ESS 202: Earthquakes

Spring Quarter, 2003

Final Project

It is time to start thinking about your group projects. You should decide on a topic and join others with similar interests. Each group should have 3 or 4 students.

Each group will write a paper that is 4-6 pages long (12 point, double spaced) including references. The references should include at least 3 scientific papers or books (per person), but may also include web sites or newspaper articles. Each group will give a 15-minute presentation to the class at the last lab (Tuesday, June 3). Papers are due Friday, June 6.

Suggestions for Topics (or choose your own)

You may want to look through your text to learn more about some of these.

Review maps prepared by California, Oregon, and Washington showing susceptibility to strong ground motion, earthquake-induced landsliding and liquefaction, lateral spreading. From text material accompanying these maps, how are they made? How valuable are they in predicting how land will respond to an earthquake? Design a land-use ordinance for a community in western Washington.

What determines the cost of insurance premiums? Why is it easier to do this for fire and auto than for catastrophes like earthquakes and hurricanes? Should the Federal Government subsidize catastrophe insurance? What safeguards should be established if is does so, using subsidized flood insurance as an illustration.

Design an earthquake preparedness unit for a sixth-grade class. Include individual preparedness, elementary preparedness. What protection should be checked for in your own home or where you work? How well prepared are you, your family, your community?

Explore the evidence for (or against) the occurrence of big magathrust earthquakes off the coast of Oregon, Washington and Vancouver Island. When did they occur, how big, how often? What kind of damage might they produce? How can we be prepared for this?

Explore the evidence for (or against) the occurrence of one or more big earthquakes on the Seattle Fault. What is the evidence, which pieces of evidence are convincing? How often do they occur? What kind of damage might they produce? How can we be prepared for this?

Review the damage from the Northridge, Kobe, and Nisqually (or other) earthquakes. These earthquakes occurred in the parts of the world that are most prepared for earthquakes. The earthquakes were of similar magnitude. Why was the Kobe earthquake so much more destructive? What geologic conditions were important factors? What is liquefaction and why is it important? What aspects of building design were effective (or not effective) in keeping buildings, bridges or other structures from failing? What was the main cause of death in these earthquakes? Comment on whether it is worth the cost to retrofit bridges or buildings in Seattle, Kobe or Northridge and whether building codes should be stronger or weaker. What are the key factors in making such decision? Why was the Kobe earthquake so damaging to the regional economy? Why was damage so light in the Nisqually

earthquake? How are the tectonic settings different for these three earthquakes? What kind of earthquakes were they, what stresses caused them. What kinds of data have been used to study them? How has this technology changed even in the past 7 years?

The subduction zone most like our own is Nankai (the Philippine Sea Plate subducting under southern Japan). It had a Wadati-Benioff Zone earthquake of comparable size to the Nisqually earthquakes just a few days later. Several people were killed in that quake. Compare these two quakes. The most devastating quakes (though by no means the largest) in the western hemisphere have been Wadati-Benioff zone earthquakes. Determine which ones they are and find out what you can about them.

Contrast the damage from the Kobe or Northridge earthquakes with other recent or past damaging earthquakes such as the ones in Taiwan and Turkey two years ago or Nicaragua and India during the past year.

Explore the development of the hypothesis we now call plate tectonics. When were the ideas developed? Did they evolve over a long period of time with the main elements of the theory being added as we obtain a better understanding, or were we all confused about the way the earth works one day and then suddenly it all made sense?

What is an earthquake prediction? What group evaluates predictions? Explore a specific prediction in detail: Examples are the New Madrid prediction, one in Peru, and the ongoing predictions of earthquakes in western Washington.

Time Line

Tuesday, May 20

1. Choose a tentative topic for your project and write one or two sentences describing your topic in general terms. This is a starting point to get each of you thinking about your project. However, once we break into groups and you research the project further the topic may change quit a bit.

2. Go to the library and find 3 books, scientific papers, or news paper or news magazine articles that pertain to your topic. Skim (don't take the time to read them carefully at this point) them enough to write one sentence about the main point of each of the 3 papers. The abstract of a paper should describe the main point. If you have a book, see if you can find the part of the book that would pertain to your topic. Chapters from your textbooks can be used. Sometimes the text will suggest references for further reading.

We will use this as a starting point for the research projects. In lab on Tuesday, May 20, we will discuss the topics that interest each of you and divide you into groups based on your interests. Tentative groups will be set on Tuesday and finalized by Friday.

Good resources are the Expanded Academic Index and Georef
http://www.lib.washington.edu/databases/top20.html
Then click on Expanded Academic Index or Georef
This provides indexing and abstracting for approximately 1,500 scholarly and general interest periodicals, covering all major fields of study in the humanities, social sciences, and science and technology. This is restricted for UW, so you can get to it from Library computers, and probably from other on campus computers.

I would like to meet with each group sometime between May 20 and May 23 to discuss your project.

Tuesday, May 27

By Tuesday, May 27 you should turn in an outline of your whole paper and decide who is responsible for writing each part of the paper. In addition to your outlines, each one of you should have at least 3 references that will provide the information for your part of the paper, and a description of the main points of each of the 3 references. These 3 should be from books or scientific papers, not abstracts, newspapers or the web. Additional information can come from the web, news papers etc.

Tuesday, June 3 at 12:30-3:30

Each group will give a 15-minute presentation on Tuesday, during the scheduled lab time.

Friday, June 6

Final papers are due on Friday, June 6. In addition to the final group paper, please send me a paragraph stating your input to the group project. There is no need to be modest here, just honest. If you feel you did most of the work let me know. If you had problems getting together, give me your perspective. If it went great, let me know that too.

You may give this to me separately from the project itself. It can be emailed if you like. (kcc@ess.washington.edu).

References should include complete reference so someone could find the paper, book, or web site you read. See Prothro and Kelly: Chapter 3: Anatomy of a Research Paper (This in on our web page under 'Reading'.) for a complete discussion of how to include references in the text of your writing and what should go into the bibliography.

Books need: title of book, author, publisher, city of publisher, date published, and number of pages.

Journal Articles need: author of paper, title of paper, name of journal, volume number, page numbers, year.

There is a lot of information available on the web, but it can be difficult to sort out how accurate it is, and it may not be there (or might change) the next time you look. It is fine to get some of your information from the web, but you should also get information from other sources such as a books or articles in a journal. When citing a web page in your bibliography, include the complete web page address and the organization that produced the page. For example, there are some very good web pages produced by the US Geological Survey (http://usgs.gov)

Library resources such as Georef and expanded academic index are good to help find papers and books. They may contain abstracts that you can read on line. However, the reference you give should be to the paper itself, which is likely to be in the Library. Ask the reference Librarian if you need help finding something.

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Notes on Grading Final Project

Papers will be graded similar to the South America Paper using the guidelines in Chapter 3 of Prothro: "Anatomy of a Science Paper". Your final project is different in nature from the South America paper, so the strict comparison between observation and interpretation will not be so clear, but it is still worth thinking about this distinction as you write your paper and organize your presentation. I will be looking in particular at the 6 General writing tips (Chapter*3*, Page1), "strong" and "weak" statements (Chapter*3*, Pages 5 and 8-9), and the use of figures and references (Chapter*3*, Pages 9to14) to support your statements. Make sure you reference all Figures in the text. The Figures you put in your paper can be used for your presentation.