Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Inertial particle distribution in high Reynolds number turbulence: wavelet-based scale-dependent statistics KEIGO MATSUDA, Center for Earth Information Science and Technology, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Yokohama, Japan, KAI SCHNEIDER, Institut de Mathématiques de Marseille (I2M), Aix-Marseille Université, CNRS and Centrale Marseille, Marseille, France, KATSUNORI YOSHIMATSU, Institute of Materials and Systems for Sustainability, Nagoya University, Nagoya, Japan — The nonlinear dynamics of inertial particles in high Reynolds number turbulence, and in particular particle clustering, are important fundamental processes in atmospheric science. Here we analyze particle data from three-dimensional direct numerical simulations of particle-laden homogeneous isotropic turbulence at high Reynolds number, up to $Re_\lambda = 531$ and with up to 10^9 particles. The influence of Reynolds and Stokes numbers on the multiscale clustering structure is investigated. To calculate scale-dependent statistics we apply orthogonal wavelet decomposition to the particle density fields. The intermittency of the density fields is quantified by computing scale-dependent flatness values. Negative values of the scale-dependent skewness allow to assess the spatial scale of void regions. We also show that the number of particles has some impact on high-order statistics, especially at small scales.

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Date submitted: 01 Aug 2019 Electronic form version 1.4