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Nutrient distribution in the North Aegean Sea affected by the Black Sea Waters

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The North Aegean Sea is a region of the Mediterranean Sea where the Black Sea exchange waters through the Dardanelles straits. In this work, the temporal and spatial variation of inorganic nutrients were studied along a north-south transect of three stations (MD1, MD2, MD3) located close to the Dardanelles straits, during winter-spring period (January, March, April and May 2011). High DO concentrations were recorded in the BSW water mass corresponding to σ_θ $<$27.0 kg m^{-3} which, together with the relatively low inorganic nutrient concentrations and the low N:P ratio values, characterize this water mass.

Vertical mixing occurred probably between January and March 2011 resulting in the increase of nutrients in the entire water column, while BSW enriched with phosphates the surface layer of the study area. A spatial decreasing gradient of nitrate and phosphate concentrations at the surface and the deeper layers of the water column was observed along the north (MD1) to south (MD3) transect.

Elevated inorganic nutrient values were observed at all the stations in January 2011 and even more in March, followed by a decrement in April as nutrients were consumed by phytoplankton. In May, an increase of the mean integrated value was observed at station MD1 due to the higher concentrations at the layer 30-65m.

The estimated N:P ratio was, in most of the measurements, higher than the theoretical value of 16:1, indicating phosphorus limitation in the study area. Temporal changes of elemental ratios may be related to changes in the surface inputs of nutrients and in the marine cycling of organic matter. Low N:P ratio values characterized the BSW water mass corresponding to σ_θ $<$27.0 kg m^{-3}. It is noteworthy, that during the phytoplankton pre-bloom period (January 2011) no N-limitation was recorded according to our data. During the phytoplankton bloom (March 2011) and post-bloom (April-May 2011) periods the study area was, in most of the cases, P-limited. A shift from P-limitation to N- limitation was recorded at 13% of our data in May. It is very interesting that N-limitation was recorded at the surface layer of stations MD1 and MD2 which is probably related to the BSW.