

## Coupling of dimethyl sulfide and its contribution to sulfate aerosols in regional climate model: From fluxes to direct radiative forcing

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Dimethyl sulfide (DMS) emission flux scheme is coupled within the framework of the ICTP-Regional Climate Model (RegCM). The sulfur chemistry scheme in RegCM is updated to include the contribution of DMS to the sulfate aerosols formation.

Three sets of experiments are taken into consideration in this study during the period from January 2002 to December 2006. The first one includes the chemistry of biogenic and anthropogenic sulfur compounds taken into accounts DMS oxidation processes and without feedback on climate, the second experiments has the same conditions as the first one and takes into accounts the climatic feedback of sulfate. The third experiment for estimating the contribution of DMS to sulfate without considering the DMS oxidation.

The results show that the contribution of DMS on sulfate aerosols is higher in JJA over the North Atlantic Ocean (with mass burden 0.2 mg/m<sup>2</sup>), while the lowest contribution recorded in DJF as low as 0.02 mg/m<sup>2</sup>. Some contributions is recorded over the Mediterranean sea.

## Silicon isotope variations in the Earth and meteorites

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A fluorhydric acid-free sample preparation method derived from Georg *et al.* [1] has been used to measure the natural variations of silicon isotope compositions in terrestrial (including 12 geological standard materials) and meteoritic bulk-rock samples.

All measurements were done using a Neptune MC-ICP-MS in medium resolution mode ( $m/\Delta m = 7000$ , peak-edge definition). Magnesium was used as internal standard for mass-bias drift correction. The  $\delta^{30}\text{Si}$  values are expressed relative to the NBS-28 silica standard.

IRMM-17 reference material yields a  $\delta^{30}\text{Si}$  of  $-1.4\text{‰} \pm 0.05\text{‰}$  (2SD,  $n=11$ ) in agreement with previous data [2-3]. Long-term reproducibilities were obtained for BHVO-2 ( $\delta^{30}\text{Si} = -0.27\text{‰} \pm 0.08\text{‰}$  (2SD,  $n=30$ )) and a in-house Si standard ( $\delta^{30}\text{Si} = -0.01\text{‰} \pm 0.07\text{‰}$  (2SD,  $n=20$ )) on a 7 months time scale.

Total variation of  $\delta^{30}\text{Si}$  in natural samples ranges from  $-0.5\text{‰}$  to  $-0.1\text{‰}$ . Comparison with  $\delta^{29}\text{Si}$  values shows that this isotopic fractionation is mass-dependent. A  $0.2\text{‰}$  isotopic variation occurs among terrestrial samples suggesting an enrichment in the heavier silicon isotopes as a function of magma differentiation, as initially hinted by Douthitt [4]. Terrestrial samples mean value ( $\delta^{30}\text{Si}_{\text{Earth}} = -0.23\text{‰}$ ) is heavier by about  $0.24\text{‰}$  in  $\delta^{30}\text{Si}$  compared to chondrites. This may be explained by silicon isotope fractionation during planetary accretion and/or differentiation.

[1] Georg *et al.* (2006) *Chem. Geol.* **235**, 95-104. [2] Chmeleff *et al.* (2008) *Chem. Geol.* **249**, 155-166. [3] Ding *et al.* (2005) *Chem. Geol.* **218**, 41-50. [4] Douthitt (1982) *GCA* **46**, 1449-1458.