



Gulf of Tehuantepec, Mexico: coastal response to winter offshore wind outbursts

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Shelf and slope observations of hydrography and currents during the Tehuano I experiment of 1989 are analysed to specify the variability of near shore conditions under varying wind stress. During the period mid-December 1988 to early February 1989, several outbursts of 'Norte' winds occurred over the Gulf. The slope and shelf currents responded strongly in the upper layers, above the strong thermo/pycnocline, but remained weak below. A tendency for near-shore inflow was evident on both sides of the Gulf, but stronger and more variable in the west. The inflow was interrupted briefly during events, but correlations between currents on opposite sides of the Gulf were insignificant. Coastal sea level dropped in the head of the Gulf at the time of an event but was unperturbed 200 km to the southeast. The coastal inflow along the eastern shelf was associated with a strong shoreward depression of shallow isosurfaces within 50 km of the coast. As the anticyclonic eddy formed by a wind event separated from the coast, the coastal inflow from the southeast crossed the head of the Gulf and turned cyclonically on the inshore flank of the anticyclone. The wedge of less saline, warmer water advected by this flow was then introduced into the central Gulf following the wind events. With renewed winds the shallow, lower salinity tongue was quickly mixed away in the central and inner Gulf. More saline, open ocean water was introduced from the north-western side of the Gulf by the inflow there. In the central Gulf, flow over the shelf and slope was predominantly offshore. The interaction between horizontal alongshore inflows, cyclonic and anticyclonic circulations, strong offshore flow and vertical mixing in the central Gulf provides a strong mechanism of shelf-ocean exchange.