

1. Monitoring of the Spring Waters and Geochemistry of Ashes Leachates During the Eruptive Crisis (2006) of the Ubinas Volcano, Perú.

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7. Session 1-2

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Ubinas (16 ° 22 ' S; 70 ° 54 ' W, 5672 m.a.s.l.) is the most historically active volcano in southern Peru. Because of its high VEI and to the occurrence of a 6 km-distant 5000 inhabitants village, Ubinas is considered as the highest priority for volcano monitoring in southern Peru.

We initiated in 1999 a geochemical monitoring program, with regular sampling and chemical analysis of two 6 km-distant thermal waters located along a N40-50W trending regional fault. Time-series show chemical changes of rising temperature, pH, SO_4^{2+} , Cl^- , HCO_3^- and SO_4/Cl ratios with 3 main trends : 1) a general decrease of the S/Cl ratio prior the magmatic unrest, 2) an increase of this ratio during the crisis indicating that new undegassed magma has been injected, and 3) some limited changes in Fria spring following the $M_w=8.4$, 2001, 23 June earthquake, probably resulting from permeability increase due to ground shaking of the N40-50W fault that temporarily enhanced fluid migration.

Leaching of four ash samples allows to investigate S, halogens and trace metal composition of plume gases. We assume here that ash particles scavenge volatile elements from the plume and therefore may be used as a proxy for plume composition. HPLC and ICP-MS allowed to measure anions (SO_4^{2+} , Cl^- and F^-) and 53 metallic trace elements, respectively, and typical Cl/S and Cl/F ratios and enrichment factors (EF) were calculated. Results indicate considerable temporal changes of both the Cl/S and Cl/F ratios and the EF with time. The too low number of samples to not allow to track chemical changes of the plume in time and to deconvolute potential processes (magmatic feeding, changing contribution of sedimentary sulfates, interaction in plume, meteorological factors).

These results evidence that springwaters and ash leachates are usable for monitoring of degassing at Ubinas if high frequency sampling is performed.