

Seismic swarm activity in Maruyama volcano, Hokkaido, Japan

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Maruyama volcanic field is post-caldera volcanism in central Hokkaido, southwestern Kuril subduction zone. Only one small phreatic eruption had been recorded at a century before in historical time. Maruyama cone, only less than 500m height from basement, was constructed by lower magma effusion rate during 0.1Ma. Several quaternary volcanisms and geothermal activity are recognized in surrounding area. A cluster of these magmatisms is recognized as resurgent activity of Tokachi-Mitsumata caldera.

Regional seismic monitoring had been in operation, but no clear seismicity was recognized before 1988. New seismic stage started in 1989 and has still continued. This abrupt break coincided with magmatic eruption activity of neighboring Tokachi-dake volcano of about 30km west of Maruyama. Earthquake catalogues has indicated very high micro-seismic activity in and surrounding area. Hypocenter distribution indicated discrete clustering, and intermittently time series sequence has been observed. Spatiotemporal hypocenter distribution indicated complex patterns, e.g. diffusive migration, abrupt jump of activity location to another cluster. Strike-slip and normal faulting has been suggested from focal mechanisms. Regional strain from geodetic data indicated compressional stress field. This discrepancy was possibly due to excess pore pressure. Triggered seismic activity associated with the 2011 Tohoku earthquake (Mw9.0) (epicentral distance was 600km) and the 2003 Tokachi-oki earthquake (epicentral distance was 180km) were additional information for supporting excess pore pressure hypothesis. Remarkable high activity of deep, low-frequency earthquakes around Moho has been observed beneath this volcano. High shallow seismic and geothermal activity might reflect magmatic fluid supply from upper mantle. Isotope analysis of noble gas from hot springs is required.