Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Rain-induced momentum exchange at the ocean surface under low wind speed conditions EMILY HARRISON, FABRICE VERON, University of Delaware — We present results from laboratory experiments on the generation of turbulence and the damping of wind-waves by rainfall. These experiments were conducted in a wind-wave flume that is 7.3 m long, 0.48 m wide, and 0.61 m tall, with the mean water level maintained at 0.4 m. A rain module, 0.86 m by 0.38 m, was suspended 4.98 m above the flume to allow droplets to reach approximately 91% of terminal velocity at impact. Turbulence was measured using both particle image velocimetry and planar laser induced fluorescence. Rain effects on the wave field were investigated with an optical wave gauge directly beneath the rain. We have completed a series of 70 experiments encompassing 7 rain kinetic energy flux conditions, 5 wind speeds, and 2 salinities (0 and 37ppt). We find that rainfall generates intense turbulence and mixing. We show that the mixing occurs in bursts associated with vortex rings generated by single drops, which are then sheared by the background current. This shearing and loss of coherence in the vortices generated by the drop impacts prevents significant vortex pairing thereby limiting the depth of the mixing region to a few 10s of cm. The depth of this mixed region is further reduced when raining on salt water.

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Date submitted: 05 Aug 2011 Electronic form version 1.4