

Intercomparison of deuterium series from the Antarctic stations Vostok and Dome C ice cores

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Intercomparison of the deuterium concentrations in the ice core (D) from the Antarctic stations Vostok (Petit et al., 1999) and Dome C (EPICA, 2004) is performed. The analyzed data (740,000 years for EPICA Dome C and 420,000 years for Vostok) are interpolated linearly to the time step of 500 years. D is a characteristic of temperature (Petit et al., 1999). This analysis gives information about the possible differences between paleoreconstructions from the Vostok and the EPICA Dome C ice core data.

The comparison of the data (Fig.1) shows similarity between of them generally with some differences (Mokhov et al., 2005). Correlation analysis for the last 420,000 years shows synchronous changes of D from Vostok and Dome C and correlation coefficient $r = 0.68$. Correlation analysis with 100,000 year sliding time intervals (Fig.2) shows differences in time dating between EPICA Dome C and Vostok data. The lags for maximum correlation between the data are about 500 years (1 time step) for 0-114 kyr BP (EPICA Dome C data lead), 2500 years (6 time steps) for 114-245 kyr BP (Vostok data lead), and 3500 years (7 time steps) for 245-330 kyr BP (EPICA Dome C data lead). Low r_{\max} for the time intervals 10-115 kyr BP and 145-320 kyr BP indicate the EPICA Dome C and Vostok dating posses are quite different for those time intervals. Different dating between the EPICA Dome C and Vostok data for the time interval 330-420 kyr BP are about 10-11.5 kyr (pretty large), and also this difference is clearly seen from in Fig.1.

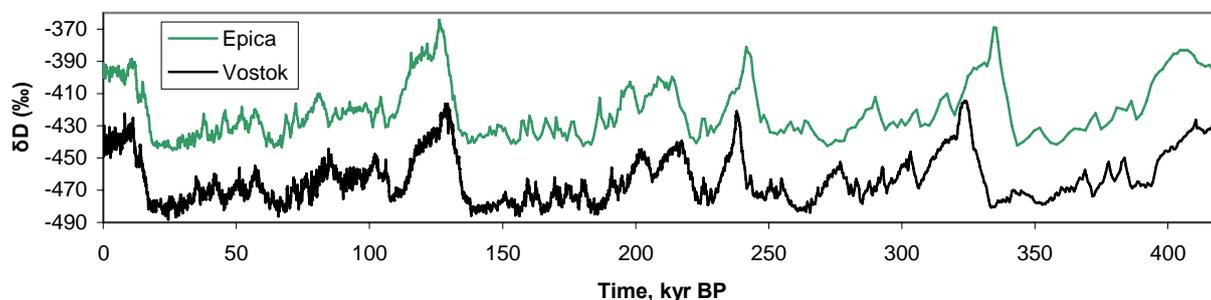


Fig.1. Comparison of the EPICA Dome C data with the Vostok data.

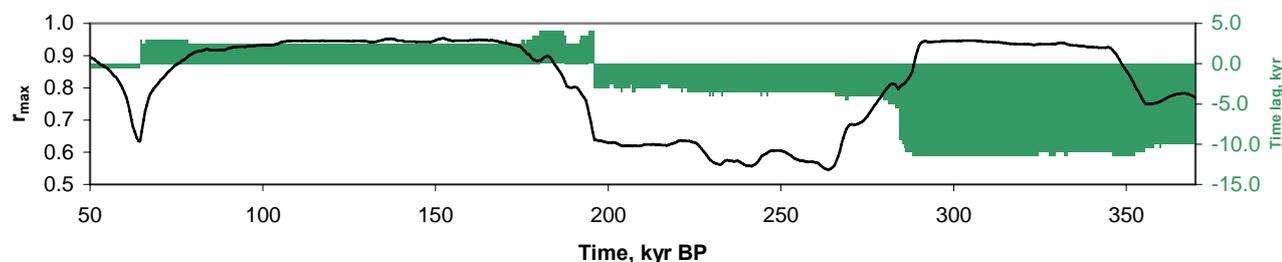


Fig.2. Correlation analysis of the EPICA Dome C data and the Vostok data. The black line shows maximum coefficients of correlation r_{\max} for 100 kyr sliding time interval, and the green area shows the corresponding time lag for r_{\max} (plus – Vostok data lead, minus – EPICA Dome C data lead).

The results of the wavelet analysis (Torrence and Compo, 1998) in Fig.3 show close similarity between the EPICA Dome C and Vostok data (maxima are displayed for about 20, 40 and 100 kyr periods) with some differences in particular for 40 and 20 kyr periods (Mokhov et al., 2005). The spectral peaks for 20, 40 and 100 kyr periods are more significant for EPICA data than for the Vostok data.

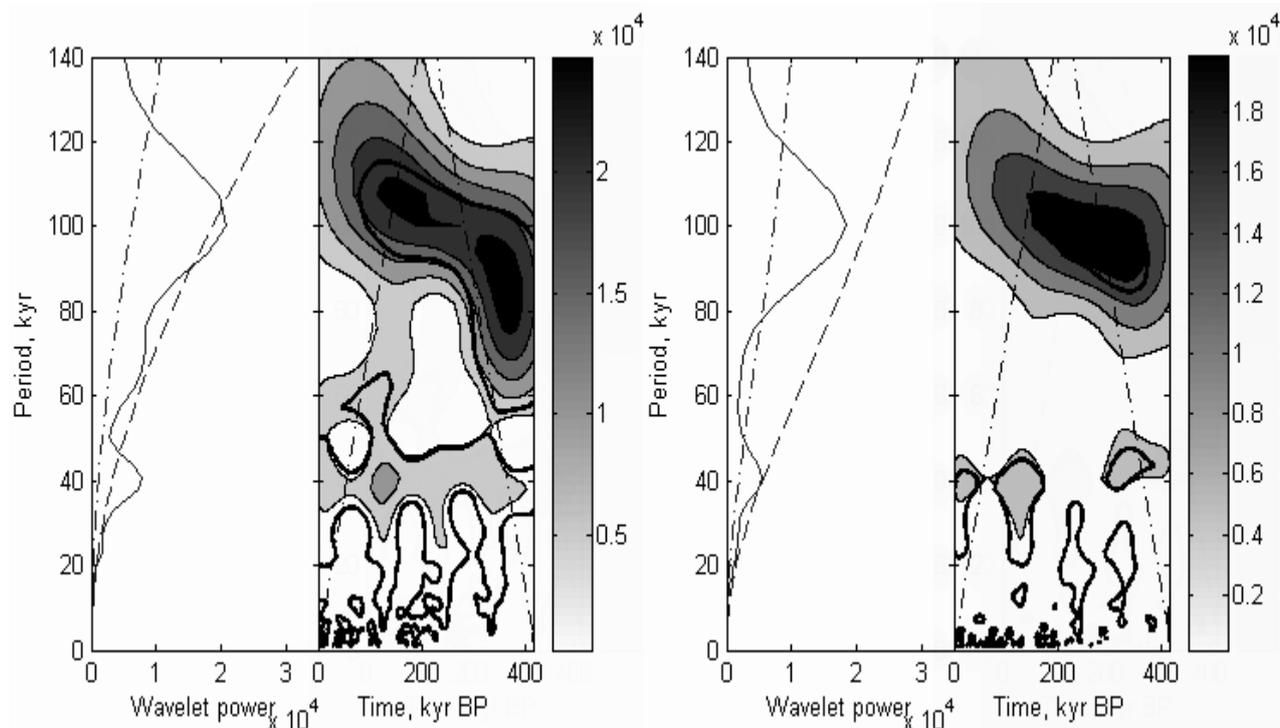


Fig.3. Wavelet analysis of the EPICA deuterium data (left pic) and the Vostok data (right pic).

The EPICA Dome C data show good correspondence with the Vostok data; however the EPICA Dome C data need further time dating improvements.

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References

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