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Long term memory, potential predictability and degrees of freedom in an Atmosphere-Ocean GCM

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A millenium control run of a coupled atmosphere-ocean GCM (ECHAM/MPIOM) is analysed to determine longterm memory, potential predictability and the degrees of freedom based on the variability of annual mean near surface temperatures. The techniques applied are based on detrended fluctuation analysis, time scale dependent variance fractions, and EOF analyses. Thus decadal climate predictability is assessed employing non-linear and linear analysis techniques. The results of these methods are compared. Regions of various degrees potential long term predictability are identified and the degrees of freedom of the underlying variability are determined.