Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

A sea-state dependent gas transfer formulation SHEETAL RAMSURRUN, Department of Mechanical and Aerospace Engineering, Princeton University, Princeton, NJ, USA, BRANDON REICHL, NOAA Geophysical Fluid Dynamics Laboratory, Princeton, NJ, LEONEL ROMERO, Earth Research Institute, University of California, Santa Barbara, CA, USA, LUC DEIKE, Department of Mechanical and Aerospace Engineering; Princeton Environmental Institute, Princeton University, Princeton, NJ, USA — While classic gas transfer parameterizations used in Earth system models are exclusively dependent on wind speed, the local sea-state is a direct driver of air entrainment and bubble production, which modulates exchange of gases between the ocean and the atmosphere. We combine the gas transfer formulation from previous work (Deike & Melville, 2018), that accounts for wind, wave parameters and a bubble mediated gas flux model, and use recent progress in wave modeling (Romero, 2019) to directly compute the breaking statistics within WAVEWATCHIII. We investigate the role of the full wave complexity at high temporal and spatial resolution on the gas flux, capturing the wave field associated with storms with a high level of fidelity, and opening a pathway for more accurate models of ocean-atmosphere interaction, from gas transfer to spray generation, based on the present formulation. We will compare our modeling approach to data sets for various gases, key to the climate system, in particular DMS and CO_2. (Brumer et al., 2017; Bell et al., 2017).

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Date submitted: 01 Aug 2020 Electronic form version 1.4