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

# Ocean waves observed from space: Applications in wave-ice interaction, climate, and engineering


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**Watanabe 112**

**Monday, October 30**

**2:30 – 3:00 pm Coffee**

**3:00 - 4:00 pm Seminar**

## Abstract


**Satellites provide the unique opportunity to obtain the necessary global, continuous datasets and are integral components of Earth observing systems. The first satellite designed for oceanic remote sensing was Seasat, launched in 1978. This mission carried a microwave synthetic aperture radar (SAR) and demonstrated it was possible to obtain valuable information of sea ice, sea surface heights, sea surface winds, and wave heights under all conditions. Since Seasat, there have been numerous advances and high-resolution sea surface roughness imagery from SARs make it possible to study the important spatial features of ocean waves from a global perspective.**

**Knowledge of ocean wave extremes is key for ocean engineers since wave-driven high sea levels are important events to understand for mitigation of coastal hazards, especially in low-lying regions like Hawaii. Here we use SARs to study important knowledge gaps including: wave-ice interaction, swell evolution, and the wave climate. Study in each of these topics is now possible due to recent advances in our understanding of SAR imaging mechanism and higher quality/quantity data from the European Space Agency's Sentinel1 (A/B) constellation. Little is known about wave directionality and SARs are the only contemporary technology to estimate wave spectra at the global scale. This information is highly complementary to the precise significant wave heights measured from altimeters. Using the 30-year altimeter and 22-year SAR records we improve our understanding of the inter-annual wave variability. This is particularly important for the estimation of extreme sea states in a changing climate. Through satellite data, we reveal important features of the wave climate and improve our understanding of ocean wave mechanics.**