



# Cities on Volcanoes 8

## Living in Harmony with Volcano

### Bridging the will of nature to society

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Session: Volcanic Lakes and their impact on human and natural environments

## Poás volcano: Geophysical-Geochemical signatures and dynamics of its magmatic-hydrothermal system

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Poás volcanic complex hosts a hyper-acid lake where geochemical signatures are related to two major controlling processes: (a) The level of influx and dissolution-hydrolysis of magmatic volatiles in a sub-surface hydrothermal reservoir forming extremely acidic brines, and (b) The amount of partial or wholesale dissolution of rock, enriching the waters in rock-forming elements. This combined uptake of magmatic volatiles and water-rock interaction makes the Poás lake-hydrothermal system one of the most dynamic and chemically extreme aqueous environments on Earth [1].

This study provides some datasets of the most salient geochemical signatures of the acid lake and their strongly fluctuating behaviour observed over the last ca. 30 years. These signatures are investigated to a) Explore the nature and extent of compositional changes and flux of magmatic volatiles released from a shallow magma reservoir, and b) Gain insights into the modulating effects of the hydrothermal system underlying the acid lake to constraint a model for the Poás lake-hydrothermal system.

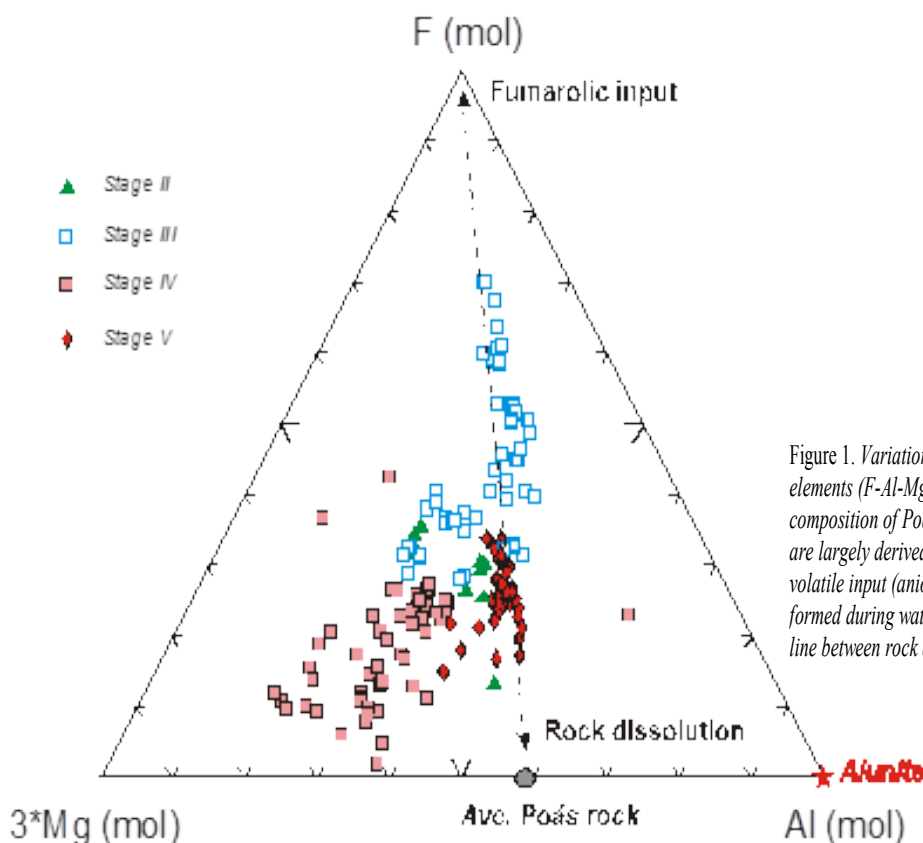


Figure 1. Variations in the relative molar abundances of major volatiles and rock forming elements (F-Al-Mg) in the lake waters from 1978 until 2010 and comparison to average composition of Poás lavas and alteration minerals. In stages III and V the solutes in the lake are largely derived from a combination of (near-)congruent rock dissolution (cations) and volatile input (anions). In stage IV, preferential retention of elements by alteration minerals formed during water-rock interaction at depth drives compositions away from the mixing line between rock and gas input.