*GEOG/GEOSCI 420: Glacial & Pleistocene Geology*
*Spring 2013*
January 29
**Abstract Draft due:** February 4 (in dropbox by 11:59pm)
**Abstract Review due:** February 5, in-class activity
**Abstract Revision due:** February 19 (in dropbox by start of class)

## Abstract Write-In Assignment

**Directions:**

**1.** Read the journal article on glacier mass balance in Norway. It may be helpful to read it once for understanding, and then again to absorb some more details. I usually start reading articles by reading the abstract (which isn't given to you), then the conclusions, then looking at the figures. If I'm still interested, I'll read the discussion, and then start from the beginning and read the whole article.

**2.** Write an abstract for the article. This should be between ~7 and 15 sentences. There should be an introductory sentence to let the reader know why the work is important, and to put it in context. Next, the abstract should describe what was done, and what important result(s) come out of the study. If relevant, the abstract should end with the major discussion point(s) that interpret how the results fit into the larger picture.

**3.** We will do a peer-review of the abstracts you write. I will give an anonymous version of your abstract to a classmate, and they will review your abstract for both writing and content. You will, in turn, review a classmate's abstract using the attached rubric. Then, you will be allowed to rewrite the abstract. Both your review and your final abstract will be graded. You will receive full points for your abstract draft if you turn it in on time. See the attached rubric for what is required of the review and the abstract.

**Grading:**

| | |
|---|---|
| 10% | Abstract Draft |
| 20% | Abstract Review |
| 70% | Abstract Revision |
| 100% | Total |

## GEOG/GEOSCI 420: Glacial & Pleistocene Geology

February 19
**Draft due:** March 4, midnight, in dropbox
**Reviews due:** March 12, in class
**Revisions due:** April 2, in class

Summary and analysis of an article on modern Antarctic Ice Sheet dynamics.

Rignot, E., 2006, Changes in ice dynamics and mass balance of the Antarctic ice sheet, *Philosophical Transactions of the Royal Society A, v. 364*, p. 1637-1655.

**Directions:**
**Part 1:**
For this assignment, you will be reading a scientific article related to the behavior of the Antarctic Ice Sheet. This article overviews some of the past interpretations of Antarctic Ice Sheet (AIS) behavior, while reviewing more recent data and how it alters our understanding of the ice sheet. The AIS is divided into two sectors, the first being the very large and relatively stable East AIS (EAIS), and the second being the much smaller and much more unstable West AIS (WAIS). You will see that most of the data we have is for the WAIS. Much Antarctic research is conducted with the understanding that the AIS can contribute significantly to sea level rise. The WAIS, because of its instability, is the more important player when thinking about sea level changes caused by Antarctica.

After reading the article, you will write a draft of a short (2-3 pages) paper. The paper should include:

1. Background on the topic (see the introduction section of the article for this, and/or include what we've covered in class. You may use your textbook for material.)
2. Why the topic is important
3. Brief summary of the study (new data presented here), including why it is important to the understanding of Antarctic Ice Sheet dynamics and mass balance
4. A discussion examining how and why the main results presented in the article are different from previous studies
5. A conclusion stating the main points of your paper
6. References (including the Rignot, 2006 article and any other sources you used while writing your paper). This does not count as part of the 2-3 page limit. It doesn't matter which reference style you use, but be consistent.
7. You may (but you don't have to) incorporate 1-2 figures that you feel improve your explanations or discussions. Be sure to reference them and

include a figure caption. These also do not count as part of the 2-3 page limit.

When writing, try to make connections between the data discussed in the article and the processes you learned about in class. I want to see that you understand *why* the ice sheet is behaving the way it is.

**Part 2:**

You will turn an electronic version of your paper into the Learn@UW dropbox, and your instructors will give them anonymously to two classmates to review. You will, in turn, review two classmates' papers. Reviews will be done outside of class, and are due one week from when the papers are given to reviewers.

Reviewing is both an important skill to have as a scientific thinker (e.g., for peer-review of scientific manuscripts; for critically analyzing studies that you read), and benefits the person whose paper you are reviewing. Your review will be graded according to the attached rubric.

Reviews should include:

1. Writing comments and/or suggestions (for clarity, grammar, spelling, sentence structure)
2. Content comments and/or suggestions (for accuracy, importance, thoroughness)

**Part 3:**

You will receive the reviews given by your classmates, and then write a revised version of your paper. Some reviewer comments will be obvious improvements to your work, and others you will choose to ignore—this is okay, and is how revisions are normally done. You must make the decision as to what to include in your own paper.

Revisions will be graded according to the attached rubric. Note that we are not necessarily looking for a paper that shows a lot of improvement—we are looking for a good paper, whether you write that the first time around or the second. We are, however, also checking to see if you incorporated the necessary revisions that were suggested by your reviewers.

## GEOG/GEOSCI 420: Glacial & Pleistocene Geology

April 2, 2013
**Draft due:** April 22, in dropbox
**Reviews due:** April 30, in class
**Revisions due:** May 9, in class

*Summary and analysis of an article describing the effects of Northern Hemisphere ice sheets on climate changes.*

**Article:** Clark, P.U., Alley, R.B., and Pollard, D., 1999, Northern Hemisphere ice-sheet influences on global climate change, *Science, v. 286*, p. 1104-1111.

**Directions:**

**Part 1:**

**Background**

Read the article by Clark et al. (1999) on Northern Hemisphere ice sheets. This article is a brief review of how ice sheets can influence climate and climate change, with a focus on the behavior of ice sheets in the Northern Hemisphere. Up until now, we have been thinking about how climate affects glaciers and ice sheets, but haven't explored how the relationship works the other way.

Much of the research that examines climate changes in the Pleistocene (and Holocene) points to the North Atlantic region as having strong global influences. It is there that ocean circulation can be readily changed, which impacts temperature across the globe. The Northern Hemisphere in general appears to dominate paleoclimate records, as a result of the large changes in terrestrial ice volumes and extents that can occur there.

When examining Pleistocene paleoclimate, it becomes clear that there was a change in the frequency of glacial-interglacial cycles around one million years ago. Previous to the change (called the Mid-Pleistocene Transition, or MPT), ice sheets grew and shrank according to precession and obliquity cycles. After the MPT, ice sheet size changed with eccentricity cycles. But, eccentricity doesn't vary very much, and doesn't seem powerful enough to cause such large changes in ice volume, including the rapid transitions from glacial periods to interglacial periods. The article by Clark et al. (1999) attempts to explain why the MPT occurred—it's not the only possible explanation, but it's a plausible explanation, and you should be able to understand it (after some thinking) with the background you have from our class.

**Article Summary and Analysis Draft**

For this assignment, you will write a summary of the article, and then develop your own analysis of some of the ideas in the article. Your paper should be 3-4 pages, double-spaced, and be structured as follows:

1. **Introduction:** including,
    a. Briefly, how have the three orbital parameters influenced climate during the Pleistocene?
    b. Briefly, why is studying ice sheets important for understanding past climates?
2. **Article Summary**: including,
    a. What were the goals of the authors?
    b. How do the authors think that substrate controls ice sheet growth and decay?
    c. What do the authors think connects differences in substrate to some of the climate changes that have occurred over the past few million years?
3. **Article Analysis**: including,
    a. Discuss the manner in which soft and hard beds can be eroded, and the influence this has on the author's hypothesis explaining the change in glacial-interglacial cycle frequency.
    b. How does the location of the elevation line altitude affect the mass balance of thin versus thick ice sheets? Remember to think about isostatic depression and rebound… There is a positive feedback connecting mass balance and the area of ice in the accumulation zone. How does this connect to the thickness of ice sheets?
    c. Why is the study of ice sheets that no longer exist important to our understanding of to modern climate system?
4. **Conclusion**: including,
    a. A few sentences summarizing the Clark et al. (1999) paper.
    b. Using your own interests and understanding, expand upon why the material discussed in your paper is important. You may use material that we covered in class, or that you are familiar with outside of class.

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