Lab 1
GEO 302C

Goal
Introduce students, go over course structure, and outline general ideas underlying climate science.

1. Introductions

2. Go over syllabus, expectations, structure of lab

3. Discussion

- Climate vs. weather
- Components of the climate system
- Forcing and response
- Response time
- Feedback
- Equilibrium

Lab 1 Homework
GEO 302C
This is due to your TA at the beginning of your next lab meeting, in the week of Feb 2, 2009

Your name:
Your EID:

Climate and weather

1a. (10 points) Succinctly explain the difference between climate and weather. Do not quote Ruddiman.

1b. (5 points for a thoughtful response. No "right" answer.) Why, beyond the near-certainty that you will be asked to differentiate between climate and weather on exam(s) in the future, do you think it is important to know the difference?

Feedback (see Ruddiman pp. 15-16 for a discussion;
http://bcs.whfreeman.com/ruddiman2e/content/cat_010/EarthsClimate_Web_Chapter.pdf
pp. 8, 14, 34 for examples of feedback-loops and their corresponding diagrams)
Also check out http://en.wikipedia.org/wiki/Feedback for more info.

2a. (10 points) Draw or thoroughly describe an example of a positive feedback loop that occurs in your discipline (i.e., your major) or in another aspect of your life.

2b. (5 points) Explain WHY it is a positive feedback loop.

3a. (10 points) Draw or thoroughly describe an example of a negative feedback loop that occurs in your discipline or in another aspect of your life.

3b. (5 points) Explain WHY it is a negative feedback loop.

Forcing and Response (see Ruddiman pp. 10-15 for a discussion of forcing and response)

4. (5 points example; 6 points explanation) Give an example of a change in the climate system that is both a forcing (cause) and a response (effect). Explain why it is both. *Hint: Think about what happens in feedback loops.*

5a. (9 points) Ruddiman lists three "fundamental forcings" of the climate system (not including humans). These same three forcings are often called "external forcings." What are they?

Bonus (5 points). Why do you think the forcings listed above are often called "external" forcings?

Response time (see Ruddiman pp. 10-15 and Table 1.1)

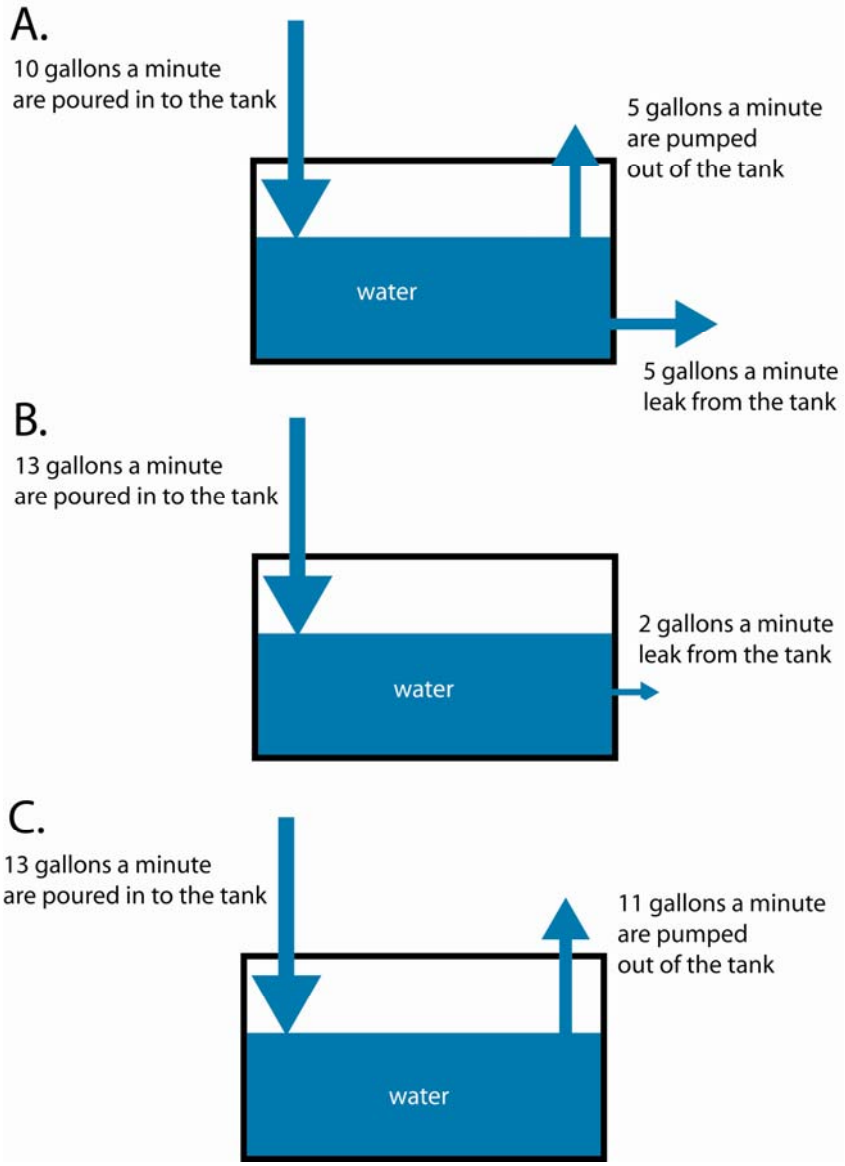
6. (5 points) Define response time with words or with a well-labeled diagram. Do not quote Ruddiman.

7a. (2 points) What is the approximate response time of the atmosphere?

7b. (2 points) What is the approximate response time of the ocean?

7c. (6 points) If the atmosphere's response time increased to that of the deep ocean, what do you think would happen to the daily range of temperatures on Earth? Why?

Equilibrium (See Ruddiman p. 11) When a system is at equilibrium, input equals output.



8a. (2 points) Is the system in Panel A at equilibrium (yes/no)?

8b. (2 points) How is the water level in A changing? (Going up? Going down? Staying the same?)

8c. (2 points) Is the system in Panel B at equilibrium (yes/no)?

8d. (2 points) How is the water level in B changing? (Going up? Going down? Staying constant?)

8e. (2 points) Is the system in Panel C at equilibrium (yes/no)?

8f. (2 points) How is the water level in C changing? (Going up? Going down? Staying constant?)

8g. (8 points) Compare the systems in Panel B and Panel C. Think about what you know about how *fast* the water level is changing in each system. What can you say about the relative rates of change in the water table between B and C?

Bonus (10 points)
Why might feedbacks in nature make attempting to understand the climate system more challenging (and correspondingly more interesting!)?