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Testing the Consistency of a 1470-years Periodic Component in Polar Ice Cores by Means of Phase Coherence Analysis

R. Donner

Institute for Transport and Economics, Dresden University of Technology, Germany
(reik@agnld.uni-potsdam.de)

The origin and statistical significance of a 1470-years cyclicity in oxygen isotope records from polar ice cores is a matter of a debate which is still going on. In this contribution, I am going to add a new piece to the puzzle of understanding millenial-scale variabilities of the climate systems. In contrast to recent approaches which have considered both, amplitudes and phases of the hypothetic cycles, Hilbert as well as wavelet transforms may be used to derive a pure phase signal. Basing on the resulting time series, I describe a novel framework originated in phase synchronization analysis which is capable to statistically test for the consistency of palaeoclimatic records with a periodic signal of rather general shape. The proposed method is applied to different ice core records. Potential age model uncertainties are explicitly taken into account.