

## Tracking the Ethiopian flood basalt fallout from Pb isotopes in Indian Ocean sediments

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Eruption of the Ethiopian trap, 30 Ma ago, is debated as one possible forcing of major climate change in the early Oligocene (e.g. Rochette et al., 1998).

Precise identification of dust sources, and estimation of geographical extent of the fallout are thus important issues for this debate.

Four tephra layers from ODP Leg 115 (site 709 and 711, Mascareigne ridge, Indian Ocean), 2600 Km away from the Ethiopian traps, well identified from magnetic susceptibility anomalies, were first ascribed to the Ethiopian flood basalt period by detailed magnetostratigraphic reconstruction.

Pb isotopes were then measured on leached sediments in order to further demonstrate connection between these tephras and the traps. HCl (1N) leaching clearly separates the authigenic from refractory phase in the sediments, the leachate bearing sea-water Pb with continental crust signatures, and the residue having mantle type signatures comparable to those measured in the Ethiopian traps by Pik et al., 1999.

High-Ti and Low-Ti magma type signatures previously described in the traps can also be well recognized among the different tephras.

Crude quantitative estimates can be obtained of the volume of pyroclastic ejection, from volcanic material inventories observed in the sediments.

Implications of these results will be discussed at the meeting, both in terms of evidence of explosive phase of the flood volcanism, and possible mechanisms of climate forcing.

### References

- Rochette P. et al., (1998), *Eart Planet. Sci. Lett.* 164, 497-510.  
Pik R. et al., (1999), *Geochim Cosmochim Acta* 63, 2263-2279.

## Characterization of river waters draining carbonate terrain: A study of the rivers in karst-dominated terrains, Guizhou Province, China

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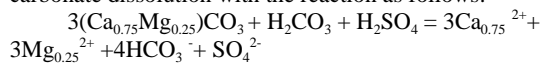
### Introduction

Geochemistry of river waters draining karst terrain in SW China has been studied in order to characterize the hydrogeochemistry of the rivers, to understand the controlling factors, to monitor the karstification process, and finally to quantify the erosion rate in the catchments.

### Results and Discussion

Bicarbonates are the dominant anions for the majority of the samples, followed by  $\text{SO}_4^{2-}$ .  $\text{SO}_4^{2-}$  and  $\text{HCO}_3^-$  together account for 90% to 97% of the total anions in most of these waters. Ca and Mg dominate the cation concentrations of these waters, accounting for more than 80% of the total cation concentrations in most of the river waters. The water chemistry of river water in Guizhou karst regions is largely influenced by dissolution of carbonates. The hydrogeochemical characteristics with high Ca, Mg contents and high alkalinity are different from those in Asia and other areas. Based on variations in water chemistry and strontium isotope composition, three weathering end-members, i.e. the silicate, dolomite and limestone source, can be identified.

Considering carbonate dissolution only and presuming that sulfuric and carbonic acid has no selectivity between dolomite and calcite dissolution, we can describe the carbonate dissolution with the reaction as follows:



TDS<sub>car</sub> of the river waters are calculated to be 131mg/l for carbonate dissolution by carbonic acid. The weathering rate accordingly calculated is 73.3t/km<sup>2</sup>/yr. CO<sub>2</sub> consumption of carbonate weathering is calculated to be 510×10<sup>3</sup>mol/km<sup>2</sup>/yr, which is higher than the CO<sub>2</sub> consumption (400×10<sup>3</sup>mol/km<sup>2</sup>/yr) by carbonate weathering in the Seine basin (Roy et al., 1999). The dissolution of carbonate by sulfuric acid is calculated to be 45mg/l. So, the total dissolution of carbonate by both carbonic and sulfuric acid is 176 (131+45) mg/l, which gives rise to a weathering rate of 99t/km<sup>2</sup>/yr, and of 49.5mm/kyr.

### Reference

- Roy S., Gaillardet J. and Allegre C.J. (1999). *GCA*,63:1277-1292.