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MOST PROBABLE DISTRIBUTION, FLUCTUATION PDFS AND SCALE-DEPENDENCE OF PARTICLE SIZE DISTRIBUTIONS

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Abstract. Aerosols, clouds and precipitation can be generally considered as stochastic, multi-body, polydisperse systems affected by various nonlinear/random forces and mutual interactions. In such a complex system, particle size distributions tend to depend on the scale over which they are sampled/simulated because of various fluctuations. Previous studies also suggest that there exists a characteristic size distribution that is most probable, and that a saturation scale exists beyond which further increases in averaging scale do not change size distributions. It is anticipated that the most probable distribution, saturation scale and the details of scale dependence depend on the probability density distribution (PDF) of fluctuations, which is in turn determined by atmospheric turbulence. This work examines the relationship between turbulence and fluctuation PDF, the most probable distribution, and the scale-dependence.

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