Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Effect of progressive surface waves on near-surface transport of scalars by turbulent wind LIAN SHEN, University of Minnesota, DI YANG, University of Houston — The presence of progressive water surface waves plays a vital role in the air-sea exchange of scalar quantities, such as water vapor and heat. The periodic surface curvature and motions of the waves impose considerable disturbance to the turbulence boundary layer flow over the wave surface, affecting the transport of both momentum and scalars. In this study, the effect of surface waves on scalar transport is investigated using direct numerical simulation (DNS). The DNS solver uses pseudo-spectral and finite-difference schemes for the flow and scalar fields, with spatial discretization carried out on a moving wave-fitted computational grid to capture the surface wave effect. The results show considerable variations in the statistics of the scalar transport for different phase speeds of the waves that correspond to different development stages of wind-generated ocean waves. Based on the DNS data, several turbulent closure models for RANS modeling of scalar transport are evaluated using *a priori* test.

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Date submitted: 01 Aug 2015 Electronic form version 1.4