Geophysical Research Abstracts,
Vol. 11, EGU2009-501, 2009
EGU General Assembly 2009

Evaluating Holocene Climate Variability using EOF and Time Series Analysis on 80 Records with Global Distribution: Common Forcing or Regional Noise?

S.A. Marcott (1), V. Ersek (1), N.G. Pisias (2), and P.U. Clark (1)

(1) Department of Geosciences, Oregon State University, Corvallis, OR, U.S.A. (marcotts@geo.oregonstate.edu), (2) College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, OR, U.S.A.

During the last million years, climate variability on multi-millennial timescales (10^4 – 10^5 yr) has been dominantly driven by variations in the Earth's orbit around the Sun (Hays et al. 1976). At millennial timescales (10^3 yr) a 7000 year oscillation appears to exist during the last glacial period that is punctuated by abrupt climate changes occurring every 2000 – 3000 years (Bond et al., 1993; Clark et al., 2007). At both timescales, the climate changes are globally distributed and at the millennial scale the changes can occur in less than a decade. The climate of the last 11,000 years, however, is more stable, and a common mode of climate variability among various records appears to be lacking. Nonetheless, it has been proposed that a ∼1500 year cycle may persist in some records, albeit with small amplitudes (Bond et al., 2001; Debret et al., 2007). This notion has spurred much debate as to whether a dominant mode of variability actually exists in the Holocene and what may be driving the climate system to oscillate around this period. To address these issues, we have evaluated a globally distributed dataset of 80 paleoclimate records using empirical orthogonal function (EOF), spectral, and wavelet analysis. We find two dominant modes of climate variability that appear to be associated with long term insolation change and an unresolved Northern Hemisphere forcing. After high-pass filtering of frequencies above 3000 years and performing multiple Monte Carlo simulations, we further find that that a robust ∼1000 year climate oscillation appears to exist when evaluated with spectral and wavelet analysis.