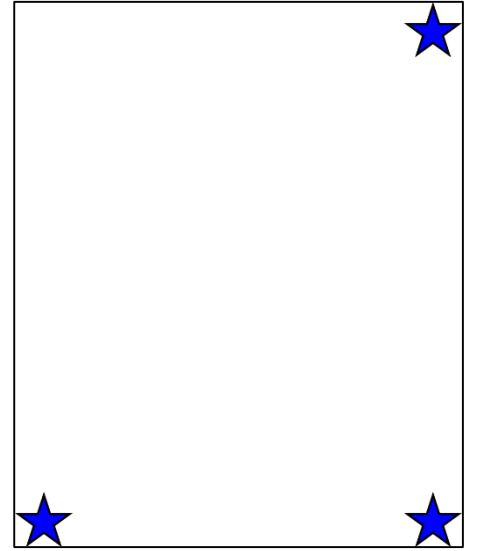
- `gmt.history` is a file created where you execute gmt from.
- Stores previous options for parameters like **-J -R -W** ...
- Only have to use -Jxmin/xmax/ymin/ymax the first time.
- Next time you can use -J only.
- Note multiprocessing issues.

Have a look inside your gmt.history

# gmt.conf

- File that stores default values (pen color, size, units).

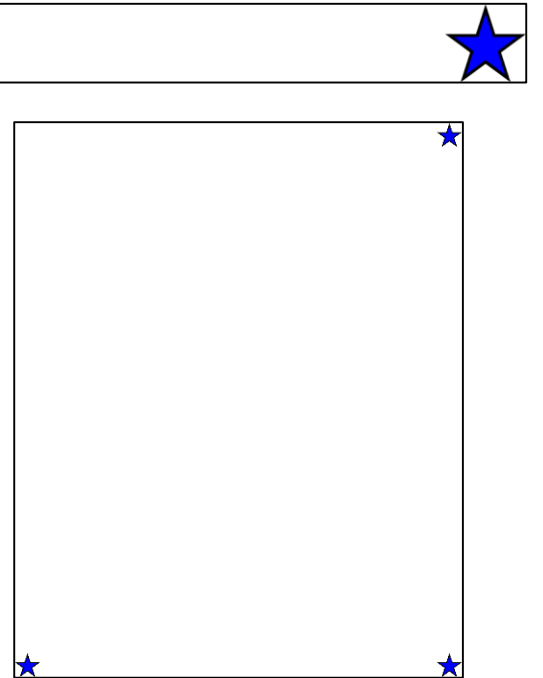
```
psxy -JM10c -R169/176/-41/-34 -Sa1c  
-Wthick -Gblue path.txt > plot.ps &&  
psconvert plot.ps -TG -A+gwhite -P
```



```
psxy -JM25c -R169/176/-41/-34 -sa1c  
-Wthick -Gblue path.txt > plot.ps &&  
psconvert plot.ps -TG -A+gwhite -P
```

## What happened?

```
gmtset PS_MEDIA = Custom_100cx100c  
replot
```





Part 2: grids, cpts

# grdmath and grdimage

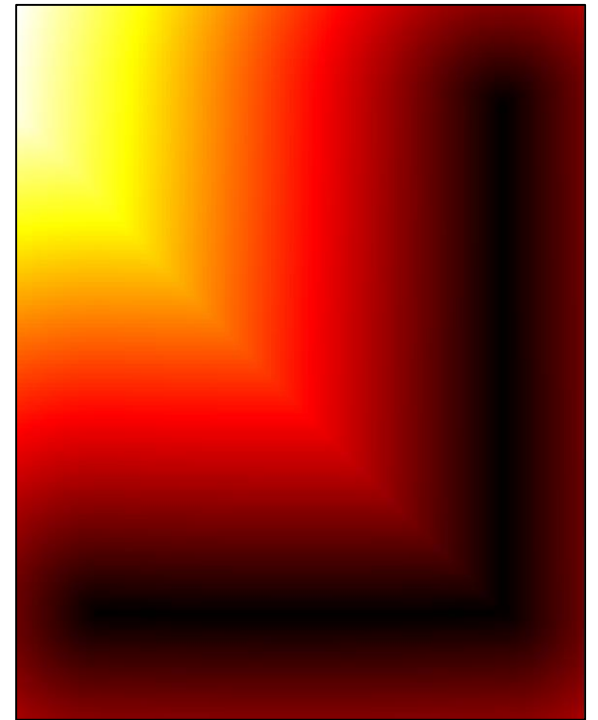
```
grdmath -R169/176/-41/-34 -I5k path.txt  
LDIST = dist.nc
```

- RPN means  $X Y MUL Z ADD SQRT = \sqrt{(x * y) + z}$

man grdmath

- LDIST takes 1 input, gives 1 output, the minimum distance to any point

```
grdimage dist.nc -Chot -JM10c -R >  
plot.ps && psconvert plot.ps -TG -A -P
```



# makecpt

```
makecpt -Chot -T0/300/20 -l > myhot.cpt
```

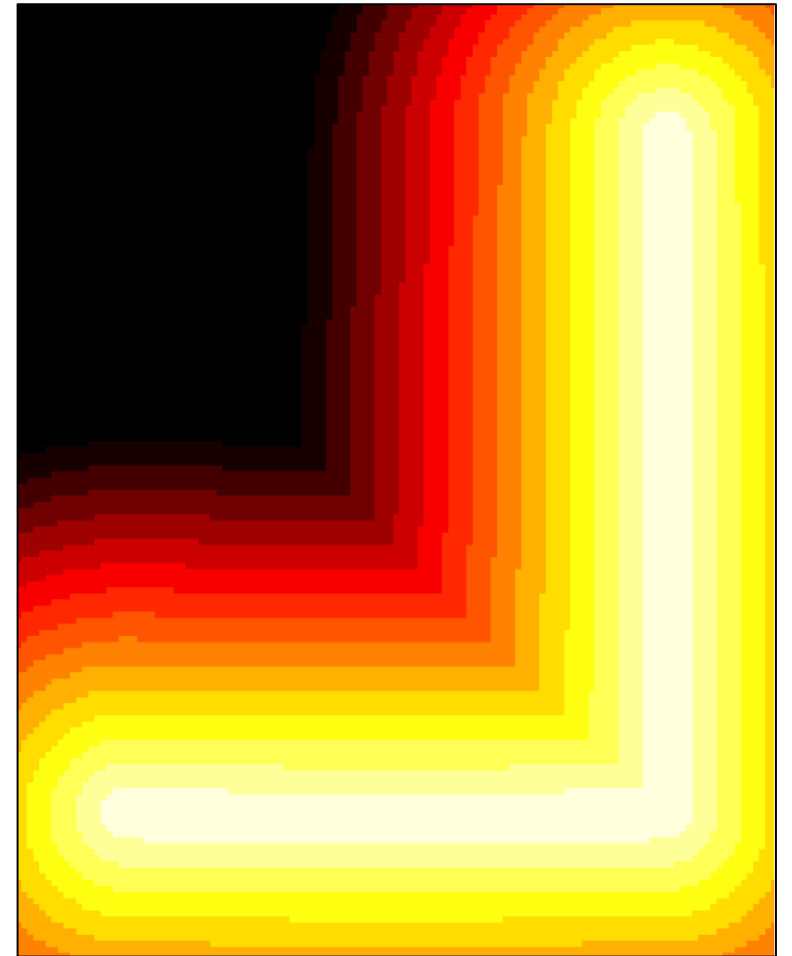
```
man makecpt
```

```
-C: ?
```

```
-T: ?
```

```
-l: ?
```

```
grdimage dist.nc -Cmyhot.cpt -J -R > plot.ps &&  
psconvert plot.ps -TG -A -P
```



# contours, -K and -O

```
grdimage dist.nc -Cmyhot.cpt -J -R -K >  
plot.ps
```

- -K will not finalise postscript (can add to it).

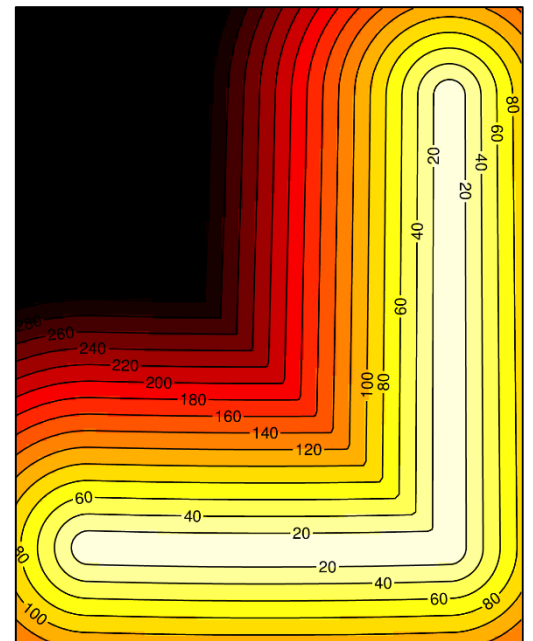
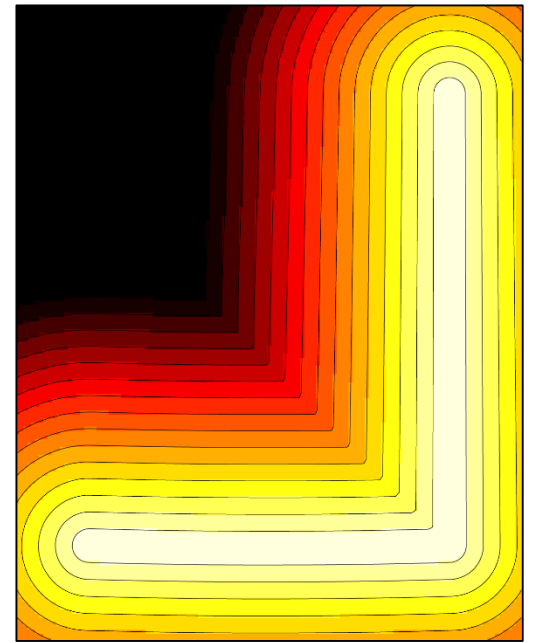
```
grdcontour dist.nc -J -R -O -C20 >> plot.ps
```

- -O required if appending to existing postscript.
- >> used to append to a file, > will overwrite.
- -C20 ?

```
grdcontour dist.nc -J -R -O -A20 >> plot.ps
```

What does -A do?

Remember to run **psconvert** to make pngs



# Part 3: GMT in Python

No more `-K -O` “caking”

Simplified API

# Basic fill

```
from qcore import gmt
```

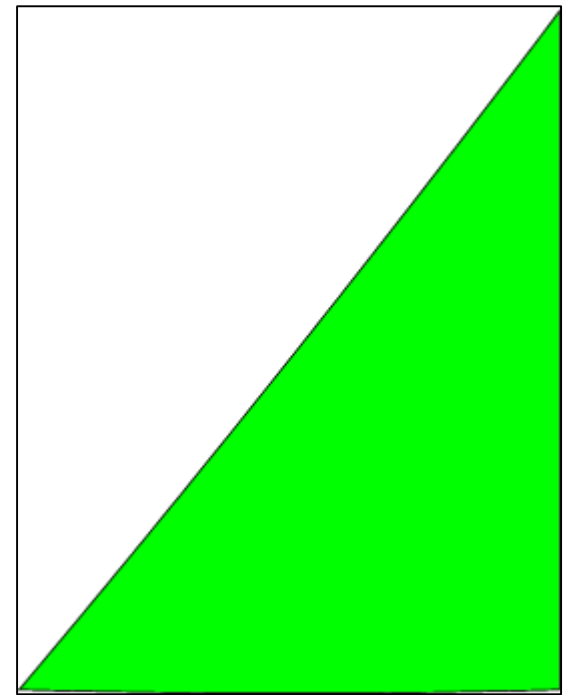
```
p = gmt.GMTPlot("plot.ps")
```

```
p.spacial("M", (169, 176, -41, -34), sizing="10c")
```

```
p.path("path.txt", fill="green")
```

```
p.finalise()
```

```
p.png()
```



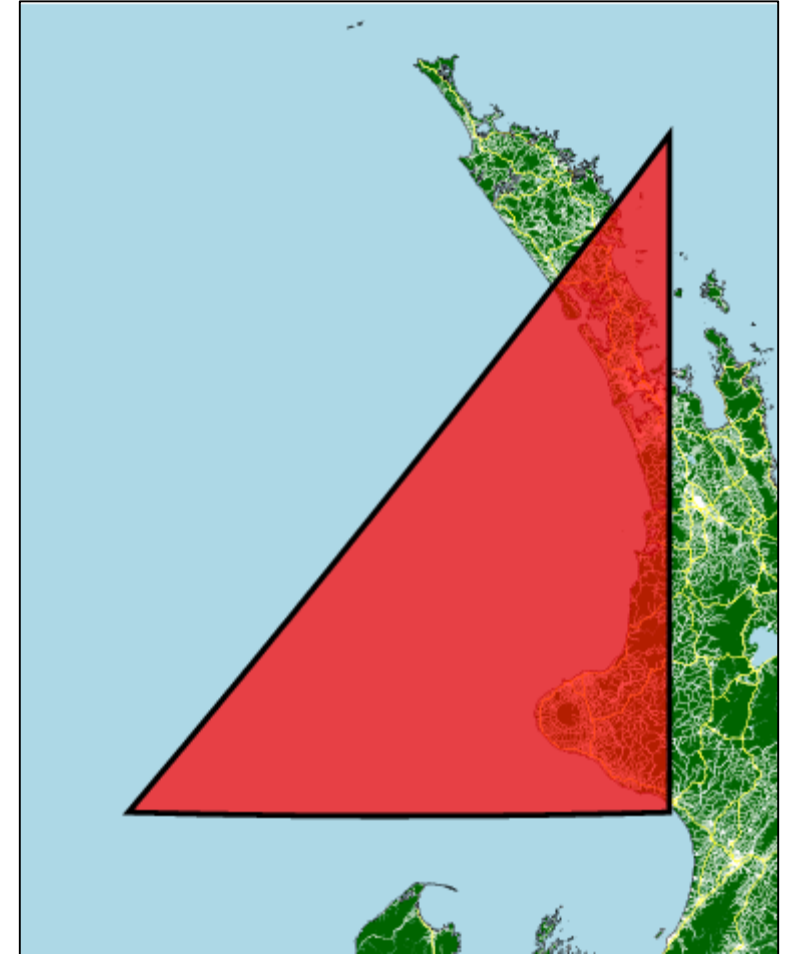
# Basemap using roads, highways...

```
from qcore import gmt
p = gmt.GMTPlot("plot.ps")

p.spacial("M", (169, 176, -41, -34),
sizing="10c")

p.basemap(topo=None)
p.path("path.txt", fill="red@30",
width="2p")

p.finalise()
p.png()
```

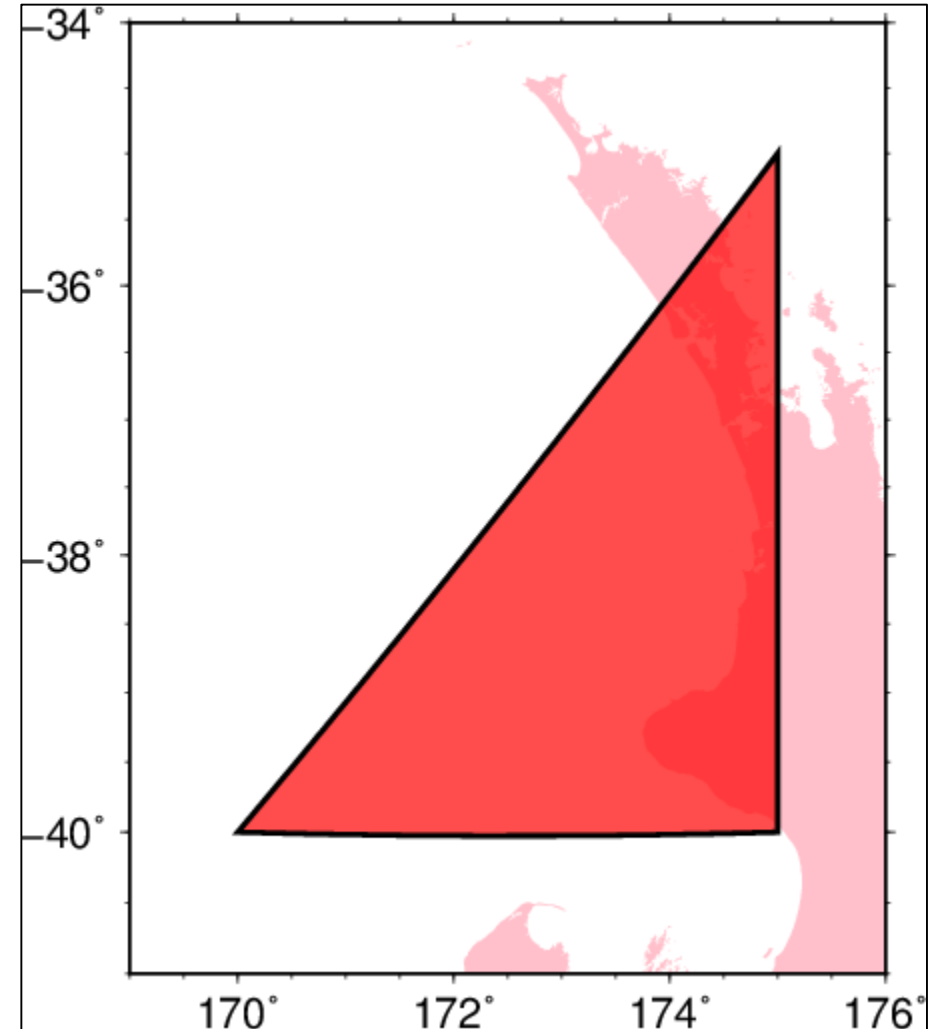


# Framed map

```
from qcore import gmt
p = gmt.GMTPlot("plot.ps")

# move map from corner of page
p.spacial("M", (169, 176, -41, -34),
sizing="10c", x_shift="1i",
y_shift="1i")
p.land(fill="pink")
p.path("path.txt", fill="red@30",
width="2p")
p.ticks(major="2d", minor="30m")

p.finalise()
p.png(background="white")
```



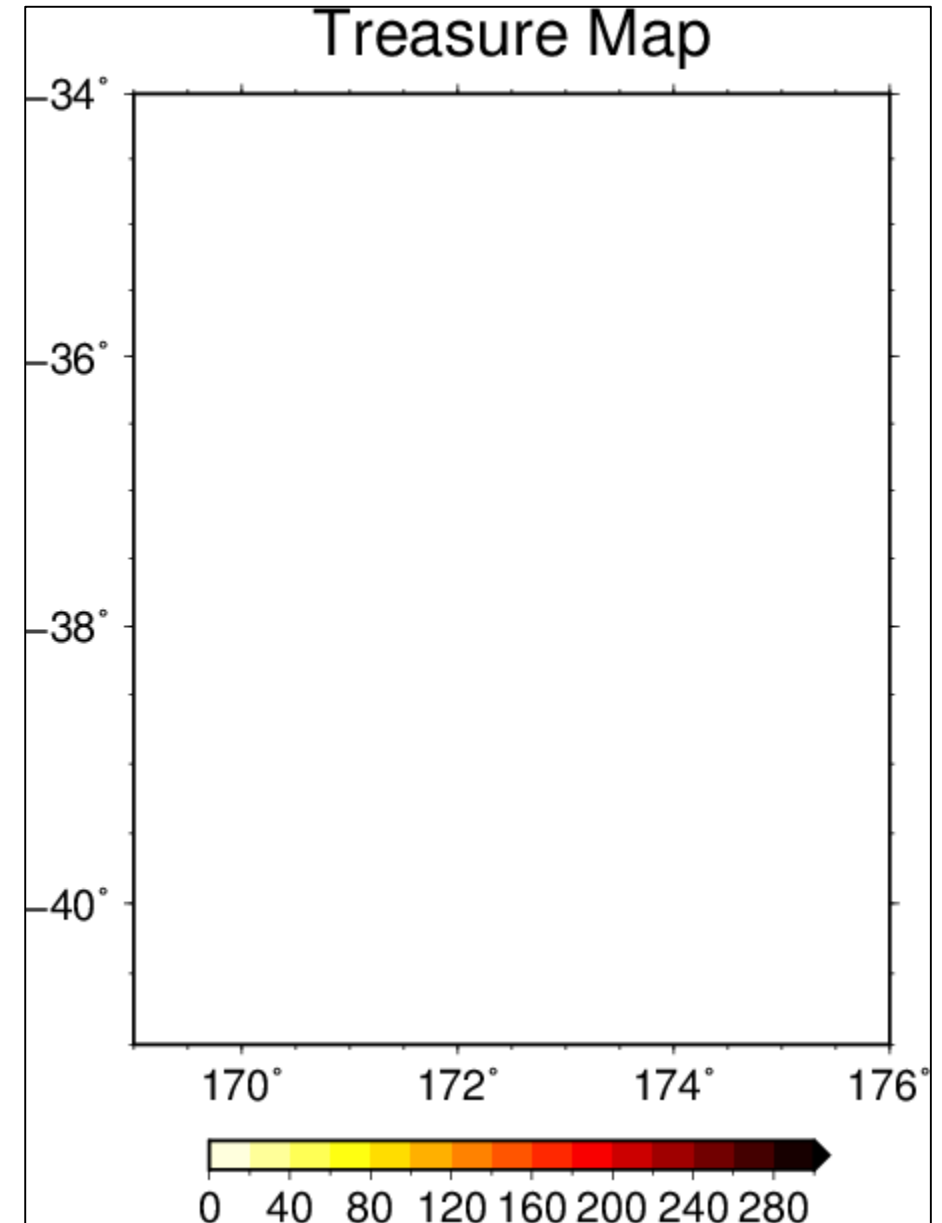


# Title, CPT, LeftCentreRight, TopMiddleBottom

```
from qcore import gmt
p = gmt.GMTPlot("plot.ps")

# move map from corner of page
p.spacial("M", (169, 176, -41, -34),
sizing="10c", x_shift="1i", y_shift="1i")
p.ticks(major="2d", minor="30m")
p.text(172.5, -34, "Treasure Map",
dy="0.2i", size="24p")
p.cpt scale("C", "B", "myhot.cpt",
pos="rel_out", length="8c", dy="0.5i",
major=40, minor=20)

p.finalise()
p.png(background="white")
```



# Notes

- Also new official python interface.
- No more `-K` and `-O` and some other things.