

California Nino/Nina in boreal summer

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Anomalous warming/cooling in the coastal ocean off Baja and Alta California has attracted broad attention due to its significant impacts on the coastal marine ecosystem. The anomalous warming/cooling has been attributed, especially in boreal winter, to the remote forcing of the tropical El Nino/Southern Oscillation (ENSO) through both oceanic and atmospheric teleconnections and/or the ENSO-independent basin-wide atmospheric circulation anomalies in mid-latitudes. In the present study, we show for the first time the existence of coastal air-sea coupled phenomenon in the coastal ocean off Baja and Alta California in boreal summer. An initial decrease/increase in the southward alongshore surface winds along the coast weakens/strengthens the coastal upwelling and raises/lowers the coastal sea surface temperatures (SSTs) through oceanic mixed-layer processes. The resultant coastal warming/cooling, in turn, heats/cools the overlying atmosphere anomalously, decreases/increases the atmospheric pressure in the lower troposphere, generates an anomalous cross-shore pressure gradient, and thus reinforces or maintains the alongshore surface wind anomalies. The air-sea coupled phenomenon is analogous to the well-known ENSO in the tropical Pacific but with much smaller time and space scales, and referred to as California Nino/Nina (CAN) after the pioneer work that describe the warming events in the coastal ocean off Baja and Alta California as California El Nino.

Keywords: California Nino/Nina, coastal air-sea interaction