

Short-term gravity signal during major eruptions at the Sakurajima volcano since 2012

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We have discussed long-term (timescale >several months) gravity change at Sakurajima volcano, which has been repeating frequent Vulcanian eruptions (500~1,000/year) since 2009 (Okubo et al., IAVCEI 2013). In fact, excellent correlations were found among the records of absolute gravity, ejected weight of volcanic ash, ground tilt, and infrasound air shock amplitude. The long-term gravity data were interpreted in terms of magma head height to explain the close correlation among the variables.

In this paper, we deal with rather short-term gravity signals based on continuous absolute gravity measurements since April 2012. After eliminating hydrological disturbances to the gravity field, we find several major eruptive events were associated with precursory short-term gravity decreases occurring over ~3 hours followed by quick recoveries lasting ~3 hours. The gravity signals occur in synchronization with the volcano's inflation/deflation as revealed by strain and tilt records, which strongly suggests that the gravity signals are due to either building-up of pressure within the volcano or mass transport in the conduit. Since similar precursory gravity changes were reported during the Vulcanian phase of the 2011 eruption of Shinmoe-dake volcano, Kirishima, Japan (Okubo et al., 2013), short-term precursory gravity changes might be universal to major Vulcanian eruptions.

Keywords: absolute gravity, crustal strain, vulcanian eruption, Sakurajima