

Spotlighted submarine volcanoes

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Recently, we have seen the explosive eruptions of Nishinoshima and Fukutoku-Oka-no-Ba in the Ogasawara arc and Hunga volcano in the Tonga arc much talked about recently. Among others, the eruption which had happened in the Hunga Tonga shocked the world. Will the same thing happen with Nishinoshima?

Only small portions of submarine volcanoes appear above sea surface as volcano islands; thus, whole images of submarine volcanoes could not be seen. Moreover, underwater eruptions often fail to show up even in color of the water. For these reasons, there is no doubt that many people get the impression that submarine volcanoes make explosive eruptions suddenly. We have a vague anxiety about something invisible and we cannot stand up to an invisible enemy.

All you need to do is get a clearer picture of submarine volcanoes. We can get a huge range of information from the data viewed through the eyes. For example, topography of submarine calderas suggests major volcanic eruption in time past and in that case a great number of submarine pumices can be observed on the sea bottom.

Japan Agency for Marine-Earth Science and Technology (JAMSTEC) studies submarine volcanoes by using research vessels and remotely-operated vehicles (ROV). We have observed an erupting submarine volcano NW Rota-1 by using ROV at the depth of 500m below a restful sea area in 2005.

How come volcanoes erupt? What is happening in the basement? What is different between submarine volcanoes and traditional land volcanoes? We look at submarine volcanoes by using research vessels and ROVs and collect lava flows and tephra from the volcanoes. These are solids made from liquid magmas. Petrography and chemical compositions of magmas provide detailed information about the origin of magmas. Magmas are partial melts of mantle, which lies below crust. The thicknesses of crust between continents and ocean floors are significantly different; continental crust is more than 30 km, but oceanic crust is often less than 20 km. Magmas need to go through the crust to reach the surface and make eruptions, the origin of magmas could be more preserved in submarine volcanoes, which erupt in the thin crust.

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