



Lava fountains and growth of cone-and-shield complexes at Mt. Etna (Italy) and Kilauea (Hawai'i): variations on a common theme

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Although basaltic volcanic eruptions are typically associated with the effusion of lava flows, they can show significant variations in eruptive styles and volume fluxes and are capable of producing significant amounts of tephra to construct sizeable pyroclastic edifices. The classic example is Kilauea on Hawai'i which is famous for its episodic lava fountaining and is currently under-going one of the most long-lived historical effusive eruptions. Another basaltic volcano which displays similar types of activity is Mount Etna (Italy), where most eruptions are associated with the emplacement of voluminous lava flows, although explosive activity including lava fountaining is also common and has increased notably in recent years. In recent years, the main focus of such spectacular and violent eruptive phenomena has been the Southeast Crater, the youngest of the four summit craters of Etna. The period of highest eruptive rate was between 1996 and 2001, when near-continuous activity occurred in five phases. These were characterized by a wide range of eruptive styles and intensities, from quiet, non-explosive lava emission to brief, violent lava fountaining episodes. Much of the cone growth occurred during these fountaining episodes, totalling 105 events. In many respects this activity was similar to that observed during Kilauea's ongoing Pu'u 'O'o-Kupaianaha eruption. However, the activity at Etna's Southeast Crater was more complex for the involvement of multiple vents displaying different eruptive styles, it furthermore produced significantly taller lava fountains than those known from Kilauea, and more tephra. Small pyroclastic flows were also produced during some of the eruptive episodes, when oblique tephra jets showered the steep flanks of the cone with hot bombs and scoriae. Fluctuations in the eruptive style and eruption rates were controlled by a complex interplay between changes in the conduit geometry (includ-

ing the growth of a shallow magma reservoir under the Southeast Crater), magma supply rates, and flank instability. The morphological features resulting from the Pu'u 'O'o-Kupaianaha and Southeast Crater eruptions are similar - large pyroclastic cones surrounded by lava shields, but they were constructed on highly different terrain (at Kilauea, a rather flat slope, and at Etna, a rather complex area extending the summit cones to the Valle del Bove collapse depression).