Sources and sinks of branched glycerol dialkyl glycerol tetraethers and bacteriohopanepolyols in the major Yenisei River system and Kara Sea (Siberia)

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The study of the delivery of terrigenous organic matter (OM) to the marine system is of paramount importance in the study of the global carbon cycle. This is even more relevant for the OM transported into the Arctic, as its watersheds contain large areas of permafrost. This is one of the so-called vulnerable carbon pools as climate warming will cause the mobilization of this OM. We have studied two groups of bacterial lipid biomarkers in a major Siberian river system; branched glycerol dialkyl glycerol tetraethers (brGDGTs) and bacteriohopanepolyols (BHPs). In river fan sediments, these compounds have been used to estimate changes in the delivery of soil-derived OM and to reconstruct palaeoclimate changes imposed on the soils in the river watershed, under the assumption that production of brGDGTs in the river itself is negligible. However, in the Yenisei River, the brGDGT signature reflects in-situ production in the river. Large changes in the riverine distribution is encountered after their inflow in large lakes (Lake Baikal) and in the marine system (Kara Sea). Compared with bulk OM stable isotopes, changes in the absolute and relative concentration of both brGDGTs and soil-marker BHPs allow to trace the delivery of terrigenous OM by the river. However, degradation and in-situ production of brGDGTs drastically change their distribution, both in freshwater and in the marine environment. This complicates the use of brGDGTs as palaeoclimate proxies, which is confirmed by their distribution in downcore sediments. However, application of novel brGDGT-based calibrations [1] allows to avoid the influence of in-situ produced brGDGTs, and may be a solution to the mixed source problem for brGDGTs encountered in marine sediments.

[1] De Jonge (2014) *Geochim Cosmochim Ac* **141**, 97–112.