Geophysical Research Abstracts
Vol. 14, EGU2012-2606, 2012
EGU General Assembly 2012

Long-term changes in the middle Adriatic oceanographic properties

I. Vilibic, S. Matijevic, and J. Sepic
Institute of Oceanography and Fisheries, Split, Croatia (vilibic@izor.hr)

We investigated long-term series (1960-2010) of physical and chemical parameters (temperature, salinity, nutrients and dissolved oxygen concentrations) along the Palagruža Sill transect (middle Adriatic Sea), a good dataset which is suitable for assessing fluctuations, shifts and climate conditions, at the open Adriatic Sea area. Data were quality-checked for long-term consistency, by using min-max conditions for each parameter, and by imposing a threshold to the spikes and rapid changes along the vertical for each parameter. A significant seasonality in all parameters has been removed from the series by a year-day least squares fitting of a combination of 12- and 6-month sinusoidal functions applied to each series, and the differences between overall averages of parameters (the data collected between 1960 and 2010) and averages of the data collected between 1991 and 1998 (the Eastern Mediterranean Transient period) have been computed.

A substantial increase of deep nutrients concentrations (below the euphotic zone) along the transect has been observed between 1991 and 1998, especially of orthophosphates. This was accompanied with lower-than-usual temperature, salinity and DO concentrations. As no possible source for increased nutrient concentration is available in the eastern Mediterranean, we assumed that the Western Mediterranean intermediate waters, rich in orthophosphates and inorganic nitrogen compared to the Eastern Mediterranean waters, were dragged to the Adriatic through anticyclonic circulation in the northern Ionian Sea, as a part of the Bimodal Adriatic-Ionian Oscillation (BiOS).

No similar nutrient levels have been documented during any other period between 1960 and 2010 in the middle Adriatic, supporting the uniqueness of the 1991-1998 time interval in terms of nutrient dynamics. This period coincided with the EMT period, which generated massive sinking of dense waters to the deep Ionian Sea, forcing anticyclonic circulation of the basin. Therefore, a prerequisite for the observed high nutrient transport from the Western Mediterranean to the Adriatic is presumably achieved through simultaneous acting of the EMT, which is unique by itself, and a right phase (anticyclonic circulation in the northern Ionian) of the BiOS.

The 1991-1998 period was characterised by nitrogen-limited conditions in terms of nutrient availability for primary production (the N:P ratio decreased to less than 16:1 in the euphotic zone) over the most of the transect area, opposing typical phosphorus-limited conditions found in the rest of the examined period (average N:P ratio for the whole period was larger than 25:1). Observed nutrient changes partially coincided with the previously published primary production maxima in some parts of the investigated area that could potentially be responsible for the observed fluctuations and anomalies in abundances of various species throughout the food chains. These findings indicate high relevance of the observed physical processes and demand an additional effort to be put in the assessment of the hydrography role in the Adriatic biogeochemistry.