SCCWRP #0708

Phytoplankton blooms detected by SeaWiFS along the central and southern California coast

Nikolay P. Nezlin[1], Martha A. Sutula[1], Richard P. Stumpf[2] and Ashmita Sengupta[1]

[1]*Southern California Coastal Water Research Project, Costa Mesa, CA*
[2]*National Oceanic and Atmospheric Administration, National Ocean Service, Silver Spring, MD*

ABSTRACT

The effect of upwelling events, storm water discharge, and local circulation on phytoplankton blooms in the central California and Southern California Bight (SCB) coastal zones was analyzed using 10+ years (1997–2007) of remotely sensed surface chlorophyll concentration (CHL, derived from SeaWiFS ocean color), sea surface temperature, and modeled freshwater discharge. Analysis of variability and factors associated with phytoplankton blooms was conducted using the offshore extension of zones of CHL > 5 mg m 3; this method excludes terrestrial interference that complicates the use of ocean color to investigate phytoplankton blooms in coastal waters. In the SCB, blooms were most frequent in spring and associated with the spring transition to an upwelling regime. Along the Central Coast, blooms persisted from spring to autumn during seasonal intensification of upwelling. Offshore CHL extensions showed a significant positive trend during 1997–2007, with maxima in 2000–2001 and 2005–2006 that coincided with higher than normal frequency of upwelling events. Upwelling was found to be a major factor driving phytoplankton blooms, although the standard upwelling index derived from large-scale atmospheric circulation was decoupled from the frequencies of both upwelling events and phytoplankton blooms. Areas of longer residence time associated with natural boundaries between coastal ocean regions had more extensive and persistent blooms. The influence of storm water discharge on offshore CHL extension appeared to be limited to areas in close proximity to major river mouths. These "hot spots" were also co-located with ocean outfalls of Publicly Owned Treatment Works (POTW) discharge and, in some cases, longer residence time of coastal waters.