Structures visible in your study area using bathymetry, gravity, magnetic anomalies and seafloor ages.

1. Use the link from the class web site to copy this script into your own Linux directory:
   
   grav-age-bathy-magmap.gmt

2. Change the permissions on the file in your own directory, so that you can execute it and edit it. (Type the command “chmod 777 grav-age-bathy-magmap.gmt”).

Note that to run this script you need to be connected to the seismo lab computers so that you can access the global gravity, magnetic, bathymetric, and age grid data sets. See /home/datalib for details about the data sets. When you run the script, note that it makes grid files and postscript files in your directory.

For these next maps, use the same map boundaries and approximately the same map scale that you used for the seismicity maps in Problem Set 5.

3. Run the script and make 4 maps of data for your study area: magnetics, gravity, bathymetry, and seafloor age. Note that the scale of the plot can be changed on the command line where you have to put -Jm0.1 (for example). Make this number smaller if the map is too big, and larger if the map is too small.

Here is a sample command line for this script, for the Hawaiian-Emperor seamount chain:
   
   ./grav-age-bathy-magmap.gmt Hawaiian_Emporer 140 210 20 50 -Jm0.1 300

Here is the syntax of the command:
   
   [command title_prefix_for_files west east south north basemap_type_scale resolution]

Note that if you want to run this program again with different parameters, you may have to either change the title (which in the above case is Hawaiian_Emporer) or remove all the files with names that start with the title. Depending on how your account is set up, the script may not over-write any existing files.

4. Print out all 4 maps in color on separate pages.

5. Put a piece of tracing paper on top of your gravity map. On this tracing paper draw another map, at the same scale, of the same region. Use colored lines to mark the active plate boundaries on your map and label the plates with their names. Trace and label any other features visible in the gravity data, i.e. fracture zones, pseudofault traces, dead spreading centers, seamounts, hotspot traces, and the traces of triple junctions; maybe even the continent-ocean boundary. Pick out everything that looks interesting or important in the gravity data even if you don’t know what it is. You can try to identify some features from other bathymetric maps or journal articles that you might have been reading.
6. Go to the Global Seafloor and Magnetic Lineation Database page, choose “KMZ Google Earth” files under “Available Data”, and look at the lineations in Google Earth. What does their data set consist of? Did they pick any features that you didn’t pick? What features did you pick that are not in their data base?

7. Write a short explanation (5 paragraphs) of the important features that are visible in your maps when you compare the different data sets. You can use whatever references you would like for this. You can also use the seismicity maps you made in PS 5. Your explanation should include the following:

a) What features are seismically active in your study area?
b) What are the strongest magnetic anomalies in your study area?
c) What age range of seafloor is present on the ocean floor in the map area? (You can determine this by looking at the map of the world magnetic anomalies and other more detailed references about your map area.) Does this agree with what is shown on the seafloor age map that you made? If any seafloor shows up as black or gray in your age map (with no age assigned to it), how old do you think it could be, and why?
d) Rank the main map features according to how visible they are in the seismicity map, in the magnetic anomaly map, and in the gravity field data. Note the differences that you see, both general and specific (for example, if the ridge segments are more/less visible than the transform faults; if one transform fault has a much bigger gravity signature than others).
e) Discuss what is likely to be causing the seismicity at the different depths that you see in your map: modern plate boundary deformation? If not, what?

Turn in for this assignment the following items):

- Printed copies of 4 colored maps for your area (gravity, age, bathymetry, magnetics)
- Tracing paper with your interpretation of the region
- Short discussion answering questions 7a-e.

Several notes:
1) You need to have enough disk space to be able to make the grids. If you have a large study area and try to make your maps at very high resolution, you might run out of disk space. If this happens to you, let us know ASAP so we can try to find a solution for you.
2) For your final paper for Ge161, due in December, you will need to include these maps, so if you save the files then you won’t have to make them again.

Length of time spent doing this assignment: ________________________________