炭素質コンドライト・普通コンドライト全岩におけるNd同位体異常
Nucleosynthetic Neodymium Isotope Anomalies in Carbonaceous and Ordinary Chondrites.

*深井 稜汰[1]、横山 哲也[1]
*Ryota Fukai[1], Tetsuya Yokoyama[1]

1.東京工業大学地球惑星科学専攻
1.Department of Earth and Planetary Sciences, Tokyo Institute of Technology

We have performed high precision Nd isotope analysis of chondrites coupled with a new sample digestion technique that confirms complete dissolution of acid resistant presolar grains. We also developed an improved dynamic multicollection method using TIMS to improve the analytical reproducibilities. To test the analytical reproducibility in the dynamic method, we repeatedly analyzed a standard sample (JNdi-1) for eight months. The long-term reproducibilities obtained in the dynamic method were 4.2 ppm, 6.6 ppm and 9.7 ppm for ^{142}Nd/^{144}Nd, ^{148}Nd/^{144}Nd, ^{150}Nd/^{144}Nd (n = 35), which are 2–11 to times superior to the static and multistatic method.
We analyzed eight ordinary chondrites, showing uniform isotope anomalies for μ^{142}Nd (–12 ±5 ppm), μ^{148}Nd (10 ±8 ppm) and μ^{150}Nd (20 ±12 ppm). Although the μ^{142}Nd values for ordinary chondrites obtained in this study are generally consistent with those of previous studies, positive anomalies in μ^{148}Nd and μ^{150}Nd were not recognized in previous studies. In contrast to ordinary chondrites, carbonaceous chondrites show variable Nd isotope anomalies exceeding analytical uncertainties. individual carbonaceous chondrites are categorized into three groups as a function of μ^{142}Nd; NWA 2090 (–5 ppm), Tagish Lake (–20 ppm), and Allende, DaG 190/082, and Dhofar 1432 (–30 ppm).
The data points for ordinary chondrites are generally plotted on mixing line between the terrestrial composition and the putative *s*-process endmember. This means that the isotope anomalies in ordinary chondrites are induced by the heterogeneous distribution of *s*-process nuclides in early Solar System. By contrast, most of the carbonaceous chondrites deviate from the mixing line towards the direction with lower μ^{142}Nd values. We presume that the offset from the mixing line is caused by the heterogeneous distribution of *p*-nuclides in the early Solar System, because a part of ^{142}Nd was produced by the *p*-process nucleosynthesis and αdecay of a pure *p*-nuclide ^{146}Sm. Although the Earth and parent bodies of chondrites do not share building blocks with a common Nd isotopic composition, the excess ^{142}Nd signature of the Earth would not necessarily require the existence of a hidden reservoir with a subchondritic Sm/Nd ratio deep in the Earth’s mantle as proposed previously.

キーワード：同位体異常、プレソーラー粒子
Keywords: isotope anomaly, presolar grain

