Geophysical Research Abstracts,
Vol. 10, EGU2008-A-07949, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-07949
EGU General Assembly 2008

Effects of large flank collapse events on the magma production and evolution of volcanoes: Examples from the Lesser Antilles Arc

G. Boudon, A. Le Friant, B. Villemant

(1) Institut de Physique du Globe de Paris et CNRS, Paris, France (boudon@ipgp.jussieu.fr)

Flank-collapse events are increasingly recognized as a common process in the construction and destruction of volcanic edifices. In the Lesser Antilles Arc, at least 47 flank-collapse events were now recognized. Voluminous flank-collapse events may have significant effects on the magma chamber stability and the magma evolution. The volcanic edifice induces a threshold effect on the magma plumbing system. The decreasing of the edifice load after a large flank-collapse can reduce significantly the lithostatic pressure on the magma chamber and may trigger an eruption. Denser and more basic magma or more viscous magma may ascent and reach the surface whereas they were at lithostatic equilibrium at depth when the volcanic cone was present. An increase of the magma production rate may also be induced by large flank collapse until the construction of a new and voluminous cone that induces progressively a new threshold effect and can stop the magmas ascent and favour their differentiation at depth. Evidences for such effects are rare. A change in the magma composition and magma production has been recognized for three of the flank-collapse events studied in the Lesser Antilles Arc: at Montagne Pelée, the 25 ka flank-collapse event ($13\ km^3$) involved the eruption of more basic magmas and an increase of the magma production rate; at Pitons du Carbet, Martinique (30-40 km^3, $\sim$350 ka) and Soufrière Volcanic Centre, St. Lucia, eruption of more viscous and highly crystallized magmas, generating voluminous lava domes followed immediately the sector-collapse events. On the basis of theorical studies recently published in the literature we can propose different models explaining the effect of the flank-collapse on the magma plumbing and petrology of erupted magmas in these different examples.