

Tiltmeter observation in Klyuchevskaya volcano, Kamchatka, Russia

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Klyuchevskaya is one of most active volcano in the world. Medium and big eruptions have occurred in every year and quarter of century, respectively. Clear magma plumbing system from upper mantle to surface was imaged by seismic tomography. Diverse eruption styles has been observed, e.g. strombolian at central corn crater, lava flow from central corn crater, fissure eruption at mountain slope and mountain base, parasitic cones generation, etc.

Aim of this research is to clarify branch condition of eruption style. A hypothesis that magma discharge rate from shallowest chamber and buoyant equilibration of magma density might be controlling factor will be tested. To monitor crustal deformation associated with magma intrusion, four bubble-type tiltmeter has been operated around volcano. Low power consumption, huge flash memory, and air battery allowed us to operate one year without maintenance. Tiltmeter have broad dynamic range from dozens of seconds to DC. High sampling rate of 100Hz give opportunity to analyze not only DC component but also transient signals with duration more than high frequency cutoff period. Signals of the 2011 Tohoku earthquake (Mw9.0) seismic waves suggested that this system can record long-period signals well. Theoretical modeling and sensor sensitivity indicated that this tiltmeter network might detect magma migration with volume less than 10^7m^3 .

Klyuchevskaya has been in quiet period since 2011. This might suggest that magma plumbing system in the shallowest part was possibly initialized. This condition might be ideal because our network will capture entire process of future magma intrusion from initial stage to eruption.