Bay Area Geophysical Society Seminar Series

Taking the Temperature of the Ocean from Pressure:

Using Ocean Bottom Pressure Measurements of Internal Waves in the South China Sea to Track the Annual Cycle of Sea State

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October 30th 5:30 PM

265 McCone Hall

UC Berkeley Campus

Abstract:
Oceans are stratified by density gradients resulting from vertical variations in temperature and salinity, creating a medium for internal gravity waves. Nonlinear internal waves can form and propagate hundreds of kilometers before breaking in shallow water. Their activity is modulated by climate change and plays a critical role in numerous oceanic processes, including vertical thermal mixing, nutrient supply, sediment transport, and acoustic transmission. Despite their importance, nonlinear internal waves remain difficult to detect over large spatial and temporal scales. We perform a 10-year analysis of nonlinear internal waves using satellite imagery and ocean bottom pressure (OBP) data. In this study, we (1) generate a decade-long dataset of propagation speeds and back azimuths of nonlinear internal waves generated in the eastern Luzon Strait of the South China Sea — home to some of the world's largest-amplitude internal waves — using Himawari-8 geostationary satellite data from the Japan Meteorological Agency (JMA); (2) analyze the periods and amplitudes recorded during wave passages over the OBP deployed offshore of Dongsha Atoll in 2020; and (3) explore nonlinear internal waves characteristics using a combination of observation methods. Our results show that seafloor

pressure measurements reveal variations in local sea state, particularly environmental parameters ie. ocean stratification. We also find that wave propagation speed consistently decreases as the waves approach shallower depths. Overall, this work provides a long-term observational framework for understanding the seasonal dynamics of nonlinear internal waves through the lens of remote sensing and seismology, and contributes to the broader effort to quantify their role in oceanic processes.

Biography. Amanda Syamsul is a PhD student at UC Santa Cruz studying the impact of climate change on earth processes. Her current projects include (1) studying internal waves in the South China Sea using seismology and remote sensing, and (2) analyzing stress on the Queen Charlotte Fault due to glacial isostatic adjustment over the last deglaciation. She received her BSc. in Geophysics with a minor in Applied Math from the University of Washington, where she also worked at the Pacific Northwest Seismic Network conducting outreach on earthquake hazard preparedness.

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