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Supplement of

African volcanic emissions influencing atmospheric aerosols over the Amazon rain forest

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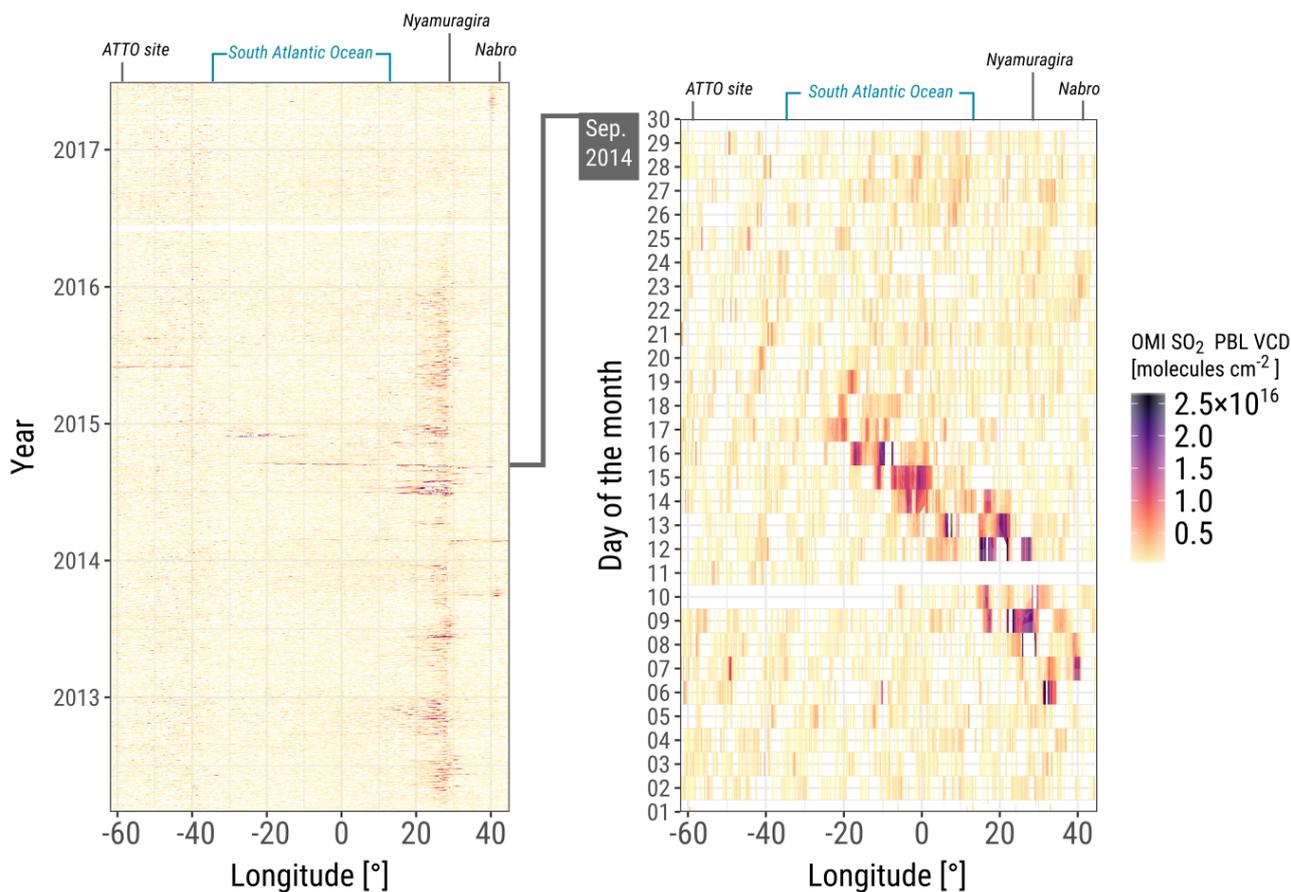


Figure S1. Planetary boundary layer (PBL) OMI SO₂ VCD Hovmöller plots corresponding to a latitude daily average (11° S to 17° N) from March 2012 to July 2017 (left), and September 2014 (right). The VCD color scale was truncated at 2.5×10^{16} molecules cm⁻² to improve visualization. The longitude location of two active degassing volcanoes in Africa, Nyamuragira and Nabro, the ATTO site, and the approximate west to east extension of the South Atlantic Ocean are indicated at the top of the plots. **Note:** The absolute SO₂ VCD values provided here might be overestimated given that they are calculated for PBL heights and the plume was emitted above 3 km a.m.s.l.

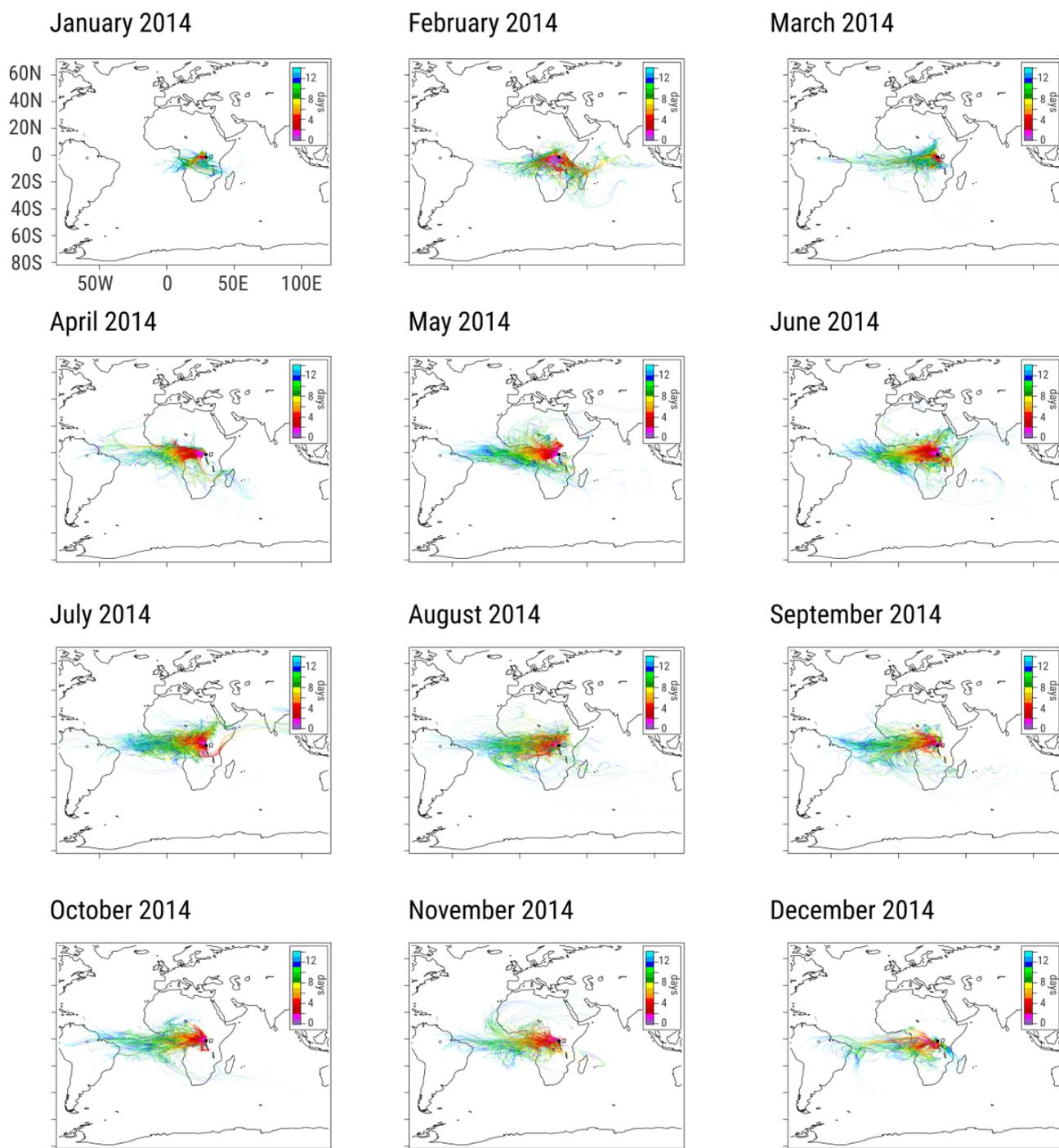


Figure S2. Calculated HYSPLIT 14-day forward trajectories corresponding to each month of 2014. The color code shows the amount of days since the trajectory start, from zero to 14 days. The trajectories were initiated at the Nyamuragira volcano location at an altitude of 3200 m a.m.s.l.

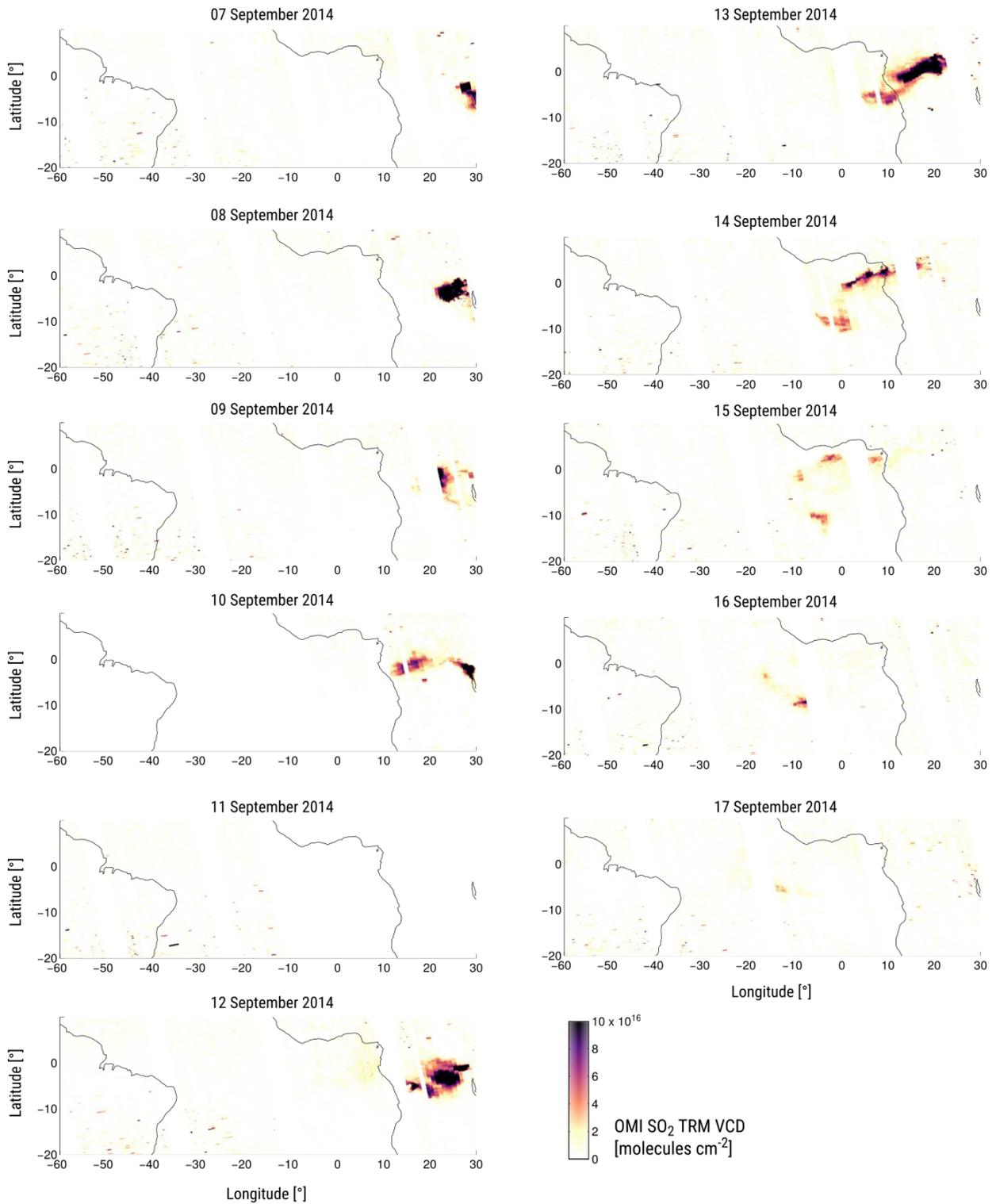


Figure S3. Maps of gridded OMI SO₂ TRM VCD observations corresponding to 7 to 17 September 2014 as indicated on top of each figure.

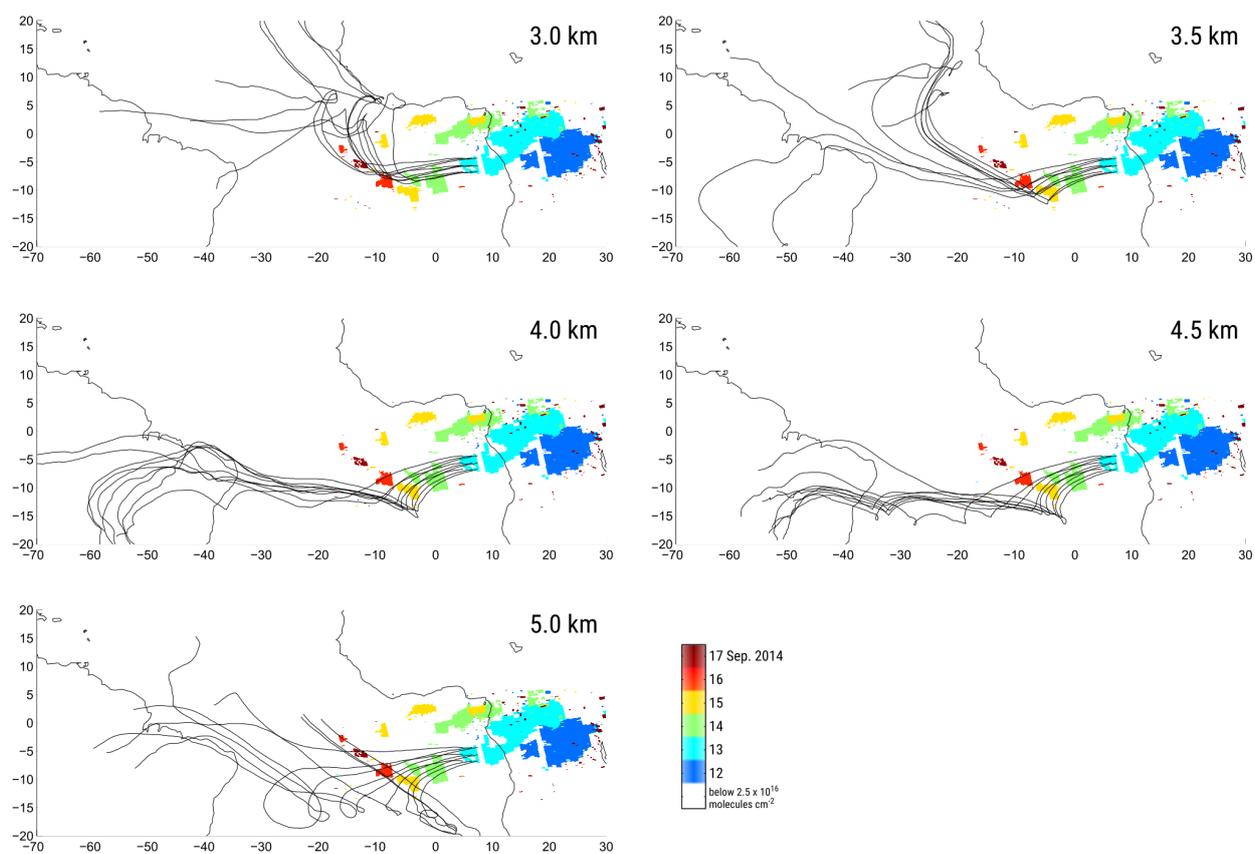


Figure S4. 15-day forward trajectories (black lines) started at different heights above mean sea level as indicated in the upper right corner of each figure. The background shows a map of SO₂ plumes with VCD > 2.5 × 10¹⁶ molecules cm⁻² color-coded by date of observation.

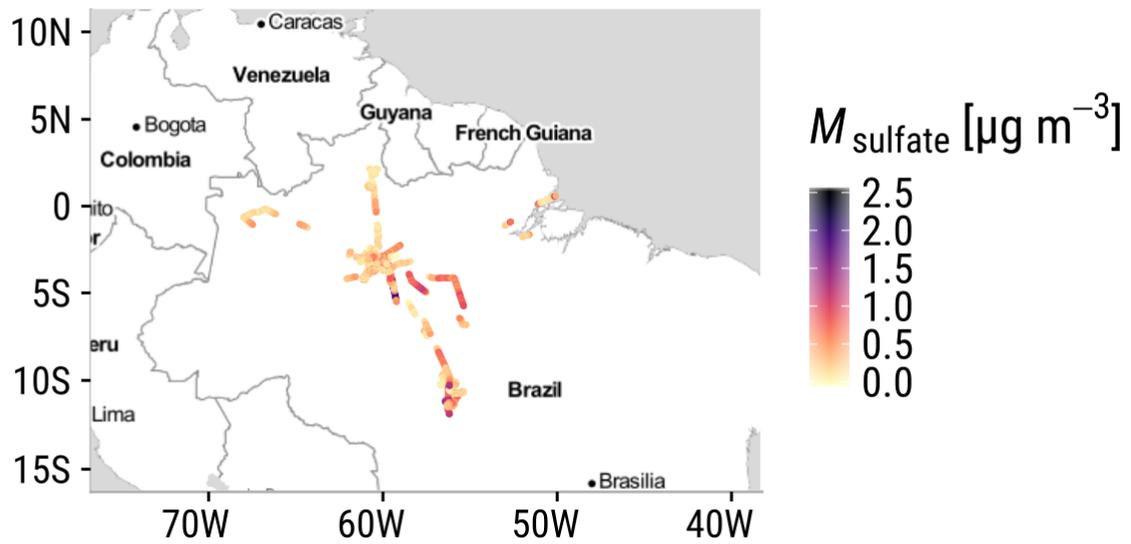


Figure S5. Map of M_{sulfate} observations between 3 and 6 km height during the ACRIDICON-CHUVA campaign over the Amazon Basin. Data from different flights from 6 September to 1 October 2014 are included.

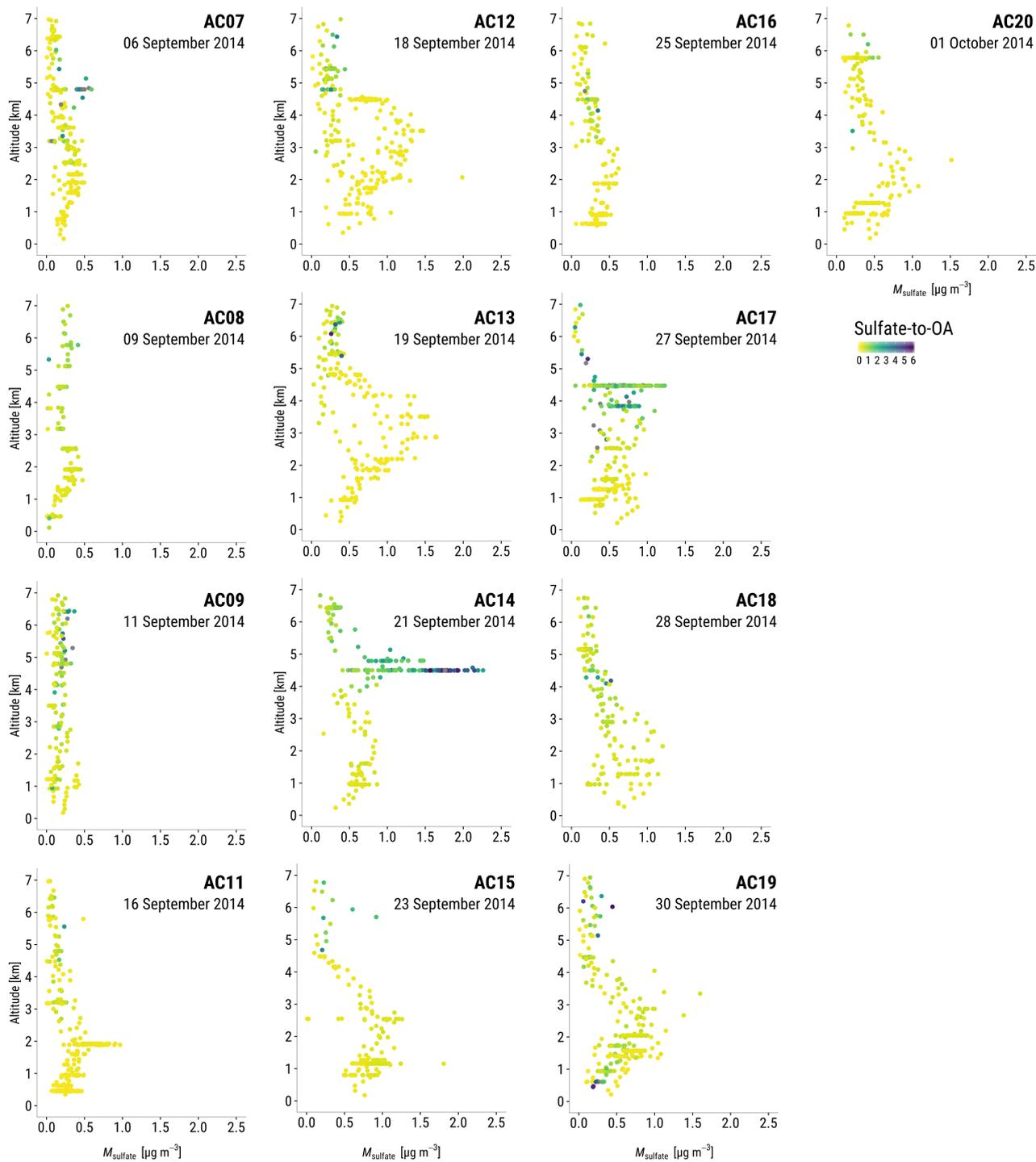


Figure S6. Sulfate mass concentration vertical profiles with color coded sulfate-to-OA mass ratios observed during different ACRIDICON-CHUVA flights over the Amazon Basin.

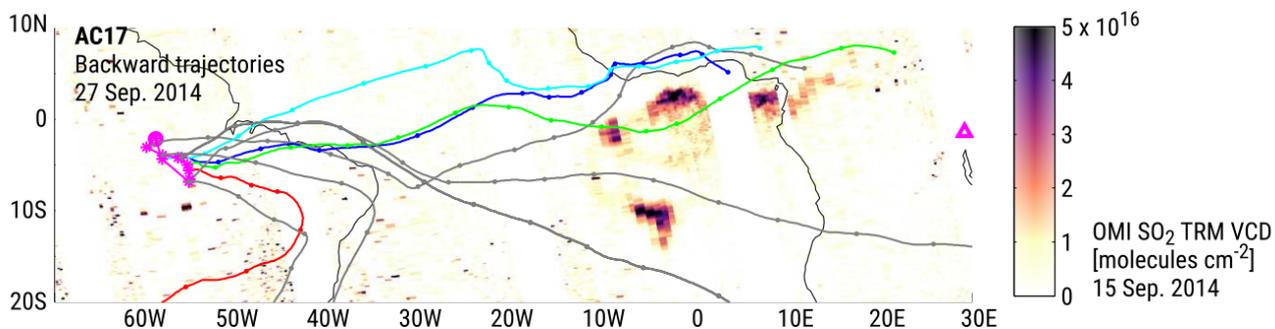


Figure S7. Map of gridded OMI SO₂ VCD, observed on 15 September 2014. 15-day backward trajectories were started at several points along the ACRIDICON-CHUVA flight track AC17 (27 September 2014) at flight altitude. Trajectories starting at points where sulfate-to-OA > 1 are shown in color (see Table S2 for details), all other trajectories are shown in gray; dots are placed at 24-hour intervals. The path of flight AC14 is marked in pink, with stars denoting the starting points of the backward trajectories. The locations of the ATTO site and Nyamuragira are marked with a pink circle and triangle, respectively.

Table S1. List of ACRIDICON-CHUVA campaign flights and their dates. More details can be found on (Wendisch et al., 2016).

Flight	Date
AC07	6 Sep 2014
AC08	9 Sep 2014
AC09	11 Sep 2014
AC11	16 Sep 2014
AC12	18 Sep 2014
AC13	19 Sep 2014
AC14	21 Sep 2014
AC15	23 Sep 2014
AC16	25 Sep 2014
AC17	27 Sep 2014
AC18	28 Sep 2014
AC19	30 Sep 2014
AC20	01 Oct 2014

Reference

Wendisch, M., Pöschl, U., Andreae, M. O., Machado, L. A. T., Albrecht, R., Schlager, H., Rosenfeld, D., Martin, S. T., Abdelmonem, A., Afchine, A., Araújo, A. C., Artaxo, P., Aufmhoff, H., Barbosa, H. M. J., Borrmann, S., Braga, R., Buchholz, B., Cecchini, M. A., Costa, A., Curtius, J., Dollner, M., Dorf, M., Dreiling, V., Ebert, V., Ehrlich, A., Ewald, F., Fisch, G., Fix, A., Frank, F., Fütterer, D., Heckl, C., Heidelberg, F., Hüneke, T., Jäkel, E., Järvinen, E., Jurkat, T., Kanter, S., Kästner, U., Kenntner, M., Kesselmeier, J., Klimach, T., Knecht, M., Kohl, R., Kölling, T., Krämer, M., Krüger, M., Krisna, T. C., Lavric, J. V., Longo, K., Mahnke, C., Manzi, A. O., Mayer, B., Mertes, S., Minikin, A., Molleker, S., Münch, S., Nillius, B., Pfeilsticker, K., Pöhlker, C., Roiger, A., Rose, D., Rosenow, D., Sauer, D., Schnaiter, M., Schneider, J., Schulz, C., de Souza, R. A. F., Spanu, A., Stock, P., Vila, D., Voigt, C., Walser, A., Walter, D., Weigel, R., Weinzierl, B., Werner, F., Yamasoe, M. A., Ziereis, H., Zinner, T. and Zöger, M.: ACRIDICON–CHUVA Campaign: Studying Tropical Deep Convective Clouds and Precipitation over Amazonia Using the New German Research Aircraft HALO, *Bull. Am. Meteorol. Soc.*, 97(10), 1885–1908, doi:10.1175/BAMS-D-14-00255.1, 2016.

Table S2. Measurements at points along the track of flight AC17 (27 September 2014) selected as starting points for backward trajectories presented in Fig. S7. Data points with sulfate-to-OA > 1 are emphasized by bold font.

Time (UTC)	Latitude [°N]	Longitude [°E]	Altitude [km]	M_{sulfate} [$\mu\text{g m}^{-3}$]	Sulfate-to-OA	Color in Fig. S7
14:06	-3.04	-60.00	0.93	0.2	0.1	Gray
14:33	-3.90	-58.24	8.07	0.2	0.2	Gray
15:02	-4.20	-56.22	0.94	0.3	0.1	Gray
16:14	-4.22	-56.60	3.84	1.6	1.5	Blue
16:37	-5.02	-55.58	4.48	1.5	11.5	Green
16:45	-5.61	-55.38	4.47	1.5	6.8	Red
16:59	-6.55	-55.29	1.25	0.6	0.1	Gray
18:09	-6.83	-55.41	4.48	0.6	0.9	Gray
18:59	-4.35	-58.31	4.47	1.5	1.7	Light blue
19:54	-2.06	-59.06	1.57	0.8	0.3	Gray