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Hazards from pyroclastic density currents at Mt. Etna (Italy)

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Despite the recent recognition of Mount Etna as a periodically violently explosive volcano, the hazards from various types of pyroclastic density currents (PDCs) have until now received virtually no attention at this volcano. Large-scale pyroclastic flows last occurred during the caldera-forming Ellittico eruptions, 15-16 ka ago, and the risk of them occurring in the near future is negligible. However, minor PDCs can affect much of the summit area and portions of the upper flanks of the volcano. During the past ~20 years, small pyroclastic flows or base-surge-like vapor and ash clouds have occurred in at least 8 cases during summit eruptions of Etna. Four different mechanisms of PDC generation have been identified during these events: (1) collapse of obliquely directed pyroclastic fountains (as in 2000 and possibly in 1986); (2) disintegration of the unstable flanks of a lava dome-like structure growing over the rim of one of the summit craters (1999); (3) phreatomagmatic explosions resulting from mixing of lava with fluid-soaked rock (2006); (4) phreatomagmatic explosions resulting from mixing of lava with thick snow (2007). All of these recent PDCs were of a rather minor extent (maximum runout lenghts were about 1.5 km in November 2006 and March 2007) and thus no they represented no threat for populated areas and human property around the volcano. Yet, events of this type pose a significant threat to the lives of people visiting the summit area of Etna, and areas in a radius of 2 km from the summit craters should be off-limits anytime an event capable of producing similar PDCs occurs. The most likely source of further PDCs in the near future is the Southeast Crater, the youngest, most active and most unstable of the four summit craters of Etna, where 6 of the 8 documented recent PDCs originated. It is likely that similar hazards exist in a number

of volcanic settings elsewhere, especially at snow- or glacier-covered volcanoes and on volcano slopes strongly affected by hydrothermal alteration.