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Interannual variability of Dissolved Oxygen values around the Balearic Islands

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Periodic movements of the trawl fishing fleet at Mallorca Island suggest a seasonal variability of the demersal resources, associated with hydrodynamic variability. The area where these commercial fisheries operate extends from the north to the southeast of Mallorca channel, between Mallorca and Ibiza Islands. It is thus affected by the different hydrodynamic conditions of the two sub-basins of the western Mediterranean (the Balearic and the Algerian sub-basins), with different geomorphologic and hydrodynamic characteristics. To characterize this hydrodynamic variability, hydrographic data collected around the Balearic Islands since 2001 with CTDs were analized [1]. Hydrographic parameters were processed according to the standard protocols. Dissolved oxygen (DO) was calibrated onboard using the winkler method. Temperature and salinity were used to characterize the different water masses.

At the Western Mediterranean, the maximum values of DO in the water column are observed in the surface waters during winter (> 6.0 ml /l), when these water in contact with the atmosphere absorb large amount of oxygen, favored by low winter temperatures and notable turbulence. Later in the spring, the gradual increase of temperature, and the beginning of stratification and biological activity, lead to a decrease of oxygen concentration mainly in surface waters. During summer, these values continue to reduce in the surface mixed layer. Below it, and due to the biological activity, an increase is observed, giving rise to the absolute maximum of this parameter (> 6.5 ml /l). During autumn, the atmospheric forcing breaks the stratification producing a homogenization of surface water. At this moment, DO shows intermediate values. Below the surface waters, about 200 m, a relative maximum corresponding to the seasonal Winter Intermediate Waters (WIW) can be observed. Intermediate waters, between 400 and 600 m, reveal an oxygen minimum (4.0 ml /l) associated to the Levantine Intermediate Waters (LIW) and underneath, the Western Mediterranean Deep Waters (WMDW) show a slight increase of these values (> 4.5 ml /l). Interannual variability of DO at the Balearic and the Algerian sub-basins and in the different water masses will be presented.

A systematic difference (> 0.10 ml/l) is observed at intermediate and deep waters between the oxygen content in the Balearic and Algerian sub-basins. This could be explained in terms of the longer path these water masses have to cover around the Mallorca and Menorca Islands, which implies a longer residence time and consumption as a result of respiration and decay of organic matter.

During some campaigns minimum DO values ($\approx$ 3.8 ml/l) were found in this area which are smaller that the values usually reported for the Mediterranean [2, 3, 4]. Different possible causes as the influence of the Easter Mediterranean Transient, the reported increase of surface temperature or just the interannual variability, will be discussed.

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