



A trend study of late Holocene paleo data versus model simulations

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A trend study of late Holocene paleo data versus climate model data is performed by studying sediment cores from specific locations in the North Atlantic, and comparing these with simulated data from the same areas and time period. The data of interest for this project is sea surface temperature, which is obtained from marine organisms in the sediment cores. The climate models used are coupled, and involve the atmosphere, ocean and sea ice, biosphere, ice sheets and the carbon cycle. The modeled data have monthly resolution, while the temperature data from the proxy material are given with sampling intervals spanning 2-40 yr.

Trend identification is made against several null hypotheses for the climate noise. Parametric and non-parametric analysis methods of Northern Hemisphere late Holocene ocean temperature records suggest that the most appropriate noise model involves long-range persistence characterized by Hurst exponents close to unity, so emphasis is on trend detection under this null hypothesis. Errors defining the confidence limits of these estimates arise from a number of sources; model errors and statistical uncertainty in the simulations, errors in the temperature proxies, and statistical uncertainty in spurious estimated trends arising in finite record-length realizations of a specific long-range memory stochastic process. Model errors are difficult to assess, but the others are estimated from ensembles of climate model simulations and ensembles of numerical realizations of long-range memory processes (Monte Carlo simulations).