# Dissolved and particulate Mn in the Amundsen Sea, Antarctic

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Micro-nutrients (e.g. trace metals) may limit the biological productivity in the coastal polynya of Antarctic. In order to investigate Mn, a bio-essential metal, in the Amundsen polynya which was known as the most biologically productive coastal area around the Antarctic, 88 seawater samples were collected at 10 stations (from Ice Shelf to offshore) using the clean sampling system during ANA04 cruise (Jan 1 – 15, 2014) by *R/V* ARAON. After the pre-concentration of dissolved Mn using NOBIAS Chelate PA1 column (Hitach High Tech. Ltd) and the acid digestion of suspended particulates, Mn concentrations were quantified using ICP-MS.

Dissolved and particulate Mn concentration varied in the range of 0.15~4.43 nmol/kg and <0.01~5.07 nM, respectively, showing the maximum in surface mixed layer of Ice Shelf and the minimum in offshore deepwater (CDW). Vertical profiles of dissolved Mn in polynya showed the minimum in the surface layer, the maximum at the lower limit of pycnocline, and decreased with depth, but increased again in the bottom water. Particulate Mn showed the high value in the mid-depth of Ice Shelf station (about 400m), but also in the bottom waters of stations in the polynya.

Subsurface maximum of dissolved Mn in polynya, which had not been observed without the Southern Ocean in the world [1], did not coincide with phosphate maximum layer, but was consistent with the depth of the disappearance of particulate P, which might be related to the remineralization of biological materials. However, Mn/P in suspended particulates was much higher (1.33 mmol/mol) than those in phytoplankton (0.4 mmol/ mol, [2]). Increased Mn concentrations in bottom water were correlated with silicate and phosphate, not nitrate. Thus, the sources of dissolved Mn were presumed as glacial melting, remineralization and diffusion from sediments, and the biological uptake, scavenging and the dilution by CDW with very low Mn concentration played the main sinks in this sea.

[1] Middag et al., 2011. *Deep-Sea Research* II, 58:2661-2677
[2] Twining et al., 2004. *Limnol. Oceanogr.*, **49**(**6**): 2115-2128