



The new ICATMAR high-frequency radar network: data analysis and preliminary results on the Catalan Coast turbulence characterization.

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Over the last year 2023, a new high-frequency (HF) radar network has been implemented along the Catalan Coast by the ICATMAR, a cooperative body between the Institute of Marine Sciences (ICM-CSIC) and the Catalan Government that aims to provide scientific advice for the maritime governance in this region. The network consists of 7 CODAR antennas, 5 of which are already operating and the rest will be commissioned before the end of 2024. These antennas provide surface radial velocities and waves measurements along the Catalan Coast, between the coastline and about 40 miles offshore. The radial velocity measurements obtained by two or more antennas are currently being combined using the (unweighted) least-squares fitting method to derive the total current velocity fields. Current data provided by the ICATMAR HF radar network has a spatial resolution of about 9 km² and is delivered every hour.

The results presented here focus on the characterisation Probability Density Functions (PDFs), statistical moments and structure functions of radial velocities. Quality control standards of JERICO network (defined in JERICO-Next D5.13) have been applied on radial velocity data measured by two antennas (stations CREU and BEGU) over an almost 1-year time series since their installation in 2023. The analysis of the main four moments were performed on validated data in order to characterize the main statistical properties. The derived PDFs differ from a Gaussian distribution by showing heavy tails, characteristic of turbulent flows and ocean observations. Structure functions up to the 15th order were calculated along each radial direction and their scaling were derived, unveiling a spatial variation of the anomalous scaling of the structure functions.

These preliminary results highlight the HF radars value as a tool for sampling surface sub-mesoscale turbulence structures which, in turn, will help improve our understanding of the dynamical properties of ocean flows, specially, in near coastal marine regions where high resolution currents data is scarce.