Quantitative reconstruction of millennial-scale temperature variations in Central Europe

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The amplitude of the environmental changes associated with the Last Deglaciation provides a useful test bench for the climatic and oceanic responses and their attendant feedbacks to major reorganizations of the atmospheric circulation and the surface hydrology. We present the first quantitative reconstruction of millennial-scale temperature variations in Central Europe during the last 40, 000 years based on newly developed temperature proxies measured in a sediment core from the Black Sea (MD04-2790). Despite the shift from lacustrine to marine conditions (and therefore associated salinity changes) that affected the basin, the tetraether-based paleothermometer (TEX_{86}) properly records the increase in surface water temperatures during the Last Deglaciation. To our knowledge, no quantitative temperature reconstruction has been published for the Black Sea area so far, a comparison of the amplitude of temperature changes reconstructed for the Last Glacial Maximum and the actual in the Mediterranean basin shows that the Black Sea values are consistent with that of the western basin and colder than the eastern basin [1]. Interestingly and in contrary to what is seen in nearby archives (pollen assemblages [2], [3] and speleothems [4]) Heinrich events deeply imprint our glacial temperature record, whereas the signature of Dansgaard-Oeschger interstadials are comparatively attenuated. The high-resolution record also provides snapshots of the basin responses to specific abrupt climatic events such as the Younger Dryas and the Bølling-Allerød.

[1] Hayes *et al*. (2005) *Quaternary Science Reviews* **24**, 999–1016. [2] Naughton *et al*. (2007) *Marine Micropaleontology*, **62**, 91–114. [3] Fletcher *et al*. (2010) *Quaternary Science Reviews*, **29 (21-22)** 2839–2864. [4] Fleitmann *et al*. (2009) *Geophys. Res. Let*. **36**.

Application of thermal analysis and NMR to study soil organic matter biodiversity and biodegradability in afforested lands

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Calorimetry and thermal analysis can be applied to studies of the stabilization of soil organic matter (SOM) under different environment situations and types of management. In this study, differential scanning calorimetry (DSC) and isothermal calorimetry were applied, along with ^{13}C CPMAS NMR, to assess the changes in SOM quality in afforested lands under pine and eucalypt in a humid temperate region.

Samples with the highest carbon percentages contained highly diverse mixture of aliphatic fractions, carbohydrates, cellulose, aromatic C and carboxyl groups. The heat of combustion was also highest in these samples. The loss of SOM and the C decay affected the aliphatic fraction and carbonyl groups, which could not be identified in the NMR spectrum or in the DSC curves of those samples. Carbohydrates and aromatic C persisted in the samples with the lowest C percentages. C gain after afforestation predominantly affected the aliphatic and aromatic fractions in the pine stands and the aliphatic and carbohydrate fractions in the eucalypt stands. The method was sensitive to detect differences in the OM nature attributable to the tree species.