Dissolved Iron in the Amundsen Sea

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During the last Antarctic summer season, shipboard measurements of dissolved iron (DFe) concentrations were made in January 2018 in the central Amundsen Sea. Surface concentrations were depleted (<0.2 nM) thoughout this region, even close to the continent and the Dotson Ice Shelf. The exception was in the Dotson Ice Shelf outflow were surface concentrations were elevated, but this did not persist far into the polynya, most likely due to a combination of precipitation and biological uptake. In the subsurface part of the water column, DFe concentrations were generally low offshore. Concentrations increased with depth but the highest concentrations in the deepest samples (1000 m) remained below 0.5 nM in upper Circumpolar Deep Water (CDW). Transport over the continental shelf of relatively warm and nutrient-rich CDW did not seem to contribute to the deep DFe concentrations, until close to the continent the concentrations increased in the near bottom CDW. The deep outflow of the Dotson Ice Shelf was elevated for DFe and concentrations over 1 nM were observed. This confirms earlier indications that the interaction between CDW and the Dotson Ice Shelf is an important source of Fe for the Amundsen Sea[1,2]. Despite supply of Fe to the Central Amundsen region, the phytoplankton community can experience Fe limitation[3]. Three bio-assay experiments were performed, one offshore in the open ocean, one in the central polynya and one near the contintal slope break. Preliminary shipboard data demonstrate that the dFe concentrations remained low throughout the experiments in the non-amended controls. In some cases, the Fe-addition improved the photosynthetic capacity Fv/Fm. Further analyses of the samples taken shipboard is underway and will determine how phytoplankton growth and community composition were affected by iron additions.

[1]Sherrell et al., 2015. Elementa-Science of the Anthropocene 3, 1-27. [2] Gerringa et al., 2012. Deep-Sea Res. II 71-76, 16-31. [3] Alderkamp et al., 2015. Elementa: Science of the Anthropocene 3, 000043.