Título: Cloud-top evolution in the Gamma space from a modelling perspective

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Abstract:This study uses the Gamma phase-space to study warm cloud microphysics evolution, evaluate different microphysics parameterizations and propose an adjust in bulk approaches to improve the description of its Droplet Size Distribution (DSD). A bin parameterization is employed to reproduce the main features of observed cloud-top paths in the Gamma space. The simulated DSD evolution during the warm cloud life cycle is evaluated and compared with the HALO airplane measurements during the ACRIDICON-CHUVA campaign. In addition, the Gamma space is used to test DSD sensitivities to variations in some of the main parameters controlling the cloud evolution: the module of the vertical velocity and the aerosol size distribution, number concentration and hygroscopicity. Comparing the evolution of the DSD from different microphysics parametrizations it was possible to evaluate the weakness of bulk schemes compared to the bin parameterization. A new approach to estimate the Gamma parameters in bulk schemes is proposed and tested for the parameterization of Thompson et al. (2008).