Geophysical Research Abstracts, Vol. 8, 03960, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03960

Geochemical and geophysical signals in data from fluids in volcanic fumaroles

E. Faber (1), M. Teschner(1), R. Torres (2), B. Silva (2), A. Ortega (2), J. Poggenburg (1), G. Garzón (2), D.M. Gómez (2)

(1) Federal Institute for Geosciences and Natural Resources (BGR), Hannover, Germany,

(2) INGEOMINAS, Observatorio Vulcanológico y Sismológico de Pasto, Pasto, Nariño, Colombia

(e.faber@bgr.de)

Data on gases in volcanic fumaroles have long been used to understand volcanic systems. Since few years automatically operated systems are available, still being under improvement, to determine proxies for gas concentrations (e.g. CO_2, SO_2, H_2S, Rn) and parameters like temperature and pressure in fluids or gases escaping fumaroles on volcanoes. These sensor based systems are powered by solar panels and data is transmitted continuously to observatory based computers by telemetry. Data sampling rate is in the range of 5 to 15 seconds but can be changed. Data on time series of weeks to months are available for the volcanoes Galeras (Colombia), Nisysros (Greece) and Krakatau (Indonesia) and can be considered relative to the activity state of the volcanoes.

The Galeras, Colombia, changed from a quiet to an active state in July 2004 and is active, with differing activity levels up to now. During the unrest period increased seismicity was accompanied by high steam and ash exhalations and rock bombardments. In our monitoring system changes have been observed in gas concentrations, near bottom temperatures, temperatures of fumaroles and the pressure in a fumarole. These changes have been observed prior to changes of the activity of the volcano. They are considered as alert signals and have been observed in different time spans from weeks to hours prior to the volcanic unrest. Examples of signals from the Galeras will be presented.

Further development of the monitoring systems is required to increase the technical

reliability, develop and add more sensors for additional parameters to be monitored and most important to continue to gather data from volcanoes. Signal definition and identification is required to establish a data base on geochemical signals which has to be enlarged by future observations and signals related to volcanic and seismic activity. Later on this data base is thought to be used to develop automatic, computer based signal recognition which may be implemented into other geophysical models. Considering that these monitoring systems are installed directly in volcanoes the technical developer has to keep in mind to achieve a low system price as most probably such systems will be lost in case of volcanic eruptions, even if they are low in magnitude.