Effects of Resuspended Sediments on the Environmental Changes in the Inner Part of Ariake Bay.

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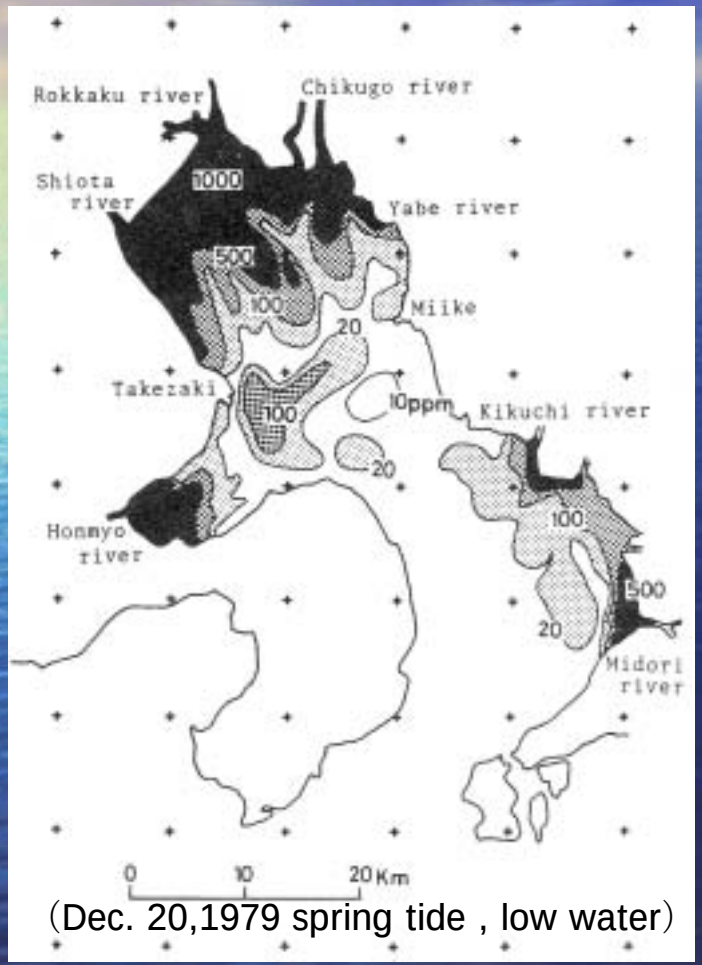


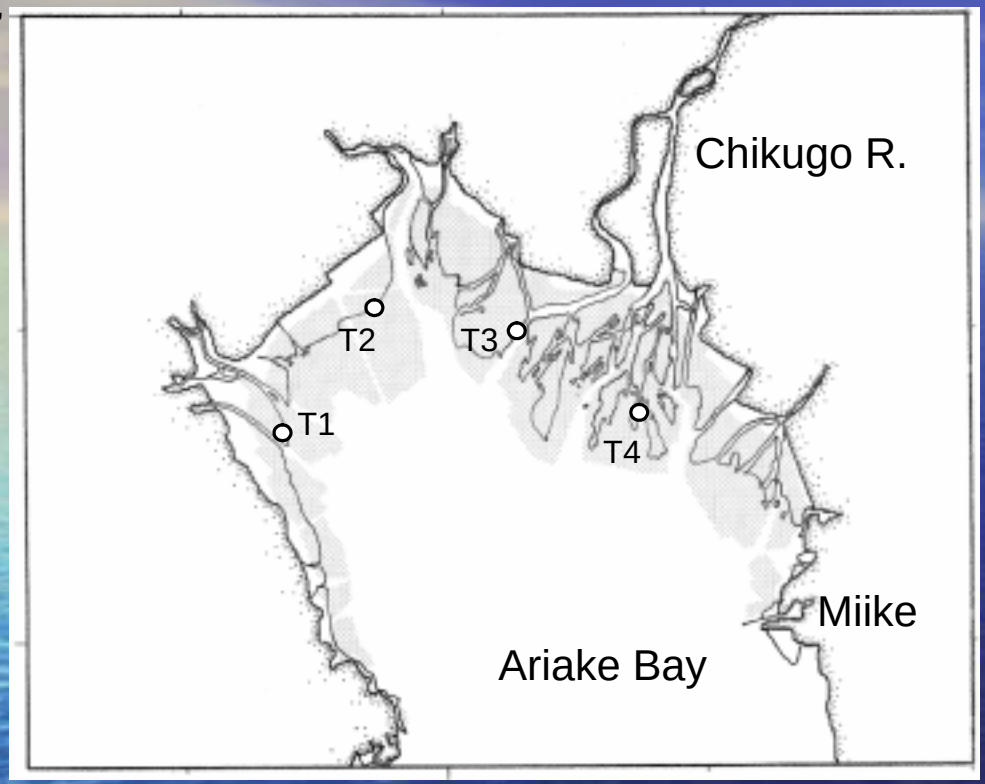
（Dec. 20,1979 spring tide , low water）

SS (mg・L $^{-1}$) image from LANDSAT
(Shirota and Kondo, 1985）

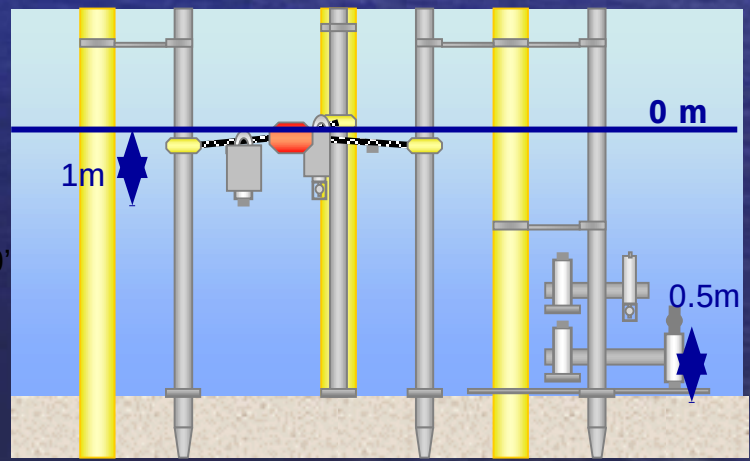
★ The maximum tidal range is over 5 m. Resuspended sediments makes high turbidity zone (SS over 1,000 mg・L^{-1}) around the tidal flats area by the strong tidal current.

★ Resuspended sediments is considered to have key roles linking currents and the ecosystem. → Light limitation

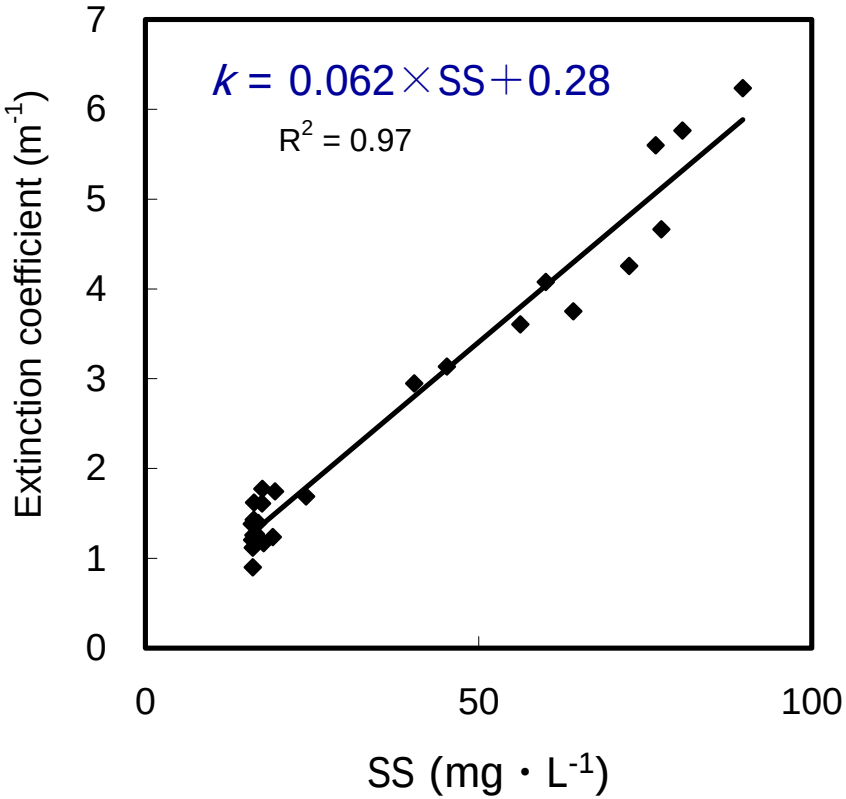
Increase of transparency and red tides are observed, which seems to be caused by the reduction of bottom sediments resuspension by the gradual reduction of tidal amplitude and mean sea level rising.

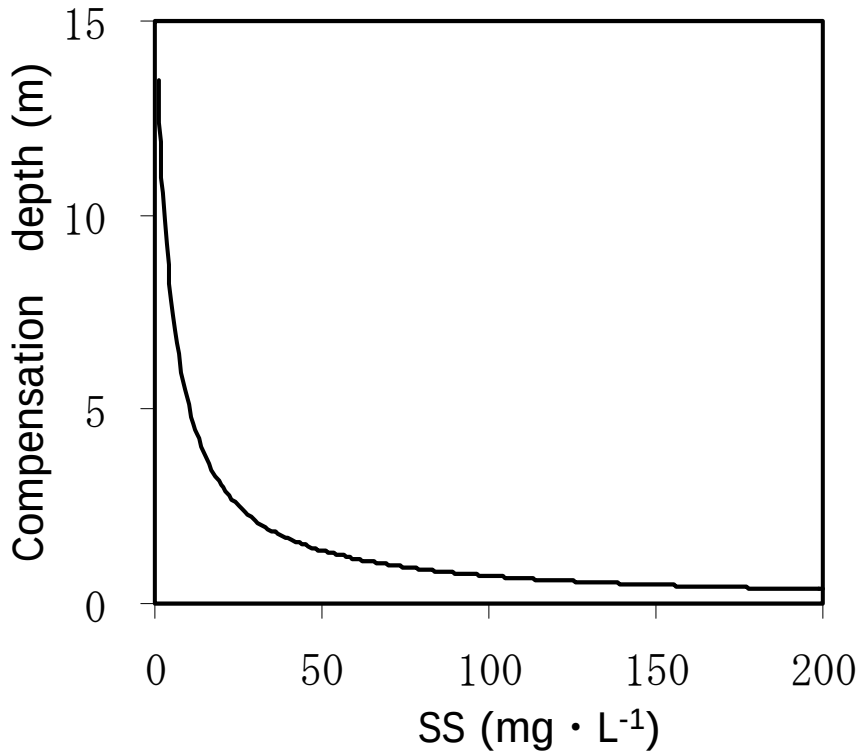


Map of the inner Ariake Bay showing monitoring towers (T1-T4).
Shaded areas denote the Nori farming ground.



In site fluorescence, turbidity and DO were monitored with the equipments attached on the towers. (1m or bottom-0.5m)





Linear regression of extinction coefficient (k) against SS concentration, for measurement made at St T4 on Nov. 25, 2003.

Over 100mg・L^{-1} of SS was commonly observed in the inner Ariake Bay during spring tide which is equivalent to compensation depth <0.7m, assuming that the compensation depth for algal photosynthesis is the depth of 1 % surface irradiance.

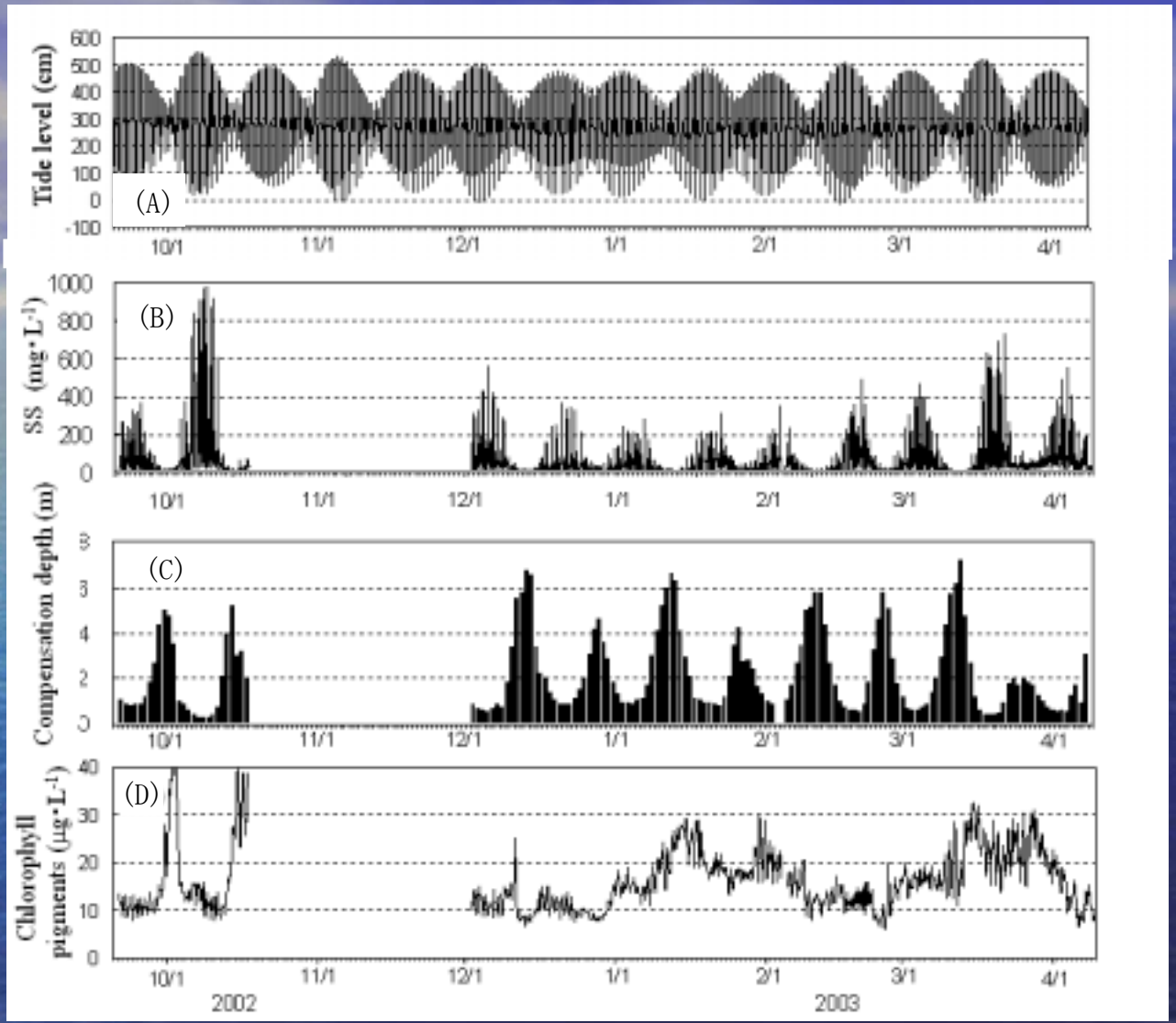


Fig. 2. Variations in the tidal level at Miike (A), SS (B), daily average compensation depth (C) and chlorophyll pigments at high water (D) at St. T4 (1m). SS (mg・ L^{-1}) and Chlorophyll pigments (μg・L^{-1}) were estimated from turbity and *in situ* fluorescence.

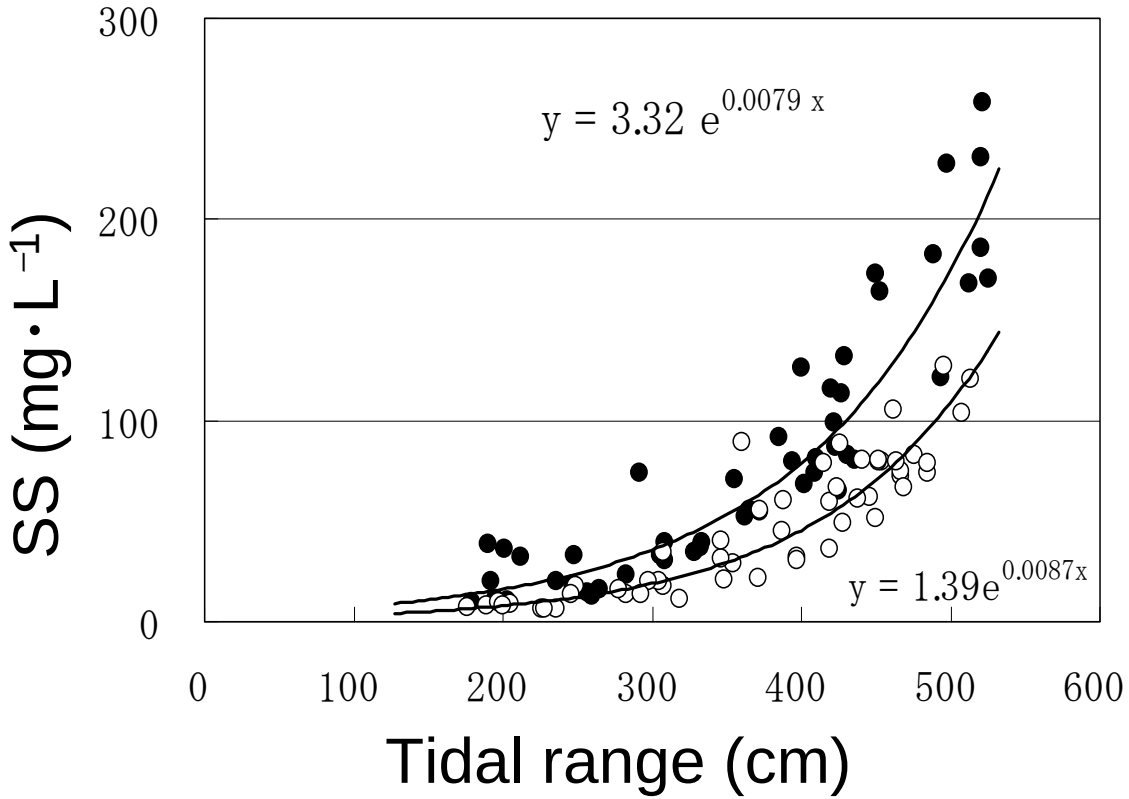


Fig. Relationship between tidal range at Miike and daily average SS at St. T4
○: during high season of the Nori farming,
●: before and after the season of the Nori farming.

★Daily average SS increases exponentially with the tidal range, however, the increasing rate during high season of *Nori* farming was lower compared with other periods. The interference of *Nori* farming gears seems to be one of the contributing factors for the reduction of tidal current and resuspension of bottom sediments.

★By the effect of gradual reduction of tidal amplitude in recent years (up to 4 %), SS will have been decreased 11% on average and 17% on maximum.

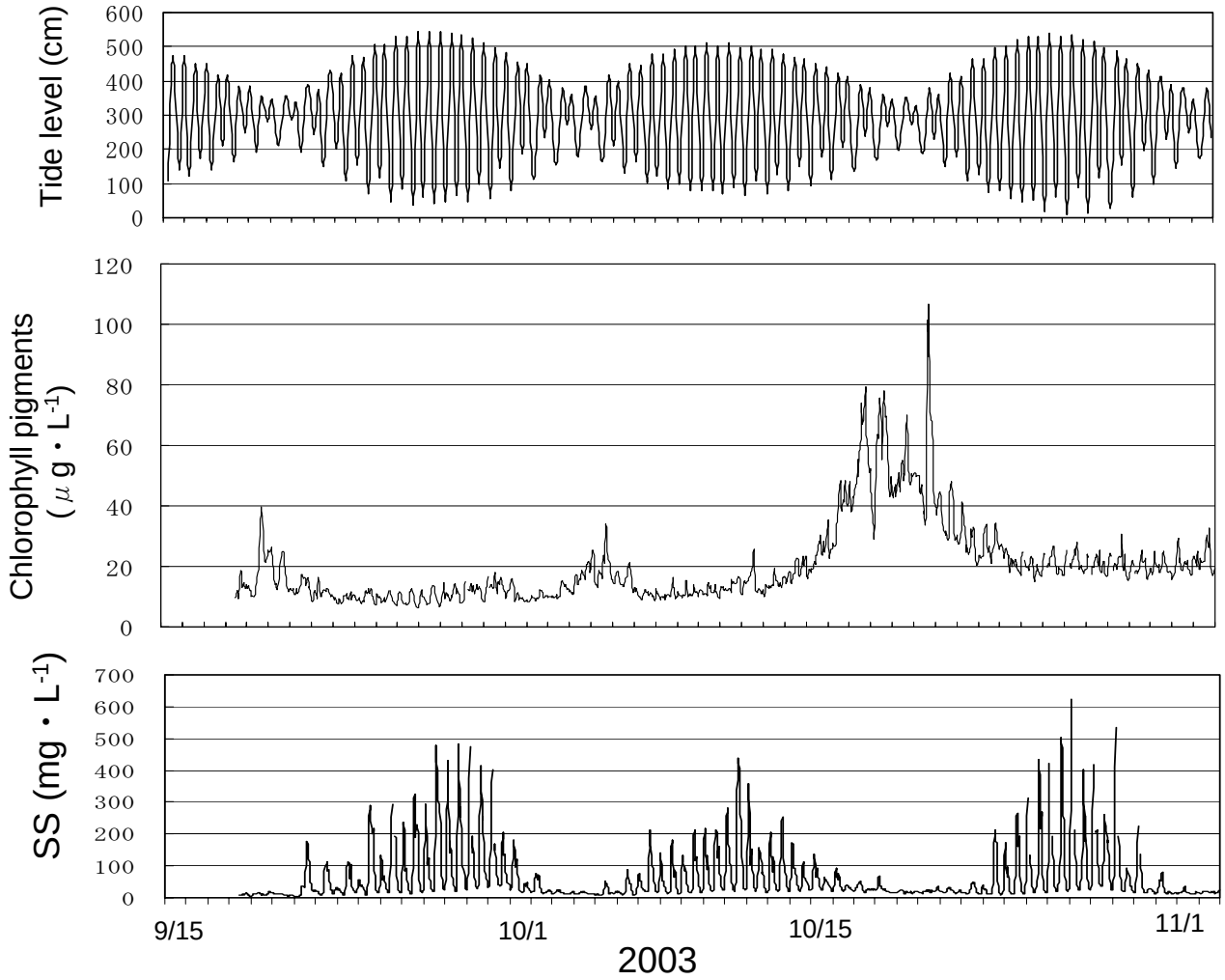


Fig . Variations in the tidal level at Miike (A), chlorophyll pigments (B) and SS (C) at St. T2 (1m) from Sept. to Oct. 2003.

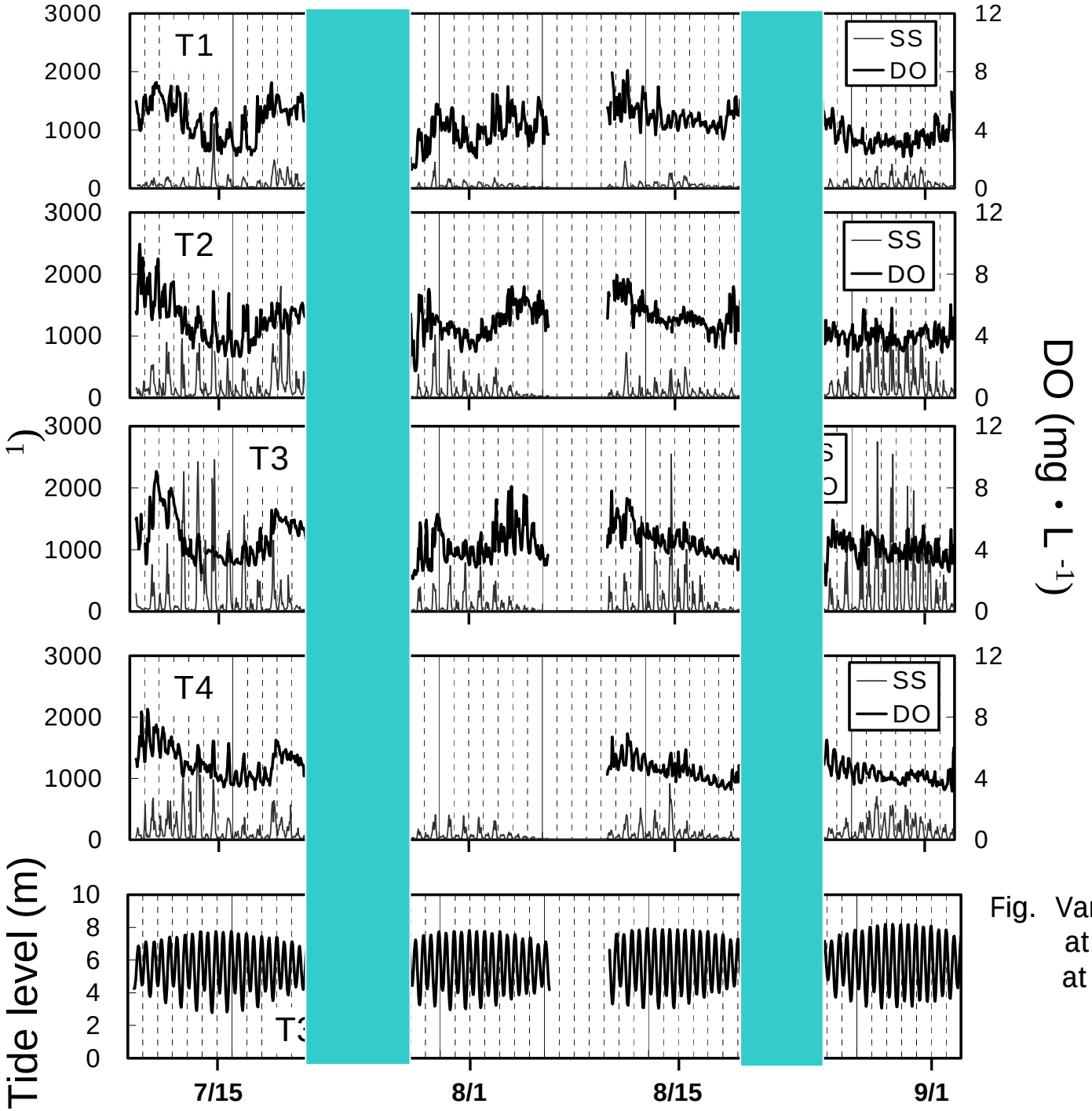
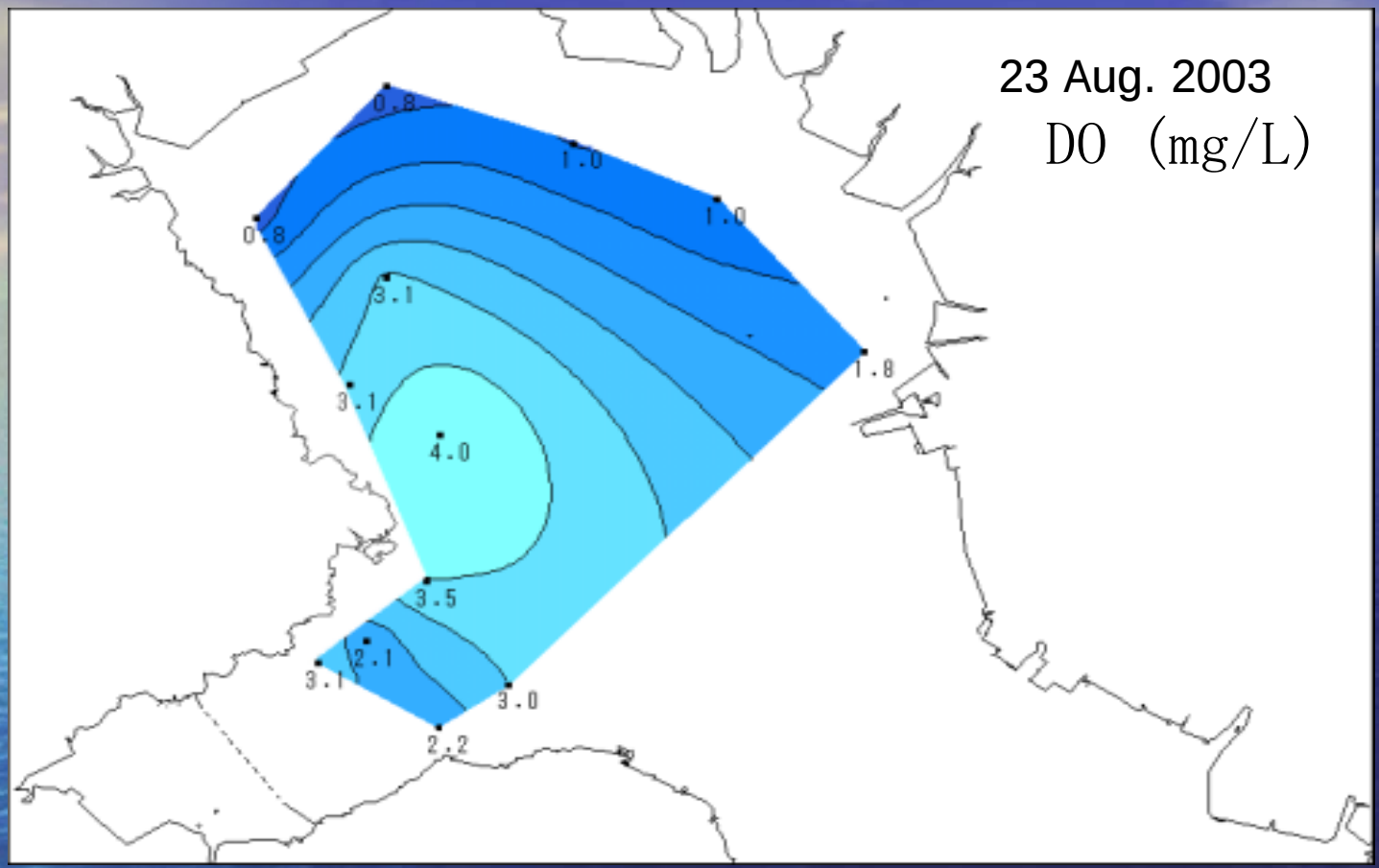
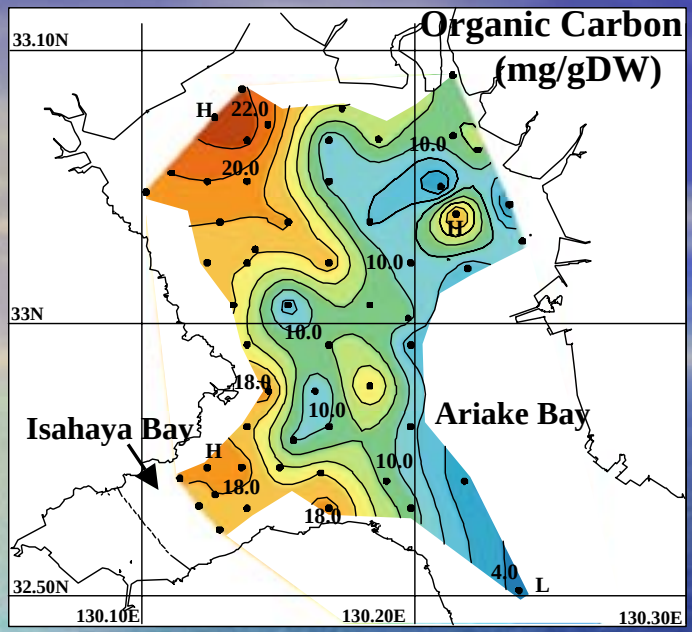


Fig. Variations in SS, DO (B-0.5m) at St. T1-T4 and tide level at St.T3 during summer 2003.



Distribution of DO (mg/L) in the bottom water on 23 Aug. 2003



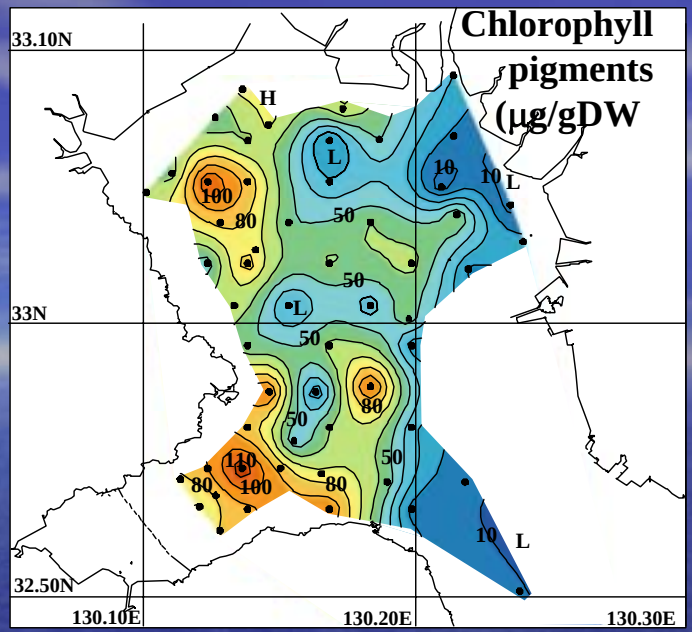


Fig. Organic carbon (left) and chlorophyll pigments (right) in the surface sediments (0-1cm) of inner Ariake Bay and Isahaya Bay (July 2002).

The concentrations are higher in the north-western part of Ariake Bay and Isahaya Bay.

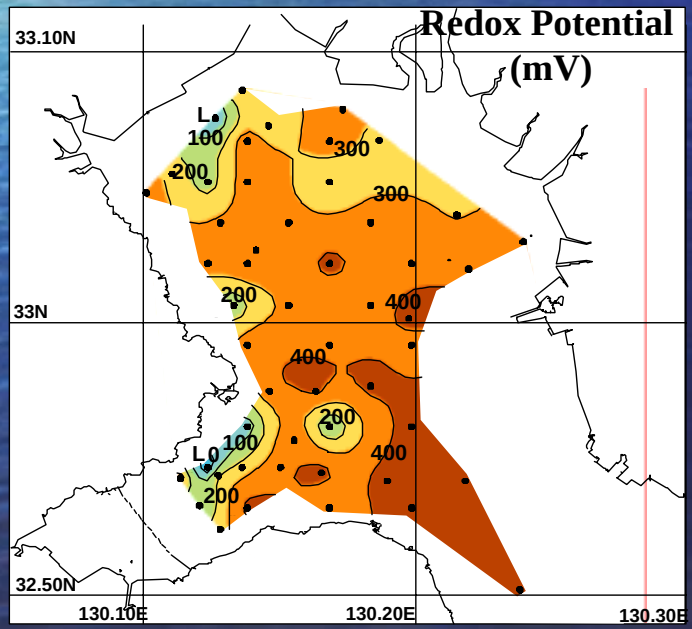


Fig. Redox potential in the surface sediments of inner Ariake Bay and Isahaya Bay (July 2002).

The sediments in the north-western part of Ariake Bay and Isahaya Bay are **under reducing condition by the accumulation of phytoplankton cells and their decomposition.**

Summary of environmental changes in Ariake Bay

Long-term tide variation

Reclamation of tidal flats

Gradual reduction of tidal range and mean sea level rising (Reduction of tidal currents)

Reduction of the bottom sediments resuspension

Stratification

Outbreak of red tides

Increase of transparency from 1980s

Oxygen deficient water

Decrease in DIN

Drastic decrease of bivalves catch

Discoloration of Nori (*Porphyra*)