

# Oceanography Seminar

## Atsuko Fukunaga

PMNM Ecological Research Statistician  
Joint Institute for Marine and Atmospheric Research  
University of Hawaii at Manoa

### “Integration of Structure-from-Motion photogrammetry into the Reef Assessment and Monitoring Program”

Long-term ecological monitoring of reef fish populations often requires the simultaneous collection of data on benthic habitats in order to account for the effects of these variables on the structure of fish assemblages. Structure-from-Motion (SfM) photogrammetric techniques can facilitate the extraction of quantitative metrics for characterization of benthic habitats from the resulting three-dimensional (3D) reconstruction of coral reefs. Out of 92 sites surveyed in the Northwestern Hawaiian Islands during the Reef Assessment Monitoring Program expedition in 2017, overlapping photographs from 85 sites achieved complete alignment and successfully produced 3D reconstructions, and in turn, digital elevation models (DEMs) and orthophotomosaics. Habitat metrics extracted from DEMs were generally correlated with one another, with the exception of curvature measures, indicating that complexity and curvature measures should be treated separately when quantifying the habitat structure. Fractal dimension had the best correlations with all other metrics of structural complexity and was also less affected by changes in orientations of the models than surface complexity or slope. Benthic cover obtained from orthophotomosaics also provide important habitat information that affects both habitat metrics and fish assemblages. SfM photogrammetric techniques, which are time-efficient in the field, thus allow for efficient collection of high-resolution benthic data that can be used to assess interactions between benthic habitats and fish assemblages.

**Thursday April 11<sup>th</sup>, 2019 3:00p.m. MSB 100**