The High Frequency coastal radar network in the Mediterranean: joint efforts towards a fully operational implementation

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The Mediterranean Sea is considered a relevant geostrategic region and a prominent climate change hot spot. This semi-enclosed basin has been the subject of abundant studies due to its vulnerability to sea-level rise and other coastal hazards. With the steady advent of new technologies, a growing wealth of observational data are nowadays available to efficiently monitor the sea state and properly respond to socio-ecological challenges and stakeholder needs, thereby strengthening the community resilience at multiple scales.

Nowadays, High-Frequency radar (HFR) is a worldwide consolidated land-based remote sensing technology since it provides, concurrently and in near real time, fine-resolution maps of the surface circulation along with (increasingly) wave and wind information over broad coastal areas. HFR systems present a wide range of practical applications: maritime safety, oil spill emergencies, energy production, management of extreme coastal hazards. Consequently, they have become an essential component of coastal ocean observatories since they offer a unique dynamical framework that complement conventional in-situ observing platforms. Likewise, within the frame of the Copernicus Marine Environment Monitoring Service (CMEMS), HFR are valuable assets that play a key pivotal role in both the effective monitoring of coastal areas and the rigorous skill assessment of operational ocean forecasting systems.

The present work aims to show a panoramic overview not only of the current status of diverse Mediterranean HFR systems, but also of the coordinated joint efforts between many multidisciplinary institutions to establish a permanent HFR monitoring network in the Mediterranean, aligned with European and global initiatives. In this context, it is worth highlighting that many of the Mediterranean HFR systems are already integrated into the European HFR Node, which acts as central focal point for data collection, homogenization, quality assurance and dissemination and promotes networking between EU infrastructures and the Global HFR network.

Furthermore, priority challenges tied to the implementation of a long-term, fully integrated, sustainable operational Mediterranean HFR network are described. This includes aspects related to the setting up of such a system within the broader framework of the European Ocean Observing System (EOOS), and a long-term financial support required to preserve the infrastructure core service already implemented. Apart from the technological challenges, the enhancing of the HFR data discovery and access, the boosting of the data usage as well as the
research integration must be achieved by building synergies among academia, management agencies, state government offices, intermediate and end users. This would guarantee a coordinated development of tailored products that meet the societal needs and foster user uptake, serving the marine industry with dedicated smart innovative services, along with the promotion of strategic planning and informed decision-making in the marine environment.

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