Geophysical Research Abstracts
Vol. 17, EGU2015-11138, 2015
EGU General Assembly 2015

The iGrav superconducting gravimeter as a tool to monitor and study active volcanoes. Preliminary results from Mt. Etna (Italy)

Daniele Carbone and Filippo Greco
INGV - Osservatorio Etneo - Sezione di Catania, Catania, Italy (daniele.carbone@ingv.it)

Microgravity observation have been proven to be a valuable tool to monitor and study active volcanoes, thanks to their ability to detect mass redistributions induced by volcanic processes.

Gravity changes are usually observed through time-lapse measurements. The latter can provide a good spatial resolution, but do not supply enough information on the rate at which the volcanic processes occur. Indeed, only changes between successive surveys (usually separated by intervals longer than 1 month) can be assessed.

Continuous gravity measurements at active volcanoes are relatively rare, mainly due to the difficulty of running continuously spring instruments (the most widely used gravimeters), especially in harsh conditions. Indeed, spring gravimeters are subject to an important instrumental drift and are severely affected by ambient parameters (mainly ambient temperature).

Superconducting gravimeters provide much better performances than spring instruments. In particular, the iGrav^{TM} superconducting gravimeter by GWR, more portable and easier to use than GWR Observatory Superconducting Gravimeters, features a sub-microGal precision, is practically drift-free (instrumental drift rate less than 0.5 microGal/month) and totally insensitive to local changes in ambient parameters. This instrument needs about 1kw of electricity to work, implying that it cannot be permanently installed in remote sites where mains electricity is not available. However, thanks to its stability and precision, the iGrav^{TM} meter can supply important information about volcano-related processes, over period of minutes to years, even if it is installed relatively far from the active structures.

Here we report on the installation of an iGrav^{TM} meter at Mt. Etna (Italy). iGrav#16 was installed at the astrophysical observatory of Serra La Nave (southwestern flank of the volcano; 1740 m asl) in September 2014 and has acquired gravity data almost continuously even since, at a rate of 1Hz. The main features of the gravity data from iGrav#16 and the possible relationships with the volcanic activity are presented and discussed.