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GEOL 441/541: Lab 5 Climate Projections related to your research project.

Due Monday, February 8 at the beginning of class.

In today’s lab you will examine the IPCC (Intergovernmental Panel on Climate Change) Fourth Assessment Report (2007) to help in your research for your research project. Use *Italics* or Another Color to help me find your responses.

1. Fill in details about your research paper (this can be brief):
2. Title:
3. Location:
4. Focus of paper:
5. Time period for which you are considering projected climate change (2030? 2050? 2100? Some other time period?):

*Note: Later in the lab, I will be asking you to write down the references for a minimum of three additional journal articles that you can consult for your research projects. In perusing the IPCC today, be looking for cited information that would be particularly valuable in your research. You will need to consult some of these original sources, not just the IPCC synthesis.*

1. Go to: <http://www.ipcc.ch/publications_and_data/publications_and_data_reports.htm#1> and look at the Fourth Assessment Reports. For now you are just familiarizing yourself with the information available in the IPCC. The IPCC report is divided by three ‘Working Groups’, which address different aspects of climate change.
2. Go to the Physical Science Basis. Which chapters look like they could be useful for your research?
3. Click on the table of contents for the chapters that you identified as being useful. Which subchapters could be useful in your research?
4. Go to the Impacts, Adaptation and Vulnerability Report, and do the same as you just did above. Which chapters and subchapters are relevant to your research? *Tip: be sure to look at the chapter that is regionally relevant to your research (North America, Asia etc.), and see which subchapters could be of value to you.*
5. Go to Mitigation of Climate Change, and note any chapters or subchapters that are relevant to your research (for some of you this report will not be as useful).



3. The two figures above we’ve discussed briefly in class. The variations in projected warming vary depending on scenarios related to population growth, energy sources, technology and politics. There are forty different scenarios, with the A1B, A2 and B1 most commonly considered (don’t worry about these weird codes). The following provides details on the A1B, A2 and B1 scenarios:

The **A1** scenarios are of a more integrated world. The A1 family of scenarios is characterized by:

Rapid economic growth.

A global population that reaches 9 billion in 2050 and then gradually declines.

The quick spread of new and efficient technologies.

A convergent world - income and way of life converge between regions. Extensive social and cultural interactions worldwide.

There are subsets to the A1 family based on their technological emphasis:

A1FI - An emphasis on fossil-fuels.

**A1B** - A balanced emphasis on all energy sources.

A1T - Emphasis on non-fossil energy sources.

The **A2** scenarios are of a more divided world. The A2 family of scenarios is characterized by:

A world of independently operating, self-reliant nations.

Continuously increasing population.

Regionally oriented economic development.

Slower and more fragmented technological changes and improvements to per capita income.

The **B1** scenarios are of a world more integrated, and more ecologically friendly. The B1 scenarios are characterized by:

Rapid economic growth as in A1, but with rapid changes towards a service and information economy.

Population rising to 9 billion in 2050 and then declining as in A1.

Reductions in material intensity and the introduction of clean and resource efficient technologies.

An emphasis on global solutions to economic, social and environmental stability.

1. Which of the above described emission scenarios has the largest projected temperature increases?
2. Which of the three scenarios do you think is most likely to occur (*There is no right answer! The future is not known…)*?

*As you continue to read through the IPCC report, pay attention to differences related to the various emission scenarios. You’ll want to consider the scenario that you think is most likely to occur.*

4. Go to the IPCC Chapter on Global Climate Projections <http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch10.html> and note which chapters may be useful to you in your research (pdf also posted on BB):

5. Go to the IPCC Chapter on Regional Climate Projections <http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch11.html> and note which chapters may be useful to you in your research:

*Note on a few acronyms :AOGCM is Atmosphere-Ocean General Circulation Model, MMD refers to Multi-model data set.*

6. Read through the sections of the Regional Climate Projections report relevant to your research, and answer the following questions. **Succinctly answer the following questions in the context related to your research topic** (again, you may want to focus on a specific emission scenario):

a. Identify the region you are looking at in the report:

b. Which processes are identified as being important to the projected changes in climate in this region (Key Processes)?

c. How skilled are climate models thought to be for this region?

d. What are the projected changes in temperature for your region?

e. What are the projected changes in precipitation for your region?

f. What are other changes in this region relevant to your research topic (storms, extreme weather, droughts sea level, etc.)? Address at least two other parameters.

g. Based on your research to date, how does the information in the IPCC report compare to the research you’ve conducted so far?

h. Some of your research topics may consider a region for which, due to the coarse resolution of the IPCC report, the IPCC projections aren’t very useful. If this is the case, how do you plan to project future changes (have you found other sources of information)?

7. List three journal articles that you will consult for your research paper that you found during today’s lab:

8. Look to see if the library has these journals, and if not request the articles via interlibrary loan.

9. For Graduate Students (and optional for Undergraduates). Part of your research project requires you to have a component of original research, and I encourage you to be creative in how you decide to incorporate this. If you don’t currently have ideas as to how you want to address this, consider using the NCEP reanalysis to assess how climate will change. You can do this by taking the information that you acquired in Question 5 above, and use NCEP to begin to explore what the projected changes in temperature and precipitation actually mean. For example, if I know that mean annual temperature in Denver is projected to increase by 3.5°C in 2050, I could look at current mean annual temperature maps and see which regions currently have mean annual temperatures that much warmer. I would then do the same with precipitation etc. I may find that the projected changes in temperature and precipitation mean that Denver’s climate will be more like Tuscon’s in the future. Here either include your plans for how you plan to do the original research, or incorporate figures along with interpretations from NCEP: <http://www.esrl.noaa.gov/psd/cgi-bin/data/composites/printpage.pl>