

GEOCHEMICAL SURVEY OF HOT SPRINGS AROUND UBINAS, THE MOST HISTORICAL ACTIVE VOLCANO IN SOUTHERN PERU

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ABSTRACT

Ubinas (5675 m a.s.l.) is known as the most active volcano in southern Peru during historical times, with 23 minor eruptive or intense fumarolic crises since 1550. Due to its intense explosive recurrence and to the high proximity of the homonymous village (4000 inhabitants), only 6 km far away from the summit crater, Ubinas appears as one of the highest priority in volcano monitoring in southern Peru.

The purpose of this survey has been (1) in a first step to evidence the geochemical characteristics of the hot springs located around the volcano in order to define (2) in a second step an appropriate fluid geochemical monitoring program.

(1) The analysis of the waters collected around the volcano displays evident geochemical trends that can be interpreted as mixing processes between 3 end-members: fresh meteoric waters, magmatic fluids, sometimes interacting with a deep chloride reservoir.

(2) Since 1999, we began a geochemical water monitoring program of two hot springs located in the lower flank of the volcano. This hydrothermal water have been characterized by a constancy in sulfate and chlorine concentrations before the big earthquake (Mw 8.4) occurred in Peru on June 23rd, 2001, causing hundreds of fatalities and serious damages along all the southern Peruvian coast. After this event, one new hot spring appears near to our sampling area and sulfate and chlorine display an increase in concentration.

This phenomenon could be attributed to a consequence of the earthquake of June 23rd, 2001, increasing the permeability of the fault system crossing the volcano. In this way, an higher permeability in the soil along preferential regional faults could allow a better interaction between the ascending magmatic gases (in particular HCl and SO₂/H₂S gas species responsible respectively of chlorine and sulfate concentration in hydrothermal waters) and the shallower fresh meteoric waters.