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Barium isotopes in atmospheric aerosols: tracing anthropogenic inputs to the South China Sea

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Barium cycling in the ocean has received great attention due to its strong correlations with terrestrial input, upwelling, and carbon export fluxes. The supply of dissolved Ba to the ocean is mainly from rivers, sediments, and hydrothermal vents. Although Ba is enriched in the upper continental crust and hence in airborne lithogenic mineral dust, the input of dissolved Ba from atmospheric deposition is generally considered to be insignificant due to the low solubility of mineral dust Ba. However, with the increase in human activities and urbanisation over the century, the input of anthropogenic aerosols is rising rapidly, and this causes huge impacts on the marine system. Studies have also shown that anthropogenic aerosols can increase dissolved trace element fluxes to the ocean (e.g., [1]). This may also play an important role in marine Ba cycling by adding extra atmospheric dissolved Ba through atmospheric deposition.

Ba isotopes have been developed recently as a powerful tracer for tracing external Ba inputs to the ocean (e.g., riverine and hydrothermal inputs [2,3]). In this study, we measure Ba concentration and isotope compositions in the bulk atmospheric aerosols collected from the northern South China Sea, a region surrounded by nations with rapid economic growth and industrialization in the Asia-Pacific area. Preliminary data show large variations in the time-series aerosol Ba concentration. In particular, the concentration increases by an order of magnitude during the period of the Lunar New Year, which may reflect the influence of anthropogenic aerosols (e.g., barium nitrate used in fireworks). The aerosol Ba isotope compositions will be investigated to help us to get the first constraints of Ba isotopes on atmospheric aerosols. This study highlights the potential of using Ba isotopes to trace anthropogenic inputs to the ocean.

References

[1] Conway et al. (2019), *Nature Communications* 10, 2628.

[2] Bridgestock et al. (2021), *Chemical Geology* 579, 120340.

[3] Hsieh et al. (2021), *Geochimica et Cosmochimica Acta* 292, 348-363.