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The fire fountaining period (January-June 2000) at South East Crater, Mount Etna (Sicily): insight on the dynamics of the shallow plumbing system

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During the last decades, studies based on the integration of volcanologic observations and petrologic investigation pointed out that dynamics of the Etnean plumbing system are quite complex and influence the different eruptive styles. The period from 26 January to 24 June 2000, when 64 fire-fountains episodes occurred at South East Crater (SEC), represent an unique and exceptional series of paroxysms within a short time. This activity provides the chance to investigate not only the intra-episode variability (i.e. transition between the Strombolian and fountaining eruptive style; see Andronico et al., this meeting, VPG03 session), but also the mechanisms governing the whole fire fountaining period (Jan-June) in the framework of the summit craters activity that resumed in 1995, after the end of 1992-93 flank eruption. We analyzed both tephra and lava flows that immediately preceded some paroxysms. Petrographic observations stress the occurrence of the common mineralogical assemblage observed in recent Etnean lavas: phenocrysts of plagioclase, clinopyroxene, olivine and opaque oxides. However, if we compare these products with those erupted during the 1995-1999 summit craters activity (Corsaro and Pompilio, 2004), we observe that 2000 tephra and lavas are less porphyritic (Porphyricity Index ranges from 15 to 25% vol.) and have higher clinopyroxene and olivine content (plagioclase/femic minerals is mostly less than 1). Furthermore glomeroporphyritic texture is not so common as in 1995-1999 products. All the analyzed samples are thachybasalts as 1995-1999 products, but result more primitive for their higher Mg# (from 47 to 51) and CaO/Al2O3 (0.56-0.66) and lower FeOtot/MgO (1.70-1.98). The more primitive composition of 2000 fire fountaining products with respect to the earlier erupted ones is furthermore stressed by the higher content of compatible trace elements as Cr and Ni. Time-related trends suggest that the composition of both major and trace elements maintains homogeneous

since the variability is within the analytical uncertainty. The only exceptions are the samples (both tephra and lava) erupted during the activity of 26 Jan because they result significantly more evolved. The preliminary results obtained by the integration of volcanologic observations, petrography and geochemistry suggest that the complex conditions existing in the shallow plumbing system of Mount Etna in the period 1995-1999 are modified by the arrival of a fresh, more primitive and volatile rich magma. This begins to be erupted in February 2000 and feeds the sustained explosive activity up to June. The first episode (26 Jan) of the fire fountaining period differs significantly from the others because it taps a more degassed, cristallized and evolved magma residing in the plumbing system.