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Impact of turbulence on cloud microphysics of water droplets population

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This work focuses on the turbulent shearless mixing structure of a cloud/clear air interface with physical parameters typical of cumulus warm clouds. We investigate the effect of turbulence on the droplet size distribution, in particular, we focus on the distribution's broadening and on the collision kernel. We performed numerical experiments via Direct Numerical Simulations(DNS) of turbulent interfaces subject to density stratification and vapor density fluctuation. Specifically, an initial supersaturation around 2 % and a dissipation rate of turbulent kinetic energy of 100 cm^2/s^3 are set in the DNSs. Taylor's Reynolds number is between 150 and 300. The total number of particles is around 5-10 millions, matching an initial liquid water content of 0.8 g/m^3. Through these experiments, we provide a measure of the collision kernel and compare it with literature models [Saffman & Turner,1955], which is then included in a drops Population Balance Equation model (PBE). The PBE includes both processes of drops growth by condensation/evaporation and aggregation.