Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Large-eddy simulation of oil droplet aerosol transport in wind over waves.[1] DI YANG, MENG LI, University of Houston, YAJAT PANDYA, GIACOMO VALERIO IUNGO, University of Texas at Dallas — In this study, large-eddy simulations (LES) are performed to study the transport of aerosolized small oil droplets in wind over surface waves. The LES model consists of a wind turbulence solver and an Eulerian scalar transport solver. The wind LES solver uses a boundary fitted computational grid system that follows the instantaneous sea-surface waves to capture the turbulent flow structures and transport phenomena near the sea surface, and a hybrid pseudo-spectral and finite-difference method for spatial discretization. The aerosol transport is modeled using an Eulerian approach, in which an advection-diffusion equation for the oil droplet concentration field is solved using the finite-volume method with a combination of upwinding scheme and central difference scheme. Using this LES model, a set of simulations with various oil droplet sizes and sea-surface conditions are performed to investigate their effects on the vertical and lateral transports of oil aerosols in the marine atmospheric boundary layer.

[1]This research was made possible by a grant from The Gulf of Mexico Research Initiative.

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Date submitted: 31 Jul 2019 Electronic form version 1.4