

# Investigation of the submarine volcanic chains around the Izu frontal arc volcanoes to reveal long-distance magma transport

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Formation of a summit caldera and northwestward migration of the hypocentre of earthquakes during the volcanic event of the Miyakejima in 2000 strongly imply a northwestward injection of magma from beneath the Miyakejima Volcano (e.g. Geshi et al., 2002; Toda et al., 2002). The occurrence of an earthquake swarm beneath Hachijojima accompanied by the very long period signals also implies the transport of the magma northwestward from the Hachijo-Nishiyama volcano (Kumagai et al., 2002). To obtain direct evidence for magma transport over this relatively long distance (~40km), two cruises were conducted to survey the submarine volcanic chains around the Miyakejima and the Hachijojima (KT03-8 cruise by R/V Tanseimaru and KR04-01 cruise by R/V Kairei).

A detailed bathymetric survey using multinarrow beam echosounder revealed a chain of small volcanoes extending about 40km southeastwards from the west of Miyakejima. Each volcano is generally 100-200m high and has less than 3km basal diameter. Samples collected from each volcano are all very similar, i.e., fresh basaltic lavas with olivine and plagioclase microphenocrysts, with textures suggesting rapid growth of these minerals. These lavas have no significant accumulation of Mn-oxides on their surface, implying young age of their eruption.

A volcanic chain is also found extending about 15km from the Hachijo-Nishiyama Volcano; this time to the NNW. The volcanoes are generally 100-150m high and about 2km in basal diameter. They sometimes form volcanic ridges rather than independent cones. We collected basaltic lavas from 4 volcanic centres with different distances from the Nishiyama Volcano. These basalts are nearly aphyric and strikingly different to the plagioclase-phyric lavas from the subaerial and submarine vents on the northeastern flank. Initial results indicate that the lavas from the volcanic chain have generally more primitive bulk chemical composition compared to those from the Nishiyama Volcano. We also collected large amount of pumice from several locations on the volcanic chain. These pumices often exhibit well-preserved cooling joints and keep their original morphological characteristics, implying their derivation from proximal eruption centres. However, the extremely homogeneous compositions of these pumices from different localities and occurrence of these pumices away from the volcanoes (~15km) require further investigation to explain their origin.

Seismic reflection profiles clearly show that the volcanic chain has been formed in the deepest part of the basin bounded by normal faults, implying tectonic control on the location of the chain.

A genetic relationship between the magmas erupted from the volcanic chains and nearby large frontal volcanoes will be discussed to assess the possibility of the magma transport over long distances.