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Multi-millennial simulations of the climate of the late Holocene

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A low-resolution version of the CSIRO coupled general circulation model has been developed, which is suitable for studying climate variability and change on multi-millennial timescales. The model is computationally efficient, and portable across a wide range of computer architectures.

Simulations are conducted in accordance with PMIP2 experimental design. Three control runs are conducted for pre-industrial conditions, forming a perturbed-physics ensemble. The control climate exhibits a very high degree of stability, and the dominant mode of internal variability corresponds to the El Niño-Southern Oscillation. However, the simulated El Niño is weaker, and has a longer return period, than the observed phenomenon.

Each ensemble member is used to conduct equilibrium simulations of the climate of 6 ka BP. The simulated temperature and precipitation changes, relative to the control runs, are in good agreement with those simulated by other models. The changes are also robust, with the differences between the ensemble members generally being small and statistically insignificant. Relative to the control runs, the simulated El Niño is slightly weaker, and there is a slight increase in the return period.

Preliminary results are also presented for transient simulations of the climate of the late Holocene, from 6 ka BP to the present day. The technique of Lorenz and Lohmann (2004) is employed, in which the rate of change in the Earth's orbital parameters is accelerated.

Lorenz, S.J., and G. Lohmann, Acceleration technique for Milankovitch type forc-

ing in a coupled atmosphere-ocean circulation model: method and application for the Holocene, *Climate Dynamics*, 23(7–8), 727–743, 2004.