

*Supplement to*

## **African volcanic emissions influencing atmospheric aerosol particles over the Amazon rain forest**

Jorge Saturno<sup>1</sup>, Florian Ditas<sup>1</sup>, Marloes Penning de Vries<sup>1</sup>, Bruna A. Holanda<sup>1</sup>, Mira L. Pöhlker<sup>1</sup>, Samara Carbone<sup>2,3</sup>, David Walter<sup>1</sup>, Nicole Bobrowski<sup>4,1</sup>, Joel Brito<sup>2,5</sup>, Xuguang Chi<sup>6</sup>, Alexandra Gutmann<sup>7</sup>, Isabella Hrabe de Angelis<sup>1</sup>, Luiz A. T. Machado<sup>8</sup>, Daniel Moran-Zuloaga<sup>1</sup>, Julian Rüdiger<sup>9</sup>, Johannes Schneider<sup>1</sup>, Christiane Schulz<sup>1</sup>, Qiaoqiao Wang<sup>10</sup>, Manfred Wendisch<sup>11</sup>, Paulo Artaxo<sup>2</sup>, Thomas Wagner<sup>1</sup>, Ulrich Pöschl<sup>1</sup>, Meinrat O. Andreae<sup>1,12</sup>, and Christopher Pöhlker<sup>1</sup>

<sup>1</sup>Biogeochemistry, Multiphase Chemistry, and Particle Chemistry Departments, and Satellite Research Group, Max Planck Institute for Chemistry, P. O. Box 3060, 55020 Mainz, Germany

<sup>2</sup>Department of Applied Physics, Institute of Physics, University of São Paulo (USP), Rua do Matão, Travessa R, 187, CEP 05508-900, São Paulo, SP, Brazil

<sup>3</sup>Institute of Agrarian Sciences, Federal University of Uberlândia, Uberlândia, Minas Gerais, Brazil

<sup>4</sup>Institute for Environmental Physics, University of Heidelberg, Heidelberg, Germany

<sup>5</sup>Laboratory for Meteorological Physics, Université Clermont Auvergne, Clermont-Ferrand, France

<sup>6</sup>Institute for Climate and Global Change Research & School of Atmospheric Sciences, Nanjing University, Nanjing, 210093, China

<sup>7</sup>Department of Chemistry, Johannes Gutenberg University, Mainz, Germany

<sup>8</sup>Centro de Previsão de Tempo e Estudos Climáticos, Instituto Nacional de Pesquisas Espaciais, Cachoeira Paulista, Brazil

<sup>9</sup>Atmospheric Chemistry, University of Bayreuth, Dr.-Hans-Frisch-Straße 1–3, 95448 Bayreuth, Germany

<sup>10</sup>Institute for Environmental and Climate Research, Jinan University, Guangzhou, 511443, China

<sup>11</sup>Leipziger Institut für Meteorologie (LIM), Universität Leipzig, Stephanstr. 3, 04103 Leipzig, Germany

<sup>12</sup>Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA 92098, USA

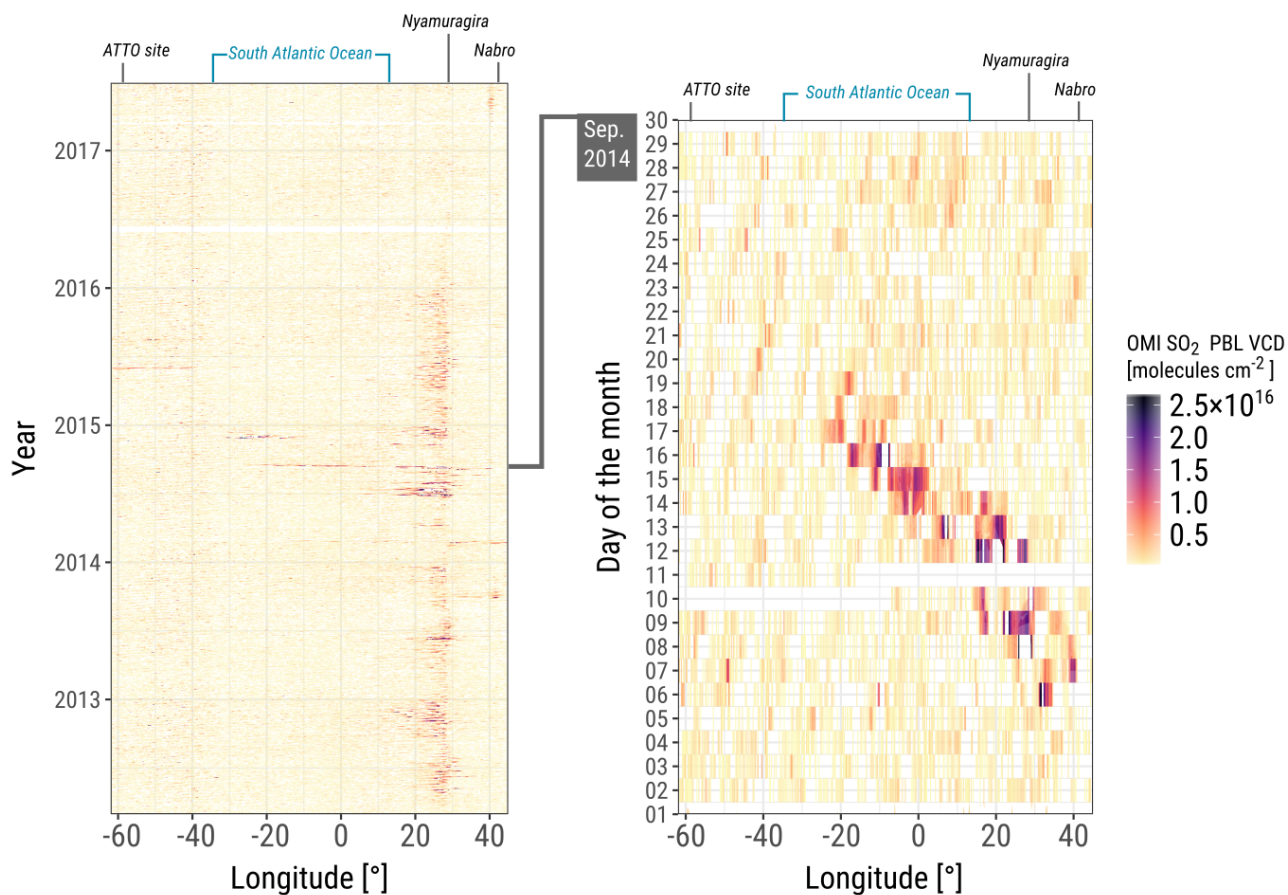
*Correspondence to:* Jorge Saturno (j.saturno@mpic.de) and Christopher Pöhlker (c.pohlker@mpic.de)

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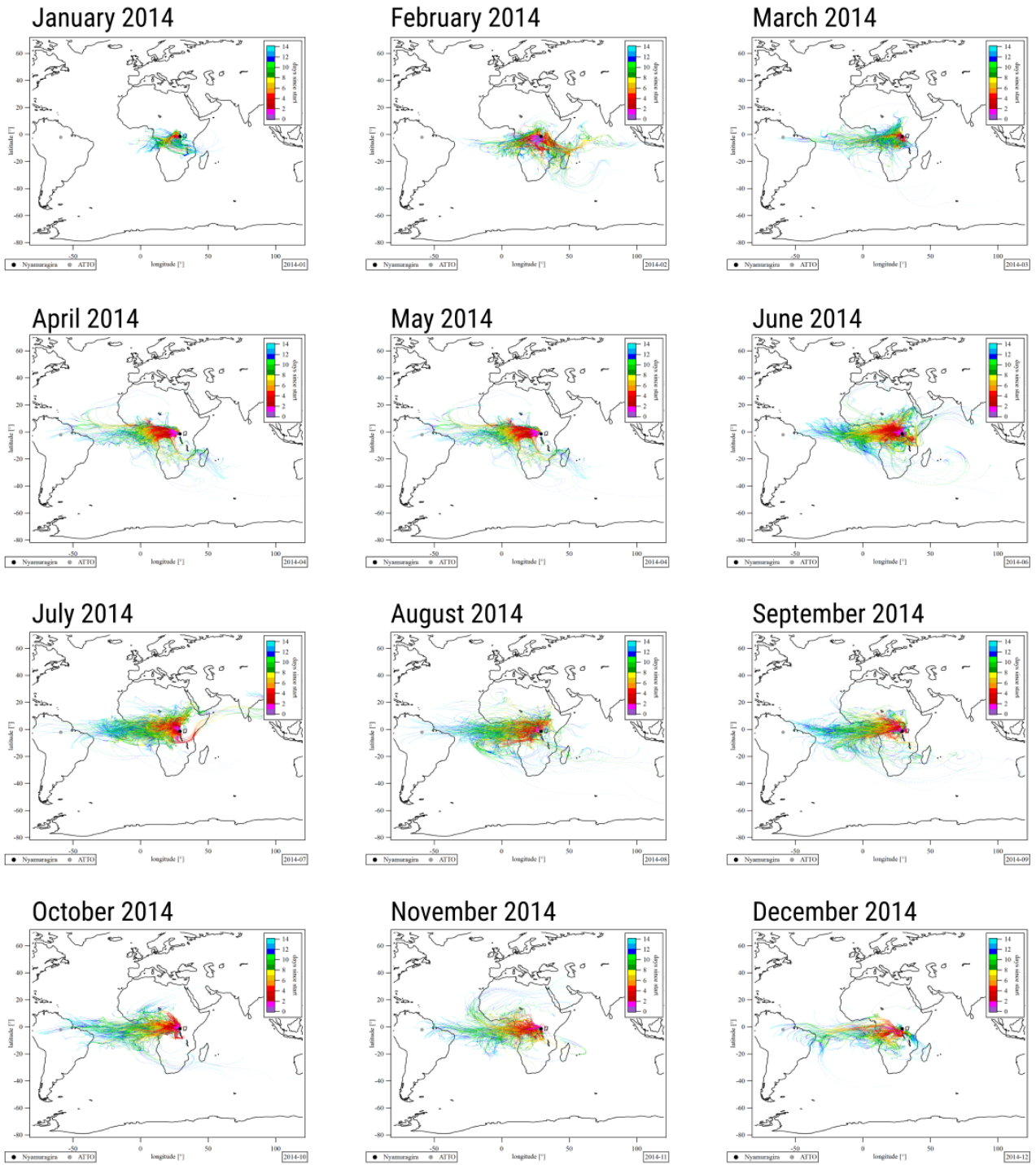
Figures S1 to S6.

Tables S1 to S2.

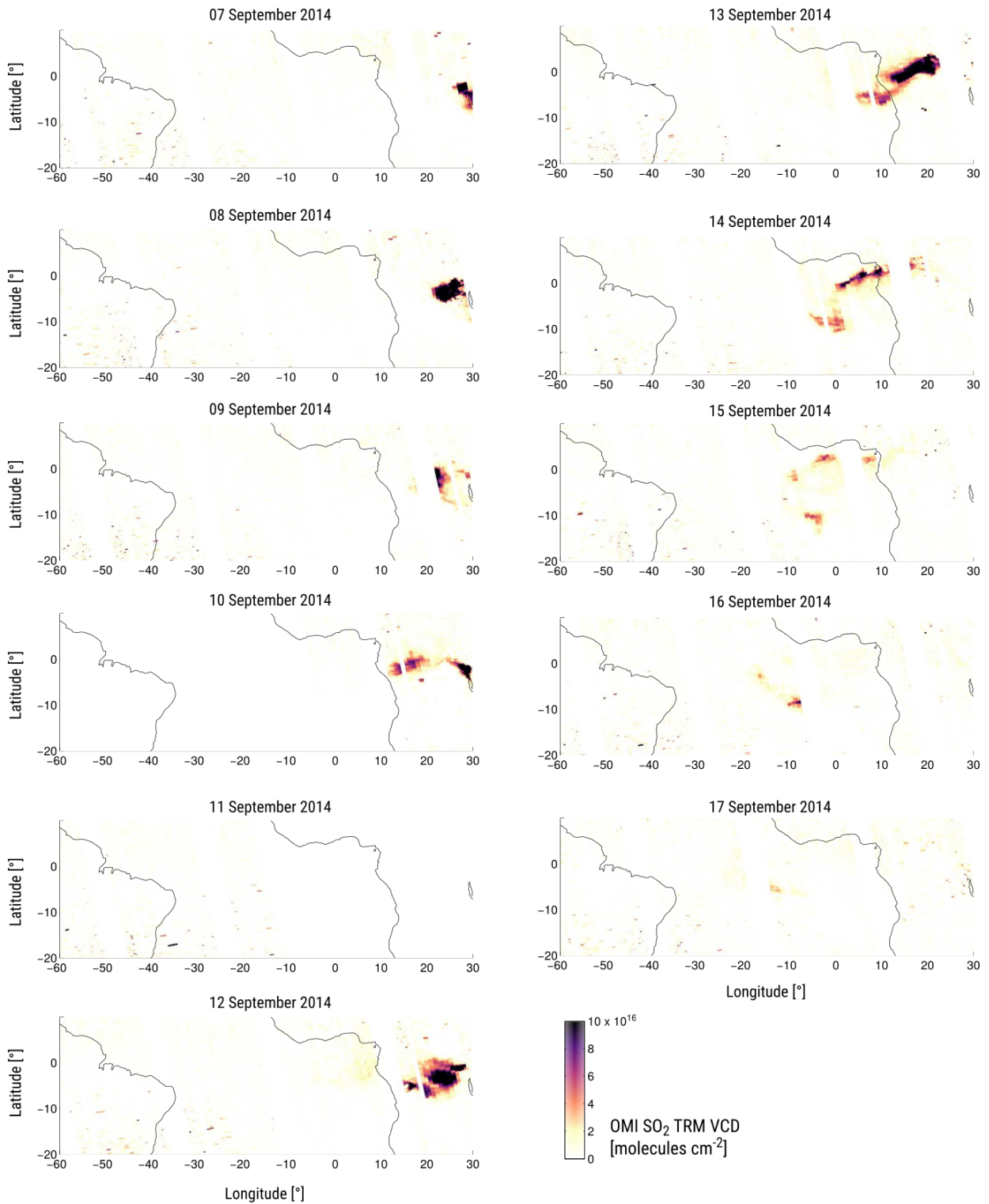
## Supplementary information



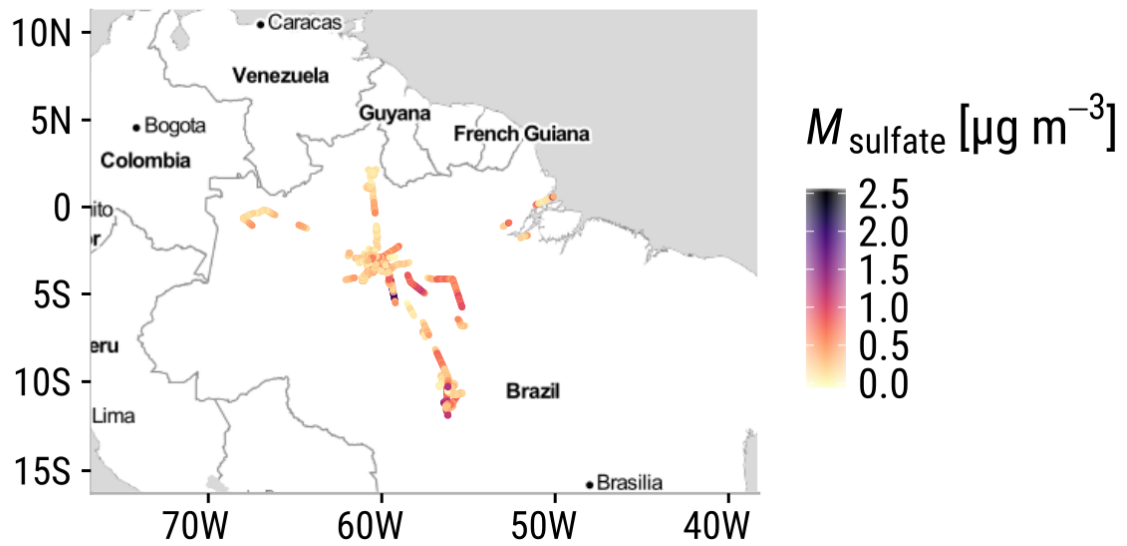
**Figure S1.** Planetary boundary layer (PBL) OMI SO<sub>2</sub> VCD Hovmöller plots corresponding to a latitude daily average (11° S to 17° N) from March 2012 to July 2017 (left), and September 2014 (right). The VCD color scale was truncated at  $2.5 \times 10^{16}$  molecules cm<sup>-2</sup> to improve 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 SO<sub>2</sub> 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.



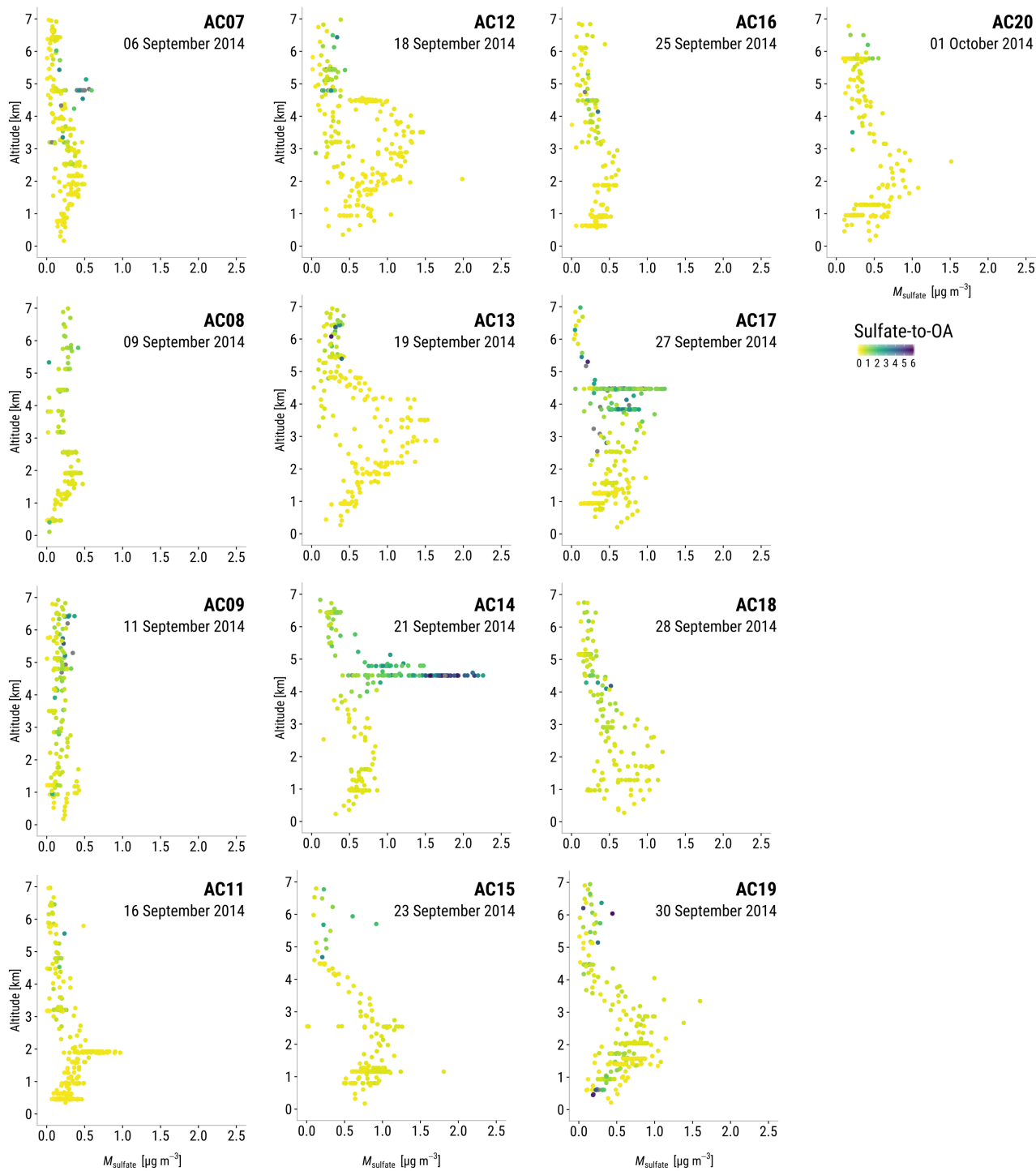
**Figure S2.** Calculated HYSPLIT 14-day forward trajectories corresponding to each month of 2014. The starting location and height are the Nyamuragira volcano and 3200 m a.m.s.l., respectively.



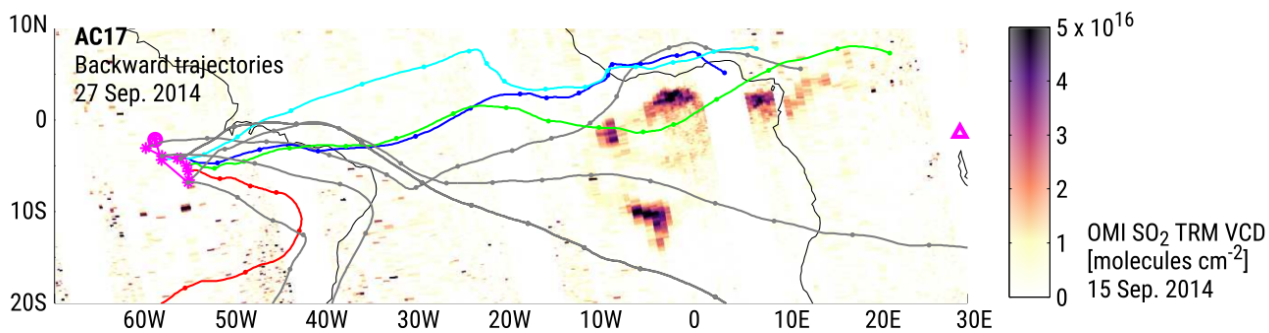
**Figure S3.** Maps of gridded OMI SO<sub>2</sub> TRM VCD observations corresponding to 7 to 17 September 2014.



**Figure S4.** Map of  $M_{\text{sulfate}}$  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 S5.** Sulfate mass concentration vertical profiles with color coded sulfate-to-OA mass ratios observed during different ACRIDICON-CHUVA flights over the Amazon Basin.



**Figure S6.** Map of gridded OMI SO<sub>2</sub> VCD, observed on 15 September 2014. 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.

<b>Flight</b>	<b>Date</b>
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



**Table S2.** Measurements at points along the track of flight AC17 (27 September 2014) selected as starting points for backward trajectories presented in Fig. S6. Data points with sulfate-to-OA > 1 are emphasized by bold font.

Time (UTC)	Latitude [°N]	Longitude [°E]	Altitude [km]	$M_{\text{sulfate}}$ [ $\mu\text{g m}^{-3}$ ]	Sulfate-to-OA	Color in Fig. S6
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
<b>16:14</b>	<b>-4.22</b>	<b>-56.60</b>	<b>3.84</b>	<b>1.6</b>	<b>1.5</b>	<b>Blue</b>
<b>16:37</b>	<b>-5.02</b>	<b>-55.58</b>	<b>4.48</b>	<b>1.5</b>	<b>11.5</b>	<b>Green</b>
<b>16:45</b>	<b>-5.61</b>	<b>-55.38</b>	<b>4.47</b>	<b>1.5</b>	<b>6.8</b>	<b>Red</b>
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
<b>18:59</b>	<b>-4.35</b>	<b>-58.31</b>	<b>4.47</b>	<b>1.5</b>	<b>1.7</b>	<b>Light blue</b>
19:54	-2.06	-59.06	1.57	0.8	0.3	Gray