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Video monitoring of the persistent strombolian activity of Stromboli volcano represents a window on its plumbing system and an opportunity for understanding the eruptive processes

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Since 1994 a video-surveillance camera located on a peak just above the active volcanic vents of Stromboli island records the explosive activity of one of the few volcanoes on the world performing a persistent eruptive activity. From 2003, after one of the larger lava flow eruption of the last century, the video-surveillance system was enhanced with more stations having both thermal and visual cameras.
The video-surveillance helps volcanologists to characterize the mild explosive activity of Stromboli named Strombolian and to distinguish between the frequent “ordinary” Strombolian explosions and the occasional “extraordinary” strong Strombolian explosions that periodically occur. A new class of extraordinary explosions was discovered filling the gap between the ordinary activity and the strong explosions named major explosions when the tephra fallout covers large areas on the volcano summit and paroxysmal ones when the bombs fall down to the inhabited area along the coast of the island.
In order to quantify the trend of the ordinary Strombolian explosions and to understand the occurring of the extraordinary strong Strombolian explosions a computer assisted image analysis was developed to process the huge amount of thermal and visual images recorded in several years. The results of this complex analysis allow us to clarify the processes occurring in the upper plumbing system where the pockets/trains of bubbles coalesce and move into the active vent conduits producing the ordinary Strombolian activity, and to infer the process into the deeper part of the plumbing system where new magma supply and its evolution lead to the formation of the extraordinary strong Strombolian explosions.