Geochemical behaviour of trace elements in a mesotrophic lake with disturbed water stratification

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Numerous studies highlighted the role of Fe and Mn oxy-hydroxides and of organic matter, in the trace element behaviour in lake water column. In an eutrophic lake, trace elements are carried from river to lake by particles which are dissolved in the hypolimnion during the summer stratification. According to sulphide concentration, trace elements can be stored in sediments as metallic sulphides.

The Bicaz Lake is a dammed lake located in the East Carpathians (Romania). The main tributary, the Bistrita River, drains a catchment rich in former mine exploitations and barren rocks deposited in dumps exposed to weathering. The aim of this study is to determine if trace elements are removed from the dissolved phase bound to particles and stored in the lake sediments. Due to the length of the lake (about 30 km), we sampled the water column on three sites from upward to downward. We analyzed and studied filtered and bulk water for one hydrological year (four surveys). Behaviour of several trace elements have been studied (As, Cr, Cu, Ni, Pb, U, V) along with Fe, Mn, Al and Si. The usual model observed in "normal" lake (i.e. a stable structuration of the water column) has not been evidenced here. The stratification of the lake is disturbed by currents. These perturbations decrease from the upper site downwards. Hydrodynamic status of the lake show a "river-like" hydrodynamic from upward to a "lake" hydrodynamic downward, close to the dam. Considering this perturbation, the study of the water column does not permit to conclude about the storage of trace elements.

Sub-micron XANES analysis of the organic structure of comet wild 2/81P particles

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Synchrotron-based soft X-ray micro-analysis was performed on particles extracted from the Stardust aerogel collector in order to obtain detailed organic functional group information on any organic solids captured as part of the Principal Examination suite of analyses for samples from Comet 81P/Wild 2. It is observed that cometary organic carbon captured in aerogel is present in a number of different manifestations and commonly intimately associated with silicates. Carbon X-ray Absorption Near Edge Structure (XANES) spectra reveal considerable chemical complexity in all of the organic particles studied so far. Universally, the Comet 81P/Wild 2 organic particles contain low concentrations of aromatic and/or olefinic carbon relative to aliphatic and heteroatom-containing functional groups, e.g. amide, carboxyl, and alcohol/ethers. N-XANES confirms the presence and assignments of these functional groups. In general, the XANES data record considerable chemical complexity across the range of organic samples currently analyzed. The atomic ratios, N/C and O/C, derived from XANES data reveal a wide range in heteroatom content; in all cases these elemental ratios are higher than that of the most primitive meteoritic organic matter. At this stage there appear to be a least three distinct classes of organics associated with the Stardust samples analysed here. These include 1) relatively dense, moderately oxygen and nitrogen rich particles that share functional group similarity with organic matter derived from primitive carbonaceous chondrites; 2) a highly nitrogen rich phase with moderate oxygen content, and a highly oxygen rich phase with moderate nitrogen content. The wide range in chemistry, both in elemental abundances and specific organic functional groups, suggests that the Comet 81P/Wild 2 organic solids may have multiple origins.