

Biophysical response to the 1997-98 And 2009-10 El Niño events in the equatorial Pacific Ocean

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El Niño-Southern Oscillation (ENSO) significantly influences atmospheric and ocean circulations in the Pacific Ocean, which in turn affect biological production and ecosystem characteristics. Much of our existing knowledge about the relationship between ENSO and biology is with respect to the classic El Niño (i.e., EP-El Niño), which has maximum warming in the eastern equatorial Pacific (EEP). However, since the 1990s, there have been frequent occurrences of a new flavor of El Niño (i.e., CP-El Niño) that has maximum warming in the central equatorial Pacific (CEP). The impact of the latter on biology is not well understood. Biophysical responses in the equatorial Pacific Ocean to the 1997-98 and 2009-10 El Niño (i.e., the strongest EP- and CP-El Niño event in the last three decades) are analyzed using satellite observations and reanalysis products. Significant differences in chlorophyll-a (chl-a) are found between the two events associated with different patterns of anomalies for the physical variables. An adjoint tracer analysis is used to examine the difference in the origin and pathway of water masses in the upper equatorial Pacific Ocean that control the difference in nutrient supply and thus chl-a.