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Room:Convention Hall

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Time evolution of the magma chamber beneath the Izu-Ohshima Island.

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1. Introduction

The Geospatial Authority of Japan (GSI) and the Japan Meteorological Agency (JMA) set up GPS network in Izu-Ohsima Island. GSI analyze GPS data of the GSI together with the GPS data of the JMA and monitors crustal deformation of the Izu-Ohsima Island on daily basis. The GSI has employed the time dependent inversion to the detected position time series and estimated the time evolution of a volume change in the magma chamber beneath the Izu-Ohsima Island. The result shows that the magma chamber inflated and deflated alternately over time with a total volume increasing from 2004. In this research, we estimate the latest time evolution of a magma chamber using the data until the end of 2010.

2. Analytical Procedure

We used the east-west (EW), north-south (NS), and up-down (UD) components at 9 selected GPS sites covering the Izu-Ohsima Island, relative to the 93051 site. Since the raw data include annual components, we first estimated them, using a polynomial function and trigonometric functions to fit the position time series for the period between 2004 and 2010.

Using the position time series without annual components, we applied square-root information filtering, following the time-dependent inversion technique for the period between January 2004 and December 20, 2010. We weighted the EW, NS, and UD movements with a ratio of 1:1:1/5, considering the standard deviations estimated from ordinary Kalman filtering. We employed the time dependent inversion to the position time series. The position of a magma chamber is estimated in the time dependent inversion on the assumption that these parameters are constant over time. A volume change is estimated on condition that it changes smoothly over time.

3. Results and discussion

As a result, a magma chamber inflated and deflated alternately over time with a total volume change of 1600m³ from 2004 to 2010. This result is consistent with the past studies. At present, a magma chamber is inflating from July 2010, slightly slowing down inflation in December 2010. A volume change for this period reaches 5 million m³. This volume change is second the largest volume increase following the 2007 inflation. In a meeting, we will present the latest time evolution of a magma chamber beneath the Izu-Ohsima using the latest position time series.

Keywords: Izu-Ohshima, magma chamber, GPS, time dependent inversion