

Zn isotopic composition of sinking particles in the deep water of the South China Sea: seasonal variations of Zn supplies

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Moored sediment traps were deployed at 2000 and 3500 m of Taiwan time series station (SEATS) in the South China Sea (SCS) for one year to investigate elemental fluxes and trace metal sources, particularly focusing on the impact of anthropogenic aerosol deposition in the region. As Zn is a representative element in anthropogenic aerosols, its elemental and isotopic compositions were both determined to evaluate the relative contribution of different sources. We found that the Zn fluxes at 2000 and 3500 m were higher in winter and spring than summer and autumn. In fall, Zn fluxes were higher at 3500 m than 2000 m and its isotopic compositions were also heavier at 3500 m than 2000 m during the same period, indicating the lateral transport of lithogenic material or sediment resuspension in the deeper water, consistent with the peak period of the Pearl river discharge. Contrastingly, the Zn isotopic compositions were relatively light in the sinking particles in winter and spring, indicating that anthropogenic aerosols, with relatively light Zn signature, account for a relatively high percentage in the seasons. Using Zn isotopic composition, we validated that Zn originated from anthropogenic aerosol deposition has been transported by the sinking particles to the deep water in the SCS.