Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Natural particles in turbulent aquatic environments: when do they differ from fluid parcels? EVAN VARIANO, LAURA MAZZARO, MARGARET BYRON, RACHEL ALLEN, IAN TSE, University of California Berkeley — We explore if, and when, natural particles act differently than fluid parcels. We focusing on the case of aquatic environments with high-Reynolds number turbulence. The particles of interest in such environments are suspended sediment (often in the form of porous aggregates), plankton, and droplets (such as oil droplets). We use laboratory experiments (described below) and literature review to build a description of the cases in which these particles display kinematics different than that of fluid parcels which passively follow the flow. Specifically, we explore the effect of size, shape, and density on settling, diffusion, and clustering. The goal for each case is specify critical values at which behavior departs from that of fluid parcels. The laboratory experiments we use employ a simple 3D particle-tracking camera (based on the defocusing principle by Willert and Gharib [1992] and currently used in "V3V" velocimetry). With this, we study a variety of particles in laboratory flow. These data, and the analysis presented herein, is a precursor to studies conducted directly in estuarine environments. Willert, C. E. and Gharib, M. 1992 Three-dimensional particle imaging with a single camera. Experiments in Fluids, 12(6), 353-358.

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Date submitted: 02 Aug 2013 Electronic form version 1.4