

FLUX OF GLYCEROL DIALKYL GLYCEROL TETRAETHERS IN THE WATER COLUMN AND SEDIMENTS OF LAKE BAIKAL

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Lake Baikal has proved to be a highly climatically sensitive system and its sediments potentially contain an exceptional paleoclimatic archive to reconstruct past climates in continental Asia. Thus, the lake basin contains a continuous record of sediments spanning up to 12 Myrs. Despite being in Siberia it has never been permanently frozen. Quantitative proxies are however not available apart from approaches based on pollen grains.

We have been investigating the use of several biomarkers to reconstruct past climate in the Baikal region. One of the challenges is that the modern biogeochemistry of Lake Baikal is largely unknown. As part of the CONTINENT project there is now available sediment trap material from a range of depths and sites in the lake spanning several years.

Here we report on the application of the archaeal lipid based indices (Schouten *et al.*, 2002; Hopmans *et al.*, 2004) and use data from sediment traps to constrain the interpretation of the proxy. We have obtained a record of TEX₈₆ and BIT from two cores drilled in Lake Baikal, spanning the last 27 kyr (CON01-605-3, south basin) and the last 57 kyr (CON01-603-2, north basin, see Fig.1). A prominent feature of the quantitative temperature records as estimated from TEX₈₆ is a succession of cooling episodes which are synchronous with a lowering of diatom production and massive influxes of terrestrial input at the Selenga river delta as revealed by Prokopenko *et al.* (2001). The timing of these events suggests a correlation with the Bond cycles known for the North Atlantic region, as proposed by Prokopenko *et al.* However, the accurate paleoclimatic interpretation of the TEX₈₆ data is dependent on the relationship between the TEX₈₆ signal from sediments and the temperature distribution in Lake Baikal. Thus, the knowledge of the fluxes of GDGTs (archaeal lipids used to calculate TEX₈₆) and the preservation of these compounds during its transfer through the water column is of primary importance. Terrestrial inputs of archaeal lipid can bias the TEX₈₆ estimates. The BIT index can be used to appraise this effect. However its confident application in Lake Baikal requires that it is first validated given that depositional conditions in lacustrine systems are not necessarily comparable worldwide.

We are also conducting a study of the archaeological lipids collected in two moorings equipped with several sediment traps that were deployed in the north and south basins of Lake Baikal between July 2001 and July 2002. A total of 20 sediment trap samples and the upper 10 cm of sediment below the moorings have been analysed. Data are now being compared to complementary limnological data with the aim to understand the mechanisms that transfer and preserve archaeological lipids in the Baikal sediments.

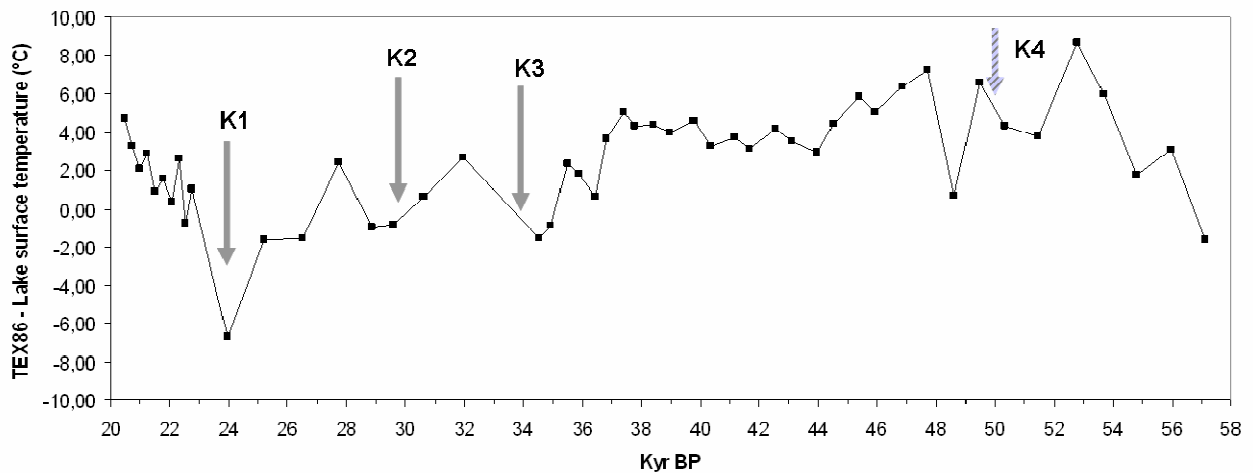


Figure 1. Lake surface temperature record for the Baikal core CON01-603-2 derived from TEX₈₆. Arrows point at cooling events revealed by diatom abundance: K1, K2 and K3 dates were constrained using AMS, but K4 was only tentatively dated by stratigraphic correlation, as it is beyond the radiocarbon range (Prokopenko *et al.*, 2001).

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