英 文 要 旨

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論文題目	Transition of magmatic activity reflecting the opening event of Japan Sea, in the northern margin area of central Japan

Early to middle Miocene basalt to dacite are distributed in Kanuma, Utsunomiya and Motegi areas, northern margin of central Japan. These volcanic rocks are divided into five groups: Hinata basalt to andesite (Hn-type) and high Sr isotopic basalt (HSr-type) in the Kanuma area, Myogazawa andesite (Myo-type) and Kazamiyamada basalt to dacite (Kz-type) in the Utsunomiya area, Motegi basalt to andesite (Mtg-type) in the Motegi area based on their petrological, geological, and Sr-Nd isotopic characteristics. K-Ar whole rock ages of these volcanic rocks are reported as corresponds to the epoch of the opening event of Japan Sea. These volcanic rocks belong to the tholeiitic rock series. The Hn-type and the Kz-type show Sr-Nd isotopic ratios close to the undepleted (Lithospheric) mantle. From this, it can be considered that the Hn-type and the Kz-type volcanic rocks were originated from the undepleted mantle. However, the Sr-Nd isotopic ratios from these rocks show negative correlation indicating, that the genesis of the Hn-type and the Kz-type cannot be attributed to simple fractional crystallization of primary basaltic magma, but to an assimilation and fractional crystallization (AFC) process. An AFC model using the basement rocks as the assimilant can successfully reproduce the isotopic and chemical variations of their volcanic rocks.

The Myo-type volcanic rocks show have a very high initial Sr isotope ratios (SrI) and low initial Nd isotope ratios (NdI). Therefore it is difficult to form the Myo-type volcanic rocks by the assimilation of the basement rocks. The Myo-type volcanic rocks are plotted on mixing line between Depleted MORB Mantle (DMM) and subducted sediment beneath the northeast Japan arc in Th/Yb versus NdI and Th/Yb versus SrI diagrams. In addition, the Myo-type volcanic rocks have the Sr-Nd isotopic compositions close to the Quaternary volcanic rocks in central Japan, which have affected by slab-fluid derived from Philippine Sea plate. Furthermore, it is showed that the Philippine Sea plate was subducting beneath the northern margin of central Japan before the opening of Japan Sea, based on the paleogeographic reconstruction model of Japan arcs. In conclusion, the Myo-type were produced by partial melting of the mantle strongly added to the slab-fluid.

The Mtg-type volcanic rocks have the Sr-Nd isotopic compositions between the undepleted mantle and the basement rocks suggesting that the assimilation with the basement rocks. In addition, the trace elements (Nd, Nb and Rb) and the Sr-Nd isotopic compositional variations of the Mtg-type are showed that successfully reproduced by contribution of the basement sedimentary rocks as the assimilant, based on AFC model.

The HSr-type volcanic rocks show have an extremely high SrI and low NdI. Therefore, the HSr-type cannot be produced by mantle-derived magmas assimilation with the basement rocks, or partial melting of mantle added to the slab-fluid. This remaining issue will have to be investigated in future.