



Seismic wave temporal changes during the 2002-2003 Mt. Etna eruption

L. Zaccarelli (1), D. Pandolfi (2), F. Bianco (1), G. Saccorotti (3), C.J. Bean (2)

(1) Istituto Nazionale di Geofisica e Vulcanologia, sezione di Napoli, (2) Seismological and Computational Rock Physics laboratory, School of Geological Sciences, UCD, Dublin, (3) Istituto Nazionale di Geofisica e Vulcanologia, sezione di Pisa

Volcanoes represent an environment where stress can change rapidly, due to fluctuations in the pressurization of the system. Such a change involves the surrounding crust with its rocks, fractures, and fluid contents, leading to a different seismic response of the medium. Here we focus our analysis on earthquake records of the 2002-2003 Mt. Etna eruption searching for relationships between waveform time changes and temporal evolution of the stress field acting on the area. Comparing two earthquakes with highly similar waveforms and almost the same hypocenter locations (doublet event) all differences in their signatures can be ascribed solely to time changes along the ray path. We studied Etna doublets from 2 different points of view, through the application of Coda Wave Interferometry (CWI) and Shear Wave Splitting (SWS) analysis. The first technique enables measurements of percentage velocity variations, whilst the second one leads to anisotropy change estimations. Both methodologies showed interesting results, whose combination can improve not only the monitoring but also our understanding of the stress field acting on volcanic areas. Indeed, their comparison enabled a deeper discussion on the interpretation of the seismic wave changes in terms of pressure variations of the fluids inside the cracks that permeate the volcanic crust.