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Analysis of specific water masses transports in the Western Mediterranean in the MEDRYS1V2 twenty-one-year reanalysis.

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We present an analysis of specific water masses fluxes in the Western Mediterranean Sea issued from a twenty years (1992-2013) reanalysis (MEDRYS1V2). Water masses are identified on the base of salinity and potential density properties and computes; the fractions of each water mass involved in total flux are computed under the hypothesis assumptions of mixing lines schemes. It was first designed in order to avoid rough truncations between water masses on the T-S diagram when using fixed thermo-haline properties thresholds. The method does not use the temperature marker due to its high seasonal variability in near surface waters (0-200 m) and we consider that potential density is a better marker to discriminate deep and intermediate water masses. The algorithm discriminates successively five different water masses : the Atlantic Water (AW) incoming from the Gibraltar strait (salinity between 36,1 and 38,45 PSU), the Levantine Intermediate Waters (LIW) incoming from the Tunisia-Sicily strait (salinity between 38,45 and 39.1 PSU), the Modified Atlantic Waters (MAW) defined as near-surface waters (potential density less than 28,9 kg m-3) that are neither AW or LIW, while Western Intermediate Waters (WIW) are those remaining until the σθ = 29,10 kg m-3 threshold for Western Mediterranean Deep Waters (WMDW) is reached. Such computed fractions of each water mass, whose sum is constrained to unity, are then used to compute their water masses transports all along over twenty years of the reanalysis. The transport are assessed across computed on key transects delimiting known sub-basin entities (Ligurian Sea, Gulf of Lion, Balearic Sea...), with total transports showing balanced mass budget. The such computed total transport reveal marked differences in their seasonal to interannual variability, while the analysis of the water mass transports allows to identify those which mainly implied induced these variability. The results first show a low seasonal and no significant interannual variability at the exit of the Alboran Sea that results from the balance between the eastward AW/MAW outflow and the westward WIW and WMDW inflows. The Corsican strait, the Ligurian Sea line and Tunisia-Sardinia straits show a marked seasonal variability (0,37-0,39 Sv) mainly driven by the AW/MAW. By contrast, a strong interannual variability dominates the seasonal one (-2 to 1 Sv) between the Algerian Basin and the northern basin, correlated to the WMDW formation. The analysis of each specific water masses transport pointed out that shows this marked variability to

be first driven by the intermediate and deep water masses transports. Similarly the interannual variability of the AW and MAW transports in the central part of the Western Mediterranean suggests some coupling between the deep, intermediate and surface water masses, even through the shallower Balearic Sea.

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