*Title:* **Environmental impact of volcanic eruptions by experimental ash leaching.**

*Student:* Judit Lloreda Rodes

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*Supervisor/s:* Dr. José Fermin López Sánchez
*Departament of Chemical Engineering and Analytical Chemistry*
Dr. José Luis Fernández Turiel
*Institut de Ciències de la Terra Jaume Almera (ICTJA-CSIC)*

Explosive volcanic eruptions eject large quantities of volcanic ash to the atmosphere. Much of these ash deposits on the ground and remains exposed to atmospheric conditions. During rainfall episodes or when ash falls on surface waters, they interact, easing the release of many elements into the environment. Reactive transport models, by leaching tests, allow experimental simulations of ash-water interactions, enabling to quantify the geochemical fluxes.

For this study, four ash samples from the Cerro Blanco eruption, in southern Puna (Argentina) were submitted to batch and column leaching tests. This eruption happened 4,200 years ago and it is one of the most important of the last 11,700 years (the Holocene) in the world. Two of the samples come from inside of two archaeological sites, believed by archaeologists to be inhabited until the eruption. After analysing the results of bulk composition and batch tests, anthropogenic contributions to one of them are proposed.

Both column and batch tests confirm the alteration of geochemical balance after rainfall episodes, causing stress for the environment. Results show the large number and quantities of elements that volcanic ashes can release, but also a general trend of low mobility. However, highlights the significant mobility and high concentrations in solution of potential toxic trace elements (PTTEs) like As, Sb and Cr.

The considerable release of nutrient as Na, Ca, K, Mg and P confirms the fertilizing potential of volcanic ashes. Furthermore, the release of PTTEs suppose environmental concerns to local ecosystems, even after thousands of years after the eruption. Results show that the geochemical hazard of volcanic ash can be assessed by leaching tests, being very useful for specific emergency response to volcanic eruptions.

**Keywords**: volcanic ash, volcanic eruption, batch leaching, column leaching, reactive transport models.