



Transport of branched tetraether lipids from the Tagus River basin to the coastal ocean of the Portuguese margin: Consequences for the interpretation of the MBT'/CBT paleothermometer

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Branched glycerol dialkyl glycerol tetraethers (brGDGTs), which are transported from soil to marine sediment by rivers, have been used to reconstruct the mean annual air temperature (MAAT) and soil pH of the drainage basin using the methylation index of branched tetraethers (MBT, recently refined as MBT') and cyclization index of branched tetraethers (CBT) from coastal marine sediment records. In this study we are tracing the brGDGTs from source to sink in the Tagus River basin, the longest river system on the Iberian Peninsula, by determining their concentration and distribution in soils, river suspended particulate matter (SPM), riverbank sediments, marine SPM, and marine surface sediments. The concentrations of brGDGTs in river SPM were substantially higher and their distributions were different compared to those of the drainage basin soils. This indicates that brGDGTs are mainly produced in the river itself. In the marine environment, the brGDGT concentrations rapidly decreased with increasing distance from the Tagus estuary. At the same time, the brGDGT distributions in marine sediments also changed, indicating that marine in-situ production also takes place. These results show that there are various problems that complicate the use of the MBT'/CBT for paleoreconstructions using coastal marine sediments in the vicinity of a river. However, if the majority of brGDGTs are produced in the river, it might be possible to reconstruct the environmental (temperature and pH) conditions of the river water using appropriate aquatic calibrations, provided that marine core locations are chosen in such a way that the brGDGTs in their sediments are predominantly derived from riverine in-situ production.