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Decrease of surface water nutrient concentration and nutrient flux from the sediment in Harima-Nada, Eastern Seto Inland Sea

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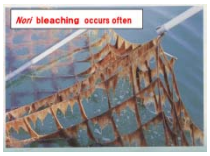
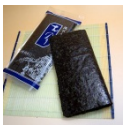
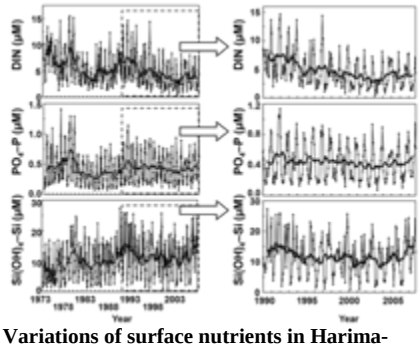
From the 1960s onwards, when Japan achieved high economic growth, the Seto Inland Sea was heavily eutrophicated due to serious water pollution by industrial effluent and urban wastewater. The result was a high occurrences of red tides. - Since the Law for Conservation of Environment of the Seto Inland Sea was enacted in 1973, water quality has gradually improved. - Since 1990, however, nutrient concentrations in seawater have decreased considerably, which has raised a new problem such as the *Nori* (*Porphyra*) bleaching in aquaculture. We investigated the causes of the nutrient decrease by examinations of nutrient concentration of surface water in the eastern part of the Seto Inland Sea. We found that nutrient concentrations in bottom layer did not increase even in the summer period when stratifications occurred. We also surveyed nutrient upward fluxes from the sediment across the overlying water-sediment interface. Our results showed that the nutrient fluxes were quite low compared with those in the fluxes examined about 10 and 30 years ago in the same area. In this study, we suggest that the decrease of nutrient upward flux is an important factor for the recent nutrient decrease of the surface seawater in the Seto Inland Sea.

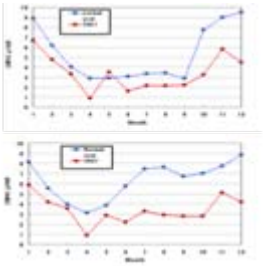


Nori (*Porphyra*)

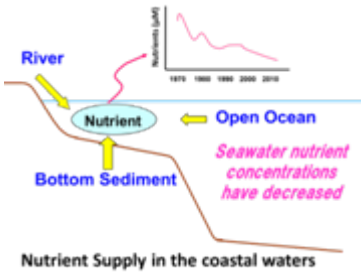




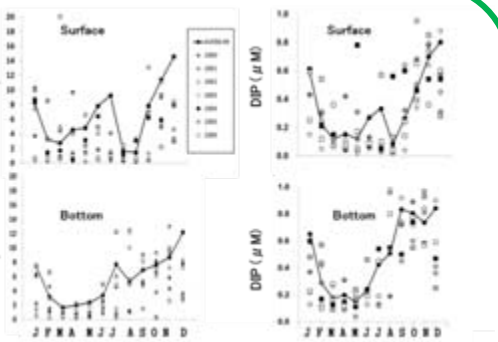
Variations of surface nutrients in Harima-Nada (Nishikawa *et al.* 2010)



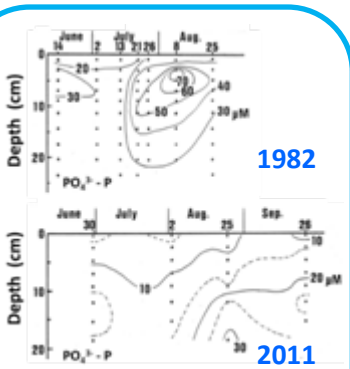
Seasonal variations of DIN concentrations at the surface and bottom layer at Harima-Nada, Seto Inland Sea, Japan (Tada *et al.* 2008)



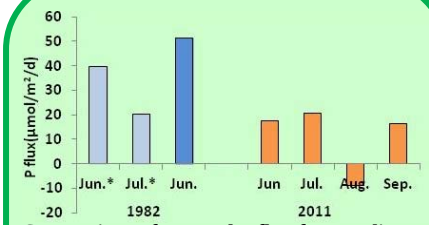
Nutrient Supply in the coastal waters



The seasonal variations of DIN and DIP at the surface and bottom layer.The lines show the average of 1990 to 1999, and the data points identifymonthly DIN and DIP concentrations from 2000 to 2006



PO_4 concentrations of pore water in 1982 and 2011.



Comparison of upward P flux from sediment in 1982 and 2011 using core incubation method.

*: different method (caluclated from vertical profiles of phosphate in the pore water using Fick's law)

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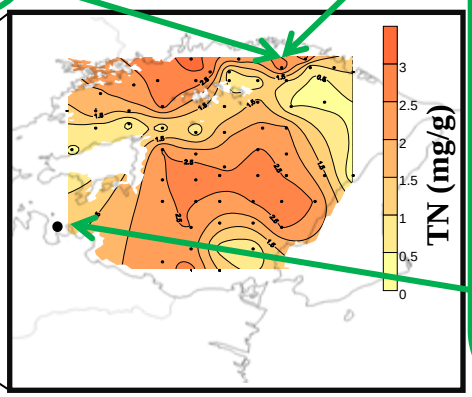
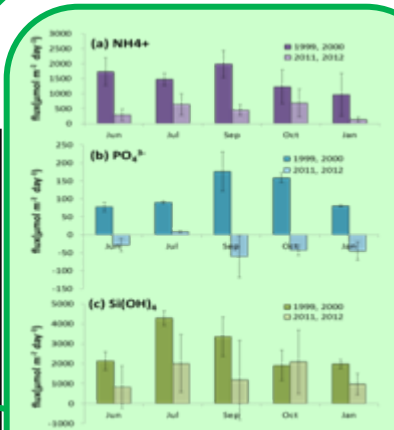
The decrease of nutrient upward flux may decrease the surface nutrient concentrations.





Comparison of upward nutrients flux from sediment in 2000s and 2010s using core incubation method.