

May 3rd 2005

Name: _____

Please answer five of the following six questions. If you answer all six only the first five will count towards your score. To receive full credit you have to explain your answers. Each question is worth ten points.

1. Ocean Circulation

- a) How are the oceans and the atmosphere heated? Draw the resulting temperature profile for both. (3 pts.)
- b) What causes the large gyres in the subtropical Pacific and Atlantic? (3 pts.)
- c) How do the oceans convect ? Why is ocean convection important ? (4 pts.)

2. The Carbon Cycle

- a) Where is carbon stored on earth? What timescales are involved when storing carbon in these reservoirs? (4 pts.)
- b) How does the biosphere store and release carbon ? (2 pts.)
- c) Describe the promises and limitations of the photosynthetic feedback on atmospheric carbon. (4 pts.)

3. Carbon Sequestration

- a) What is carbon sequestration, and why are we interested in it ? (2 pts.)
- b) Describe two scenarios to sequester carbon that are currently under trial in the United States or Europe. (4 pts.)
- c) What controls long term atmospheric carbon dioxide levels? (4 pts.)

4. Global Warming and Climate Modeling

- a) Briefly describe two general types of climate models as well as their advantages and disadvantages. (2 pts.)
- b) What forcings are likely to affect global climates and how well do we understand them? (3 pts.)
- c) How can we get around some of the limitations discussed in b) ? (3 pts.)
- d) How much did average global temperatures rise in the past 100 years and how much more are they expected to rise by the end of this century? (2 pts.)

5. Short-term Climate Change

- a) Outline a few methods to reconstruct short-term (and relatively recent) climate change. (3 pts.)
- b) How did the climate in the North Atlantic region change over the past 1000 years? (3 pts.)
- c) What are the possible causes of these climatic changes? (2 pts.)
- d) How did they affect humans living in this region? (2 pts.)

6. Glacial-Interglacial Cycles

- a) How did early geologists reconstruct glacial periods? How many glacial periods did these early researchers reconstruct? (2 pts.)
- b) How do we know today that the Earth underwent a series of approximately 20 glacial-interglacial cycles over the past 2 Million years? (4 pts.)
- c) What triggers glaciations and what might terminate them? (4 pts.)

