

Geochemistry of uranium in the reduced carbonaceous sediments of small lakes in Baikal Region

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The most commonly identified pathway to explain the accumulation of authigenic U in reduced sediments is the microbially mediated reduction of U(VI) to less soluble U(IV) [2]. However previous researchers could not acquire the direct evidence of uranium reduction and formation of its poorly soluble oxides, so the additional investigation of the problem is needed [1]. Our work is aimed at detecting of U reduction process in sediments of two small lakes (fresh and salt) which are located in the Baikal region. To achieve this goal we separated sediments to lithogenic and various authigenic fractions using the method of sequential extraction, which is based on the method of Tessier [3]. According to our research values of activity ratios ($^{234}\text{U}/^{238}\text{U}$) in the insoluble residue significantly differ from 1 in both lakes. This indicates the presence in the residuals not only the lithogenic fraction, but a noticeable amount of UO_2 . Uranium accumulates in lake sediments mainly through chemogenic processes, in different forms (in oxides and hydroxides, organic matter or isomorphic impurities in carbonates). This work was supported by grant RFBR 12-05-31087mol_a

[1]Chappaz, Gobeil, & Tessier (2010), *Geochim. Cosmochim. Acta* 74, 203–214 [2]Klinkhammer & Palmer (1991) *Geochim. Cosmochim. Acta.* 55, 1799–1806 [3] Tessier, Canbell, & Bission, (1979), *Anal. Chem.* 51, 884–851

Volatilization of methylated selenium, sulfur and arsenic from a wetland

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Selenium (Se) is an essential trace element for life. However, it can negatively affect human health due to its narrow range of beneficiary concentration and its unequal distribution in the surface environment. To date, sources, sinks and fluxes in the global Se cycle are poorly understood and quantified. Although methylation and volatilization of Se from terrestrial environments is known to occur (and is studied for e.g. bioremediation purposes), its relevance to the natural global atmospheric Se budget remains unknown.

We applied a novel chemotrapping method in combination with a flow-through chamber system to identify and quantify volatilization of Se, sulfur (S) and arsenic (As) from a minerotrophic peat bog in southern Switzerland. We were able to determine gaseous fluxes of Se ($0.11 \mu\text{g Se}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$), S ($37 \mu\text{g S}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$) and As ($0.16 \mu\text{g As}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$) in the form of non-, mono- and di-methylated species. By comparing these fluxes with total concentrations of these elements in both the peat and surface water, it became evident that Se is approximately 40 to 110 times more efficiently volatilized from the peat bog than As and S, respectively. Furthermore, we observed that elevated temperatures increased volatilization of the investigated elements to a different extent. Our results suggest that Se volatilization from wetlands, and possibly other terrestrial environments, may crucially influence the biogeochemical cycle of Se.