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Climatology of temperature, salinity and dissolved oxygen in a changing Adriatic Sea

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A new climatology, based on a comprehensive dataset (1911-2009) of temperature, salinity and dissolved oxygen, is presented for the whole Adriatic Sea, by using Data-Interpolating Variational Analysis (DIVA). Climatological maps were produced at 26 levels and validated with Ordinary Cross Validation. The approximation error and the uncertainty degree associated to the updated climatology have been estimated in order to provide information on the reliability of the products obtained. The concept of Climatology–Observation Misfit (COM) has been introduced as an estimate of the uncertainty of the patterns revealed in the climatology, which is induced by the dynamical variability associated with the climatological structures. The uncertainty associated with the climatology, higher in the upper layer and in the northern and shallower part of the basin, underlines the importance of mesoscale processes in the Adriatic Sea. Lastly, in order to identify possible temporal trends, long-term variability has been investigated in the Mid Adriatic and the South Adriatic Pits. New or better resolved features emerged from this analysis: (1) below 100 m all properties profoundly differ between the Middle and the South Adriatic and seem characterized by different biogeochemical dynamics; (2) the South Adriatic Pit clearly shows the remote effects of the Eastern Mediterranean Transient, while no effect is observed in Middle Adriatic Pits; (3) the deepest part of the South Adriatic seems now to be significantly saltier (+0.18 since the period 1910-1914, with an increase of +0.018 decade-1 since the late 1940s) and warmer (+0.54°C since 1910-1914),; (4) the Middle Adriatic Pits present a long-term increase in Apparent Oxygen Utilisation (+0.77 ml l-1 since 1910-1914, with a constant increase of +0.2 ml l-1 decade-1 after the 1970s).