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Geochemical variation of Izu rear-arc volcanic rocks at drill Site U1437: Preliminary results from IODP Expedition 350

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The Izu-Bonin-Mariana (IBM) arc is a good place to understand oceanic arc evolution. Crustal composition of the Izu segment of the arc differs beneath the arc-front and rear-arc (e.g. in terms of K, LREEs) (e.g. Hochstaedter et al., 2001; Ishizuka et al., 2003; Tamura et al., 2007). However, the magmatic history of the Izu rear-arc has not been well studied because Oligocene and Eocene Izu rear-arc lavas and volcaniclastics produced before the opening of the Shikoku basin have not been recovered by dredging or ROV sampling. Site U1437, drilled during IODP Expedition 350, is the first drill site in the Izu rear-arc and aimed to recover a record of volcanism in the rear arc from the present day to the Paleogene. This study will present preliminary major element (measured by X-ray fluorescence, XRF), trace element (measured by XRF and inductively coupled plasma-mass spectrometry, ICP-MS) and isotope ratios such as Sr, Nd, Pb and Hf (measured by ICP-MS and thermal ionization mass spectrometry, TIMS) to examine the geochemical signature of the recovered material and whether it can be related to the present day rear-arc or arc-front.

Site U1437 is located in a basin between the Manji and Enpo rear-arc seamount chains, about 90 km west of Myojinsho volcano on the Izu arc-front. Drilling reached 1806.5 meters below seafloor (mbsf), and the recovered rocks were divided into seven lithostratigraphic units and one igneous unit (a rhyolite intrusion). Lithostratigraphic Units I to V (0-9 Ma) dominantly consist of tuffaceous mud/mudstone. Below 1320 mbsf, Units VI and VII (older than 9 Ma) are composed chiefly of volcaniclastic layers, including coarser ($>$2 cm) volcanic clasts that are possibly derived from more proximal sources (Tamura et al., 2015).

Initially we have analyzed the major and trace element compositions of the volcanic clasts from Units VI and VII. Those show a wide range of compositions, from basalt to rhyolite, but are mainly intermediate (average SiO_2 = 54.1 wt%). The K_2O contents of the basalt to andesite clasts within the volcaniclastics are $<$0.9 wt%, with the exception of one clast, and their Zr/Y are $<$3.2 (average = 2.4), with the exception of two clasts. These characteristics are within the range of both the present day Izu arc-front and rear-arc. The present rear-arc type lavas are strongly enriched in LREEs, whereas the arc-front type are depleted. However, the chondrite normalized REE patterns of the clasts are flat (La/Yb $\sim$ 1.0) or show slight depletions in LREEs relative to HREEs, so it is not clear if these proximal clasts are similar to the current arc-front or rear-arc. The deepest clasts that have been analyzed (from 1797.26 and 1798.57 mbsf) are basaltic andesites and have relatively high Zr/Y (3.5 and 4.1, respectively), similar to the present day rear-arc. However, their K_2O contents (0.89 and 0.35 wt%, respectively) and flat REE patterns are not.

The wide range of clast compositions make it difficult to distinguish whether the clasts from the deeper part of Site U1437 are derived from the present day Izu arc-front or rear-arc and whether or not this geochemical distinction existed when this material was erupted on the basis of major and trace elements alone. Analyses from additional samples and the isotope compositions of the clasts may be more diagnostic.