



Volumes, rates and related hazards of Etna's 2007-2010 eruptions (Italy)

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Digital comparison of two LiDAR-based digital elevation models of the summit area and eastern flank of Mount Etna (Italy), acquired in June 2007 and September 2010, were used to quantify with high accuracy the volumes of eruptive products (lava and pyroclastics) emitted in this time interval. During this period, Etna's activity was characterized by a classical sequence of summit paroxysms followed by a voluminous effusive eruption on the upper east flank (May 2008-July 2009). We integrated the total volume difference resulting from the subtraction of the 2007 DEM from the 2010 DEM with individual, well-constrained volumes of eruptive products based on data from field and aerial surveys to attribute more precise volumes to events that have until now remained poorly constrained. The total volume of 2007-2010 eruptive products is ~ 86 million cubic meter, by far the largest proportion (~ 73.6 million cubic meter) of which is represented by the lava flows of the 2008-2009 flank eruption. In spite of being one of the longest-standing flank eruptions of Etna of the past ~ 350 years, its mean effusion rate of 2 cubic meter per second was rather low. The survey also reveals the unusually high lava volume (~ 5.8 million cubic meter) of the paroxysmal episode of 10 May 2008, which preceded the flank outbreak by three days, and which was emplaced within four hours at an average rate of ~ 400 cubic meter per second, the flow front stopping at a distance of 6.2 km from the source vent. With a slightly longer duration of this eruptive episode, that lava flow might have come rather close to the outskirts of the nearby town of Zafferana Etnea.