Geophysical Research Abstracts, Vol. 8, 09845, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09845

Study of possible geochemical precursory information: an automatic monitoring network installed in Tuscany, Italy

Scozzari A., Cioni R., Guidi M., Pierotti L.
CNR Institute of Geoscience and Earth Resources, Pisa, Italy (r.cioni@igg.cnr.it)

The study of earthquake precursory phenomena is attracting the interest of the scientific community since long time; nevertheless, the problem of earthquake prediction has not been solved so far and the development of monitoring methods and devices is still a current subject. The collection of good quality data series, with a meaningful time coverage is an essential step to drive the research about precursors to tangible results. The precursory information can be derived from the identification of preseismic alterations and their subsequent validation through a suitable process of the data. A high resolution assessment strategy (both in time and space), which could improve the existing methods of earthquake hazard assessment, may come from merging the experiences relating to the many aspects of the assessment process, such as modeling and individuation of relevant parameters, design and management of the measurement systems (both manned and automatic), data processing and interpretation steps. This work describes the experience gained from the design, installation and management of two networks; each of them constituted by five geochemical stations for the continuous automatic monitoring of physical, physico-chemical and chemical parameters in natural water. These networks, funded by the Regional (Tuscany, Italy) Seismic Service Sector, have been designed and installed starting from late 2002 in Garfagnana/Lunigiana (North Western Tuscany) and in the area of Monte Amiata (Southern Tuscany). All the stations have a common architecture and are based on: i) an analog instrumentation core that performs the measurement of Temperature (°C), Electrical Conductivity, pH and Eh, ii) a sub-system for the measurement of the concentrations of CO2 and CH4 in dissolved gases, iii) a rugged PC platform with custom software onboard for data acquisition, pre-processing and communication. The results of about three years of continuous monitoring can be summarized as follows: i) the monitoring

stations exhibited a very promising performance in their ability to detect even small temporal variations of all the measured parameters, with respect to equivalent commercial devices, ii) acquired data have allowed to recognize the water circulation patterns; iii) the continuous automatic monitoring is the only way to understand the real temporal variability of the of the aquifer system; iv) for all the stations very large temporal variations in all acquired parameters have been detected. However, it has been possible to recognize that the variation of each parameter were well explained by natural mixing processes among different water types; v) only at one station, an increase of the CO2 content in the dissolved gases was observed about ten days before a M 3.7 earthquake occurred at a distance of about 15 Km South of the monitoring station. Even if this last event does not authorise to speak about a precursory phenomena, the work on all the collected data, including the climatic ones that can influence the observed parameters (ie. rainfall), has shown promising aspects regarding the assessment of possible earthquake precursors. This presentation goes through: i) a description of the geological/geochemical framework for the selection of the installation sites; ii) an architectural description of the monitoring devices; iii) a technical overview of the installations made; iv) comments about data collected in this working period.