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26th IUGG General Assembly

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Abstract: VS13p-097

Magmatic volatiles in ash leachates and environmental impact assessment of the 29-30 October 2014 eruption of Turrialba volcano

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We report data on the acidity and volatile content on ashes released by Turrialba on 29-30 Oct 2014. Turrialba (3340m a.s.l.) entered a phase of unrest in 1996. From then on, it progressively underwent enhanced seismic activity, outgassing, and an evolution on the composition of fluids toward a more magmatic dominated phase. On 29th Oct 2014, after 13 hours of continuous tremor, ash eruptions took place with columns reaching up to 2km.

Volcanic ash is a source of a range of chemicals that can be leached upon contact with water or bodily fluids. Soils and aquatic systems can become loaded with toxics affecting living organisms. Ingestion of ash and subsequent leaching to stomach acid might result in a higher fraction of volatiles and metals in the circulatory system of mammals, possibly leading to health effects such as bone fluorosis.

Data acquired from the 29-30 Oct 2014 ash leached with pure water, indicate their acidic nature (pH's between 3,3-3,95) and high content of adsorbed volatiles (mg anion/kg of ash): F- ranging from ≈400 to 800, Cl- ≈1400 to 3100, Br- ≈60 to 120, and SO₄²⁻ ≈26600 to 35000. Ashes emitted during opening of vents at the West Crater in 2010, 2011, and 2012 were rather neutral or slightly acidic. Next, a gastric leach was applied to the ashes with an HCl pH 1,5 solution at 37°C, to mimic conditions in the stomach. The amount of volatile species exceeded those found on the ash leached with pure water as much as one order of magnitude.

The volcano ejected a fairly rough estimate of $2 \times 10^9 \text{ Kg}$ of ashes, which is equivalent to $1,6 \times 10^6 \text{ Kg}$ of F- released into the environment. Thus, it is important to assess the ash ingestion and inhalation hazards to livestock and humans, and quality of drinking water and food supplies in the vicinities of Turrialba volcano.