ORE SEMINAR

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OCEAN AND RESOURCES ENGINEERING

IN THE SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY AT THE UNIVERSITY OF HAWAI'I AT MĀNOA

Physical Oceanography in High Roughness Environments

Justin S. Rogers, PhD, PE

Post-Doctoral Scholar, Environmental Fluids Lab, Stanford University

Watanabe 112
(between HIG and University Health Services)

Wednesday, November 30

3:00-3:30 pm Coffee
3:30-4:30 pm Seminar

Abstract

Marine systems globally face increased risks from climate change and increasing human populations. In, addition, coastal human populations face risks from hazards such as flooding from storms, sea level rise from climate change, and decreased protection from reefs. Effective conservation and management of these systems therefore requires a fundamental understanding of the underlying physical oceanography in these settings and its interaction with marine organisms and the built environment. I will present results from my recent work on Palmyra Atoll in the Central Pacific. Based on field experiments on this very rough coral reef, we measured the highest wave dissipation from bottom friction ever recorded, and implemented an improved method to calculate this dissipation in wave models. This implies that healthy reefs may provide more coastal protection than previously thought. Secondly, based on field experiments and models, we show that the thermodynamics, waves, and flow travel time have a profound effect on where healthy reefs can grow on the atoll. The physical factors favoring high coral cover percentage varied according to the different prevailing hydrodynamic regimes: low temperatures in backreef habitats, short travel times in lagoon habitats (days since entering the reef system), and lower wave stress on forereef habitats. In light of future warming from climate change, local areas of reefs which maintain lower temperatures through wave-driven mean flows will have the best likelihood of promoting coral survival.