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Autonomous profiling buoy system: a new powerful tool for research and operational oceanography

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Oceanography is nowadays a fast-changing field. The scientific community is orienting towards the implementation of a growing array of satellite-borne or mobile and moored high-tech devices and sensors, while sending fewer scientists at sea to collect measurements, minimizing the expensive ship-time costs. In other words, oceanography is now moving from a platform-centric sensing system to a net-centric distributed sensing system. Integration with operational ocean models, providing the best estimate of the ocean state by means of data assimilation, is the step forward, with nowadays mature initiatives at global scale and at regional scale in the Mediterranean Sea. While the ocean still remains a complex system, largely undersampled, multiplatform-integration, improvements in tools capabilities and assimilation in models represents one way to reduce uncertainties in marine areas. In this context, and differently from mobile platforms (e.g, gliders, argos), fixed-point moorings nicely provide long term point wise time-series, but limited by a low vertical resolution. Technology is fast evolving towards the implementation of automatic profilers, which partially overcome this limitation.
In June 2013 the Institute of Marine Sciences of the Italian National Research Council (CNR-ISMAR) started the test phase of one of the very few Mediterranean autonomous profiling systems installed in a open-sea mooring, transmitting, daily, hydrological vertical profiles in real time through satellite communication. The selected site was the Corsica Channel, a narrow passage between Corsica and Capraia islands, connecting the two main regions of the western Mediterranean: the Tyrrhenian and the Liguro-Provençal basins. The Corsica Channel represents a 'choke point' for the study of the dynamics and evolution of the western Mediterranean Sea. Previous studies in this passage indicate an annual and seasonal cycle with northward winter fluxes representing about the 60% of the total annual transport. In summer, excluding few cases of current inversions, exchanges between the two basins are mostly interrupted.
Here the use of the new profiler is discussed. The profiling buoy system can be mounted at any level of a moored chain, which doesn't need any surficial support, allowing the flexibility to monitor discontinuities and sharp changes along selected depth ranges, at the same time, transmitting real-time data for best integration in modern operational oceanography networks.