

Data Collection

Data Collection and Data Extraction Using GMT

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Abstract

This documents describes how to gather and format marine geophysical data from GEODAS and the GMT database.

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v2 - 29-07-2005 Updated version for Version 2 of the How to Guide

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1 GEODAS

GEODAS is a marine database, standing for GEOphysical DAta Systems. It is administered by the National Geophysical Data Centre (NGDC), part of NOAA. The database includes publicly available data from US and foreign oceanographic organisations from 1953 present. This data includes: marine trackline geophysical survey data, hydrographic (bathymetric) survey data, aeromagnetic survey data and coastal relief gridded data.

1.1 Online Search

It is recommended that you perform an online GEODAS search before you begin plotting maps for a particular region. The online search enables you to search for the most up-to-date publicly available data and it is highly likely that you will find ship tracks in the GEODAS database that is not in our own local database.

The online search can be found at:

http://www.ngdc.noaa.gov/mgg/gdas/gd_sys.html

1.2 Downloading New Data

After you have completed the online search, you can either display and select the data using the online facility or you can do this using the GEODAS CDs. To download any datafiles, you must have a copy of the CDs.

Type geodas in the terminal to open the GEODAS GUI:

1 `geodas`

Then go to File/New Search. You will have to fill in the following parameters:

Search Name: What you would like the output files to be called (e.g. Phil for Philippine Sea)

Title: The title of the search (e.g. Philippine Sea)

Database: Select the type of data you would like to extract. This will usually be Trackline, however, you should also search for aeromagnetic

Parameters: Choose the type of marine geophysical data you would like to search for (e.g. magnetics)

Area: Click on Select Areas, then click the Lat-Long Box, then click Drag and make a rectangle over the area you would like to search. Next click File and click Accept.

The next step is to click Run Search. In some cases, you may have to expand the geodas box in order to see the Run Search button. The files that were created from the search are saved in a directory called geodas in your home directory.

Once you have performed the search of your area of interest, you need to plot the data so that you can firstly view what data is available (if any!) and also so you can compare with what is in your local shiptrack database. Go to: Program and then Plot Search. Then under the plotting options click on Colours and select to colour code by survey, then click on Geophysical Parameter To Plot and select the parameter you searched for (e.g. magnetics) and then click Screen Plot to plot the map to the screen.

A map showing all the tracks (colour-coded) that you selected for the defined area should displayed on the screen. You then have to compare this map with a map plotted using our GMT database to see which tracks are not in our database. You can click on the colour-coded ship tracks and the name of the ship track will appear flashing on the legend bar. Record the ship name and the mgd77 name for

the ship tracks that are not in our GMT database.

Once you have recorded the ship track names that you are interested in, you need to find out the year in which this cruise occurred. Go to: Program and the Retrieve Headers. The first two numbers (and sometimes the first 4) under the date entry is the year. eg. 800703 (this is the number recorded under the date) means 1980. You can also get this information from the website.

Finally, you can now download the data that you are interested in. Place GEODAS CD in the CD drive. Then go to Program/Download Data/Select Multiple Files and click Download. Once the files have been successfully downloaded, they will be located in the geodas directory in your home directory, under a directory named after your search name. A list of *.a77 files should be there.

1.3 Reformat New Data

The data downloaded by GEODAS is in a file format different from that which GMT requires. We therefore, have to convert the downloaded *.a77 files into *.gmt files. To do this, we simply run the following command in the terminal:

```
1 mgd77togmt <shiptrack_id_number>.a77 -F<cruisename> -Y<year> -V
```

Sometimes certain files will not work and it is usually a problem with the year. Check the .a77 file to see if the year in this file is different to the year that the header says. If so, then change the year and run the command again and it will work.

Once this is completed, email Dietmar so that he can incorporate the new data into our local GMT database.

2 GMT Data Extraction

This section describes how to extract ship track marine geophysical data from our local database using GMT.

2.1 Find Cruises in a Given Area

To find the cruises that have crossed the area you are interested in and that are stored in the local GMT database, you use the GMT command **gmtlegs**. Check the man pages for more detailed information. The following example creates a file called outfile.legs which consists of a series of cruisenames which collected gravity (-G), magnetic (-M) and topography (-T) data.

```
1 gmtlegs -R<region_of_interest_W/E/S/N> -G -M -T > <outfile>.legs
```

2.2 Obtain Detailed Cruise Information

To obtain detailed cruise information about individual cruises, you use the GMT command **gmtinfo**. Check the man pages for more detailed information.

```
1 gmtinfo <cruisename> > <outfile>.info
```

The output looks like:

Info: v3201 Year: 1974 N_{recs} : 2289 n_g : 206 n_m : 0 n_t : 1409 W : 285.78240 E :
288.35051 S : 38.63816 N : 40.48434 $Begins$: 18101974 $Ends$: 31101974.

which corresponds to :

legid, year of the cruise, number of records, then number of gravity, magnetics, and bathymetry points found, then

2.3 Extract Data Using Cruisenames

To extract the data from the cruise-legs that you have identified using `gmlegs`, you use the GMT command **gmtlist**. **gmtlist** is a data-extractor for legid files and more information can be found in the man pages.

To extract magnetic data from a cruise between a distance range along track, do the following:

```
1 gmtlist <cruisename> <region_of_interest_W/E/S/N> -Fxynd -Sa<start_distance>
2 -Sb <end_distance> > <outfile>.dm
```

To extract gravity data from a list of cruise legs (e.g. the output from `gmtlegs`), do the following:

```
1 gmtlist 'cat <outfile>.legs' <region_of_interest_W/E/S/N> -Fxyg > <outfile>.xyg
```

2.4 Simple Plot of Data

To plot the location of the cruise-legs that you just extracted, you can use a GMT command called **gmttrack**.

To plot a shiptrack with distance annotations along the track and the name of the cruise plotted adjacent to the track, do the following:

```
1 gmttrack <cruisename> R<region_of_interest_W/E/S/N> J<map_projection>
2 Ba30 P A8 M<distance_annotation_interval> > <outfile>.ps
```

To plot the extracted data on an xy plot, you first need to run **gmttrack** to figure out the distance you want to plot along track (x axis). then you need to run `gmtlist` and extract the data for the distance range you selected in `gmttrack`. Next, you run **minmax** to figure out the minimum and maximum values of the data (y-axis) and then you use the GMT command **psxy** to plot the xy plot of the data.

```
1 gmttrack <cruisename> R<region_of_interest_W/E/S/N> J<map_projection>
2 Ba30 P A8 M<distance_annotation_interval> > <outfile>.ps
3
4 gmtlist <cruisename> <region_of_interest_W/E/S/N> -Fxynd -Sa<start_distance>
5 -Sb <end_distance> > <outfile>.dm
6
7 minmax <outfile>.dm
8
9 psxy <outfile>.dm R<region_of_interest_W/E/S/N> J<map_projection> W1 V B100 > <outfile>.ps
10
```

This is a very useful tool if you see a feature in the gravity for example and want to know what type of bathymetry is there or what the gravity signature is like. It is good to pick fracture zones for example. This is also useful to find out the track you want to plot for your stacked profiles.