Probabilistic climate projections with HadCM3

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Abrupt climate change, 13 July 2005
Uncertainty in model formulation is likely to remain: parameter uncertainty / structural uncertainty

Need to quantify how model uncertainty translates into uncertainty of climate projections (e.g. climate sensitivity, regional climate change) for probabilistic statements
Examples:

Uncertainty in DJF SAT

Uncertainty in DJF precip.

Murphy et al. 2004
Uncertainty in regional change in Atlantic P-E+R under CO$_2$ doubling
Approach:

- Feasibility study for ‘THC risk assessment’
- Sample parameter space of HadCM3 atmosphere
- Based on un-fluxadjusted HadCM3 perturbed physics ensemble (~20 members)
- Quantify how uncertainty in (atmospheric) model formulation impacts on THC behaviour to rising greenhouse gas concentrations
- Understand the difference in THC response (if any!)
- Need to define useful metric to quantify quality of each member
Preliminary results:

HadCM3 (thin), QUMP#2 (heavy) 1% CO2 incr.