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Etna's Voragine: the astonishing phenomena of December 2015 and May 2016

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The activity of December 2015 and May 2016 at the summit crater Voragine of Mt. Etna volcano (Sicily, Southern Italy) was among the most explosive recorded during the last two decades. Other paroxysmal episodes at the Voragine occurred on July 22, 1998 and September 4, 1999, and were both characterized by extra-ordinary volcanic phenomena, such as production of a 12-km-high eruptive column and lava fountaining up to 2000 m above the crater edge, respectively. The same crater was theater of exceptionally violent paroxysmal episodes with similar dynamics also in the past (i.e., February 1947, July-August 1960, August 1989). In all these cases, severe tephra fall-out affected the volcano flanks with important hazard for the population and social activities. This eruptive behavior is odd if contextualized within the framework of the basaltic s.l. volcanism making peculiar Mt. Etna volcano, which is prevalingly characterized by effusive or mildly Strombolian eruptions. Whilst conspicuous work is currently in progress to unravel the factors leading to the recurrent eruptions during the period 2011-2014 at the New South East Crater of Mt. Etna (more than 50 paroxysmal episodes with lava fountaining up to 500-m-high), the chemical-physical reasons controlling the outstanding volcanic activity at the Voragine are still not clear. In this presentation, we show preliminary data concerning the whole rock geochemistry (major and trace elements) together with textural and compositional features of mineral phases. In order to get time constraints on magma dynamics, the application of diffusion modeling for selected major and trace elements in plagioclase and olivine crystals has been revealing surprising temporal development of pre-to-syn-eruptive volcanic processes occurring into the storage and transport system of Mt. Etna volcano.