Title: Reexamination of Sediment Management in Newport Bay Under Accelerating Sea-Level Rise

Newport Bay is an important economic and ecological resource of Orange County, providing critical estuarine and wetland habitat for over 200 species of birds and generating about $200 million dollars a year in economic impact through tourism. Excess sediment from the watershed historically threatened to bury wetland habitat in the Upper Bay and clog navigational channels in Newport Harbor. However, reduced watershed loads combined with the possibility of accelerating sea level rise raises concern that critical intertidal habitat will convert to subtidal habitat, and points to the need for better understanding of future morphodynamic change under the combined influence of human activity (e.g., dredging, watershed controls) and natural processes (e.g., tide and storm-driven erosion and deposition). Herein we present a hydromorphodynamic model (Delft3D) to simulate the response of Newport Bay to future storms, tidal dynamics, and dredging under sea level rise scenarios. The model is calibrated and validated using time series of bathymetry, water levels and currents, and uncertainties in model predictions are assessed.
Additionally, an innovative method to perform computationally-demanding hydromorphodynamic simulations of episodic storm inputs over decadal time scales is developed. Model results point to the possibility that marsh accretion can be enhanced by altering dredging practices in Newport Bay, thus making the system less vulnerable to inundation by sea level rise.

Presenter: Matthew Brand, University of California Irvine

Matthew Brand is a PhD student at the University of California, Irvine studying environmental engineering. Matthew's work focuses combining sediment transport and morphodynamic modeling in coastal embayments, with a particular focus on how regulatory policy and human interventions play a role in shaping these systems. Matthew received his bachelor's and Master's degrees from the University of Vermont in Environmental Engineering, and is currently in his second year in UCI's PhD program. Matthew is funded through the NOAA Ecological Effects of Sea Level Rise (NOAA-EESLR) project and the National Science Foundation's Graduate Research Fellowship."