Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03386, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03386
EGU General Assembly 2008


# Relationship between magma supply and eruptive behavior at Mt. Etna volcano during the 2006-2007 period

C. Ferlito, **M. Viccaro**, E. Nicotra, R. Cristofolini

Università di Catania, Dipartimento di Scienze Geologiche, Corso Italia 57, 95129 Catania, Italy (m.viccaro@unict.it)

The eruptive activity at Mt. Etna during the 2006-07 period took place at several vents mainly located in the eastern portion of the summit craters area. The active vents opened at: the South East Crater (SEC) at 3340 m (during July-December 2006 and 5 episodes in 2007); the saddle between the Bocca Nuova Crater (BNC) and the SEC at 3180 m (during November 2006 and on March 29, 2007 episode); the southern flank of BNC at 3050 m (during October-November 2006 and on March 29, 2007 episode); a vent located south-easterly from the SEC at 2800 m (during October-December 2006). All the eruptive episodes were characterized by emission of lava flows, which formed compound lava fields in the western part of the Valle del Bove and in the Cratere del Piano area. Lava flow emissions were accompanied by intense strombolian activity and several lava fountain episodes. The most powerful event occurred on November 16, 2006 when, after a sector collapse of the eastern portion of the SEC, a new fissure opened. The injected magma produced an eruptive column that collapsed giving origin to a small pyroclastic flow. Lava samples from July 2006 to September 2007 show rather homogeneous petrographic features. Products are mesophyric with a seriate texture and PI between 20 and 30. Among the phenocrysts, plagioclase ($\sim$10 vol%) and augite ($\sim$8 vol%) are the most abundant, followed by olivine ($\sim$5 vol%) and scarcer Ti-magnetite ($\sim$3 vol%). The groundmass is hyalopilitic to intersertal; microlites are mainly plagioclase and subordinate augite, olivine and Ti-magnetite. Lavas can be classified as K-trachybasalts. Their general petrographic and geochemical characters are rather similar to those displayed by most

of the rocks erupted during the period 2001-2005 [1, 2], although they appear slightly more basic. Furthermore, volcanics emitted in the 2006-07 eruptive period display a marked compositional change with time. Specifically, products emitted at the eruption onset in July 2006 exhibit lower $TiO_2$, $FeO_{tot}$, MgO contents and $CaO/Al_2O_3$ ratio than those emitted in November-December 2006 and throughout 2007. REE, Rb, Ba, Sr, Th and Nb are negatively correlated with MgO, confirming the progressive involvement of a geochemically distinct magma with time. This is also supported by the analysis of Sr-Pb isotopic ratios, whose values are similar to those of the 2001-05 products. $^{87}Sr/^{86}Sr$ ratio shows a marked negative correlation with $^{206}Pb/^{204}Pb$, which is also time-related within the entire 2006-07 eruptive period. Thus, 2006-07 products can be considered as the most basic and geochemically distinct among those emitted within the 2001-07 period. Recent works [3, 4, 5] have emphasized that inputs of basic magma into the Etnean shallow feeding system after 2001 have a peculiar high volatile content ($\sum H_2O+CO_2$+S+Cl+F $\sim$4 wt%). When such magmas enter closed-system reservoirs, they are able to supply the residing ones with high amounts of exsolved and exsolvable volatiles, potentially triggering and leading to powerful strombolian eruptions, such as the 2001 and 2002-03 events [1, 2]. On the other hand, when they ascend through tectonic systems connected with the main open-conduit, they can take part in steady-state degassing from summit craters, loosing their volatiles load and driving to mostly effusive eruptions, such as the 2004-05 event. The eruptive activity characterizing the period 2006-07 does not fit well in this scenario, since magmas with composition and volatile contents similar to those of the previous events were able to originate episodes, through structures linked with the main open-conduit system, with extremely variegated eruptive behaviors, being from wholly effusive to highly explosive. The intermittent short-lasting activity, along with the scarcity of relevant seismic phenomena, can be consistent with: (1) pulsating recharges and fast magma ascent occurring within the open-conduit system and/or (2) an intermittent tectonic control acting on the shallow feeding structures. This supports the idea that, at present, the open-conduit might not be able occasionally to buffer the pulses of ascending magmas, giving rise to violent phenomena at the summit craters.

**References**


[1] M. Viccaro et al., *J. Volcanol. Geotherm. Res.* **149**, 139-159 (2006).

[2] C. Ferlito et al., *Bull. Volcanol.*, in press, doi: 10.1007/s00445-007-0149-y (2007).

[3] A. Aiuppa et al., *Earth Plan. Sci. Lett.* **222**, 469-483 (2004).

[4] N. Metrich et al., *Earth Plan. Sci. Lett.* **228**, 1-17 (2004).

[5] N. Spilliaert et al., *J. Geophys. Res. - Solid Earth* **111**, B04203 (2006).