Tectonic and magmatic evolution at subduction initiation- the case of Izu-Bonin-Mariana-

O. ISHIZUKA[1,2], K. TANI[3], Y. HARIGANE[1], S. UMINO[4], R. HICKEY-VARGAS[5], G. M. YOGODZINSKI[6], Y. KUSANO[1], A. MCCARTHY[7], I.P. SAVOV[8], R.J. ARCULUS[9], M.K. REAGAN[10], R.J. STERN[11]

[1] Geological Survey of Japan/AIST, *correspondense:o-ishizuka@aist.go.jp
[2] JAMSTEC, Japan
[3] National Museum of Nature and Science, Japan
[4]Kanazawa University
[5]Florida International University
[6]University of South Carolina
[7]University of Laussane
[8]University of Leeds
[9]Australia National University
[10]University of Iowa
[11] University of Texas at Dallas

The early tectonic and magmatic evolution of the Izu-Bonin-Mariana (IBM) arc system in the Western Pacific is crucial to understand the process and cause of subduction initiation (SI) along the Pacific Plate margin. Forearc igneous sections provided firm evidence of seafloor spreading at the time of subduction initiation (Ishizuka et al., 2011, 2014; Reagan et al., 2011, 2013, 2017). IODP Expedition 351 revealed SI-related seafloor spreading on the rear side of the future IBM arc (Arculus et al., 2015). Basaltic basement of the ancient IBM rear arc shares key geochemical characteristics with "forearc basalt (FAB)", a product of decompression melting of a highly-depleted MORB-type source found in the IBM forearc. Radiometric dating of the rear arc crust revealed the age of this basalt is similar to the FAB (52-48 Ma). Thus the IBM arc was established on ocean crust formed during only a few m.y. accompanying SI. This model needs to be evaluated more thoroughly since a tectonic reconstruction shows the possibility that the earliest arc basement was in fact oceanic crust of the West Philippine Basin (WPB).

A recent cruise (KH14-5) to the IBM forearc in Northern Mariana recovered abundant volcanic rocks and mantle peridotites. Volcanic rocks include FABs and boninites with the same age as those from other parts of the IBM forearc. This result implies that SI and subsequent magmatic evolution occurred almost contemporaneously along the entire length of the IBM at 52 Ma. Combined with new chronologic constraints from WPB, a revised tectonic and magmatic model at SI will be discussed.