2016 OCEAN SCIENCES MEETING
AGU • ASLO • The Oceanography Society
21–26 February • New Orleans, Louisiana, USA

EC12B-04: Characterizing Stormwater Dispersion and Dilution from Small Coastal Streams

ABSTRACT

Monday, February 22, 2016
11:15 AM - 11:30 AM
Ernest N. Morial Convention Center - 222

Characterizing the dispersion and dilution of stormwaters from small coastal creeks is important for understanding the importance of land-derived subsidies to nearby ecosystems and the management of anthropogenic pollutants. In Southern California, creek runoff is episodic, intense and short-lived and the plumes are buoyant, all make the sampling of freshwater plumes challenging. Numerical modeling offers a viable way to characterize these systems. The dilution and dispersion of freshwater from two creeks that discharge into the Santa Barbara Channel, California is investigated using Regional Ocean Modeling System (ROMS) simulations with a horizontal resolution of 100 m. Tight coupling is found among precipitation, hydrologic discharge, wind forcing and submesoscale flow structures which all contribute to plume evolution. During flooding, plumes are narrow and attached to the coast, due to downwelling/onshore wind forcing and vorticity filaments lying parallel to the shelf. As the storm passes, the winds typically shift to offshore/upwelling favorable conditions and the plume is advected offshore which enhances its dilution by the ambient flow. Plumes reach the bottom nearshore and form thin layers a few meters thick offshore. Dilution of passive tracers released with the runoff is strongly anisotropic with stronger cross-shelf gradients than along-shelf. Dispersion analysis of statistical moments of the passive tracer results in scale dependent diffusivities consistent with the particle-pair analysis of Romero et al. (2013). Results are discussed on model validation, the roles of submesoscale processes and wind forcing on plume evolution, and suggest that stormwater discharges can provide significant nutrients to nearby kelp ecosystems.

Authors

Leonel Romero
University of California Santa Barbara

David Siegel
University of California Santa Barbara

James McWilliams
University of California Los Angeles

Yusuke Uchiyama
Kobe University

Charles Jones
University of California Santa Barbara

View Related Events

Session: The Dynamics of Buoyancy Driven Flows in Estuaries and River Plumes and on the Continental Shelf II

Primary Topic: Estuarine and Coastal

Day: Monday, February 22, 2016