



Earthquake monitoring and prediction research in active volcanic areas by means of diffuse CO_2 emission studies

N. M. Pérez and P. A. Hernández

Environmental Research Division (ITER), Polígono Industrial de Granadilla, 38611, Tenerife, Canary Islands, Spain (nperez@iter.es)

Many earthquake-related hydrologic and geochemical temporal changes have been recorded since the 1960s. Hydrologic and geochemical parameters investigated include water level, temperature, electric conductivity at wells, flow rate at springs, concentration of various ions and dissolved gases, and components of soil gas in shallow holes. Several mechanisms had been proposed to explain the hydrologic and geochemical changes related to earthquakes. However, relatively few significant precursors have been recorded and the results are still inclusive. Geochemical precursors while clearly strain indicators do not have a well understood relation to strain; therefore, a strong skepticism is found in the earthquake research scientific community. Precursors are important phenomena for addressing two fundamental and closely linked problems: the characterization of plate-boundary deformation and the nature of the earthquake preparation phase (Silver and Wakita, 1996). Diffuse CO_2 emission in and around volcanic systems could be a potential geochemical tool for earthquake monitoring research. CO_2 is the second major component in volcanic-hydrothermal-magmatic gases, easily to measure, and shows a low solubility in silicate melts enhancing its migration to the surface environment. Volcanic-hydrothermal areas denote relatively deep-seated faulting and therefore of interest to search for earthquake precursors. Recent studies on diffuse CO_2 degassing rate in volcanic systems from El Salvador (Salazar et al. 2002) revealed the detection of precursory geochemical signatures of CO_2 efflux prior to tectonic earthquakes which might have induced changes in the fluid pressure of the volcanic-hydrothermal systems. Additional geochemical precursors of CO_2 efflux related to earthquake activity in the Canary Islands showed the potential of this geochemical tool for earthquake monitoring and prediction research

in active volcanic areas.

Salazar, Pérez, Hernández, Soriano, Barahona, Olmos, Cartagena, López, Lima, Melián, Galindo, Padrón, Sumino and Notsu, 2002. Precursory diffuse carbon dioxide degassing signature related to a 5.1 magnitude earthquake in San Salvador, Central America. *Earth and Planetary Science Letters*, 205, 81-89.

Silver and Wakita, 1996. A search for earthquake precursors. *Science*, 273, 77-78.