

## The effect of water-rock interaction time on stable carbon isotope of cave drip in Qixing cave, China

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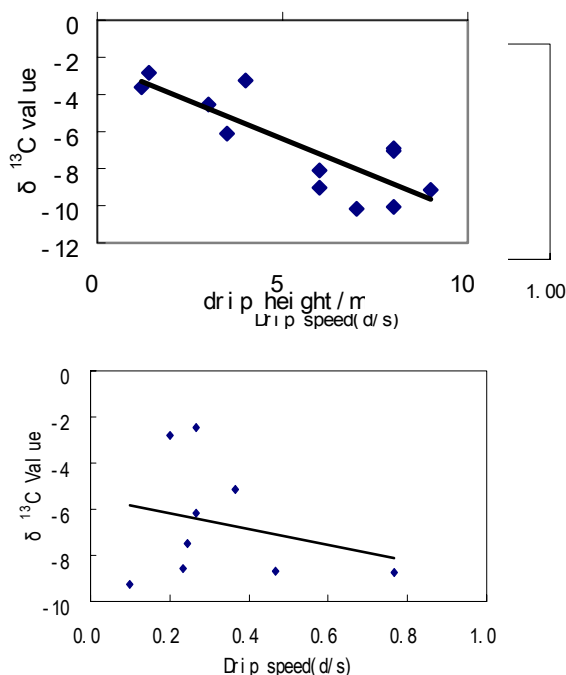
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### Aim

As substitute index of environment, stable carbon isotope has been used broadly in different natural records, such as tree rings, stalagmite, and so on. The aim of this work is to better understand the mechanism of palaeoclimate and palaeoenvironment reconstruction by stable carbon isotope of speleothem.

### Results

The stable carbon isotope composition was measured in Qixing cave drip water in April 2002 and 2003. The results were showed as followed:



### Discussion and conclusion

The effect of water-rock time on stable carbon isotope of cave drip can be discussed by drip height and drip speed. According to the aboved figure, the  $\delta^{13}\text{C}$  value(PDB) of drip water changes inversely with drip height and drip speed. The reason is that the higher and faster drip indcate the thinner rocky cover , the shorter time of water-rock interation and the less heavy carbon isotope coming from carbonate rock in common situation. The conclusion is that the water-rock time is longer, the DIC  $\delta^{13}\text{C}$  value of drip water become heavier.

## Calcium and magnesium isotope systematics in rivers. Fractionation or lithological control?

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Ca and Mg are two of the most concentrated elements in continental fresh waters, and analysis of their isotope ratios by MC-ICP-MS or TIMS provides a powerful new tool for investigating the global cycles of Ca and Mg and the under constrained weathering reactions by which these elements are released from the continental crust [1,2].

Stable isotope ratios in rivers are controlled by mixtures of waters with distinct compositions, often inherited from source rock heterogeneity, but also from fractionation during a series of processes associated with weathering reactions including uptake by biomass. Ca and Mg isotope ratios in the dissolved ratios of rivers from diverse weathering environments reveal that their isotopic compositions are sometimes but not always controlled by lithology.

This is illustrated by the fact the rivers with the lowest  $\delta^{26}\text{Mg}$  drain limestone, the rock type with the lowest  $\delta^{26}\text{Mg}$ . However, the  $\delta^{26}\text{Mg}$  between the solid and dissolved phase are offset by up to 1‰. Similarly small rivers draining granite and gneiss have a  $\delta^{26}\text{Mg}$  which is distinct from the solid phases. Similar differences between the solid and dissolved phase exist for Ca isotope ratios. The difficulty in interpreting such variations is that they may arise *either* as a result of mixtures between inherited lithological signatures *or* as a result of fractionation during weathering processes.

A multi-tracer approach, linking major dissolved ions, Sr isotope ratios, and Ca and Mg isotope ratios in small and large basins, and soil pore waters, allows the difficulty between inherited isotope signatures and process related signatures to be considered in more detail.

The implications are of significance for better constraining the oceanic cycles of Ca and Mg, as rivers deliver a significant proportion of Ca and Mg to the oceans.

### References

- [1] Schmitt A.D., Chabaux F. and Stille P. (2003) *Earth and Planet. Sci. Lett.* **213**, 503–518.
- [2] Tipper E.T., Galy A., Gaillardet J., Bickle M.J., Elderfield H. and Carder E.A. (2006) *Earth and Planet. Sci. Lett.* **250**, 241–253.