



## **14-year-long discrete gravity measurements at Etna volcano**

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Since 1994 a 24-kilometer East - West trending profile of 19 stations on the southern flank of Etna volcano is surveyed at a high sampling rate (usually quasi-monthly measurements, up to weekly during periods of paroxysmal activity), to recognize underground mass redistributions related to the ensuing volcanic activity. We analyzed the 14-year-long gravity data set recorded during a time interval between August 1994 and September 2007, which encompasses several eruptive events (both activity at the summit craters and lateral eruptions). An important issue with the above data-set is the need of separating the useful signal (i.e. the volcano-related one) from unwanted components (instrumental, human-made, seasonal and other kinds of noise). A multi-resolution wavelet analysis allowed the time-space decomposition of the signal into a variety of scales. The residual space-time image evidenced: (i) recurrences in both space (i.e. zones under which mass redistributions occur more frequently) and time (i.e. cyclic processes) and (ii) microgravity anomalies correlated with the ensuing volcanic activity. In order to recover a 2D subsurface mass distribution along the profile, we modeled the 1994-2007 gravity anomalies using a quadratic programming (QP) algorithm to infer the position and dimension of the sources. Our results highlighted correlations between large-scale and long-term mass redistribution and seismicity at different depths which provided implications for the eruptive cycles of Etna occurred in the last years.