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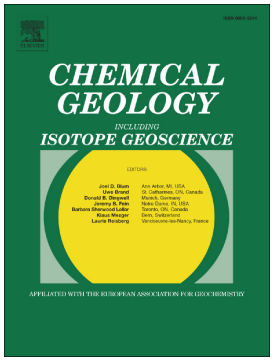

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ACCEPTED MANUSCRIPT

Degassing vs. eruptive styles at Mt. Etna volcano (Sicily, Italy). Part I: Volatile stocking, gas fluxing, and the shift from low-energy to highly explosive basaltic eruptions

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Running title: Composite volatile patterns behind the eruptive style of Mt. Etna

Abstract

Basaltic magmas can transport and release large amounts of volatiles into the atmosphere, especially in subduction zones, where slab-derived fluids enrich the mantle wedge. Depending on magma volatile content, basaltic volcanoes thus display a wide spectrum of eruptive styles, from common Strombolian-type activity to Plinian events. Mt. Etna, in Sicily, is a typical basaltic volcano where the volatile control on such a variable activity can be investigated. Based on a melt inclusion study in products from Strombolian or lava-fountain activity to Plinian eruptions, here we show that for the same initial volatile content, different eruptive styles reflect variable degassing paths throughout the composite Etnean plumbing system. The combined influence of i) crystallization, ii) deep degassing and iii) CO_2 gas fluxing can explain the evolution of H_2O, CO_2, S and Cl in products from such a spectrum of activity. Deep crystallization produces the CO_2-rich gas fluxing the upward magma portions, which will become buoyant and easily mobilized in small gas-

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