GMS2 type station for geochemical continuous multi-parametric monitoring on Etna volcano

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During the last twelve years three GMS2 (Geochemical Monitoring System 2) monitoring stations have been operating in three water wells on Mt. Etna: "Acqua Difesa" and "Currone" (on Etna's south flank) and "Ilice" (on Etna's east flank). GMS2 stations (Figure 1) every 10 minutes collect a data record composed of an array of chemical-physical parameters measured in groundwater. These data contribute to enrich our knowledge on an active volcanic system such as Mt. Etna, regarding, in particular, the chemical and physical effects of the interaction between up-rising magmatic fluids and shallow aquifers and the detection of possible pre-eruptive signals.

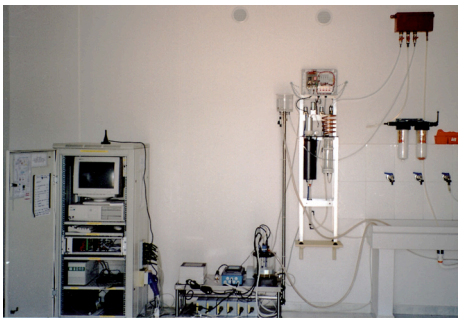

Figure1: Field set-up of GMS2 monitoring station located at "Currone" water well (Catania, Italy)

So far, a huge quantity of data regarding temperature, conducibility, pH, redox potential, dissolved CO_2 and dissolved radon have been acquired. The peculiarity of modular GMS2 acquisition system is that it allows: 1) to operate with great simplicity during maintenance, repair and replacement of elements; 2) to gather remote data through telephone relay using mobile phone structures; 3) to control data directly from INGV Roma offices, to verify their quality and to maintain the station if necessary. GMS2 data are validated by similar, discretely acquired, geochemical data. Examples of GMS2 data are shown.

An original microscopic approach of UV-visible-near infrared spectroscopy

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We present an original microscopic scale approach of UV-visible-near infrared spectroscopy of minerals and glasses bearing transition elements. It is based on, a microscope built with Cassegrain mirrors and coupled to a UV-visible-near infrared double beam spectrophotometer. This setting enables the collection of spectroscopic data with an adjustable spot between 120 and 20 μm, over the 250- 2600nm range. An important point is the link of the microscope to the *double beam* spectrophotometer using a spot size aperture mechanically coupled in both reference and sample beams. The angle of incidence is distributed in the range 17.8° to 32.2° with an average angle of 25.0°± 0.1°.

Inside the spectrophotometer, the microscope can be associated, to a Linkam furnace to record spectroscopic data *in situ* at temperatures up to 1500°C. High pressure data can also be recorded *in situ* using a diamond anvil cell with internal pressure calibration via a laser.

Microscopic measurements at microscale and high T or P will be used to investigate the spatial evolution of element speciation in mineral and glasses.

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DOI:10.1180/minmag.2013.077.5.7