

Type of the Communication (Speed-Talk)

3.6 Recent freshening and cooling of Biscay subsurface waters.

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Abstract: The monitoring program Radiales (<https://www.seriestemporales-ieo.net/>) by the Spanish Institute of Oceanography, has been providing hydrographical and biogeochemical series in marine waters around Spain on a monthly basis from early 90's. The proximity of the shelf-break in front of the city of Santander (SE Bay of Biscay) allowed tracking intermediate and deep waters along the standard section perpendicular to this city for three decades (sampling was limited to 1000 meter until late 2007, then extended to 1500 m, and full-depth 2400 m since 2014). From the start of the sampling in nearly 90's, subsurface waters showed unabated warming and salt-increase. Warming was linked to isopycnal sinking (heave) during the 90's and early 00's until the occurrence of very strong winter mixing in 2005 that shifted quickly the salinity down to lower East North Atlantic Central Waters (ENACW) levels (ca. 400 m). Overall, warming and salt-increase at the core of ENACW added up to 0.3°C and 0.08 in salinity within only two and a bit decades. In 2014, the upper central waters showed freshening and cooling for the first time in the series, a process that enhanced in the following years especially in salinity that currently (2021) presents the lowest value of the overall timeseries. This shift in regional hydrography follows the large salinity drop observed in the subpolar gyre around 2012 and its subsequent expansion downstream into the subtropical gyre and subarctic seas. This regime shift implies that subsurface environmental conditions in the region have returned back to 90's state, contrasting to the uppermost waters which continue to show large positive anomalies. The effects of this cold and freshwater inflow in the regional circulation of southern Biscay are discussed.

Keywords: Hydrography, ENACW, circulation patterns.

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