Hf and Nd isotopic composition of (nano)particles and ultrafiltrates of temperate streams and rivers

K. SCHMIDT[1], M. BAU[1], C. MÜNKER[2], G. MERSCHEL[1]

[1]Department of Physics and Earth Sciences, Jacobs University Bremen, Germany. k.schmidt@jacobs-university.de

[2]Institute for Geology and Mineralogy, Universiät zu Köln, Germany

The isotopic composition of Nd and Hf in the oceans has been intensively investigated, and recently, much progress was made in studying river(-bourne) sediments. However, a profound understanding of the net riverine fluxes of Nd and Hf from the continents to the oceans and of its isotopic composition are still limited. Geological, hydrological and environmental conditions appear to play a key role, and studies investigating the Nd and Hf isotopic composition of the individual element "pools" of rivers, i.e., bedload sediments, suspended particles, nanoparticles and colloids (NPCs), and of the truly dissolved fraction are required.

We present combined Hf and Nd isotope data for the particulate (>200nm), the dissolved (truly dissolved + NPCs <200nm) and the truly dissolved pools (<1KDa) in three temperate rivers in Germany: The strongly polluted Rhine River was sampled upstream and downstream of a pollution point source of anthropogenic LREE, to identify the potential impact of anthropogenic REE contaminants. In contrast, the Wiembach Creek in Leverkusen, Germany, is a small pristine tributary to the Wupper River which itself is a tributary of the Rhine River. The NPC-rich Weser River is a moderately polluted river in NW Germany.

The Hf isotopic composition at given εNd is often mineralogically controlled due to incongruent weathering and sediment transport, and in the investigated rivers, the dissolved pool is usually more radiogenic than the suspended particles. In the Weser River, Hf in the truly dissolved pool is less radiogenic than in the NPC-dominated dissolved pool. In contrast, the truly dissovled pool in the Rhine River is slightly more radiogenic than the NPCs. These differences are related to the DOC content of the samples and to the distribution of Hf between the NPCs and the truly dissolved pool. In contrast to Hf, differences in the isotopic composition of Nd in individual size pools should rather reflect different (rock) sources. However, εNd of the truly dissolved pool in the Rhine River is ca 2ε units more radiogenic than the dissolved pool, possibly due to anthropogenic contamination with Nd.