Spatiotemporal velocity changes off the islands of Miyakejima and Kozushima

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We obtain a model of three-dimensional (3-D) P- and S-wave velocity structures off the islands of Miyakejima and Kozushima, at the northern end of the volcanic front of the Izu-Ogasawara (Bonin) arc, using both of the data from ocean bottom observations and usual seismic network ones. The seismic swarm began under Miyakejima in June 26, 2000, and was linked to the eruption of Miyakejima. It spread toward the northwestern ocean ridge from Miyakejima and the largest earthquake swarm ever recorded in Japan followed.

The ocean bottom observations were carried out from July 2, 2000 to May 6, 2001, in collaboration with Hydrographic Department, Japan (JHD), the Japan Marine Science and Technology Center (JAMSTEC) and the Earthquake Research Institute (ERI). To estimate 3-D P-wave velocity (Vp) and S-wave velocity (Vs) structures, we use the arrival time data of earthquakes.

Due to the high irregularity in the uppermost crust and the difficulties of handling both of the data of seabed and the land simultaneously, we are required to consider the effect just beneath the stations. We regard the travel time difference above 5km depth between the structures of JHD and this study as station correction. To examine the temporal velocity change, five data sets for July, Aug., Sept.-Dec, 2000 and 2001 are made. we determine Vp,Vs models in each period, applying the seismic tomography method to that data.

The result shows that there are two low velocity regions mainly which locate the west of Miyakejima and the east of Kozushima and they change temporally their intensity. We surmise that this low velocity regions indicate magma intrusion and that spatiotemporal change might explain the repeating seismic immigration between Miyakejima and Kozushima.