



Can bad weather conditions trigger eruptions? The case of study of Stromboli 2007 eruption.

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The unrest of Stromboli volcano leading to the February 27-April 2, 2007 eruptive period and the March 15 paroxysm is constrained by combining broadband seismic data and 1-Hz GPS (High Rate GPS – hereinafter HRGPS) measurements. During the preeruptive stage, the simultaneous examination of seismic and HRGPS data, together with weather parameters, suggests the possible influence of external perturbations on the magmatic system, which evolved toward a critical state after January 2007. For this aim, we show that the cross wavelet transform and wavelet coherogram are very effective tools to study prospective coupling between heterogeneous time series. Some days after the onset of the eruption, a sudden change of the seismic and eruptive behaviour was recognized, while ground deformation began to show a deflation. The March 15 paroxysm was preceded, some days before, by a peak of the HRGPS spectral power densities (a small inflation) and by the variation of location and features of long period (LP) events together with the occurrence of a few VT earthquakes located at depths down to 3.5 km b.s.l. These findings constrain, for the first time at Stromboli volcano, the deep origin of a fast rising magma batch, rich in gas, that led to a strong explosive event, and highlight a strict relationship between VLP seismicity and the eruptive activity.