

Seasonal and Spatial Variation of Nearshore Hydrographic Conditions in Central Chile

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Abstract

Numerous oceanographic processes involved in the transport and survival of larval stages of marine organisms, as well as, in nutrient and phytoplankton delivery, occur in nearshore waters. Yet, while large-scale oceanographic patterns are relatively well known for central Chile, little information exists on temporal and spatial variation in the nearshore environment. In this study, we examined the inner shelf hydrography of two sites in central Chile separated by 15 km and with slightly different coastline orientation. Our results show that both sites follow the general oceanographic patterns described for the region, with a well mixed water column and spatial homogeneity in winter months and the onset of a thermocline in spring and through the summer, when upwelling favorable winds intensified. However, despite the proximity of the sites, persistent differences in surface temperature, salinity, stratification, and chlorophyll-a concentration, as well as in the intensity of wind forcing were detected. Time series and cross-correlation analyses between wind and temperature, as well as satellite images, suggest that the intensity and frequency of upwelling varies between these sites, probably due to differences in coastline orientation. The potential existence of a localized upwelling shadow at one site and the influence of riverine input are discussed. The meso-scale oceanographic differences described in this study can have important consequences on the dynamics of nearshore ecosystems and should be born in mind when designing conservation or management strategies.

Keywords: Nearshore oceanography; Upwelling shadow; Chile; Surface temperature; Topographic effects; Wind forcing