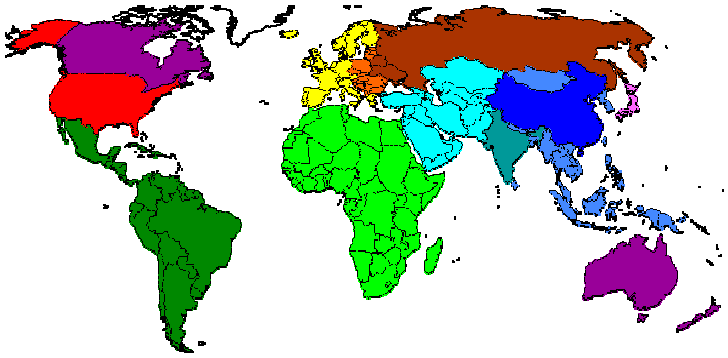
Climate Modeling
(Part B, The Java Climate Model)
The Environment and Disease Laboratory 2B
Fall 2002



Introduction

The Java Climate Model written by Dr. Ben Matthews uses box modelling to simplify the complexity of climate modeling and its interactions with the carbon cycle and public policy. The simplification permits you to explore complex interrelations in real time on a desktop computer. The model permits you to vary a number of different paramters and see how these influence CO_2, temperature, and sea-level over the next 300 years. Load the Java Climate Model (JCM) at:
http://inside.bard.edu/~sanderso/EnvDis/climateModeling/jcm/

Before you start there are a few basic things to keep in mind.

- You can get very brief information on nearly any aspect of the plots and charts merely by moving your mouse over that item. You can get in-depth information by selecting the help button then selecting some part of a plot with which you'd like help. Be sure to press Help again when you are done with it.
- You cannot "break" the model. The author has thoroughly linked most topics in order to enhance non-linear browsing. Click with abandon!
- If you find yourself lost, just click the Reset button at the upper lefthand side of the plots frame.

Directions

1. Follow the menu link "Menu". This brings up a sort of table of contents entitled "JCM Doc Menu". Now select "How to use" link beneath the Introduction section. Read and follow all four steps in this brief introduction to JCM. Note in Step #4 there is a slight error. The directions tell you to select the "SRES no-policy scenarios" from the Emissions menu. In fact, this is found under the Mitigation menu. Also, in Step #4 be sure to try rescaling the x and y axes, since this is often necessary.

2. Set mitigation to "Stabilize Temperature". This allows you to explore a policy that attempts to set direct limits on global warming. Suppose temperature change is limited to 2 degrees C in 2200. Which places seem to warm first? Where will temperatures change the most? the least? (Hint: you might find it useful to permit the Regional Climate Map to cycle through

years and then stop this map when it reaches about 2200. You can do this by clicking the very small YE button on the Regional Climate Map. This will cycle through the years of simulation, stopping whenever you move your cursor inside the YE button and running if the cursor is in the Regional Map, but outside the YE button.) Note also that you can view the temperature change at any location by moving the cursor over that location.

3. One of the articles we read explained that increased variability in the climate was probably a greater problem than a simple change in the average temperature or precipitation. If you cycle through the months in 2200 (with a 2 degree temperature increase) and compare that with the temperatures during 2000, what differences in variability do you find?

4. Four approaches to stabilizing the effects of greenhouse gases are provided. These are explained under MENU-Mitigation. Try these different approaches. You may like to display the regional climate map and then select the YE (year) button. This will show how temperatures increase over the years 1750-2300. Which is most effective at helping to limit the increase in temperature? Which is most feasible given the current state of global affairs?

5. Tour the SRES Scenarios (linked from the Main Menu). These scenarios were developed by the Intergovernmental Panel on Climate Change (IPCC) to indicate six different world growth scenarios. You may also like to read the author's reflections on the science policy problem (found under "Approaches" on the Main Menu). Write 2-3 paragraphs explaining what do you think the role of modeling should be in helping to determine public policy on global climate change? In answering this you may like to consider the accuracy of modeling, the variability of outcomes, and the vast number of unknowns that ultimately leads to possible scenarios.