Generic Mapping Tools (GMT)

An introduction to making maps and graphs using GMT

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http://gmt.soest.hawaii.edu/
What is GMT?

- Command-line tools for processing data and making maps and graphics
- Runs on Linux, MacOS X, and Windows (using Cygwin)
- Open Source
- Widely used
- Great documentation
Plan for this demo

- Look at some examples
- Run some simple examples
- Questions
Low Order Geoid
HAWAIIAN TOPO AND GEOID

a)

b)
Ship and Satellite Gravity

![Graph showing the relationship between power and wavelength for ship and satellite data. The graph includes a log-log scale for both axes, with power on the y-axis and wavelength on the x-axis. The data points for ship and satellite are differentiated, with ship represented by a black circle and satellite by a black square. The graph also includes a box inset for input power and a box inset for coherency squared.](image-url)
HAWAIIAN RIDGE
\[ z(r) = \cos \left( \frac{2\pi r}{8} \right) * e^{-r/10} \]
Two types of histograms

Topography (m)

Frequency

NORTH

WEST

SOUTH

EAST
AGU 1991 Membership Distribution
Delaunay Triangulation
\[ z(x,y) = x \ast \exp(-x^2 - y^2) \]
Gridding with missing data
Gridding of Data

- `pscontour (triangulate)`
- `surface (tension = 0)`
- `surface (tension = 0.5)`
- `triangulate → grdfilter`
Clipping of Images

Example 17: We first plot the color geoid image for the entire region, followed by a gray-shadedETOPO5 image that is clipped so it is only visible inside the coastlines.
3RD INTERNATIONAL GMT CONFERENCE
Honolulu, Hawaii, April 1, 2005

SILLY USES OF GMT COLOR PATTERNS

3RD INTERNATIONAL GMT CONFERENCE
Honolulu, Hawaii, April 1, 2005
Hotspot Islands and Cities
RedHat (RHAT) Stock Price Trend since IPO

The chart shows the stock price trend of RedHat (RHAT) from October 1999 to January 2004. The stock price varies significantly, with a sharp drop in early 2000 and a subsequent recovery. The chart highlights the purchase price for Wessel, which is indicated by the horizontal dashed line.
Distances from Rome to the World
Main plotting programs

- pscoast – plot coastlines, rivers, etc.
- psxy – plot x,y data
- pstext – add text to maps
- pslegend – create a legend
- grdview – plot gridded data
- grdcontour – plot contour maps from gridded data
Data Selection

• gmtselect – select data based on geospatial criteria
  (For example, “select all points within 800 km of San Francisco or Seattle, and on land”)
Data processing programs

- arbitrary grid math
- spatial filtering
- mask data using coastline data
- sample gridded data along arbitrary paths
- map projection
- grid irregularly spaced data
- and more ...