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PhD project: Variability and trends of water masses in the Atlantic continental margin of the Iberian Peninsula

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Summary: The main aim of this thesis is to analyze oceanic physical changes occurred in the Bay of Biscay during the last decades. To carry out this purpose the newest databases were selected in order to ensure appropriate spatial and temporal resolutions. Thus, in-situ databases (Argo floats), satellite data (MODIS sensor) and reanalysis databases (SODA, OISST1/4 and CFSR) were combined to analyze changes in salinity and temperature, as well as, variations in other physical variables such as mixed layer depth, for the whole Bay of Biscay.

Thermohaline variability of the two main upper water masses, Eastern North Atlantic Central Water (ENACW) and Mediterranean Water (MW), were studied over the periods 1975-2010 and 2004-2013. ENACW has been observed to warm and salinicate over both periods, whilst a cooling and a freshening were detected for MW over the period 2004-2013. These variations were mainly due to changes in the region where both water masses originated. This fact was evidenced applying the methodology developed by Bindoff and McDougall (1994) and also analyzing air temperature trends and precipitation less evaporation balance trend in the Northeastern Atlantic.

The conclusion of this study shows that significant changes in physical properties and processes were detected in the Bay of Biscay during the last decades. The combination between ocean features and local processes, which show their influence at different temporal and spatial scales, explain these variations. This thesis evidences the importance of carrying out regional studies to understand physical changes in oceans, as well as to understand its influence on marine ecosystems in order to determine scenarios and policies to mitigate those changes.

