



## **Balancing bulk gas accumulation and gas output prior and during fire fountain episodes at Mt. Etna**

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Lava fountains represent a distinctive feature of Mt. Etna's activity. Up to the date of this writing (January 2015), 45 episodes of lava fountaining occurred from one of Etna's summit craters (NSEC) since January 2011. In particular, during the summer of 2011, the highest frequency of fire fountain episodes was recorded, with repose intervals of only a few days.

Previous studies concluded that the episodes of lava fountaining at Etna are triggered by massive collapses of a foam layer that accumulates at shallow depth, i.e. in the uppermost portion of the magmatic reservoir of the NSEC. To address this hypothesis, we compare the volume of gas accumulated at depth prior to some fountaining episodes with the volume of gas emitted during the paroxysmal activity. The former figure is obtained through inversion of data from a continuously recording gravimeter installed in the summit zone of Etna. The latter is retrieved through the time development of the height of the fire fountains, in turn deduced from thermal imagery.

Preliminary results suggest that, for the collapsing foam model to hold, the later stages of the foam growth must occur under lower than lithostatic pressure. This finding implies high vesiculation (lower-than-expected density) of the magma in the conduit between the shallow reservoir and the ground surface.