



Development of a low cost and low power consumption system for monitoring CO₂ soil concentration in volcanic areas.

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Volatiles dissolved in magma are released as gases when pressure or stress conditions change. H₂O, CO₂, SO₂ and H₂S are the most abundant gases involved in volcanic processes. Emission rates are related to changes in the volcanic activity. Therefore, in order to predict possible eruptive events, periodic measurements of CO₂ concentrations from the soil should be carried out.

In the last years, CO₂ monitoring has been widespread for many reasons. A direct relationship between changes in volcanic activity and variations in concentration, diffuse flux and isotope ratios of this gas, have been observed prior to some eruptions or unrest processes. All these factors have pointed out the fact that CO₂ emission data are crucial in volcanic monitoring programs. In addition, relevant instrumentation development has also taken place: improved accuracy, cost reduction and portability.

Considering this, we propose a low cost and a low power consumption system for measuring CO₂ concentration in the soil based on Arduino. Through a perforated pick-axe buried at a certain depth, gas samples are periodically taken with the aid of a piston. These samples are injected through a pneumatic circuit in the spectrometer, which measures the CO₂ concentration. Simultaneously, the system records the following meteorological parameters: atmospheric pressure, precipitation, relative humidity and air and soil temperature. These parameters are used to correct their possible influence in the CO₂ soil concentration. Data are locally stored (SD card) and transmitted via GPRS or WIFI to a data analysis center.