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Department of Atmospheric Sciences M.S. Defense Announcement

Department of Atmospheric Sciences, S.O.E.S.T., University of Hawai'i at Mānoa
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M.S. Defense Title:

Observing the Sea Spray Aerosol Size Distribution on the Windward O'ahu Coastline

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Date: Thursday, March 12, 2020

Time: 9:00am

Location: IPRC Conference Room, POST 414

Abstract:

Sea spray aerosol (SSA) play a significant role in the local climatology of coastal areas by acting as giant cloud condensation nuclei (GCCN), which can accelerate warm rain initiation due to their hygroscopicity. However, there is great uncertainty in SSA size and quantity in the atmosphere. In-situ observations of GCCN are particularly limited because of their low concentration and relatively large sizes. At NCAR, the Giant Nucleus Impactor (GNI) was developed to observe giant aerosol particles. Optical microscope observations are made of wetted salt particles impacting onto polycarbonate slides exposed to ambient airflow in marine environments. With the GNI in mind, we developed a new, low-cost, and accessible method for sampling large SSA in the marine boundary layer. Using 3D printing and Arduino microcontrollers and sensors, we designed and built a SSA sampler named the “mini-GNI” that can expose slides to capture large and wet SSA. The mini-GNI can be attached to a kite string, allowing for sampling at multiple altitudes simultaneously. With the mini-GNI deployed on a kite platform, we captured SSA size distributions and examined what environmental variables influence the SSA size distribution in the atmosphere on the windward side of O‘ahu. We found that SSA concentration is not correlated with instantaneous wind speed. Instead, positive correlations were identified between SSA concentration and wave height and wind history. These results suggest that the SSA size distribution in Hawai‘i is locally driven and is dependent on different variables than the SSA size distribution over the open ocean.