Supplement of Atmos. Chem. Phys., 18, 14979–15001, 2018
https://doi.org/10.5194/acp-18-14979-2018-supplement

Atmospheric Chemistry and Physics
Open Access
EGU

Supplement of

Aircraft-based observations of isoprene-epoxydiol-derived secondary organic aerosol (IEPOX-SOA) in the tropical upper troposphere over the Amazon region

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Table S1. Overview of all flights with date, duration, maximum altitude that was reached and the meteorological situation. Furthermore, information on the flight strategy and comments to the C-ToF-AMS measurements.

Flight No.	Date in 2014	Duration	Altitude [km]	Meteorological characteristics	Flight strategy and comments
AC07	06.09.	7 h 35 min	13.9	Convection	Cloud profiling; no zero filter measurements
AC08	09.09.	5 h 30 min	13.8	Convection	Cloud profiling
AC09	11.09.	6 h 10 min	12.6	Convection	Cloud profiling; no zero filter measurements
AC10	12.09.	7 h 25 min	14.4	Convection, cirrus	Cirrus sampling; CVI measurements only
AC11	16.09.	7 h 25 min	12.9	Convection	In- & outflow measurements, cloud profiling
AC12	18.09.	6 h 15 min	13.8	Convection	Polluted cloud profiling
AC13	19.09.	6 h 30 min	12.9	Convection	Polluted cloud profiling
AC14	21.09.	7 h 15 min	15.2	Convection	No filter measurements
AC15	23.09.	7 h 20 min	13.8	Convection	Outflow sampling, cloud profiling
AC16	25.09.	6 h 50 min	13.2	Convection	In- & outflow measurements
AC17	27.09.	6 h 40 min	8.1	Convection	Cloud contrast measurements: clouds above forested and deforested areas
AC18	28.09.	6 h 50 min	14.4	Convection	Clean cloud profiling
AC19	30.09.	7 h 15 min	13.8	Convection, pyro-cumulus	Marine and biomass burning influence
AC20	01.10.	7 h 05 min	14.4	Convection	Cloud profiling

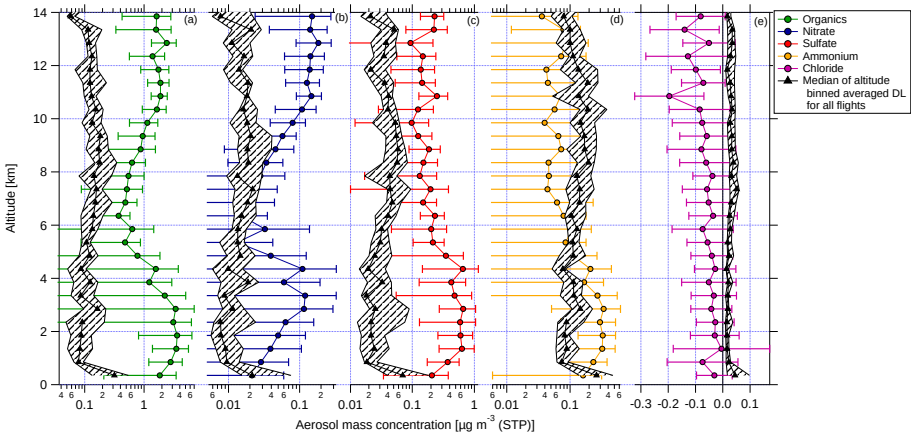

Figure S1. Vertical profile of averaged mass concentrations and median of altitude binned averaged detection limits for **(a)** organics, **(b)** nitrate, **(c)** sulfate, **(d)** ammonium and **(e)** chloride for all flights during the ACRIDICON-CHUVA campaign. Mass concentration axes are logarithmic, except for chloride. Chloride is not considered in the analysis, because measured data are below the detection limit. Detection limits were derived by averaging time-dependent detection limit values per altitude bin for each flight. The median of the altitude binned averaged detection limits for all flights is given in this plot.

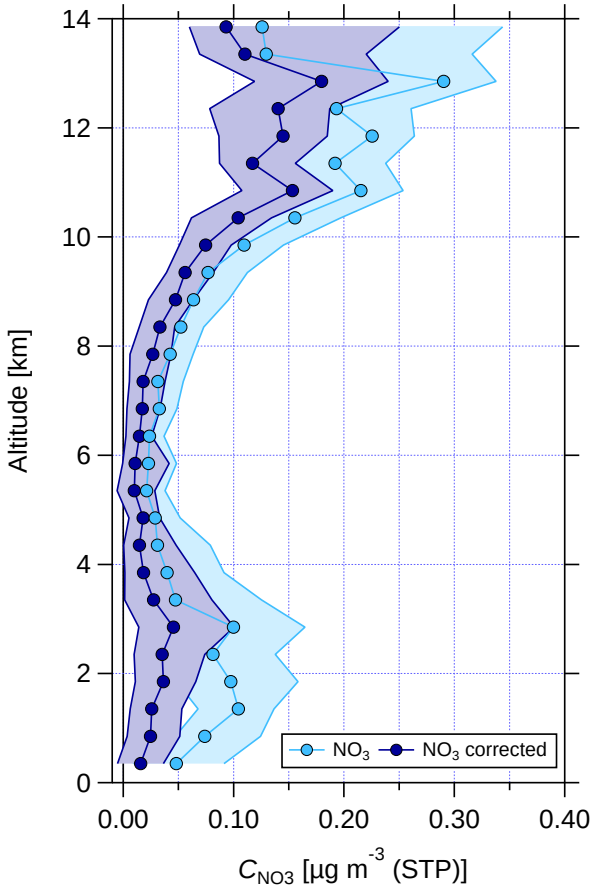

Figure S2. Vertical profile of median nitrate mass concentrations and interquartile ranges before (light blue) and after (dark blue) corrections according to Fry et al. (2018) and supplement to Fry et al. (2018).

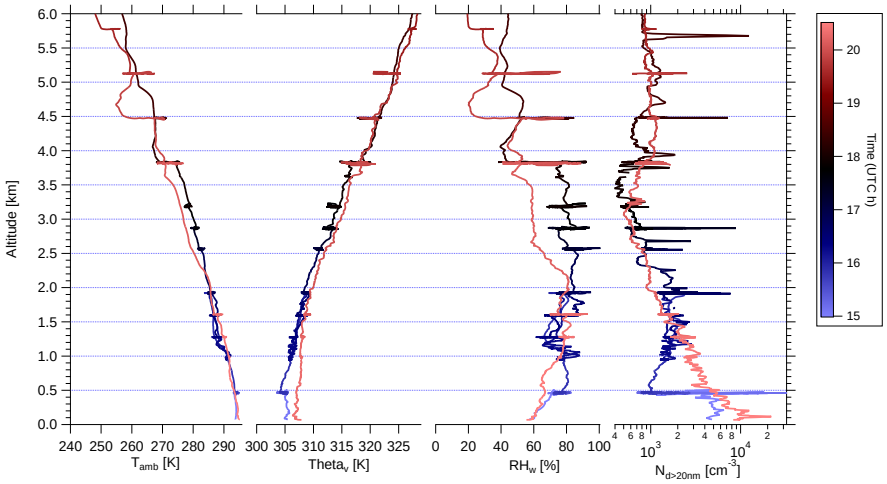

Figure S3. Vertical profile of **(a)** ambient temperature (T_{amb}), **(b)** virtual potential temperature (Θ_{v}), **(c)** relative humidity with respect to water ($\mathrm{RH_w}$), and **(d)** aerosol number concentration for particle diameters larger than 20 nm ($N_{\mathrm{d>20nm}}$) for flight AC08 performed on 09 September 2014. The boundary layer height was determined by evaluating these parameters. The daily evolution is visible in the data with BL height of ≈ 1 km before noon (local time) and increasing BL height up to ≈ 2 km in the afternoon (local time). Time is given in UTC hours. The discrepancy to local time is - 4 hours.

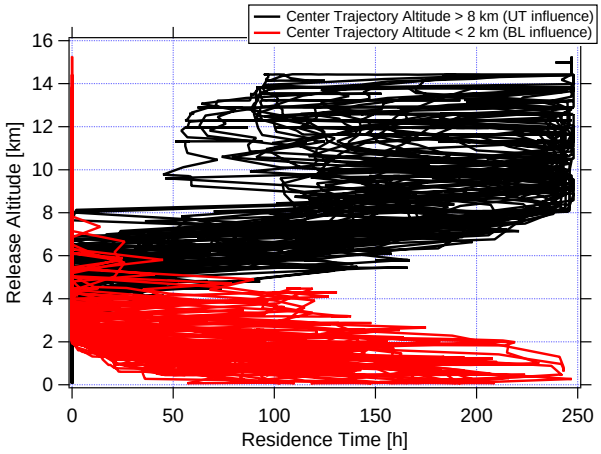

Figure S4. Release altitude of the trajectories versus the residence time, i.e. the time that the trajectories spend in the boundary layer (BL, red curve) and in the upper troposphere (UT, black curve). There is only little interaction and almost no overlap between both curves. This leads to the conclusion that convection cannot be resolved with the FLEXPART model.

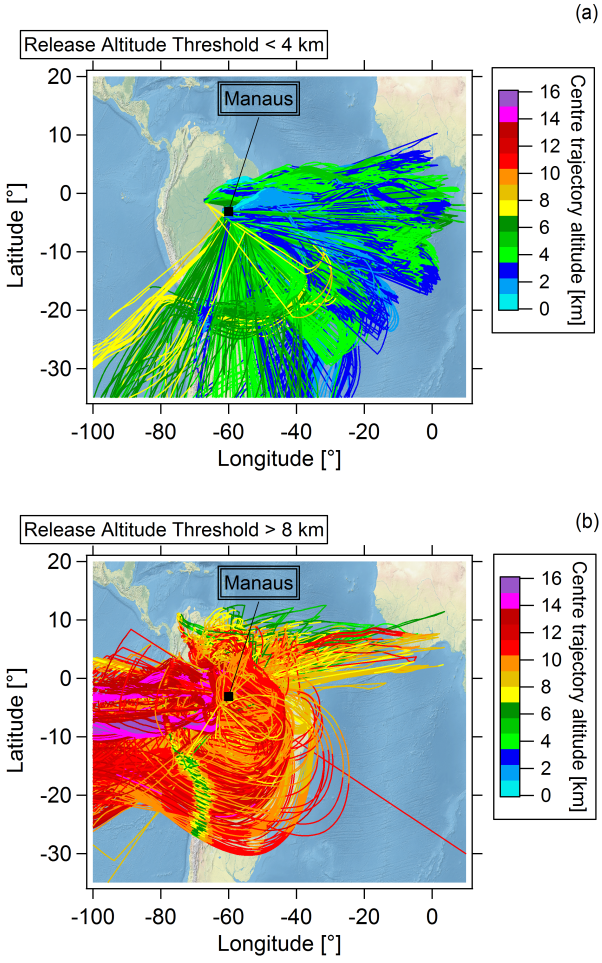

Figure S5. Maps with trajectories that are released below 4 km (lower troposphere, LT, Panel **(a)**) and above 8 km (upper troposphere, UT, Panel **(b)**). The colour code refers to the altitude of the centre trajectories.

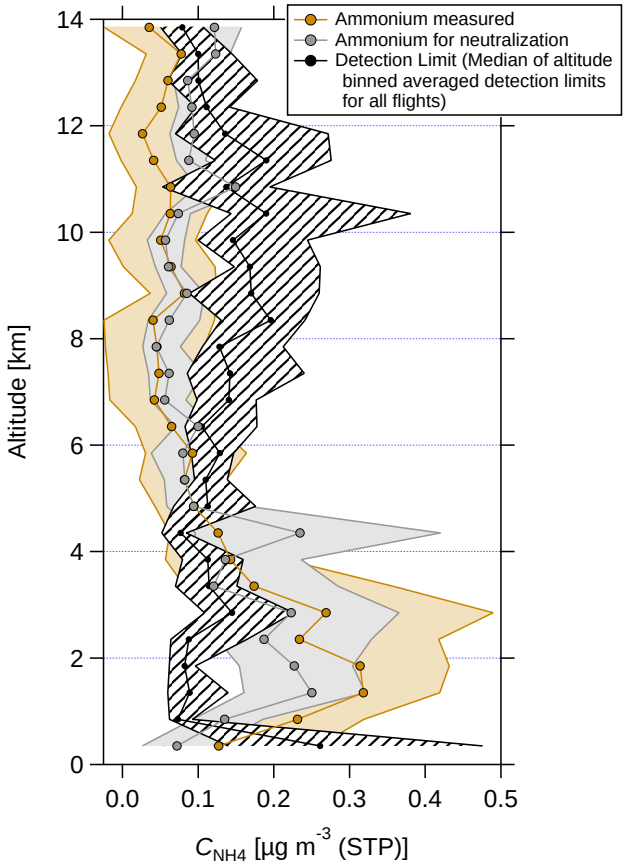

Figure S6. Vertical profile of measured ammonium (yellow), for neutralization needed ammonium (grey), and the ammonium detection limit (black). Aerosol in the LT and UT was mainly neutralized, although there is a tendency of acidic aerosol in the UT. Please note, that differences between measured and calculated ammonium could derive from uncertainties due to cross-relations between ammonium and water fragmentation table entries. Detection limit was derived by averaging time-dependent detection limit values per altitude bin for each flight. The median of the altitude binned averaged detection limits for all flights is given in this plot.