



On the upwelling dynamics off northwest Africa in 2009-2012

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Drifter data, satellite maps and time series of SST, upwelling index and ocean surface wind products are used to characterise the North Western Africa upwelling system in the period 2009-2012, with particular focus to the region between Cap Blanc (Mauritania) and Cap Vert (Senegal).

This region corresponds to the southern part of the seasonal translation of the Trade winds along the western African coast and the relative upwelling has a marked seasonal periodicity. The upwelling season generally starts in late November and persists until early July north of 20°N, whereas it starts in late December until May in the south; in June the upwelling events south of Cap Blanc disappear and gradually the residual cold water mixes with the warm surface tropical Atlantic water. The most intense upwelling episodes are recorded between February and May and the upwelling index reaches its maximum in April-May (values larger than 1000 m³/s). These episodes usually coincide with maximum intensities of upwelling favourable winds (Trade winds) and are characterised by a mean duration of 5-10 days, SST values lower than 20.2°C and upwelling index larger than 700 m³/s.

Cold and nutrient-rich coastal near-surface waters are upwelled and transported offshore (westward) by means of energetic filaments rooted at specific locations along the coasts of Mauritania and Senegal. Four recurrent upwelling filaments (SST lower than 20°C), with an offshore extension between 200 km and 400 km, are observed and characterised. These filaments persist for a few weeks, and they subsequently mix with the surrounding waters. The filament formation is generally associated with the topographic features (capes) of the region.

Wind vorticity fields show positive values close to the coast between Cape Vert and Cape Blanc during the upwelling seasons; larger values correspond with the location of the main cold water filaments.

Cold water upwelled in the Cap Vert region are transported both westward, toward the Cape Verde Archipelago, and southward on the Senegal continental shelf; the southernmost extent of these waters occurs in spring.