Biogeochemical Mn cycling and its influence on the water column Mn concentrations in the Southwestern East/Japan Sea

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Abstract

Biogeochemical cycling of Mn was studied for the southwestern East/Japan Sea for the upper part of sediments collected from 1995 through 2007. The sites cover continental shelf, continental slope and deep basin areas (the Ulleung Basin ~ 2300 meter deep). From the profiles of dissolved Mn concentrations in porewater, we found that intensive redox-cycling of Mn occurring in the upper layer of sediments over the study area. From the vertical profiles of dissolved Mn in porewater and particulate Mn in iron-oxyhydroxide phase of sediment, we calculated benthic fluxes of dissolved Mn and accumulation rates of particulate Mn in sediment that varied significantly between sedimentological settings. Accumulation rates of particulate Mn in the oxyhydroxide phase increased with water depth of sampling site. On the contrary benthic fluxes of dissolved Mn decreased with water depth of each site despite of the high sediment accumulation rate and high organic carbon concentrations of the continental margin areas. The authors related this phenomena to the concentrations of water column Mn concentrations showing downward increase below 1000m water depths and concluded that there may be a horizontal transport of dissolved and/or colloidal Mn from the continental slope to the basin.

Modelling of U-series nuclides in regoliths and the recovering of weathering propagation rates

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The interest of U-series nuclides as tracers and chronometers of weathering processes results from the dual property of the nuclides to be fractionated during water-rock interactions and to have radioactive periods of the same order of magnitude as the time constants of many weathering processes. The development of U-series nuclides for investigating weathering processes is quite recent, and was significantly stimulated by the analytical improvement made over the last decades in measuring the ^{238}U series nuclides with intermediate half-lives (i.e., ^{234}U-^{230}Th-^{226}Ra) (1-5).

Here it is proposed to present some recent results obtained with the analysis of U-series nuclides in weathering profiles to determine rates of soils processes. We will especially highlight how a simple modelling of u-series nuclides based on mathematical formalism assuming a continuous gain and loss of the different U-series nuclides within a weathering profile allow ones to recover propagation rates of weathering front within the regolith. The limitations of this approach and the future developments required to progress in this topic will be also discussed.

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