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Behavior of Uranium and Thorium isotopes in Darkhad basin, northern Mongolia

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Darkhad basin is located adjacent to Lake Hovsgol and occupies a southwestern part of the Baikal Rift Zone. In this area, the signals in response to insolation forcing in the lacustrine sediments have been found in vertical profiles of various components, such as diatom abundance (biogenic silica content), grain size, organic carbon content and elemental concentrations. In particularly, it is known that uranium (U) is one of the most important chemical indexes in Lake Baikal and Lake Hovsgol. Previous studies have reported that U (authigenic U) concentration in sediment increases during the interglacial periods and decreases during the glacial periods. Therefore, many researchers have pointed out a possibility that the variation can be used as a paleoenvironmental indicator. In this study, we analyzed U and Th isotope concentrations in sediment core (DDP10-3) of Darkhad basin to discuss the depositional process and the possibility as a paleoenvironmental indicator.

Core DDP10-3, 164.5 m long, was collected at 51^{o}19'51.20"N, 99^{o}30'4.40"E in Darhard basin in the spring of 2010. The core was cut into 3 cm thick for the entire length. In this study, sub-samples were selected each ca. 1 m intervals for U and Th isotopes analysis. Their sub-samples were freeze-dried and homogenized. Each 0.5 g dry sediment sample was calcined overnight at 450 ^{o}C, and then decomposed with open system wet method using HNO3-HF-HClO4 and fusion with Na2CO3. Concentrations of U and Th isotopes were determined by alpha-particle spectrometry, after eluting U and Th from other elements using anion exchange resin. At August 2011, we collected twelve water samples at eight inflow and one outflow rivers in Darkhad basin for information on 238U concentration and 234U/238U activity ratio. The U isotopes concentration in river water samples was analyzed by the above method.

Dissolved 238U activity concentrations and 234U/238U activity ratios in the river water show a range from 3 to 50 mBq/L and from 1.5 to 5, respectively. The concentration and ratio of inflow rivers are classified into the three types according to influx route (southern, western and eastern routes of Darkhad basin). Each concentration and ratio of southern, western and eastern inflows is 50 mBq/L and 5, 3 mBq/L and ca. 1.5, and 3-12 mBq and 1.7-2.6, respectively. A major factor in this difference is considered to be due to the geological setting around Darkhad basin. Concentrations of 238U and 232Th in sediment samples vary in a range from 10 to 83 mBq/g and from 9 to 70 mBq/g, respectively. The 234U/238U ratios range from ca. 1 to 2 and show mainly close to 1 throughout the whole core. The high 234U/238U ratios ($>$ 1) were observed at about 140 m, 72 m and 27 - 37 m core depths. These high 234U/238U ratios indicate the presence of some authigenic U in the bulk sediments. There are the authigenic U in the interval of absence of carbonate minerals. In the conference, we will discuss about the depositional process of U and Th isotopes.

Keywords: Uranium-Thorium, Northern Mongolia, Continental Asia, paleo-climate change