



Early warning of paroxysmal explosions at Stromboli volcano (Southern Italy) using dilatometers and broadband seismic stations.

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The activity of Stromboli volcano is generally characterized by a persistent mild explosive activity at the summit craters. This activity is sporadically interrupted by episodes of lava effusion and violent paroxysmal explosions. The latter phenomenon, even being well below the range of sub-plinian explosions, poses a serious threat on the summit craters area which often hosts tourists and scientific operators. The current, widely accepted, volcanological model, of these explosions, implies the rapid ascent of a batch of primitive, gas rich magma. As the batch approaches the shallow part of the conduit, the exsolution and the expansion of gas bubbles generates an increasing overpressure until the explosion occurs. The last two explosions, occurred on April 5th 2003 and March 15th 2007 and have been recorded by a dense network of broadband seismic stations. The latter has been recorded also by two dilatometers deployed just few months before the event. In both cases clear geophysical precursors have been recorded some minutes before the explosion. These signals were related to the deformation of the volcanic edifice caused by the pressurization of the shallow conduits just before the explosion. The signal recorded on broadband station is related to the tilt, while dilatometers recorded the volumetric strain. We will show how, using numerical modelling, it is possible to infer about the time evolution of the strain source. Those results indicate the feasibility of an automatic early warning system that can give an alert about the occurrence of violent explosions some minutes before these dangerous phenomena.