Report on break-out session 3 'Forcings'
C20C meeting – 15 March 2007 – Exeter

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a) Sea surface temperature

The group discussed the priorities for development of the Hadley Centre Sea Ice and Sea Surface Temperature dataset HadISST2 during the coming 3 years. The most important requirements are for bias-free SST and sea ice and for fully quantified SST and sea-ice uncertainties so that C20C experiments can be forced by an ensemble of HadISST2s selected from the uncertainty ranges. SST has priority over sea ice because of the evidence for the forcing of the atmosphere by tropical SST anomalies. The satellite era has higher priority than earlier years.

Other important improvements for HadISST2 are flexible spatial and temporal resolution, and enhancement of data to give meaningful information (as opposed to estimated climatological averages) everywhere. Owing to the unusual El Niño and severe European winters in the early 1940s, priority should be given to incorporation of newly-digitised SST data and newly-available Arctic chart sea-ice data for the World War 2 period. Analyses of Southern Ocean pre-1982 SST, and of near-ice SST in both hemispheres, should also be improved. The availability of climatological diurnal cycles of SST was welcomed because these cycles can now be superimposed on HadISST1 or HadISST2 in C20C simulations.

b) External forcings

The group discussed whether the representation of external forcings applied to future C20C model calculations should be standardised between modelling groups. This would increase comparability of C20C results, although differences in capability between participating groups makes it difficult to apply a rigid protocol for some forcings (e.g. aerosols). The difference in relative importance of forcings between the global and regional scales of interest to C20C was also highlighted. For example, changes in carbonaceous aerosol from biomass burning are not crucial to understand global mean climate change, but may be important over North Africa. The group took the view that it is impractical to standardise representations of the various tropospheric aerosols species between models. This is because it requires complex numerical aerosol schemes. Only some groups possess these, and where they do the forcings produced are scheme- as well as emissions-dependent. Nevertheless, the group strongly recommended that, wherever model capability allows, detailed aerosol representations be used in future C20C simulations to improve regional climate simulation e.g. the Indian monsoon.

Land-use changes are another key regional external forcing, and it was suggested that a subset of interested groups perform land-use change experiments, in line with the outcomes of the land surface break out group (see Breakout Group 2 Report). Overall, it was decided that there should be a 'minimum threshold' of conformity in forcings in future C20C experiments, including HadISST SST and sea-ice, greenhouse gases, stratospheric ozone change, and stratospheric volcanic aerosol. All these forcings, except volcanic aerosol, are part of the existing C20C protocol, details of which are

on the C20C website. For volcanic aerosol, a small sub-group led by the Hadley Centre will produce a recommendation of how this can be represented in C20C experiments and post their findings on the C20C website.