

## Primary production in the eastern part of the Seto Inland Sea

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In the 1970's and 80's, the Seto Inland Sea was affected by eutrophication. Since the 1980's anthropogenic nutrient loads from rivers have been reduced and subsequently the occurrence of environmental problems has decreased. However, new problems such as reduced fishery yields and nutrient deficiencies for seaweed culture have occurred. This implies a change in the ecosystem structure from the 1970's to the present. Primary production in the Seto Inland Sea was extensively surveyed during the 1960's - 90's, but recently information is more limited. In this study, we investigated primary production in the eastern part of the Seto Inland Sea and compared the results with those in the 1980's and 90's.

We measured primary production at 7 stations in Osaka Bay (2), Harima Nada (2), Bisan Seto (2), Hiuchi Nada (1). Water samples were taken from five different depths, corresponding to 100, 48, 33, 14, 8.3% photon fluxes. The water samples were then transferred into replicate 1-L polycarbonate bottles in the laboratory. After the addition of  $\text{NaH}^{13}\text{CO}_3$ , the samples were incubated for 2 hours in a Plant Growth Chamber. The incubations were conducted at in situ temperature under the corresponding light intensity regulated using filters. Photosynthetic rate at each depth was calculated according to the  $^{13}\text{C}$  methods of Hama et al. (1983). A trapezoidal integration was applied to calculate primary production throughout the euphotic zone. These investigations were carried out in September, November, 2013, and February, May, August, 2014.

The estimated primary production varied among the dates (Fig. 1). Primary production in February and May, 2013, was lower than that in September and November, 2013, and August, 2014. Uye et al. (1987) and Tada et al. (1998) described that primary production in the Seto Inland Sea was low in winter. Their results also showed that the primary production in spring was similar to those in summer and autumn. The trends shown in our results differ with the previous studies.

Primary production measured in summer and autumn (September and November, 2013 and August, 2014) varied widely among the stations. Primary production in the central part of Osaka Bay and Hiuchi Nada were consistently lower throughout the investigation period. Primary production changed largely at the inner part of Osaka Bay, Harima Nada and Bisan Seto. The maximum production was observed at Harima Nada in September and November, 2013, and at the inner part of Osaka Bay in August, 2014. Primary production showed a peak at the inner part of Osaka Bay and showed decreasing trends through Harima Nada to Bisan Seto in February, May and August, 2013. On the other hand, primary production showed a different distribution pattern in September and November, 2014, when high primary production was also observed at Bisan Seto. These results are different from those of Tada et al. (1998), in which they noted low primary production in Bisan Seto.

In the present study, the maximum primary production ranged from 1.0 to 1.6  $\text{gC m}^{-2} \text{day}^{-1}$  in summer and autumn. This range was similar to the value observed in the same season in the 1990's. However, we also found differences in trends between previous studies and the present study. In order to examine structural changes in the primary production in this region, further analysis is needed on the factors controlling the distribution pattern of primary production.

### References

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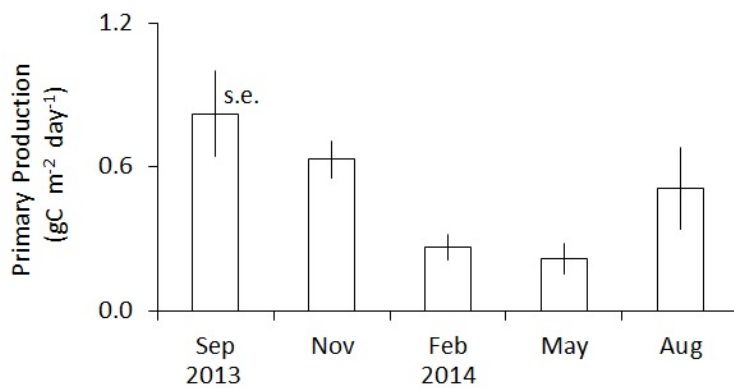


Fig. 1 Primary production in the eastern part of the Seto Inland Sea .