

SCCWRP Annual Report 2001-02

Remote-sensed analysis of the influence of 1997-1998 El Niño on the California pelagic ecosystem

Nikolay P. Nezlin, William M. Hamner¹ and Louis D. Zeidberg¹

¹*University of California, Department of Organismic Biology, Ecology and Evolution, Los Angeles, CA*

ABSTRACT

The influence of the 1997-1998 El Niño event on coastal California was evaluated via multidisciplinary analysis of remote-sensed data. We processed and analyzed the time-series of surface chlorophyll concentration, sea surface temperature, and wind stress in eight small regions off central and southern California. Seasonal summer minima of remote-sensed chlorophyll concentrations were observed in all zones of the region under study during the entire periods of observations (1978-1986 for Coastal Zone Color Scanner [CZCS] and 1997-2000 for Sea-viewing Wide Field-of-view Sensor [SeaWiFS]), suggesting that nutrient limitation is regulated by the strength and depth of the seasonal pycnocline. Seasonal maxima of chlorophyll were observed during summer in upwelling zones, during spring in the regions adjacent to upwelling zones, and during winter in the southern area, far from upwelling zones. The main factors stimulating the growth of phytoplankton biomass were the intensity of coastal upwelling and wind stress. The 1997-1998 El Niño event coincided with a complete collapse of the squid fishery. This collapse was preceded by a significant decrease in remote-sensed phytoplankton biomass. Sea surface temperature increased first in the Southern California Bight and then in the more northern upwelling zones without significant changes of wind pattern. The variations observed during the El Niño event were consistent with a deepening of the pycnocline resulting from downwelling waves propagating northward along the coast. This excess stratification likely results in reduced nutrient flux into the euphotic zone; however, the precise mechanism that led to collapse of the squid fishery requires further investigation.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2001_02AnnualReport/29_ar35-nick.pdf