Geophysical Research Abstracts
Vol. 14, EGU2012-9179, 2012
EGU General Assembly 2012

Constancy and variability of Strombolian eruptive activity: long-term analysis of infrared surveillance videos from Stromboli Volcano

J. Taddeucci (1), D.M. Palladino (2), D. Bernini (2), G. Sottili (3), D. Andronico (4), and A. Cristaldi (4)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Seismology and Tectonophysics, Rome, Italy (taddeucci@ingv.it, +39 0651860 507), (2) Università "La Sapienza", Dipartimento di Scienze della Terra, Rome, Italy , (3) Consiglio nazionale delle Ricerche, IGAG, Rome, Italy, (4) Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Etneo, Catania, Italy

Persistent Strombolian activity characterizes open-conduit volcanoes worldwide. Among these, Stromboli (Italy) is one of the best monitored by permanent networks that include visible and infrared cameras. Continuous surveillance videos from the INGV archive allow us to parameterize the dynamics of explosive events in the period 2005-2009. Here we focus on three consecutive days per each year, by analyzing a total of 4275 explosive events from the different active vents. Via image analysis of the video frames, we obtained the time lapse among consecutive events, and duration and geometrical parameters (maximum height, width, and ejection angle) of individual jets. Long-term average values of the above parameters quantitatively define the activity baseline, as follows: inter-event time lapse 5 minutes (standard deviation 5 minutes); jet duration 15 s (5 s); jet height 70 m (24 m); jet width 33 m (10 m); jet axis at angle of 3° (16°) to the vertical. Significant deviations from these baseline values are observed over different (minute to year) time-scales, e.g.: peak jet durations and heights may reach up to 120 s and 251 m, respectively. The analysis of the mutual relationships among the eruptive parameters, and their temporal variation patterns at the different vents, provide a statistically based groundwork to define the dynamics of Strombolian activity. In this regard, a higher aspect ratio (height over width) of the jet seems to reflect increasing depth of the bubble burst beneath the magma free surface in the conduit, to be compared with seismic- and acoustic-derived information. Also, the remarkable constancy of jet angles at specific vents, notwithstanding the occurrence of a significant collapse of the whole crater area during the 2007 eruptive crisis, reveals self-similar resumption of the branching, shallow conduit system and provides insights into its connection to the feeder dike. The robust statistically based definition of the Stromboli behaviour can be helpful to determine the intensity thresholds of the activity and the areas prone to ejecta dispersal, relevant for hazard assessment.