



Supplement of

Further evidence for CCN aerosol concentrations determining the height of warm rain and ice initiation in convective clouds over the Amazon basin

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Figure S1. Three dimensional graphics for all flights. Colors indicate the air temperature.



Figure S2. Cloud drop size distribution at cloud base calculated from the CCP-CDP probe (mean - solid line, cumulative - dashed line) for flight AC19 performed over Atlantic Ocean, averaged for all the 176 s of cloud base passes. The solid line is the drop size distribution (cm⁻³); the broken line is the cumulative drop concentrations starting from largest diameter (cm⁻³).









Figures S3. a-h) Vertical velocities as a function of cloud depth (D_c) for all flights. The flight number is indicated on the top of figures. Each dot indicates 1Hz average concentration.



Figure S4. a) Cloud droplet concentrations measured with the CCP-CDP as a function of temperature for flight AC18. Each dot indicates 1Hz average concentration. The sample number in seconds (N) and the start time of the cloud profile are shown on the top of the panel; b) Cloud droplet effective radius (r_e) as a function of cloud depth (D_c) for flight AC18. The line indicates the r_e estimated for adiabatic growth (r_{ea}) from cloud base (dashed lines indicate the r_{ea} values considering the uncertainty of the estimate). The height of 0 °C is indicated by a black horizontal bar across the r_{ea} line. The estimated adiabatic number of droplets (N_a) at cloud base is shown on top of the figure.



a)





Figure S5. a) Mean droplet size distribution composite from the CCP-CDP and CCP-CIP probes (left panel). Similar for indicated cloud water content in the right panel at temperature(T) and altitude (H) above sea level, and the mean values for the total number of droplets (N_d), CWC, DWC, RWC and r_e. The color bars indicate the height of the height where rain starts to form. On the top of the panels are indicated the HALO flight number, date, time of flight (UTC), duration of cloud pass in seconds, HALO during the cloud pass. On the right side of the panels CCP-CIP images corresponding to the cloud pass are shown. B) Similar for the greatest height with measurements above cloud base.



Figure S6. a) Cloud droplet concentration measured with the CCP-CDP probe as a function of temperature for Flight AC08. Each dot indicates a 1Hz average concentration. The sample number (N) and the approximate time of the cloud profile are shown on the top of the panel; b) Similar for Flight AC12; c) Similar for Flight AC20.



Figure S7. a) Cloud droplet effective radius (r_e) as a function of cloud depth (D_c) for flight AC08. The line indicates the r_e estimated for adiabatic growth (r_{ea}) from cloud base (dashed lines indicate the r_{ea} values considering the uncertainty of the estimate). The height of 0 °C is indicated by a black horizontal bar across the r_{ea} line. The estimated adiabatic number of droplets (N_a) at cloud base is shown on top of the figure. b) similar for flight AC12 and c) similar for flight AC20.