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New evidences of ocean surface current processes in the SE Bay of Biscay, using HF radar data

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High Frequency Radar (HFR) data in the south-eastern Bay of Biscay (Atlantic Ocean) offer, since 2009, a new approach to the temporal and spatial variability of the ocean surface processes in the area. Past studies have already described the main characteristics of the surface and subsurface water circulation over the shelf and slope. As they were mainly based upon punctual in time or in space in-situ measurements, the 5 year-long hourly HFR-derived velocity fields analyzed here, contribute considerably to the understanding of surface current patterns in the HFR footprint area.

New evidence is given, over different time-scales, on the main ocean surface processes, in an area where surface currents show marked temporal and spatial variability. With cyclonic (anticyclonic) patterns during winter (summer) months, the analysis of lowpass ?ltered currents shows that a key component of this seasonal variability is associated with the surface signature of the Iberian Poleward Current (IPC). Clearly intensi?ed over the upper part of the slope, this current circulates eastward off the Spanish coast and northward over the French shelves and slopes in winter. In order to complete the previous descriptions, a K-means clustering technique, has been applied to HFR and wind data (from the Weather Research and Forecasting model). The results of the K-means analysis offer a deeper insight into the surface circulation patterns together with the wind patterns, after analyzing the occurrence probabilities of the radar current groups into the wind groups. In addition, a composite analysis based on a daily-scale winter-time series of the IPC for the 2009-2012 period deduced from satellite SST data and the low-passed surface currents, allows to identify the surface currents residuals related to the IPC.

This HFR network offers data operationally, being, nowadays a key component of the Basque Ocean Observing System, and highly valuable for operational purposes.