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# Body wave attenuation heralds surfacing magma at Mount Etna (Italy): the 2001-2003 and 2007 – 2008 case studies

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During magma emplacement in the shallow crust, transient variations of physical properties underneath active volcanoes are expected and in a few cases observed. The predictability of such changes strongly depends on how fast this process is, compared to our ability to handle geophysical data and consistently resolve transient anomalies in the physical properties of the medium. The velocity of the magma upwelling depends on the local conditions of the volcanic conduit and rheology of the magma. Mt Etna is a perfect natural laboratory to investigate such issues, due to the almost continuous magmatic activity and the high quality of seismologic and geodetic data. Our experience with the most recent eruptive activity at Etna volcano (1989, 1991-1993, 1999, 2001, 2002-2003, 2004, 2006-2007, 2008-2009) has indicated that most of these eruptions were preceded by changes in several geophysical parameters, the most evident being: i) increase of seismicity; ii) deformation and iii) stress field variations. Changes in seismic attenuation properties in the region of magma intrusion can be also detected, and the 3D tomography by using a set of earthquakes recorded just before an eruption provides an image of such changes. Thus, to recognize if any change in the attenuation parameters, QP and/or QS, was produced by intrusive processes at Mt Etna, we analyzed the seismicity occurred in two different periods (2001-2003 and 2007-2008) during which three eruptive episodes occurred. Here we show that seismic attenuation of local earthquakes strongly increases due to the emplacement of magma within the crust, forecasting eruptions.