

Abstract Submitted  
for the DFD11 Meeting of  
The American Physical Society

**Lubrication Effect of Sea Spray under High-wind Conditions** YEV-GENII RASTIGEJEV, N.C. A&T State University, SERGEY SUSLOV, Swinburne University of Technology, YUH-LANG LIN, N.C. A&T State University — Accurate modeling of sea spray under high-wind conditions is essential for improving intensity forecast of hurricanes or severe storms. It has been shown that the presence of water droplets in the vortex of hurricane leads to a significant reduction in turbulent intensity and consequently to a sharp flow acceleration. In this study, several mathematical models are proposed to detail the influence of sea spray on vertical momentum transport. The models are based on: turbulent kinetic energy (TKE) equation,  $E-\varepsilon$  closure and the Monin-Obukhov similarity (MOS) theory. It is demonstrated that for values larger than the critical speed, the spray concentration rapidly increases, which results in significant flow acceleration. All models produce qualitatively similar results for all turbulent flow parameters considered. It was found that the MOS-based and  $E-\varepsilon$  models tend to predict noticeably stronger lubrication effect than TKE model, especially for slower wind speeds. The results of calculations are in very good agreement with available experimental data. The work is supported by NOAA, NA06OAR4810187 and NSF, HRD-1036563 grants.

Yevgenii Rastigejev  
N.C. A&T State University

Date submitted: 10 Aug 2011

Electronic form version 1.4