Volcanic Ashes Recovered by IODP Expedition 350 Site U1436 in the Izu Arc: A Prologue of Submarine Caldera Formation?

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International Ocean Discovery Program (IODP) Site U1436 (32°23.88’ N, 140°21.93’ E) lies 1,776 m below sea level and about 60 km east of the arc front volcano Aogashima, and was drilled as a geotechnical survey for proposed D/V *Chikyu* drilling at Site IBM-4. Coring at Site U1436 recovered a 132 m record of Quaternary explosive volcanism in the Izu arc. Because the prevailing wind blows from west to east across the Izu arc, the forearc is a repository of medial and distal aerially dispersed ashes and tuffs from Izu and Japan, as well as eastward flowing density currents from the frontal arc. Effusive eruptive products (e.g., lavas) are better preserved on the frontal arc islands, while deep marine depocenters form a complement, by chiefly preserving products from explosive eruptions. However, which volcano or volcanoes did these ashes erupt from? Could the ash record at Site U1436 be nothing but a haphazard collection of Izu arc volcanoes?
There are several interesting features of Site U1436 cores.
1) The biostratigraphic datums indicate a possible hiatus between 66 mbsf and 74 mbsf. The 66 m of the cores above the hiatus provides a nearly complete record of the Late Pleistocene (< 0.91 Ma). They show higher linear sedimentation rates (LSRs) and mass accumulation rates (MARs) than the lower parts below the hiatus (> 1.5 Ma).
2) Ash fallout and volcaniclastic flow deposits (~150 intervals) are present at Site U1436. The majority of tephra fall layers at Site U1436 are from volcanoes of the Izu volcanic front as well as from mainland Japan (Schindlbeck et al., pers. comm.).
3) Site U1436 is bathymetrically isolated from all Quaternary volcanic front volcanoes through submarine troughs and edifices except for Higashi Aogashima caldera. Therefore, Higashi Aogashima caldera is the only likely source for eruption-fed density currents at Site U1436
4) One distinctive interval of black ash (~55 mbsf, 0.75 Ma) is comprised of glassy shards of basaltic andesite (~55 wt% SiO_2) that comprise an extension of the dominantly basaltic compositional array of Aogashima volcano (major and trace elements). The evolution of magma chemistry of this black glassy ash and its possible Higashi Aogashima caldera origin are consistent with the hypothesis of submarine rhyolite caldera formation in the Izu arc by Tamura et al. (2009) as follows. Rhyolite calderas have no mantle roots beneath the crust. Instead, Tamura et al. (2009) proposed that dikes from the adjacent basalt volcanoes provide the heat source to partially melt the surrounding crust to produce rhyolite magmas. Thus, dikes from Aogashima volcano and their fractional crystallization may have resulted in andesitic magmas and transferred latent heat to the crust. They could be the heat source that produced the rhyolites and resulting Higashi Aogashima caldera.

Tamura, Gill, Tollstrup et al. (2009). Silicic Magmas in the Izu-Bonin Oceanic Arc and Implications for Crustal Evolution. *Journal of Petrology* **50,** 685-723.

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