Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

PPS25-02 会場:102B 時間:5 月 22 日 14:30-14:45

宇宙における化学進化と隕石中の極性有機化合物
Extraterrestrial chemical evolution related to polar organic compounds in meteorites

奈良岡 浩 [1*], 山下 陽平 [1]
Hiroshi Naraoka[1*], YAMASHITA, Yohei[1]

[1] 九州大・理・地球惑星科学
[1]Dept. Earth & Planet. Sci., Kyushu Univ.

Volatile elements including HCNO are the most abundant in the molecular clouds predominantly as H_2, CO, H_2O, NH_3, HCHO, HCN. Chemical evolution of these simple molecules to complex organic compounds has still been ambiguous in interstellar environments as well as primitive solar nebula. On the other hand, primitive meteorites such as carbonaceous chondrites are relatively rich in the volatile elements as organic matter and water. Even though the heavy isotope enrichment of these elements (especially in D and ^{15}N) in the meteoritic organic matter is indicative of their origin in interstellar molecules, there is a significant missing-link between meteoritic organic matters and interstellar molecules. For understanding of reaction mechanisms in the chemical evolution, a serious problem is that even primitive meteorites had experienced various degrees of aqueous alteration on their parent bodies, which would erase original signatures of the most primitive organic matters. However, it is known that meteoritic organic matters are highly heterogeneous in chemical and isotopic compositions. Such large variations of the meteoritic organic matter may have clues to reveal the chemical evolution.

Polar organic matters in carbonaceous chondrites, which contain amino acid precursors (resulting in amino acids after hydrolysis), show significant diverse chemical compositions with D and ^{15}N enrichments. From the analytical technique points of view, however, it has been difficult to characterize the polar organic compounds for their chemical structures and isotopic compositions. In this study, we will perform mass spectral analyses on the polar organic matters. Preliminary the powdered samples of the Murchison meteorite (CM2) were extracted sequentially with hexane, methanol and water. The carbon content of the hexane extract was much less relative to that of the methanol and water extracts, indicating that most soluble organic matters are present in the polar fraction. The bulk methanol and water extracts were enriched in ^{15}N (+20 to +35 per mil relative to Air), supporting that the polar fraction could be enriched in exotic organic compounds. The polar extracts were analyzed using hydrophilic interaction chromatography (HILIC) columns with MS/MS detector. Currently the wide range of mass peaks was detected to characterize.

キーワード: 化学進化, 炭素質隕石, 極性有機物, 質量分析, 水質変成, 同位体組成
Keywords: chemical evolution, carbonaceous chondrite, polar organic matter, mass spectral analyses, aqueous alteration, isotopic composition