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Multiscale and multidisciplinary Marine Rapid Environmental Assessment data collection methods for process studies: the case of the Taranto Gulf

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The present work aims to investigate the thermohaline properties and the circulation of the Gulf of Taranto, which is a deep, semi-enclosed ocean area in the northern Ionian sea, encircled by two Italian peninsulas of southern Apulia and Calabria.
Since few observations in the past have been reported in the Gulf of Taranto, it emerged the need of planning and implementing oceanographic cruises in this area, based on an innovative concept of MREA (Marine Rapid Environmental Assessment). The methodology was based on an optimal experimental strategy to collect definitive evidences on ocean mesoscales with a spatial-and-time synoptic coverage. The MREA surveys have been performed thanks to the synergies between Italian oceanographic research centers and the Italian Navy Hydrographic Institute.
Starting from the experience and results of MREA14 (Pinardi et al., 2016), which have shown in the Gulf an anticyclonic circulation in Autumn (October 2014) and the presence of submesoscale structure, a new experiment (MREA16) was repeated in a different season (Summer, June-July 2016), evaluating possible changes in current circulation. Furthermore, the new sampling methodology was refined and strengthened integrating the classical CTD data collection with additional simultaneous measurements of currents by means of vessel-mounted ADCP. The geostrophic circulation pattern derived from the CTD objective-analysis mapping techniques has been verified with the ADCP measurements. Moreover, the analysis on circulation fields confirms the presence of possible submesoscale structures, which can be well solved by a high-resolution sampling scheme.
The MREA investigation in Gulf of Taranto shows a large-scale gyre anticyclonically-oriented in Autumn (MREA14) and cyclonically-oriented in Summer (MREA16). This opposite circulation pattern is probably connected to (i) the impact of Western Adriatic Coastal Current (WACC), (ii) the effect of the Northern Ionian Sea outflow–inflow system in different seasons and (iii) the local atmospheric forcing.