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昭和火口噴火活動期の桜島火山の地盤変動源体積の時間変化
Temporal volume change of deformation sources of Sakurajima volcano during activity at Showa crater

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During active period of vulcanian eruption at summit crater of Minami-dake (1974 — 1992), ground subsidence was detected by precise leveling, and 2 deflation sources were estimated at a depth of 10 km beneath Aira caldera and at a depth of 3 km beneath Minami-dake [Eto, 1989, DPRI annual]. Eruptive activities at Showa crater started in June 2006. After 2009, ground inflation was detected with increase in eruptive activity during the periods of October 2009 — May 2010 (2009 event), October 2011 — March 2012 (2011 event) and January — June 2013 (2013 event). Ground deflation also detected after 2009 and 2013 events (May — September 2010; July — October 2013), and before 2011 and 2013 events (March — September 2011; July — December 2012).

We performed combination analysis of GNSS, tilt and strain data for 2011 event assuming 3-pressure-source model. 2 inflation sources are located beneath Aira caldera at a depth of 9.6 km depth (A-source) and beneath Kita-dake at a depth of 3.3 km (K-source), and a deflation source is located beneath Minami-dake at a depth of 0.7 km (M-source) [Hotta et al., 2014 AGU Fall Meeting].

In this study, we estimate temporal volume change of each source after 2009 on the assumption that sources do not change their position at A-, K- and M-sources of 2011 event. A- and K-sources repeat inflation and deflation on a 1- to 1.5-year cycle. However, start of the change of K-source is simultaneous or several months earlier than that of A-source. Overall trend of volume change of A-source is inflation. On the other hand, K-source shows no significant inflation or deflation trend. M-source inflates several months before 2009 and 2011 events and deflates during these events, which is considered to be magma migration and ejection, respectively. M-source is continuing deflation after 2011 event. Assuming DRE of 2500 kg/m^3 for magma, we convert amount of ejected magma from weight of ejected ash and then estimate volume of migrated magma between sources. Magma injection progressed in inflation events, but stopped during other periods. It is considered that magma injected intermittently toward A-source. Amount of magma ejection increased in 2009, 2011 and 2013 events, but is less than that of magma injection from A- to K-source. On the other hand, it is in reverse for deflation periods.

キーワード: 桜島火山, GNSS, 傾斜計, 伸縮計, 茂木モデル, 時間変化
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