W isotope ratio of the Earth's mantle

Asako Takamasa[1]; YuVin Sahoo[2]; Shun'ichi Nakai[1]; Hidenori Kumagai[3]; Susumu Umino[4]

[1] ERI, Univ. of Tokyo; [2] ERI, Univ. Tokyo; [3] JAMSTEC; [4] Inst. Geosci., Shizuoka Univ.

It is quite difficult to obtain samples from inaccessible part of the inner Earth, such as lower mantle and core. To detect the inclusion of the components of the inaccessible parts, some assumption of the chemical and isotopic compositions of the bulk Earth should be made and variation of chemical and isotopic composition of a sample is discussed with reference to the bulk Earth values.

Tungsten isotopic ratio (182W/183W or 182W/184W) of mantle is estimated to be higher than that of the core and this isotopic trace is very useful for investigation of core-mantle interactions.

Previous studies reported W isotope ratios of the Earth's rock,meteorites (achondrite, chondrite, iron meteorite), the moon's rock and the mars's rocks, in the epsilon notation relative to the W standard solution (NIST-3163). W isotope ratio of this standard solution has been used as the representative of silicate Earth. However, as this standard is made from W ore in the continental crust, it is not clear if this truly represent the Earth's mantle

W isotopic ratio of MORB should represent that of the depleted upper mantle, but to date there is only one data of W isotope ratio reported by Lee et al.(1998) (Atlantic MORB(D-15)=0.24+/-0.36 epsilon). The scarcity of the data is caused by difficulty of W isotope measurements and extreme low W concentration MORB rock. Study for core-mantle interaction requires precise measurements as error is 0.3 epsilon unit or better. The accuracy of the previous data is insufficient to discuss core-mantle interactions.

In this study, we are developing the W separation method for samples with low W concentration, -like MORBs and komatiites, etc. We will report the results of the trial and W isotopic compositions of the MORB samples with W concentration (about 100 ppb). In addition, we will present W concentration of variety of samples and discuss the distribution of tungsten in the Earth.