



Effects of zooplankton grazing on iron speciation in the Southern Ocean

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Low iron concentrations limit primary production in vast regions of the world's ocean including the Southern Ocean (SO). Therefore, the trace element iron plays a key role in marine carbon uptake and thus ocean-atmosphere CO₂ feedbacks. Iron speciation and ligand binding strongly determines the amount of bioavailable iron and is thus more important in this context than total iron concentrations. We performed grazing experiments in shipboard incubations with the natural SO phytoplankton community and different zooplankton grazers added, to investigate the effect of grazing on iron ligand production. We observed an increase in the relative amount of free ligands and a positive effect on phytoplankton biomass under copepod grazing. In contrast, no such effects were observed under salp grazing, which seem to have grazed beyond the maximum sustainable yield that would allow further phytoplankton growth. We conclude that due to copepod grazing, iron is complexed in a form that can be used by phytoplankton and ligands are produced in excess to the iron concentrations. These data imply that the type and intensity of grazing pressure can affect the bioavailability of iron and thus also the efficiency of natural and/or artificial iron inputs for primary production in the SO. This mechanism has to be considered when estimating the role of iron in the context of climate change.