Zooplankton trends in an oligotrophic area of the Central Western Mediterranean: The Balearic Sea: 1994-2008

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Sampling station: (39°28’10N; 2°25’E)

Mallorca channel: St. 1 (75 m) 5 nm from the coast

Sampling period

1994–2005 Every 10 days
2006–2008 Seasonal sampling
The atmospheric circulation pattern governing the Balearic region appears tightly linked to the North Atlantic climate variability.

*Fernandez de Puelles and Molinero, 2007*
North Atlantic Climate and Balearic hydrology

75 m depth temperature tracks the variability in climate and hydrography in the Balearic Sea

$r = 0.30; p < 0.001$

Fernandez de Puelles and Molinero, 2007
The mallorca channel is in the boundary area between different water masses and an important passage for the meridional exchanges. Hence, the BS appears as an ideal site to investigate the dynamics of the water masses characterizing the WM basin and therefore to track their effects on the functioning of the pelagic ecosystem in relation to climate changes.

* The cooler, more saline water of the Northern basin

* the warmer, fresh waters of the Algerian basin of the WM

* Hence, the BS appears as an ideal site to investigate the dynamics of the water masses characterizing the WM basin and therefore to track their effects on the functioning of the pelagic ecosystem in relation to climate changes.
Data

Biological data
- 15 year time-series of zooplankton,
  - Mesozooplankton community
  - Small mesozooplankton (100µm - 250 µm)

Physical, chemical and chlorophyll data
- Temperature, salinity, nutrients (depths)
- Chlorophyll a

Long time-series analysis and climate
- The “SCOR-WG125 methodology”, based on the work of Mackas et al., 2001 and visualized using the COPEPOD Interactive Time-series Explorer
Water Temperatures at the Mallorca Site: 1994-2008

Temperature (°C) at 0–5 m

Monthly data distribution & Means

Temperature (°C) at 75 m

Monthly data distribution & Means

Annual Anomalies

IAV = 0.273

Year


IAV = 0.383

Year

Salinity (Surface and 75m depth): 1994-2008
Chlorophyll \( a \) interannual variability
Chl $\alpha$ and zooplankton
Zooplankton biomass (0-75 m)
Mesozooplankton and copepod abundance
Small mesozooplankton abundance 100-250 µm fraction
Interannual variability of main zooplankton groups
Other less abundant groups .....
Mean individual weight of zooplankton (µgr DW/ ind)
Summary

- Based on 15 year period we have observed main trends of the zooplankton community in waters off the Balearic area, that can represent the oligotrophic water of the Western Mediterranean.

- Although SST was warming, cooler and saline waters were found in the bottom indicating northern water influence, that increased stratification period.

- The mesozooplankton showed a decrease in biomass and abundance and a lower individual weights was found, likely due to changes in the zooplankton composition.

- The synchronous variations between zooplankton and their environment indicates the rapid response to these organisms to changes and consequently, can be considered as a good hydrographic and climatic indicator.

- Additional and longer times series are needed to understand signals of climate change at Mediterranean scale but it is specially necessary to consider this boundary area for further studies of Mediterranean climatic change.

These results may have important implications for the assessment of small pelagic fish (i.e. anchovy, sardine) which are indirectly affected by climatic effects on copepods (e.g. their main food source).