SCCWRP Annual Report 2003-04

Satellite ocean color observations of stormwater runoff plumes along the San Pedro Shelf (southern California) during 1997 to 2003

Nikolay P. Nezlin and Paul M. DiGiacomo[1]

[1]*California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA*

ABSTRACT

Knowledge of freshwater runoff plume dynamics in southern California is important for management of coastal water quality, because river discharges associated with episodic winter rainstorms can be a major source of pollutants and pathogens to coastal waters. The purpose of this study was to analyze the spatio-temporal dynamics of plumes at the San Pedro Shelf in southern California and identify factors influencing the incidence and dispersal patterns of plumes. We used 1-km spatial resolution satellite images collected in 1997-2003 by the SeaWiFS optical radiometer. The area of each plume was detected by the backscattering characteristics of surface waters at the mouths of four rivers that discharge to the San Pedro Basin. The rainstorm magnitude was estimated from atmospheric precipitation averaged over the total area of local watersheds. The plume size estimated from the backscattering coefficient nLw555>1.3 mW cm^{-2} μm^{-1} sr^{-1} was highly correlated with the amount of rainwater precipitated over the watershed area and accumulated during the period preceding the plume. The minimum rainstorm magnitude under which no plume occurred in the study area was almost zero, and even small precipitation resulted in a plume. The persistence of the plumes was estimated by fitting the coefficients of the model of plume water dissipation to achieve maximum correlation between the plume area and the rainstorm. Twenty-five percent of rainwater dissipated daily, which gradually decreased the plume size. The size, and alongshore and crossshelf translocation of the plumes were modulated slightly by the local circulation, forced remotely by the equatorward wind a few hundred kilometers to the south (along the coast of Baja California). The influence of tidal circulation on the plume area was slight and statistically insignificant.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2003_04AnnualReport/ar11-nezlin_pg107-124.pdf