Geophysical Research Abstracts
Vol. 15, EGU2013-2322-1, 2013
EGU General Assembly 2013

Structural variation of the feeder dikes of explosive eruptions in Miyakejima, Japan

Nobuo Geshi
Geological Survey of Japan, AIST, Tsukuba, Japan (geshi-nob@aist.go.jp, +81 29 856-8725)

Explosive eruptions of basaltic volcanoes exhibit wide variation about its explosivity, from stable lava effusion, mild strombolian eruption, to plinian eruption. Complex behavior of magma within the conduit may control the style of eruption activities, and the structure of the conduit controls the behavior of the ascending magma through the conduit. Existence of external water (ground water) may also affect the explosivity of the eruption.
In the caldera wall of Miyakejima, Japan, we can observe various type of the cross section of feeder dikes with its surface products. The new caldera wall exhibits the cross section of a basaltic stratovolcano with numerous feeder and non-feeder dikes. Some feeder dikes connect directly to the lava flow. Some feeder dikes connect to the base of scoria cone with 100- 200 meters across and several tens meters high. Size and internal structure of the scoria cone indicates the mild strombolian activity. Uppermost ten meters of these feeder dikes shows upward-flaring (widen the dike thickness to the surface), which infers the magmatic erosion of the dike wall by explosive activities. More explosive activities formed some diatremes. The depth of these diatreme reaches 100 meters from the original ground surface. Typically, these diatremes connect to very-flat scoria cone and wide-spread thick scoria-fall deposit, which indicates the explosive magmatic activities. The sizes of these flat scoria cones are comparable to that of the scoria cones which was built by sub-plinian eruption (e.g., Izu-Oshima 1986). Upward flaring structure of the diatreme indicates the effective mechanical erosion of the dike wall by the explosive activities. The caldera wall also exhibits some diatremes which formed by the phreatomagmatic eruptions (Suoana diatreme).
The wider feeder dikes for lager diatreme suggests the higher magmatic overpressure for the explosive activities in comparison to the less-explosive feeder dikes. Comparison of the structures of these feeder dikes indicates that the variation of the depth of fragmentation (or explosion) controls the explosivity of the basaltic eruption. The fragmentation depth of mild strombolian feeders are relatively shallow (<10 m), whereas the deep rooted diatreme of the sub-plinian feeders indicates the deep fragmentation more than 100 meters from the original ground surface. The structural variation of feeder dikes suggests that the differences of magmatic overpressure and the fragmentation depth may control the eruption behavior.