# A reconstruction of terrestrial volcanism over the last 2500 years using sulfur isotopes in ice-cores

ELSA GAUTIER[1]*, JOËL SAVARINO[1], JAMES FARQUHAR[2] AND JOSEPH ERBLAND[1]

[1]NRS, LGGE, Grenoble, France
(*correspondence: elsa.gautier@ujf-grenoble.fr)
[2]Department of Geology, University of Maryland, USA

Ice cores provide an opportunity to reconstruct a history of Earth's volcanic activity. Many attempts have been made in the past to build a robust volcanic climate forcing model based on the ice records, but the robustness of this model depends on discriminating between large distant eruptions and closer, smaller eruptions.

We use non-zero $\Delta^{33}S$ of ice-core sulfate as a proxy for [4] stratospheric volcanic eruptions. $SO_2$ emitted by these events can be mass-independent fractionated ($\Delta^{33}S \neq 0$) during photolysis reactions in the stratosphere [1], [2], [3], [4]). The signal, recorded in aerosol sulfate, is preserved in ice cores. The sulfur anomaly allows identification of eruptions very likely to be stratospheric, with potential climatic impact, regardless to the ice core location, the age or the magnitude of the recorded event.

In 2010-2011, five 100m-long ice cores from Dome C, Antarctica, were collected to reconstruct the history of volcanism over the last 2500 years. Assumed volcanic events have already been identified through sulfate concentration measurements in the field, and located on the cores. We used an algorithm for the peak detection, and 51 potential volcanic events were identified. Snow and ice containing specific volcanic events have been isolated, decontaminated, melted, concentrated and extracted using ion exchange methods. Each presumed volcanic event has been subdivided in 5 fractions at least, in order to differentiate the back-ground isotopic signal from the sulfate peak. The peak itself has been divided into three portions. The $\Delta^{33}S$ is expected to vary between the begining of deposition ($\Delta^{33}S > 0$) and the end ($\Delta^{33}S < 0$).

[1] Farquhar *et al* (2001), *J. Geophys. Res.* **106**, 32829-32839 [2] Savarino *et al* (2003), *J. Geophys. Res.* **108**(D21), 4671 [3] Baroni *et al* (2008), *J. Geophys. Res.* **113**(D20), 1–12 [4] Baroni *et al* (2007), *Sciences* **315**, 84-87