



Identifying short-term gravity variations at hydrothermally active restless calderas: The case of Nisyros, Greece

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We report on short-term (over tens of minutes) residual gravity changes recorded at the restless Nisyros caldera in Greece via a series of discrete measurements at benchmarks within or in proximity to a hydrothermal area located along the caldera floor. The obtained time series reveal sinusoidal gravity variations with amplitudes of up to 0.025 mGal and wavelengths of 40-50 min. Degassing of a magmatic source coupling into (shallow) hydrothermal systems including the ascent of steam pockets and transient pressure variations during steam/liquid interface propagation appear to be the most likely causative process for the observed short-term variations. We assess standard protocols of micro-gravity surveys for hazard assessment in volcanic areas in the light of these findings and propose additional techniques, such as continuous gravimetry, for the discrimination of hydrothermal signals from deeper-seated, i.e. magmatic, signals during gravity monitoring of restless volcanoes hosting active hydrothermal systems.