

# Japan Geoscience Union Meeting 2011

(May 22-27 2011 at Makuhari, Chiba, Japan)

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SVC050-13

Room:302

Time:May 23 11:45-12:00

## Towards mid-term eruption prediction of Izu-Oshima volcano (4): deep LF earthquakes, magma accumulation, CO<sub>2</sub> degassing

Hidefumi Watanabe<sup>1\*</sup>

<sup>1</sup>Disas. Prev. Div., Tokyo Met. Gov.

In order to make successful mid-term or long-term eruption predictions, we need to detect particular precursor processes operating in magma-plumbing system. Since 1989, we have detected the secular re-inflation of the volcano and further revealed the repeated deflation-inflation cycles, resulting a net inflation of the volcano. The rate of secular inflation has decreased exponentially until 2006, and since then kept a constant speed. The amplitude of deflation-inflation cycles has also increased. The JMA catalog of hypocenters indicates that the activity of deep low-frequency (LF) earthquakes occurring at depth ranges of 30-40 km beneath Izu-Oshima volcano has increased since 2007, and that the elevation of LF earthquakes activity has preceded the volcano inflation. We naturally suppose that the volcano inflation is caused by the supply of magma from depths. What is the origin of the deflation? There are two possible processes causing the deflation, magma drain back and the contraction of magma due to degassing. In order to discriminate the deflation mechanisms, we need to combine the magma accumulation and degassing processes. To monitor the degassing of basaltic magma accumulating beneath the volcano, CO<sub>2</sub> is most helpful because CO<sub>2</sub> separates from melt at the earliest stage of accumulation. In September 2005, we started continuous monitoring of soil CO<sub>2</sub> concentration at the eastern part of the summit of Izu-Oshima volcano. We observed the correlated increase of soil CO<sub>2</sub> concentration during the periods of not only accelerated inflation but also deflation of the volcano, suggesting that the degassing of accumulated magma might cause the deflation. By integrating the observation data, we suppose that the rate of magma supply from the upper mantle has increased since 2007 causing an increase of CO<sub>2</sub> over-saturated region at the upper part of magma reservoir beneath the volcano.

Keywords: eruption prediction, precursors to eruption, Izu-Oshima volcano, magma accumulation, CO<sub>2</sub>