

Group Project

GEL 161, Exploration Geophysics & Seismology

Spring 2008

Overview

The group project consists of proposing a geophysical survey of a specified target with a specified goal, using three different geophysical methods. You can think of your group as a *geophysical consulting* company that is trying to get contract to carry out the geophysical survey for a client. Your job is to convince the client (me) that you are knowledgeable about the region, specified goals and how to use geophysical methods to achieve them.

There will be four separate groups for 4–5 members, each of which will work on a different *target*. Each target will be similar to one of the four application examples discussed in the chapters 21, 22, 24, and 26 in the textbook. The example application chapters should be used as a guide as to what your final report should include, in addition to the specific requirements listed below.

The proposal will need to include appropriate geologic and/or tectonic background information, justification explaining why each proposed geophysical method should be used, and a survey design indicating where stations for each method will be placed and why (e.g., based on information about the spacing needed to achieve a required resolution, the size and depth of the target, etc...). I will provide each group with some background material, some references and some useful maps and data, but you will need to do additional research in the library or online to learn more about the specific target.

Important Dates & Information

Written Report: The written report will be due in class on Thursday, **June 5th**. I WILL NOT ACCEPT LATE GROUP PROJECTS. Requirements for the written report are listed below.

In-class Presentation: Each group will give a 10-15 minute presentation in class on Thursday, **June 5th**. Ideally, each member would give part of this presentation. However, if any member is uncomfortable with speaking in class, then arrangements can be made with the other group members to allow this member to do preparatory work for the presentation.

Preliminary Due Dates:

- **April 15:** Submit *Consulting Firm Business Name* and group members.
- **May 6:** Submit proposal outline that also identifies which members are responsible for each part of the project.
- **May 20:** Submit revised proposal outline based that also identifies which members are responsible for each part of the project.

Grading: The group project is worth 20% of your grade: one-quarter of this grade will be based on your individual contribution to the group project, one-quarter will be based on the in-class presentation, and the other half will be based on grading of the written group project. Each person's individual contribution to the written project and in-class presentation will need to be detailed in the submitted project.

Overview of Topics

1. **Rifting in the Salton Sea Trough, southern California:** this region has many similarities to the Kenya Rift discussed in Chapter 21. South of the Salton Sea Trough there is active oceanic seafloor spreading, but it is unknown whether seafloor exists under the Salton trough. **Your goal** will be determine the subsurface structure beneath the Salton trough in order to characterize the extensional processes taking place and whether oceanic seafloor is forming beneath the sediments.
2. **Hydrocarbon exploration in the Santa Barbara Channel:** this is an offshore oil producing region in southern California between Santa Barbara and the Channel Islands. It is smaller than the North Sea oil fields discussed in Chapter 22. As domestic oil pressures rise, US oil is in more and more demand. While offshore drilling so close to the beautiful southern California beaches is a much-debated issue, **your goal** is determine how much oil remains in the Santa Barbara Channel offshore oil fields and where should new oil rigs be built next?
3. **Long Valley Caldera and Mammoth Volcano:** the long valley region has had active volcanism in the recent past, and magma related seismicity in the last few years. It has not been as active as Redoubt or Mt. Etna discussed in Chapter 24 recently, but in the past, it was responsible for blanketing most of the western US with the Bishop Tuff. **Your goal** is to assess the volcanic and earthquake hazard potential of the Long Valley Caldera region by finding and characterizing subsurface magmatic bodies and related faults.
4. **Contamination of the Stanislaus Aquifer:** this is an isolated aquifer that is located beneath Modesto in central California. However, in the past there has been chemical contamination caused by improperly disposed of materials at the Riverbank Army Ammunitions Plant. With the changing climate in California the demand on aquifer's for water is increasing. The city of Modesto and surrounding communities are expanding and this requires building more wells to provide water to the growing population. **Your goal** is to assess the contamination pathways in the Stanislaus Aquifer (part of the Modesto Subbasin) to provide the information needed to construct wells in the regions with least present and future contamination.

Note, that it is your job to propose and design the survey to gather the required information in order to achieve the stated goal, but you will not actually get to collect the data or actually answer the posed questions (for that, you will need to finish your degree and become a geophysicist).

Written Report Requirements

Below is an outline of the minimum requirements for the written report. Note, that can add to these or organize this information as you deem appropriate. Figures (computer generated or hand-drawn) that help to illustrate concepts are encouraged.

1. Cover page: project report title, group members name, etc...
2. Table of Contents

3. List of Group Members and the specific contributions of each member (you can divide by section, activity, however, you decide).
4. Introduction to project background, project goals, methods used, and brief summary of the parts of the report.
5. Geologic, tectonic, or hydrologic background: written summary of important information about the setting of the region of interest. This must include at least one map and simple cross section. These can be found on the web (and referenced) or drawn by hand and scanned into the computer.
6. Geophysical methods: a brief introduction to this section outline the methods and why they are being used. Separate subsections for each of the three geophysical methods. Each section should briefly describe the method, its strengths and weaknesses, why it was chosen. This section should end with a brief summary.
7. Proposed survey: this section should describe how the survey will be implemented including the three methods described in the previous section. This section should include justification for things like station spacing, number of traverses, etc... This section should also include at least one map showing how you propose to carry out each of the three surveys (locations of stations, sources, traverses, grids, etc...). This section should end with a summary of how the results from the three methods will be combined and interpreted to achieve your goals.
8. Conclusions: a brief conclusion or summary of the report that explains to the *client* how and why this proposed survey will achieve the stated goals.
9. References.

Oral Presentation Requirements

You oral presentation should include all of the sections that are included in the written report, but should focus on providing a summary of the overall report, and should use maps and figures to help communicate your main points. Each group will have 10 - 15 minutes (I will specify this later), therefore you should plan to have about 1 slide per minute to communicate your results.