

## Effects of iron enrichment on nitrogen cycle near the subsurface chlorophyll maximum in the subtropical North Pacific

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Mechanisms sustaining a peak in nitrite concentrations at the base of the euphotic zone (primary nitrite maximum, PNM) have remained uncertain, with available data supporting either bacterial nitrification or nitrite release by phytoplankton. Based on the field observations and on board incubation experiments conducted in the subtropical North Pacific, we tested a hypothesis that iron limitation stimulates nitrite release from phytoplankton cells to the surrounding water near the subsurface chlorophyll maximum (SCM) due to inhibition of nitrite metabolic pathway.

Intensive vertical samplings around the SCM along an east-west transect at 23-24°N in the North Pacific showed that the PNMs were 5–25 m deeper than the nitracline and SCM. The incubation experiments confirmed that the phytoplankton assemblage in the SCM were under iron-limitation. At a station where the PNM was observed near the SCM, the iron enrichment resulted in an increase in nitrate consumption and a decrease in nitrite accumulation in the incubation bottles. The bottles incubated under a stronger light intensity than that at the SCM layer also showed similar trend in the nutrient dynamics. These results suggest that the excretion of nitrite by phytoplankton under both iron and light limitation is playing an important role for PNM formation. On the other hand, at a station where the SCM was much shallower than the PNM and the nitracline, the observed nitrite excretion by phytoplankton assemblage in the bottles was not significant probably due to the severe nitrogen limitation at the SCM.

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