

Estimation of POC and Biogenic silica export fluxes using $^{234}\text{Th}/^{238}\text{U}$ disequilibrium in the Amundsen sea, Antarctic

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In order to understand the carbon cycle in the Amundsen Sea, the Antarctic, the export fluxes of organic carbon and biogenic silica from the euphotic zone to depth were estimated using $^{234}\text{Th}/^{238}\text{U}$ disequilibrium method. Seawaters in 14 water columns were collected during February and March 2012, and analyzed for total and dissolved ^{234}Th , and particulate organic carbon and biogenic silica.

The water column activities of total ^{234}Th showed deficiency and excess relative to those of ^{238}U . Deficiency of total ^{234}Th in the euphotic zone showed mirror images both with chlorophyll-a and fluorescence, and was consistent with the loss of nitrate, which indicated the impact of biological activity. In addition, deficiency of total ^{234}Th from deepwater was associated with the increase of total Fe/Mn concentration. Excess total ^{234}Th activity presented below the euphotic zone might be related to the active remineralization process.

The export flux of ^{234}Th estimated using the steady state model was av. $0.87 (\pm 0.25) \times 10^3 \text{dpm/m}^2/\text{day}$. The export fluxes of organic carbon and biogenic silica, which were estimated by the product of total ^{234}Th flux and ratio of $\text{POC}/^{234}\text{Th}$ ($7.08 \pm 4.27 \mu\text{M/dpm}$) and $\text{BSi}/^{234}\text{Th}$ ($0.80 \pm 0.36 \mu\text{M/dpm}$) in the sinking particles, were av. $5.85 (\pm 2.42) \text{mmol/m}^2/\text{day}$ and $0.69 \text{mmol/m}^2/\text{day}$, respectively. These fluxes were similar levels to those in the Weddell Sea during February and March 2008. Export ratios (ThE) relative to the primary production in the euphotic zone were in the range of 3~50% (av. 27.8%), which indicated less efficiency in the biological pump than the Ross sea during January and February 1997.

[1] Cochran *et al* (2000), *Deep-Sea Research II* **47**, 3451-3490. [2] Rutgers van der Loeff *et al* (2011), *Deep Sea Research Part II* **58** (25-26): 2749-2766.

Variation of As-leaching from coal ashes according to extractant pH, reaction time, and shaking methods

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In this study, the leaching characteristics of arsenic (As) from the weathered coal ashes (fly ash + bottom ash mixture), which have been reclaimed in an ash pond of a power plant, and the fresh fly ashes were evaluated using various leaching experiments. The As-leaching experiments were performed considering extractant pH (5, 7, and 9), shaking methods, and extraction time as variables. Especially, the ashes were extracted repeatedly using new extractant to observe the leaching characteristics as a function of time. The As concentration in the fresh fly ash was 16.1 mg/kg. In contrast, the weathered coal ashes showed the lower concentrations 5.77-10.0 mg/kg, reflecting that a part of As already has been leached by the reaction with the pond water. The weathered ashes showed the more As leaching at lower pH, indicating that the contribution from the carbonate-bound fraction becomes greater as the pH becomes acidic. The As leaching decreases drastically as the reaction time increases. Our results also show that the As-leaching is dependent not only on the shaking speeds and stroke distances but also on the bottom areas of the reaction bottles. For example, the As-leaching was greater when the bottles with wider bottom were used even at the same shaking speed and stroke distance.