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Coastal upwelling activity on the Pacific shelf of the Baja California Peninsula

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High primary productivity on the Pacific coast of the Baja California Peninsula is usually related to coastal upwelling activity that injects nutrients into the euphotic zone in response to prevailing longshore winds (from the northwest to north). The upwelling process has maximum intensity from April to June, with the coastal upwelling index varying from 50 to 300 m³/s per 100 m of coastline. Along the entire coast of the peninsula, the upwelling intensity changes in accordance with local wind conditions and bottom topography. Spatial variability can also be modulated by the influence of mesoscale meanders of the California Current. We have identified the seasonal and synoptic variability of upwelling signatures on the Baja California shelf, using averaged monthly and weekly sea surface temperature (SST) distributions obtained from remote sensing imagery from the Advanced Very High Resolution Radiometer in the period from 1996 to 2001. Analysis of SST distribution and direct experimental data on temperature and nutrient concentration shows that the areas with the coldest SST anomalies were closely related to the bottom slope, shelf width, and coastline orientation relating to wind direction. We also assume that the nutrient transport into the coastal lagoons may be forced by the coupling of coastal upwelling and tidal pumping of surface waters into the lagoon system.

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