Pressure source estimated from the GPS measurement before the Miyakejima volcano eruption on July 14, 2000

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Introduction

The 2000 Miyakejima volcano eruption is started from the earthquake swarm and rapid ground deformation on June 26, and it is developed to a caldera collapse at Oyama, large dike intrusion between Miyakejima and Kozushima Islands, and a large de-gassing. As the GPS continuous measurement are done at 12 sites in Miyakejima Island on June 26, the rapid ground deformation more than 30 cm is observed at the south and southwest part of the island by the GPS measurement until the midnight of June 26. The rapid dike intrusion is estimated from the ground deformation (Meilano, 2002)

On the other hand, since a caldera collapse is undergoing on July, long period earthquakes and ground tilt steps are observed. Yamashina (2002) discusses the line length changes between the sites in the island, and he suggests the inflation deformation before the volcano eruption on July 14.

Ground deformation detected by GPS measurement before the eruption on July 14, 2000

Kariya et al.(2000) process the continuous GPS data at 12 sites by GSI, ERI, NEID and JHD in the island in the period June 25 to August 26. As their result, the horizontal deformations in the island generally show the deflation since the first dike intrusion on June 26 to end of August. We estimate the rates of the station velocities as the exponential fit in the period of June 27- July 7, and we calculate the residual of estimation and observation on July 14. The residual displacements show the inflation deformation with about 10 cm. It is good correspondence with the suggestion by Yamashima (2002).

Pressure source estimated from the ground deformation by GPS measurement

As the horizontal displacements observed at GPS sites in the period of June 27 - August 26, and of June 8 – 14 also indicate concentrically, we employ the point pressure model. The point pressure is located at Ako, west coast as the deflation source and at southern Oyama, with the depths of 5 km and 4 km respectively.

After the caldera collapse on June 8, ground tilt measurements show the changes and tilt steps are frequently observed in the boreholes by NIED (Yamamoto et al., 2001). The long period earthquakes are observed and the epicenters of the long period earthquakes are determined in the southern Oyama (Kikuchi et al., 2001). It suggests that these ground tilt steps and long period earthquakes are occurred in the inflation point source estimated from the GPS measurements.