

WEDNESDAY 21 MAY 2003: THE SYMONS MEMORIAL LECTURE

Dr Matthew Collins (Centre for Global Atmospheric Modelling): **Seasonal to decadal climate variability and predictability**

One strategy for inspiring confidence in predictions of anthropogenic climate change is to use the same models to make predictions of unforced seasonal to decadal variations in climate. If the public regularly receive accurate predictions of e.g. next winters UK precipitation, then they are more likely to believe predictions of winter UK precipitation in 2050. This is however a high risk strategy as (i) current models do not adequately simulate all aspects of natural climate variability and (ii) such variations may be in themselves inherently unpredictable and therefore we may never be able to produce accurate forecasts. This talk will highlight recent advances in modelling and understanding natural climate variations and their limits of predictability. There will be a particular focus on the El Nino Southern Oscillation and on decadal variations in the strength of the ocean thermohaline circulation.

Mr Keith Williams (Hadley Centre, Met Office): **Evaluating cloud feedback under climate change**

Predictions of climate change due to increasing greenhouse gases under a particular forcing scenario vary considerably between different climate models, largely as a consequence of the models displaying different climate sensitivities. It is widely believed that the radiative feedback from clouds remains one of the largest uncertainties in determining the climate sensitivity. This study illustrates how the use of compositing techniques to stratify model and observational data can lead a greater understanding of processes affecting the simulated cloud response under climate change. This permits key dynamic and thermodynamic relationships to be identified and isolated and so, may provide a more appropriate basis than afforded by traditional techniques for evaluating modelled cloud processes which are important for climate change.

Dr Timothy Lenton (Nerc Centre for Ecology and Hydrology , Edinburgh): **The carbon cycle and climate change**

Land and ocean carbon sinks are predicted to be growing at present and hence buffering the rate of rise of atmospheric CO₂. However, future global warming is predicted to suppress the ocean carbon sink and cause soil respiration to overtake the CO₂ fertilisation of net primary productivity, generating a transient land carbon source, which will amplify peak levels of atmospheric CO₂ and global warming. The size of the land carbon source depends on the rate and magnitude of forcing and uncertainties in terrestrial ecosystem processes. On a millennial timescale, the apportioning of carbon between the atmosphere, ocean and land will return close to steady state. If the entire known fossil fuel resource has been emitted, the remaining airborne fraction of carbon dioxide (~30%) will make the world at least 5°C warmer.

Dr John F B Mitchell OBE (Chief Scientist, Met Office): **Can we believe predictions of climate change?**

Predictions from global climate models are increasingly being used to guide policy on

climate change. Thus, it is important that we assess, as far as we can, how reliable climate models are. I discuss the main methods which have been used to date to attempt to show the reliability of climate models and present some illustrative results. I also assess how useful these approaches are likely to be in establishing a model's fidelity in predicting climate change and, where appropriate, indicate possible improvements.