



The effects of oxygen deficiency on demersal and benthic fauna in a two-layered system

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In between the Black Sea and the Aegean Sea, the Marmara Sea has a two layer exchange system separated by a sharp pycnocline at a depth of ~25 m. Renewal time of the layers is a few months and 6yr upper and lower layers, respectively. As a result of restricted mixing between two layers the lower layer is permanently deficient of oxygen. On the other hand the inflow water rich in oxygen from the Strait of Çanakkale into the deep layer prevents the improvement of anoxic conditions. In general the dissolved oxygen values are in the range of 1-3 mg/L in the lower layer of the Sea of Marmara.

In this study, demersal and benthic fauna are investigated in the control of the low oxygen condition in the lower layer of the Marmara Sea. The demersal fish and benthic material were collected from 34 stations located in 30-200 m contour by trawling in August 2000 and September 2001. The dissolved oxygen concentrations in water column were measured at the 64 stations in the Marmara Sea in these two cruises.

Highest dissolved oxygen (DO) concentrations were monitored at southern Marmara Sea coast, particularly around Erdek Bay. Despite of seasonal fluctuations in DO concentrations throughout the study period, high concentrations in the region supported benthic life (5.0-10.0 mg/L) with the effect of the inflow DO rich Mediterranean water. Generally, southern coasts and Bay of Tekirdağ had high concentrations, while northern basin had very low DO values (<2 mg/L). Species richness also had a similar distribution and higher richness was detected from the Strait of Çanakkale to İmralı Island, excluding enclosed bays, particularly of Bandırma and Erdek Bays. Similar to DO, total biomass was also recorded higher at southern basin.

Previous studies showed that the Bay of Gemlik displayed critical conditions with

DO values decreasing to 0.1-0.9 mg/L in summer, while winter concentrations were around 1.3 mg/L, thus limiting benthic life in the bay and almost no macrobenthic form is detected. But in August 2000 and September 2001 bottom DO concentrations are also detected very close to zero and anoxic conditions were recorded. The anoxic conditions ended with nearly lifeless benthic substrate. The anoxic conditions were recorded only for short period in summer. The increasing vertical mixing due to atmospheric conditions changed anoxic conditions in winter.