Metal Element Composition of Suspended Particles in the Adjacent Sea of the Changjiang Estuary

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Metal elements play important role in marine biological production and environmental security. Particulate matters are effective carrier of metals transport in the ocean. The adjacent sea of the Changjiang Estuary is a region with high turbid water, which is influenced by the run off from the Changjiang River and Qiantang River. The composition and distribution of particulate metals in this area were studied.

Suspended particulate matter (SPM) samples from the surface and bottom waters were collected in July 2014. Metal elements, i.e., Al, Ca, Fe, Mg, Mn, Ti, Ba, Co, Cr, Cu, Ni, Pb, Sr, V and Zn in SPM were determined with a inductive coupled plasma-atomic emission spectrometer after acid decomposition, and phosphorus was determined with a spectrophotometer. Lithogenic versus biogenic and related contributions of metals in SPM were discussed.

High SPM contents were observed in stations close to the Changjiang Estuary. Particulate Al and Pb contents in seawater showed similar distribution pattern with that of SPM, while particulate phosphorus (PP) was different slightly due to its biological origin.

The contents of Al and some metals in SPM increased with SPM content in seawater, which indicated that Fe, Ti, Sc, Mn, V with Al were mainly lithogenic elements. The contents of biogenic P and several other metals decreased with SPM. It reflected that the dilution by aluminum silicate when SPM were high. Co, As, Cd, Sr, Cr, Cu, Ni, Pb and Zn were such biogenic elements. The content of some metals does not change much with the SPM (e.g. Mg, Ca and Ba).

Normalizations with Al and P for each element were used to classify the lithogenic and biogenic contributions, respectively. Sc, Fe, etc. were mainly controlled by lithogenic input, and not obviously controlled by biological activities and other processes. As, Cd, Cr, Co, Ni, Pb, Zn were mainly controlled by non-lithogenic input, e.g. biological activities. Ca, Mg, Sr, Mn, Ba, Cu showed comprehensive origins both from biological activities and lithogenic input. Lithogenic and biogenic (with other origins) Ca fractions were estimated both for surface and bottom SPM samples.