Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Impact of turbulence on cloud microphysics of water droplets population MINA GOLSHAN, FEDERICO FRATERNALE, MARCO VANNI, DANIELA TORDELLA, Politecnico di Torino — This work focuses on the turbulent shear-less 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 distributions broaden- ing and on the collision kernel. We performed numerical experiments via Direct Numerical Simulations (DNS) of turbulent interfaces sub- ject to density stratification and vapor density fluctuation. Specifically, an initial super-saturation around 2lent kinetic energy of 100 cm^2/s^3 are set in the DNSs. The Taylors Reynolds number is between 150 and 300. The total number of par- ticles 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 kernel of collisional integral operators to be compared with literature models [Saffman Turner, 1955] and possibly used inside drops Population Balance Equations (PBE) that include both processes of drops growth by condensation/evaporation and aggregation.

Ruth Teferi
APS

Date submitted: 09 Aug 2019 Electronic form version 1.4