

Crustal deformation of Miyakejima volcano, Japan since the eruption of 2000 using dense GPS campaign observation

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Miyakejima Island is an active volcanic Island located about 175 km south from Tokyo, Japan. Miyakejima volcano has had at least 15 historical eruptions and erupted about every 20 years in the past 100 years. The latest eruptive activities began in 2000. These activities included forming a caldera for the first time in 2500 years and gigantic volcanic gas emission that forced islander to evacuate over four and half years. This style was different from the style of the last 100 years.

A dense GPS observation campaign had begun at Miyakejima volcano in cooperation with the University of Tokyo, Kyushu University, and Nagoya University in 1995. At the eruption in 2000, the state of the magma intrusion was captured in detail from the observed displacement. However, this campaign observation had stopped from 2002 to 2010 because of the landing restrictions to the island due to the large amount of volcanic gas emission. We rebuilt the dense GPS network and restarted the campaign observation from 2011. In this study, we examined the magma-supplying system under Miyakejima volcano by means of GPS observations to get insights about the future activity of Miyakejima volcano.

We used the data of our campaign observation of 2011 and 2012 recorded by 45 stations, and the data of four GEONET sites of Geospatial Information Authority of Japan (GSI) in this analysis. The observation data were analyzed by RTKLIB (Takasu et al., 2007) using GPS precise ephemeris from IGS. We estimated the crustal deformation of Miyakejima from 2011 to 2012 from the obtained coordinate values, and calculated the position and volume of spherical source using the software named Magnetic and Geodetic data Computer Analysis Program for Volcano (MaGCAP-V). The result showed there was the small inflation source at a depth of about 3 km beneath Mt. Oyama, which is the central cone of Miyakejima volcano. From this result, we can say Miyakejima have the possibility that the magma supply to the magma chamber leading to the next eruption has begun. We will carry out the observation this year and examine whether the expansion trend continues or not.

Keywords: Miyakejima, GPS, Crustal Deformation