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# Multi-scale variability of the Sicily Channel

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The complex spatial and temporal variability of the surface layer of the Sicily Channel is investigated combining in-situ (Lagrangian drifter trajectories and float profiles) and satellite data (Absolute Dynamic Topography, Sea Level Anomaly, Sea Surface Temperature). Drifter and altimeter-derived data spanning the period 1993-2018 are used to describe: (i) the seasonal and decadal variations of the surface currents in the context of the Mediterranean basin-wide circulation, and (ii) the decadal reversals of the surface circulation in the adjacent Ionian Sea. Furthermore, the interannual variability of the significant mesoscale structures in the Channel is studied upon the concept of 'optimal currents', derived from the merging of the satellite-derived geostrophic currents and Sea Surface Temperature data in the period 2012-2016. These multi-sensor-derived currents improve the present-day altimeter estimates, retrieve the ageostrophic component of the circulation field and provide a high spatial (1/24°) and temporal (daily) resolution adequate to describe in detail the quasi-permanent mesoscale structures. Moreover, the vertical structures and the hydrological characteristics of these mesoscale eddies are delineated using Argo float profiles. The results provide further insights on the circulation patterns already described by previous studies, better defining the temporal variability, the formation mechanisms and some previously unknown characteristics of the mesoscale field in this key region of the Mediterranean Sea.