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Mesoscale variability in the Alboran Sea: Synthetic aperture radar imaging of frontal eddies

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In autumn 1992 the entire Alboran Sea (western Mediterranean) was sampled by the Spanish R/V García del Cid. The incoming jet of Atlantic water, its associated meandering front, and the two big anticyclonic gyres were described from conductivity-temperature-depth (CTD) and acoustic Doppler current profiler (ADCP) data. Smaller-scale eddies were also observed. Additionally, 36 ERS-1 synthetic aperture radar (SAR) scenes were obtained from mid-September to mid-October. The SAR images capture these features when wind conditions are suitable. The current shear is mainly depicted as narrow lines of low backscatter because of the damping of waves by natural surface films. These lines delineate the northern border of both gyres and the beginning of the alongslope Algerian current at the eastern limit of the Alboran Sea. ADCP observations confirm that lines on SAR imagery follow the direction of the surface currents. The two gyres present high backscatter values in their center, while their frontal boundaries appear modulated by the variation of the marine atmospheric boundary layer stratification due to the surface thermal front. SAR has observed small spiral eddies that were not evidenced by the almost contemporaneous but too coarse CTD in situ sampling. Good spatial correspondence between radar-detected and in situ-measured structures occurs when comparing SAR images to the surface dynamic topography, rather than strictly surface water characteristics.

Palabras clave: Fronts, Remote sensing, Eddies, mesoscale processes, jets, Upper ocean processes

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