Fire and Ice - An exercise in interpreting topography and bathymetry

Background Information

Seafloor bathymetry and land topography used to create your map are continuously updated and available to scientists and students at <http://www.marine-geo.org/portals/gmrt/>. A program called Virtual Ocean is available at this site. Using Virtual Ocean you can create and save maps. You can also save data as scene files that can be viewed and manipulated in 3-D (iView3D or Fledermaus).

If you have access to a computer, you can create your own map using Virtual Ocean. You will then be able to zoom in on features and navigate around the map and neighboring areas. To get started go to, <http://www.marine-geo.org/portals/gmrt/>. From the Global Multi-resolution Topography Data Portal, choose Virtual Ocean from the sidebar list. Download the Virtual Ocean application. Choose Mercator projection. When the world map appears choose “available data” from the toolbar. In order choose: Select data from menu; layers; contributed regional bathymetric grids; U.S. continental margin; Alaska; Sand Point Alaska. The map will appear and using the toolbar, you can manipulate it and save maps in several formats.

For bathymetry images of volcanoes and glacial grooves on the seafloor you can visit the Mediabank at the Global Multi-resolution Topography Data Portal. Choose Mediabank from the sidebar. Next choose Category; bathymetry. There are several images that can be viewed as a slideshow. These will assist you in interpreting seafloor bathymetry in the Sand Point area.

You are comparing seafloor features mapped at ~1 m spatial resolution to seafloor features mapped at ~200 m spatial resolution. The bathymetry data is merged with ~100 m resolution land topography data from the Shuttle Radar Topography Mission ([SRTM](http://www.jpl.nasa.gov/srtm/)). The inset map was created using multibeam sonar data collected by NOAA Ship *Rainier* as part of the U.S. Coastal mapping program (~1 m spatial resolution). This data is used for completing and updating navigational charts. The seafloor area that appears as gray background (~200 m spatial) was created from satellite predicted bathymetry (Smith and Sandwell).

Lab Report : Fire and Ice

Begin by examining your map. It shows the topography and bathymetry of the western part of the Kenai Peninsula, Alaska. Local features and landmarks are the Shumagin Islands, Pavlof Volcanoes, Sand Point and Moller Bay.

1. Look closely at the inset map showing detailed bathymetry. Compare the resolution in the Sand Point area with the surrounding seafloor bathymetry.
2. Use the space below to make two lists: one of features associated with volcanic activity; and one of features associated with glacial activity.
3. Carefully examine your map. Locate a volcano, a glacial valley (U-shaped), and a stream valley (V-shaped). When you are familiar with these features begin collecting evidence. Make two lists: one of all the types of evidence you find for volcanic activity (i.e. cones, volcaniclastic debris flows); and one of all the types of evidence you find that glaciers were once common in this area (U-shaped valleys, moraines).
4. Examine the seafloor. Identify at least one area that exhibits evidence of explosive volcanic activity and at least one area that was smoothed by the passage of glaciers.
5. When you are comfortable identifying surface features formed by glaciers and volcanoes, you are ready to compare relative ages. Look for evidence of glaciers eroding volcanoes and of volcanic cones emerging into U-shaped valleys.
6. State your research question.
7. What is your testable hypothesis?
8. What data did you collect to answer this question?
9. Analyze your data to answer your question.
10. Was your hypothesis correct?