

Oceanography Department Seminar

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“High-resolution climate projections of ocean acidification for the main Hawaiian Islands”

Anthropogenic CO₂ emissions have led to significant rates of ocean acidification (OA) globally. Reduced availability of carbonate ions poses serious challenges to calcifying organisms, compromising their ability to maintain shells and skeletons and exacerbating negative effects of other stressors. The main Hawaiian Islands disrupt northeastern trade winds and ocean currents, resulting in robust submesoscale phenomena like upwelling and eddies. In the surrounding waters, sharp gradients exist between nutrient-rich coral reef ecosystems near the islands and the oligotrophic waters of the surrounding North Pacific Subtropical Gyre. These fine-scale features are not adequately resolved by global climate models, limiting their utility for predicting future OA trends in the region. To address this, we have generated high-resolution regional ocean/biogeochemical projections at 4 km horizontal resolution based on the global CESM2 dataset. I will discuss distribution, variability and future trends of commonly used OA indicators (pH, aragonite saturation and substrate-to-inhibitor ratio) across three CMIP6 scenarios (SSP1-2.6, SSP2-4.5, and SSP3-7.0) in the region. An unprecedented increase in OA is anticipated in the first half of 21st century, followed by scenario-specific outcomes. I explore spatial gradients of future OA patterns along Hawaiian coast through the lens of climate novelty/disappearance index, and highlight contrasting synergistic behaviors of the OA proxies in combination with rising temperatures. This dataset is being integrated into the Atlantis ecosystem model to support local decision-making processes with respect to fisheries and recreational services.

Thursday February 15th, 2024 3:00p.m. MSB #100