The evolution of Zn and Cd isotopes in the South China Sea

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Isotopic compositions of Zn and Cd for biogenetic particles and seawater samples from the South China Sea (SCS) have been determined in order to better constrain how do Zn and Cd isotopes evolve in the SCS. In general, the $\delta^{66/64}$Zn increases from -0.25‰ in the surface to 0.05‰ in the thermocline, and remains constant at 0.13‰ in the deep ocean. As for biogenic particles, they have the δZn of 0.04‰, suggesting that phytoplankton prefers heavy Zn isotopes. As a result, the vertical profile of Zn isotopes in the SCS appears to be governed by biological pump that transports heaver Zn into the deep ocean.

In contrast, the $\varepsilon^{114/110}$Cd in the seawater decreases from 9.6ε in the surface to 5.0ε in the thermocline, and remains constant at 3.5ε in the deep ocean. This seems to reflect the preferential uptake of light Cd isotope by phytoplankton in the surface water. However, the biogenic particles have the Cd isotopic signature of 9ε, comparable to that of the anthropogenic aeolian inputs, suggesting that the biological fractionation is perhaps insignificant in the SCS. Consequently, the vertical profile of Cd should reflect that of anthropogenic inputs to the surface ocean, and are subsequently transported into deeper ocean by vertical advection.

The diatom-dominated (during our sampling) SCS biogenic particles have similar Cd but heavier Zn relative to the surface water, consistent with previous findings that Cd is assimilated while Zn is mainly adsorbed in extracellular level by the phytoplankton.

Geochemical characteristics of the Nakdong River, Korea

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The geochemical compositions of the river waters are influenced by many different factors including weathering and anthropogenic activity. Therefore, the informations on geochemical characteristics of river waters are required to get insight into the geological and hydrogeochemical processes of the river.

The Nakdong River is the second largest but the longest river in Korea. The length of the river is 506.17 km and the drainage area of the Nakdong basin is 23, 384.21 km^2. The water samples of river and tribuatry waters were collected three times in November, May, and July to see the effect of precipitation because July belongs to rainy season. The basin area of this river can be divided into two groups based on the geology: granitic and gneissic rocks in upstream region and sedimentary and granitic rocks in downstream one.

Piper diagram shows that the geochemical patterns changes from Ca-SO_4/Ca-HCO_3 type to Na-SO_4 one from upstream to downstream, showing the increase of the anthropogenic effects, and the influence of the different geology seems to be very small. The concentrations of the cations are in the order of Ca>Na>Mg>K, and those of anions are HCO_3>SO_4>Cl>NO_3, indicating that weathering is the main process controlling the geochemical compositions of the Nakdong River, especially in the upsteram region. The concentrations of Na abruptly increase at the sampling locations near Daegu, which is the third largest city in Korea, indicating a significant pollution by anthropogenic activity. The concentrations of cations in waters sampled in different months are in the order of November>July>May. However precipitation affects anion compositions differently. The concentrations of HCO_3 and Cl have the same trend as cations, but those of SO_4 and NO_3 are in the order of July>May>November, indicating possible influence of precipitation on the concentrations of these two anions.