

Temporal variations of productivity at low trophic levels over the past 150 years in the western Seto Inland Sea, Japan, revealed by sedimentary records

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We examined fossil pigments in a ²¹⁰Pb-dated sediment core to document the temporal variations in phytoplankton biomass over the past 150 years in a semienclosed bay, Beppu Bay, in the western Seto Inland Sea, Japan. The flux of fossil pigments was used as an index of phytoplankton biomass, which we reconstructed after removing the effect of post-burial degradation on the concentrations of fossil pigments.

The flux doubled from the 1960s to the early 1970s, decreased or remained stable in the early 1980s, and increased again from the late 1980s to the early 1990s. The first increase in phytoplankton biomass during the 1960s was likely caused by eutrophication due to an increase in terrestrial nutrient fluxes from watersheds. The decreasing phytoplankton biomass in the early 1980s was likely related to the establishment of a sewage treatment system that reduced the terrestrial nutrient fluxes to the sea. However, the terrestrial nutrient fluxes could not explain the second increase from the late 1980s to the early 1990s. Intensification of the influx of nutrients from the shelf slope to the sea was likely the cause of the second increase in phytoplankton biomass. This is supported by the inverse relationship between phytoplankton biomass and sea level at the shelf slope, the latter being an index of the intensity of the influx of oceanic nutrients from the shelf slope to the sea. The supply of oceanic nutrients may be therefore a critical factor in the determination of primary production in the western Seto Inland Sea.

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