



## **GraVisual: a LabVIEW® program to quickly analyse long gravity data-sequences**

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In 1997 three continuous gravity stations at distances from Etna's summit craters ranging between 1 and 10 Km have been installed. The stations, equipped with LaCoste and Romberg (LR) spring gravimeters, acquire (1 datum/min sampling rate) gravity and other parameters which are used to reduce the gravity signal for instrumental effects. The stations are connected by mobile phone and wireless link with INGV-Catania. Since up to 8 parameters are acquired simultaneously, each station furnishes a huge amount of data. We have designed an advanced software package, which allows the large data sets coming from the remote stations to be visualized and analyzed quickly and with a high level of automation. The advanced software package, called GraVisual, has been designed under LabVIEW®, a graphical programming environment. LabVIEW® features a large library of analysis tools (spectra, Fourier Transform, filters, curve fit, probability and statistic, etc.) through which even complex analyses on large data sequences can be performed in near real time. Since the gravity data sets are often affected by gaps and discontinuities due to instrumental resets, great care has been taken in designing a tool for database editing and management. After the pre-processing step is completed, the program allows the following operations to be accomplished: (a) choose a temporal window within which all subsequent operations will be performed; (b) correct the gravity data for the earth tide; (c) correct the data for the instrumental drift (modelled as a linear or polynomial curve); (d) filter unwanted frequencies from the data sequences; (e) perform time-domain to frequency-domain transformations (spectra); (f) perform correlation analyses; (g) perform comparisons between parameters acquired in different stations. The operator can also set and save groups of "standardised" analyses to be automatically applied to the data saving a great amount of time. However, the default parameters set in each standardised analysis tool (i.e. cut-off frequencies of the filters) can be suitably changed by the operator

by using the controls in the program interface. Since this software is quite easy to implement, it allows changes in the continuously recording array to be accommodated on one hand, and can be used to handle data from other similar arrays on the other. Besides, LabVIEW® features a web tool able to embed charts of the graphical interface in an existing HTML document and thus data coming from each continuously running gravity station can be easily sent via Intranet or Internet to a remote-monitoring site.