

## **Report on break-out session 1 ‘Pacemaker Experiments’ C20C meeting – 15 March 2007 – Exeter**

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Important questions that Pacemaker experiments can answer:

1. What is the common response to ENSO SST among the various models that have made pacemaker runs? Where do they disagree? Does a multi-model consensus (not just the mean) make sense? For example, several groups have examined the ENSO-monsoon relation ... do they reach the same conclusions and, if not, why not?
2. What is the common response to North Atlantic SST among the various models that have made pacemaker runs? Where do they disagree? Does a multi-model consensus (not just the mean) make sense? For example, do different models have different (any) representation of the NAO?
3. Are there other regions where SST should be specified in a pacemaker experimental setup? Is there a more objective way to define the prescribed SST region(s)?
4. How do pacemaker simulations compare with more traditional C20C simulations (global specified SST)? Is there variance among the models that have run in both modes, i.e., do different models have different changes in behavior comparing traditional vs. pacemaker runs? Should some pacemaker experiments be run with prescribed climatological SST in the tropics as a control?
5. What is the role of ocean dynamics? Can/should we introduce dynamical ocean models to investigate this? For example, we could have fully coupled models that include heavy flux correction only in the region where we are specifying SST in pacemaker mode now. Does the  $q$ -flux formulation differ significantly among models, and, if so, why is that necessary?
6. When doing ensemble simulations, is some uncertainty in the prescribed SST required?
7. How can the pacemaker strategy be used to address the decadal prediction problem?
8. How can the pacemaker strategy be used to contribute to the anticipated IPCC AR5?

The Pacemaker breakout group recognizes the inherent limitations of the first generation of pacemaker experiments. In particular, the procedures for prescribing SST anomalies in these experiments do not take full account of the two-way interactions of the atmosphere-ocean system in various regions of interest. Moreover, these experiments do not address important issues related to the origin of the SST anomalies themselves. Novel coupling techniques and experimental designs are needed to delineate the roles of various feedback processes in climate variability on various time scales.

The Pacemaker group did not get to the point where a prioritized set of experiments was agreed

among interested participants. This needs to be done in the period following the Exeter Workshop bearing the above comments in mind.