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ORGANIC MATTER DEGRADATION IN A "FRESHWATER OCEAN" – A SEDIMENT TRAP STUDY IN LAKE BAIKAL

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Lake Baikal offers the unique opportunity to study water column processes in a freshwater system with conditions similar to oceanic systems. With a maximum water depth of ~1640 m, Lake Baikal is the deepest lake on Earth and due to efficient vertical mixing, oxygen concentrations are high throughout the water column (Weiss et al. 1991). Investigations on sediment trap material provide information on the early stages of organic matter degradation in the water column. The data set we present is unique with regard to the environmental setting and the high spatial resolution of the sampling intervals.

Sediment trap material from 18 different water depths has been analysed for bulk organic matter parameters (concentrations of total organic carbon (TOC) and total nitrogen (TN), C/N-ratios, organic carbon and nitrogen isotopic compositions ($\delta^{13}C$ and $\delta^{15}N$), chlorin concentrations, and Chlorin Indices (Schubert et al. 2005)). A detailed study will be presented, which focused on the concentration and composition of total hydrolysable amino acids (THAA), amino acid stereochemistry (D- and L-isomers), and the characterization of the fatty acid fraction.

The extent of organic matter degradation in the water column of Lake Baikal is reflected in the fluxes of TOC, TN, chlorins, THAA, and fatty acids at different water depths. All these parameters strongly decreased within the upper 500 m, indicating efficient degradation of settling organic matter in the upper water column. In line with earlier studies (e.g. Cowie and Hedges 1994), the labile compounds represented by chlorins, THAA, and fatty acids, were preferentially degraded over bulk organic carbon. A wide range of diagenetic indicators has been applied to assess the diagenetic stage of the sediment trap material. They all showed consistent trends, indicating that the diagenetic stage of the sediment trap material increased with increasing water depth. In particular, the Chlorin Index increased, the contributions of amino acid carbon to TOC ($\%T_{AA}C$) and of amino acid nitrogen to TN ($\%T_{AA}N$) decreased, the ratio of non-protein amino acids and their respective protein precursors increased, and the amino acid based degradation index (Dauwe et al. 1999) decreased with increasing water depth. Based on the distribution of D-amino acids, it was possible to estimate the contribution of peptidoglycan amino acids to THAA. This

contribution increased along with the increasing diagenetic stage of the sediment trap material, indicating that a relative accumulation of bacterial cell wall material can already be traced at the early stages of organic matter degradation and transformation.

In summary, this study of sediment trap material from Lake Baikal provided interesting insights in organic matter degradation in this unique aquatic system. It showed the applicability of different diagenetic indicators for studies of freshwater systems and at early stages of organic matter degradation. Furthermore, it was possible to trace the accumulation of bacterial organic matter during reworking and degradation in the water column of Lake Baikal.

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