Evolution of seismic reflectors beneath Sakurajima Volcano after 2008, revealed through the rounds of controlled source seismic experiments

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Evolution of seismic reflectors beneath Sakurajima Volcano is presented, which is revealed with rounds of seismic experiments after 2008. Sakurajima Volcano is one of the most active volcanoes in Japan. The rounds of seismic experiments have been carried out while the activity on the 1946's crater in the eastern frank rose up after its revival on 2006, after the pilot survey in 2008. A round of seismic experiments includes 14 shot points with charges and 252 temporary stations with a vertical seismometer for seismic reflection survey. The temporary stations were deployed along two lines in the east foot and in the northern frank of the volcano. The evolutions of seismic response are detected in seismic records corresponding to the ray paths passing through the northern to north eastern part of Sakurajima. The migrated sections from the differential seismograms show detailed evolution in the seismic reflector distribution beneath the depth of 4km which can represent magma intrusion. A seismic reflector with negative polarity rose up to the depth of 4km in the north-eastern portion of Sakurajima Volcano where a chimney like structure locates, during 2008 to 2009 while constant inflation of the volcano. Other negative reflectors enhanced and decayed in the deeper part. These movement of seismic reflectors is consistent with geodetic evidence of the magma movement in the period. Therefore such evolution of seismic reflectors can represent intrusion of magma towards the craters. On the other hand, sporadic reflectors with positive polarity appear around the depth of 2km in two sections on the 2009's and the 2011's round which obtained while frequent explosions at the 1946's crater. The depth of the sporadic reflectors are coincident with the bottom depth of the effective part in the explosion models which have been presented by Iguchi(1994) and Tameguri(2004). Therefore the sporadic reflectors in the shallow part can represent a sort of mass deficiency raised by the explosions. We found controlled source seismic monitoring of volcano is feasible. The controlled source seismic monitoring will provide certain advantages in understanding scale and in evaluation of its potential risk in the next phase of current activity. Detail of our method will be presented.