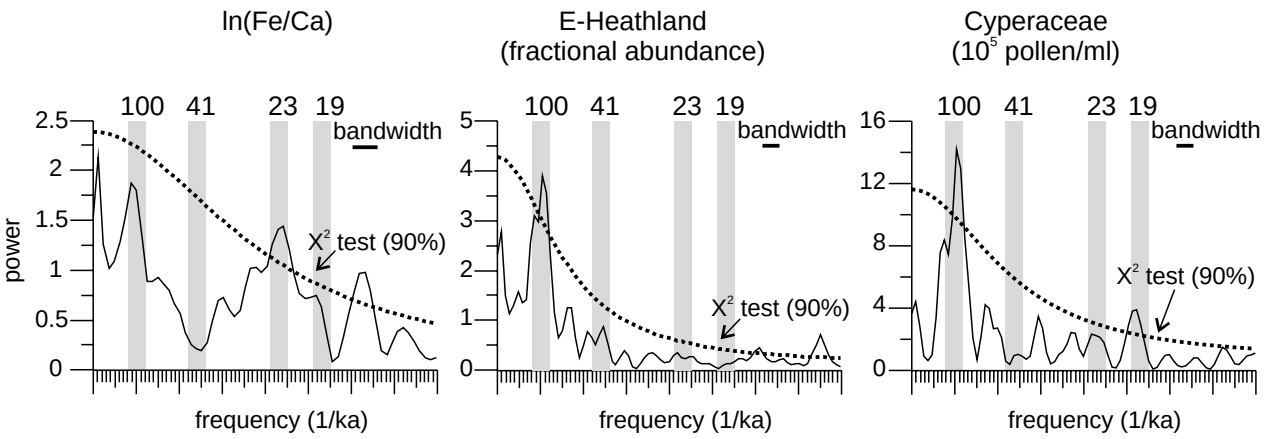
Supplementary Figure 1: REDFIT frequency analysis

We conducted a frequency analysis on the data of the ln(Fe/Ca) ratios, the E-Heathland fractional abundance scores, and the Cyperaceae pollen concentration covering the Brunhes Chron using the algorithm of REDFIT [Schulz & Mudelsee 2002] from the statistical package PAST version 3.14 (1999-2006) [Hammer et al. 2001]. The E-Heathland and Cyperaceae curves each consisted of 181 data points between 0 and 790 ka. REDFIT was run with 2 times oversampling, a Blackman-Harris window, and 2 overlapping averaging segments resulting in a bandwidth of 0.004291; false alarm level was 99.17. The ln(Fe/Ca) curve contained 2307 data points between 1 and 790 ka. REDFIT was run with 2 times oversampling, a Blackman-Harris window, and 3 overlapping averaging segments resulting in a bandwidth of 0.005726; false alarm level was 99.91. The figure shows the power of ln(Fe/Ca) ratios (left), the power of the E-Heathland values (middle), and the power of the Cyperaceae pollen concentration (right) against frequency running from 0 - 0.08 cycles per ka. Denoted are the bandwidth for each spectrum and a parametric approximation of the level above the null hypothesis of a red noise model using X2-test at 90% (dashed lines). Grey bars indicate the orbital periodicities of 100, 41, 23, and 19 ka). Note the maximum in spectral density at 23 ka (precession) in the power spectrum of ln(Fe/Ca) and the lack of spectral density at the precession bands (23 and 19 ka) in the power spectrum of the E-Heathland values. The Cyperaceae pollen concentration, which is both influenced by the expansion of Cyperaceae (sedges) and by the transport of pollen by river discharge, shows significant power at both the 100 and 19 ka.

Supplementary References

Hammer, Ø., Harper, D.A.T. & Ryan, P.D., 2001. PAST: Paleontological Statistics Software Package for Education and Data Analysis. Palaeontologia Electronica, 4(1): 1-9.

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