Introduction

In this document, supplementary information is shown: Comparisons of PAN between GLO-RIA, CAMS reanalysis, and CAMS forecast (Figs. S1-S5), and comparisons of IASI total columns and CAMS forecast surface VMRs.
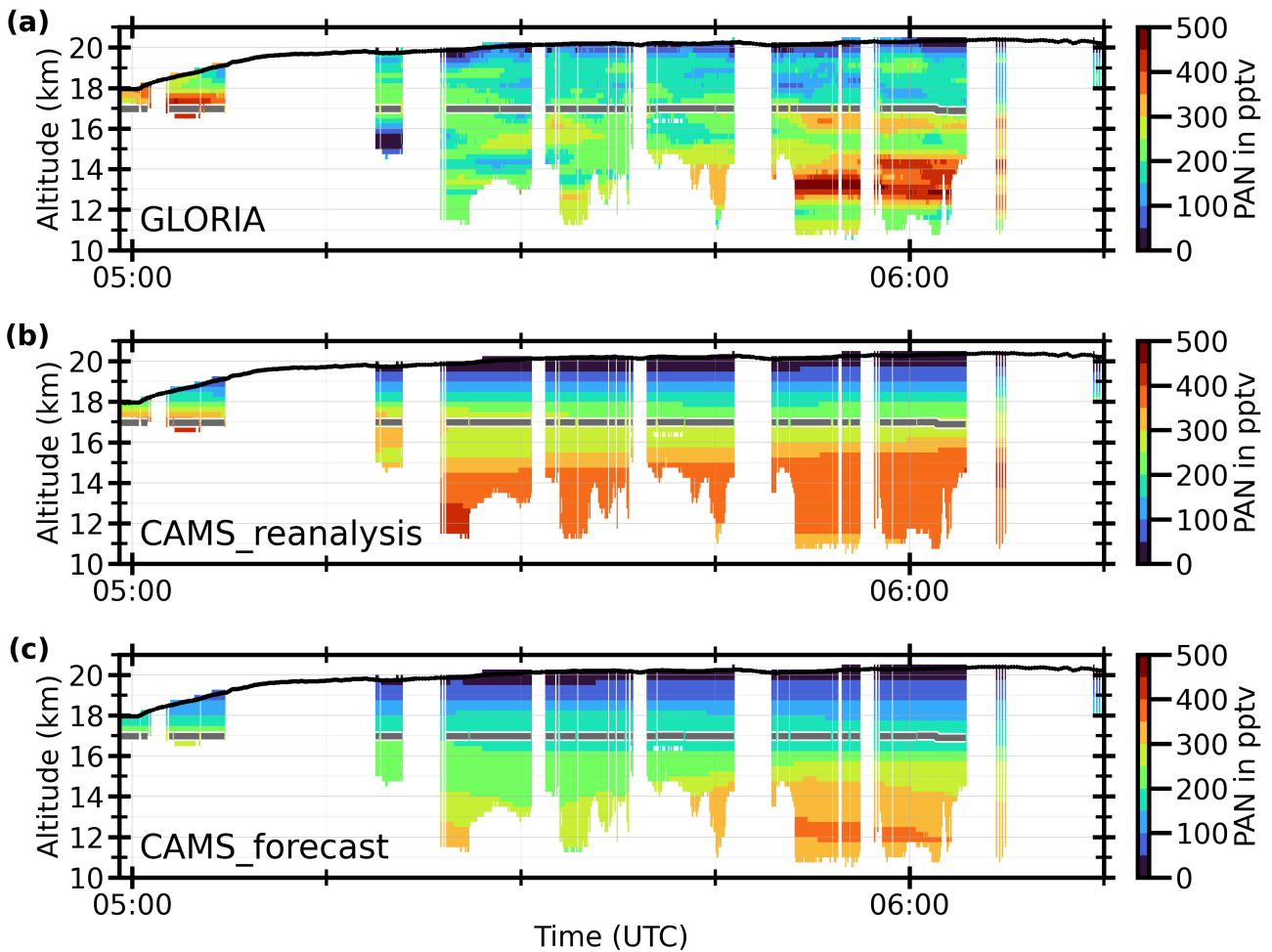

Figure S1: StratoClim flight on 29 July 2017: GLORIA time/altitude cross sections of (a) PAN together with (b) CAMS reanalysis and (c) CAMS forecast simulation results, interpolated onto GLORIA geolocations. GLORIA data is horizontally averaged to match lower horizontal resolutions of CAMS forecast of ≈44 km. The black line indicates flight altitudes, the gray line shows the ECMWF analysis 380 K potential temperature as indication of the tropopause location in the Asian Monsoon. Blank spaces indicate regions of high cloud tops, calibration measurements, or aircraft movements.
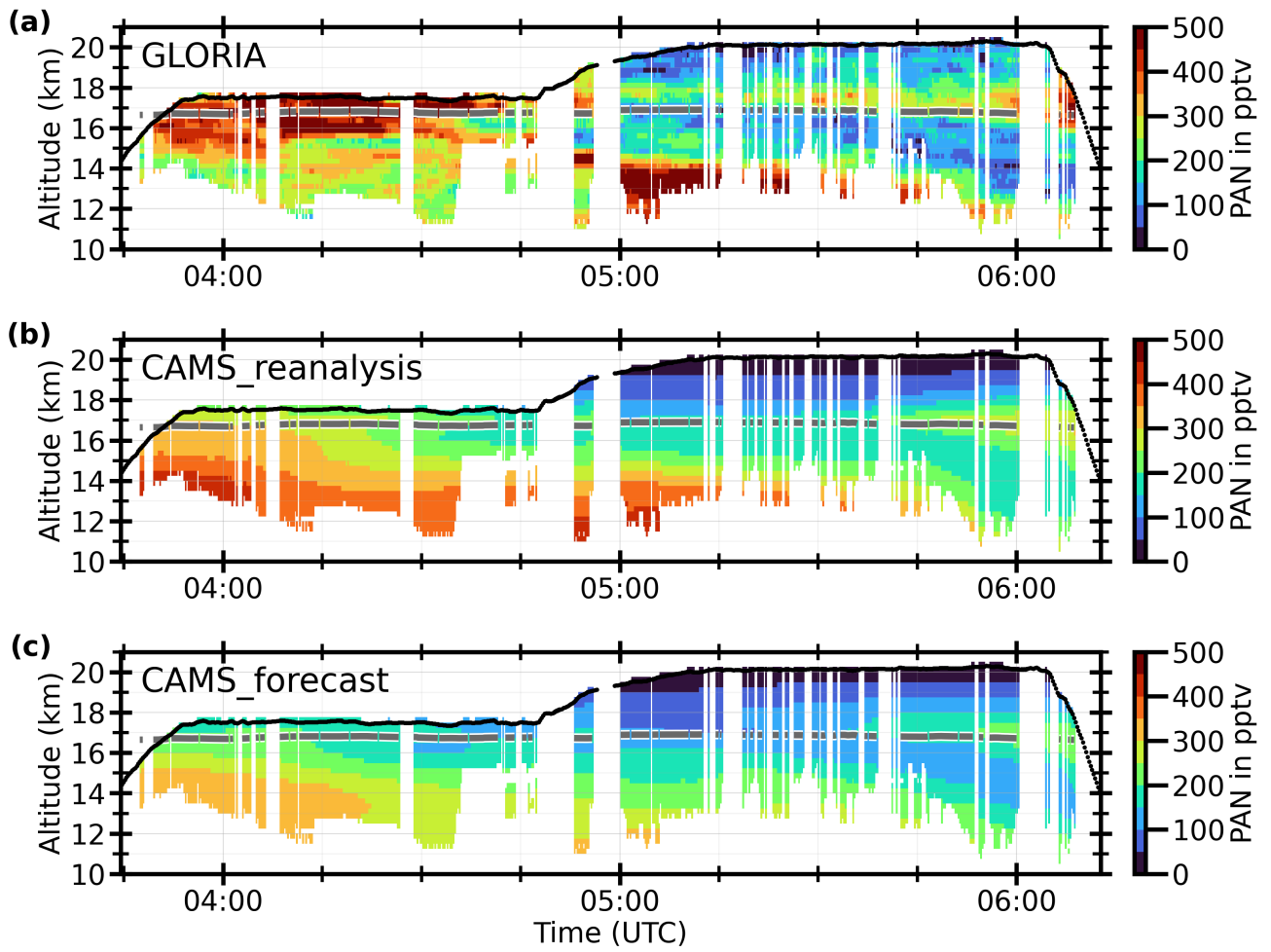
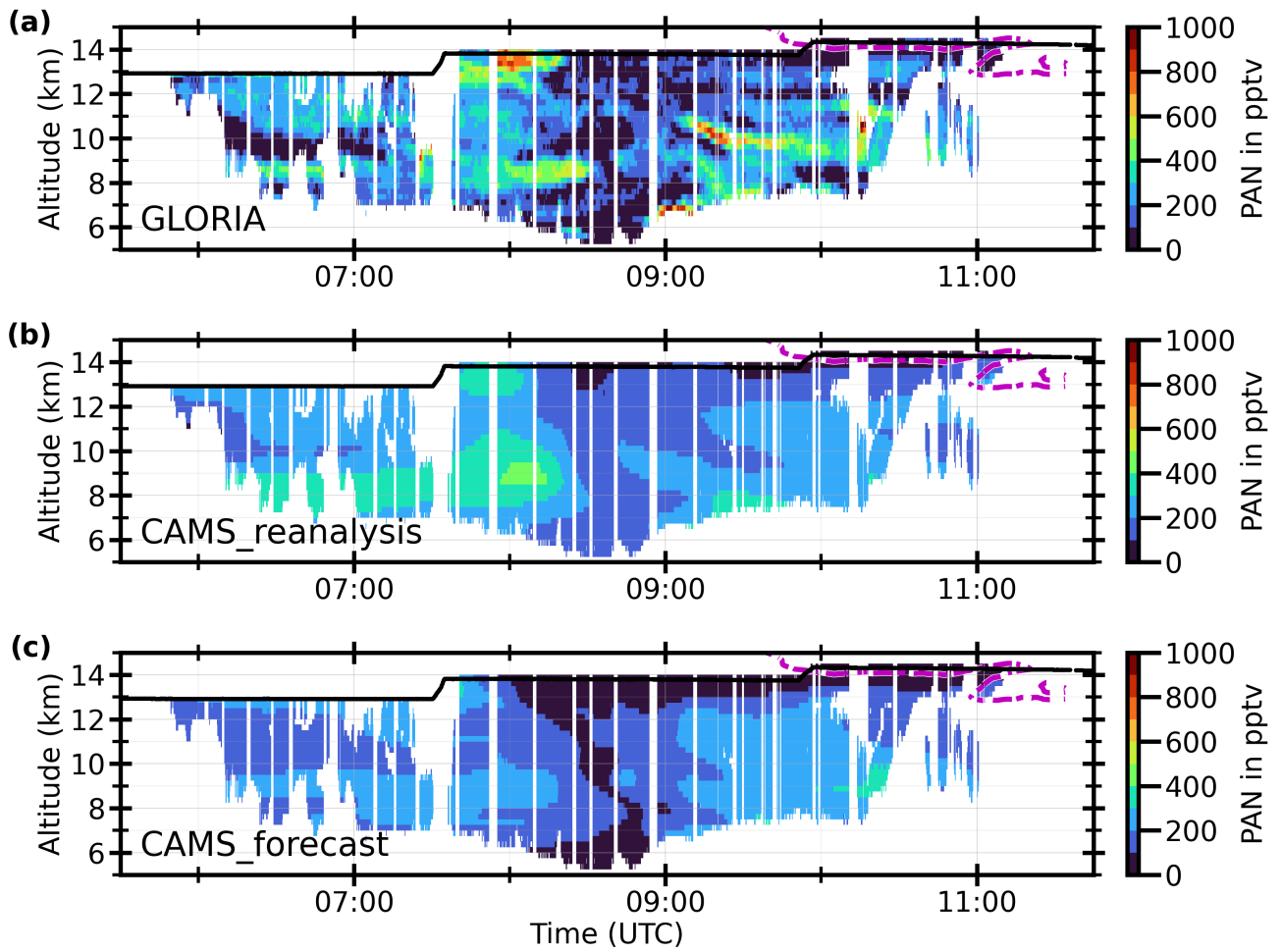Figure S2: Same as Fig. S1, but for StratoClim flight on 31 July 2017.

Figure S3: Same as Fig. S1, but for SouthTRAC flight on 8 September 2019. Note that color bars have changed compared to previous plots.
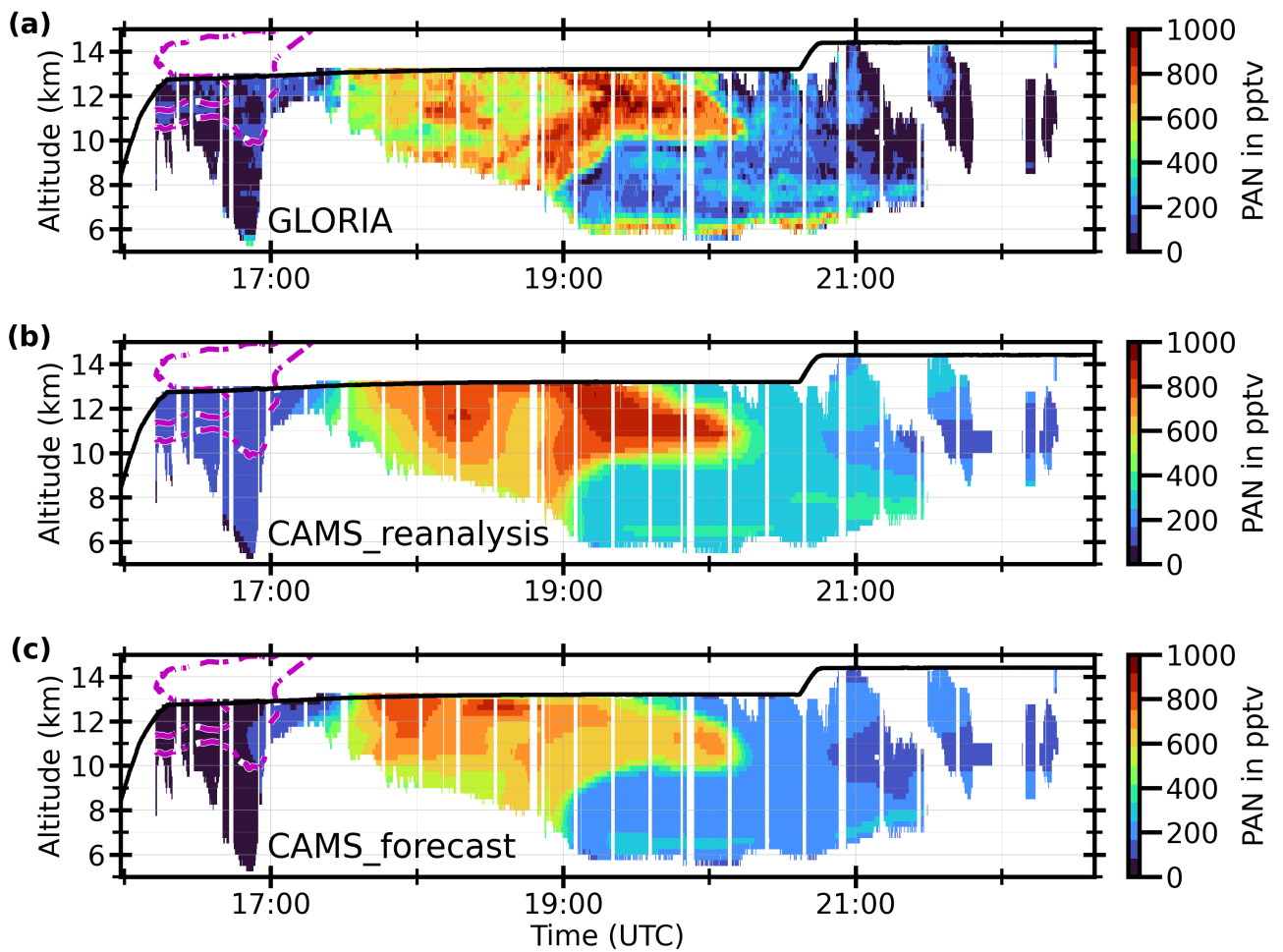
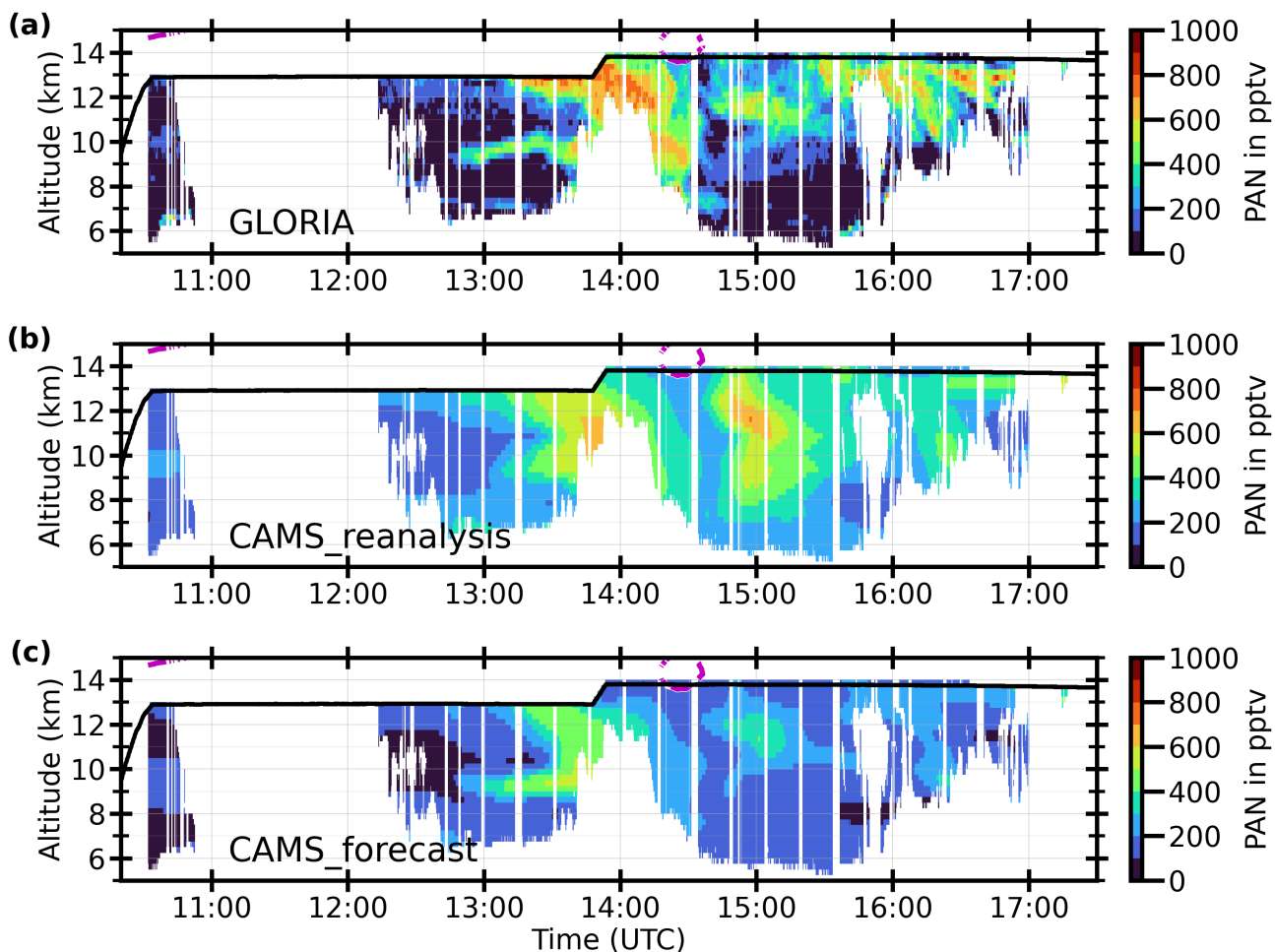Figure S4: Same as Fig. S1, but for SouthTRAC flight on 7 October 2019.

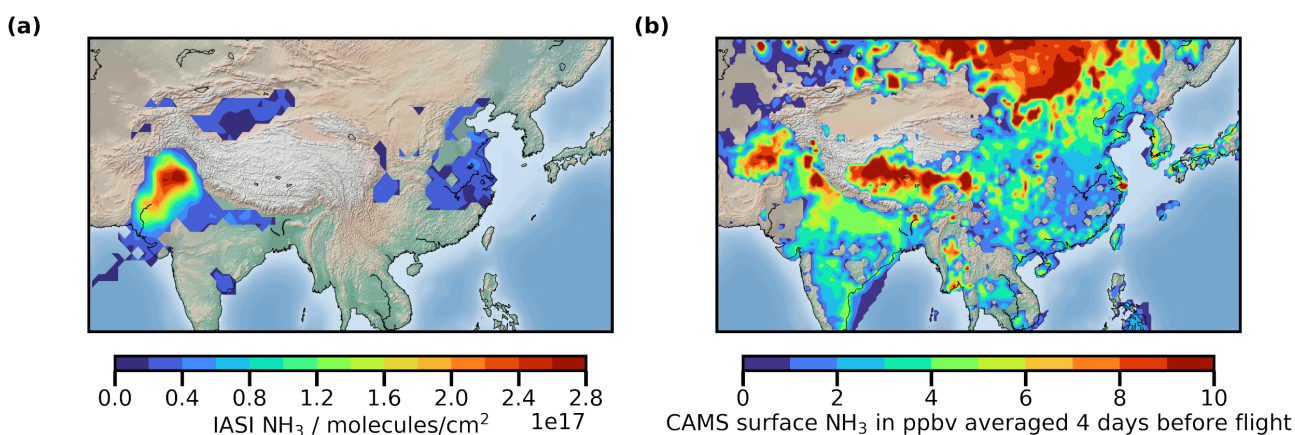Figure S5: Same as Fig. S1, but for SouthTRAC flight on 4 November 2019.

Figure S6: (a) IASI (METOP-A+B) total column NH_3, averaged for days (26-30 July 2017) before the StratoClim flights. Averaged columns smaller than 1.4e16 molecules/cm^{-2} (5% of the maximum of the color bar) are filtered out to focus on maximum columns. (b) CAMS forecast surface VMR, averaged for days as in (a) before the StratoClim flights. Surface VMRs smaller than 0.05 ppbv (5% of the maximum of the color bar) are filtered out to focus on maximum VMRs.

(a)

(b)

(c)

(d)

(e)

(f)

IASI NH$_3$ / molecules/cm^2

0.0 0.4 0.8 1.2 1.6 2.0 2.4 2.8
1e17

CAMS surface NH$_3$ in ppbv averaged 4 days before flight
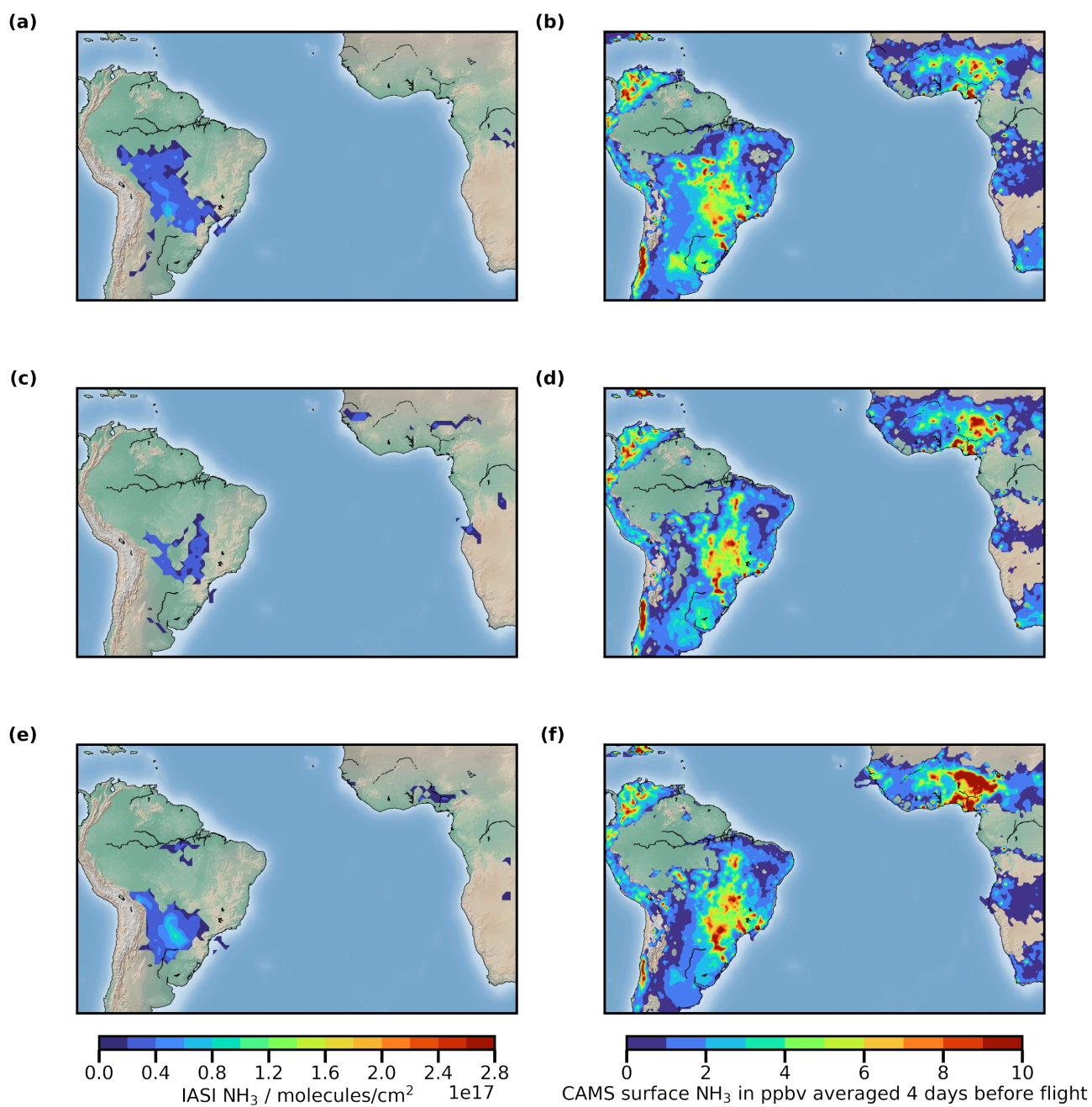
0   2   4   6   8   10

Figure S7: Same as Fig. S6, but for SouthTRAC flights on (a-b) 8 September 2019, (c-d) 7 October 2019, (e-f) 4 November 2019.