



Monitoring crustal changes at volcanoes by seismic noise interferometry: Mt. Etna case of study

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In this work, we analysed the seismic noise recorded at Mt. Etna by 18 stations during the interval 2007-2015 in the frequency band 0.1-0.3 Hz, chosen to avoid contamination from volcanic tremor. Variations in time of medium seismic velocity in the range -0.8 to 0.8% were found, mostly affecting the stations located on the volcano flanks. Based on the investigated frequency content, the maximum depth of the $\Delta v/v$ changes was estimated equal to ~ 4.5 -6.5 km. To identify the source mechanism of the observed medium changes, the variations were quantitatively compared by Wavelet Transform Coherence with volcano-tectonic and meteorological parameters. A significant relationship with meteorological parameters with seasonal periodicity (especially air temperature and snow loading) was found, probably caused by thermo-elastic strain and increasing-decreasing surface loading cycles. Moreover, a sharp medium velocity decrease, taking place in mid-December 2009 and clearly time-related to the main volcano-tectonic strain release phenomenon of the investigated period, was also found. Such a velocity decrease was interpreted as resulting from ascent of fluids and gas exsolution taking place at the same time as the volcano-tectonic swarm.