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DEGRADATION OF MARINE BIOMARKERS FROM BLACK SEA SEDIMENTS REVEALED BY THEIR RADIOCARBON CONCENTRATIONS

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The potential of biomarkers for reconstructing past environmental conditions depends on their source specificity as well as on their preservation during transport and in the sediment. Bottom water oxygen contents are thought to be one of the major controlling factors of organic matter preservation. We investigate the selective degradation/preservation of several lipid biomarkers by comparing their abundance and radiocarbon concentration in surface sediments from oxygen-replete and oxygen-depleted sites in the Black Sea. The world's largest surface water basin with both well-oxygenated and permanently oxygen-deficient conditions below the pycnocline (100-200 m) provides ideal conditions for this study.

A radiocarbon (^{14}C)-based study of several organic compounds by Wakeham (unpublished data) revealed a wide range in ^{14}C concentration of marine phytoplankton-derived biomarkers in surface sediments from one site in the SW Black Sea reflecting post-depositional processes. In previous studies it was found that sea surface temperatures (SST) determined from the ratio of di- and tri-unsaturated alkenones (UK'37) are unrealistically low and show strong spatial (own data) and down-core variations (Xu et al. 2001) questioning the applicability of UK'37 in the Black Sea. Information on the applicability of the new TEX86 proxy for SSTs derived from glycerol dialkyl glycerol tetraethers (GDGTs) from marine Crenarchaeota in the Black Sea are scarce. However, the GDGT-based Black Sea surface temperature determined by Schouten et al. (2002) was even lower than the alkenone-derived value. The difference was attributed to the differences in seasonality of the precursor organisms.

In this study surface sediments from a slope transect (90-2000 m water depth) in the NW Black Sea and from a location in the SW Black Sea (1700 m water depth) were analysed. The latter core was recovered near the Sakarya River and may contain input of terrigenous material supplied by the river. We present compound-specific ^{14}C data of several marine phytoplankton-derived lipid biomarkers including alkenones and short-chain fatty acids to study their degradation/preservation under oxic and anoxic conditions. These data are compared to ^{14}C concentrations of archaea-specific GDGTs. Preparative gas chromatography was used for the identification of fatty acids and their separation for ^{14}C analysis. GDGTs

were determined by high-pressure liquid chromatography with positive ion atmospheric pressure chemical ionization mass spectrometry (HPLC-APCI-MS). The results are discussed in the context of sources and preservation of the different compound classes, and inferences are made on the use of the associated proxies for paleo-environmental reconstructions in the Black Sea.

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