

Structural controls on magma pathways beneath Asama volcano, Japan

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Asama Volcano, Japan, is one of the most active volcanoes in the Japanese islands. Recent development of geophysical monitoring in Asama Volcano allows us to infer the magma pathway and its structural controls beneath the volcano. Combining geodetic data and precise earthquake locations during recent eruptions suggests that the magma intrudes several kilometres to the west of the summit to a depth of about 1 km below sea level as nearly east-west trending dyke. The vertically intruded magma then move horizontally by several kilometres to beneath the summit before it ascends vertically to make the surface. Combining the P-wave velocity and the resistivity structure shows that the intrusions are under structural controls. Frozen and fractureless magma associated with volcanic activity until 24,000 years ago impedes the ascent of rising magma on its way to the surface. The S-wave velocity structure inferred from ambient noise tomography reveals a low velocity body beneath the modelled dyke. We inferred that this low velocity body is likely to be a magma chamber by combining with an observation that seismic sites and tiltmeters to the west of the volcano tilted toward the inferred dyking area almost simultaneously with an eruption on 2 February 2009.