Experiments to simulate Climate Change: EdGCM

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Climate change is a topic of great importance. It is clear that, if CO2 levels continue to rise, changes in the climate are inevitable. The best means we have of anticipating these changes is to use Earth System Models. A model, EdGCM, is available and can be used to carry out a series of numerical experiments to evaluate the likely changes in climate under various scenarios.

Tasks to be undertaken:

- Study the documentation available on EdGCM
- Study in detail the basic reference paper, Hansen
- Study the summary material from the IPCC AR4 Reports.
- Download and install the EdGCM model from http://edgcm.columbia.edu/
- Familiarize yourself with the components of the model system
- Design a set of numerical experiments to investigate the sensitivity of the climate under a range of scenarios:
    - Simulate current climate conditions (1961-9990)
    - Sensitivity to CO2 level (doubling CO2).
    - Response to changes in solar outputs
    - Role of orbital parameters in paleo-climate
- Select a set of provisional conclusions from the AR4 Report. Using the EdGCM model system, design and carry out a series of tests to generate numerical evidence that *either* supports each of these conclusions *or* produces evidence that conflicts with them.
- Using numerical output from the EC-Earth model (provided by Met Eireann) and/or from CGCM 3.1, 1961-2000 and 2021-2060 (from Paul Nolan), compare the simulations of the climate for the late 21st century arising from EC-Earth and EdGCM. Present arguments to explain any inconsistencies between the two models.
- Summarize your findings in a report.