Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Exploring the dynamics of turbulence suppression due to dispersed phase in various geophysical flows[1] MRUGESH SHRINGARPURE, Mechanical and Aerospace Engineering, University of Florida, USA, MARIANO CANTERO, Institute Balseiro, Bariloche Atomic Center, San Carlos de Bariloche, Argentina, TIAN-JIAN HSU, Civil and Environmental Engineering, University of Delaware, USA, BALACHANDAR S., Mechanical and Aerospace Engineering, University of Florida, USA — Geophysical flows that are characterized as multiphase and turbulent, the feedback of dispersed phase tends to alter the carrier phase turbulence and degree of isotropy. In turbidity currents, suspended sediments sustain turbulence by driving the flow and at the same time can kill the flow by suppressing turbulence through stratification effects. Similarly in hurricanes, the intensity of wind can be modulated by the stratification effects of water droplets that are injected into it by sea-sprays. To study such flows, we implemented models with dilute suspensions and performed DNS at moderate Reynolds numbers. These studies show that there are three governing parameters: Reynolds number, Richardson number and size of the dispersed phase particles. Parametric groupings that quantify turbulence suppression were identified for these flows. We have also looked into the interaction of wave induced turbulence and its ability to transport fine sediments. Here we will present the mechanism that is responsible for modulating the near wall vortical structures that can potentially explain the loss of turbulence in turbidity currents, fluctuations in the carry capacity of wave induced sediment transport and drag saturation of hurricane intensity winds due to sea-sprays.

[1]We acknowledge support from US NSF through grants OCE 1131016 and OISE 0968313

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Date submitted: 03 Aug 2013 Electronic form version 1.4