Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SVC45-P11 Room:Convention Hall Time:May 27 18:15-19:30

Volcanic deformation associated with increase of earthquakes in the northern part of Izu-Oshima in July 2014

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Late July 2014, an earthquake swarm was occurred in the northern part of Izu-Oshima, a volcanic island, and many volcanic earthquakes were observed including 17 felt quakes, the maximum JMA seismic intensity was 3, observed at Motomachi Town. Though swarm in this region observed once in three or four years, the event in June 2014 was most intensive since 2002. These events may provide the key to assess the volcanic activity of Izu-Oshima, and should be investigated in various respects. We made a research about volcanic deformation associated with the event using GPS data observed at about 15 stations of MRI, JMA and GSI.

Examining daily mean values of base line length between GPS stations, step-like temporal variation was found in the northern part of the island in late July. The steps were as large as about 1 cm, and more clear in the base lines along the north-south direction. These steps were restricted in the northern part, and seemed to be associated with the M3.7 earthquake, the maximum in the swarm, occurred on July 28. No corresponding step was observed in the middle or the southern part of the island.

Horizontal displacement was inspected referred to a site located on the northwestern rim of the summit caldera. For the two months just before the swarm event, only small displacements less than 3 mm were observed in many sites. It means the volcanic deformation of the island was slowed down when the swarm began. However, for the next two months of the event, large displacements indicating the deflation over the island was detected, especially in the eastern part, eastward movement over 1 cm. The rate of the displacement was as much as about 0.5 cm/month, it is comparable to the rate from November to December in 2012, the largest rate in recent years.

Keywords: Izu-Oshima, ground deformation, GPS, volcanic earthquake