S1 MAMAP remote sensing measurments (Google Earth overlays and single tracks)

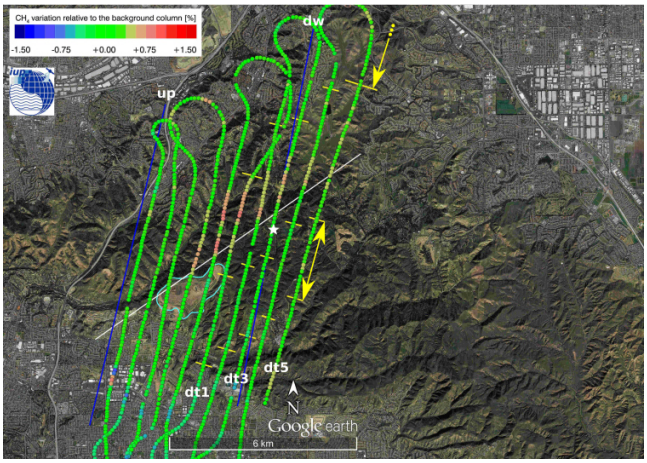

Figure S 1. As Fig. 5 (a) but for the 27.08.2014 and the star corresponds to the origin used in Figs. S5 (c,d) and S9 (a).

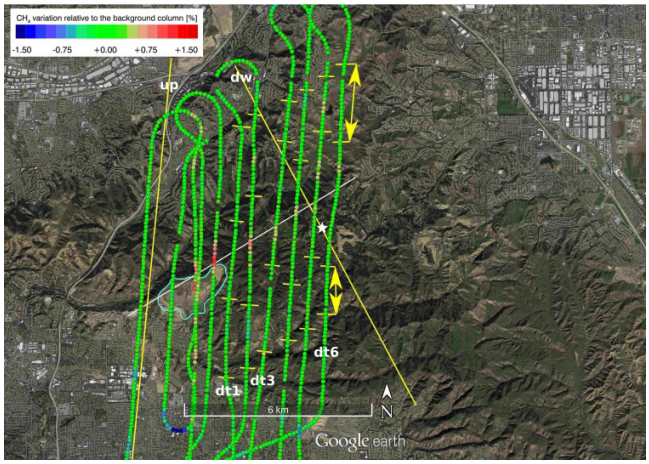

Figure S 2. As Fig. 5 (a) but for the 28.08.2014 and the star correspond to the origin used in Figs. S6 (c,d) and S9 (b).

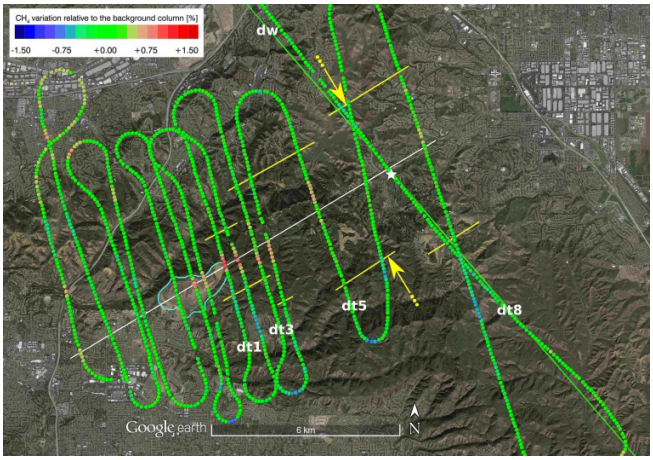

Figure S 3. As Fig. 5 (a) but for the 03.09.2014 and the star correspond to the origin used in Figs. S8, S9 (c).

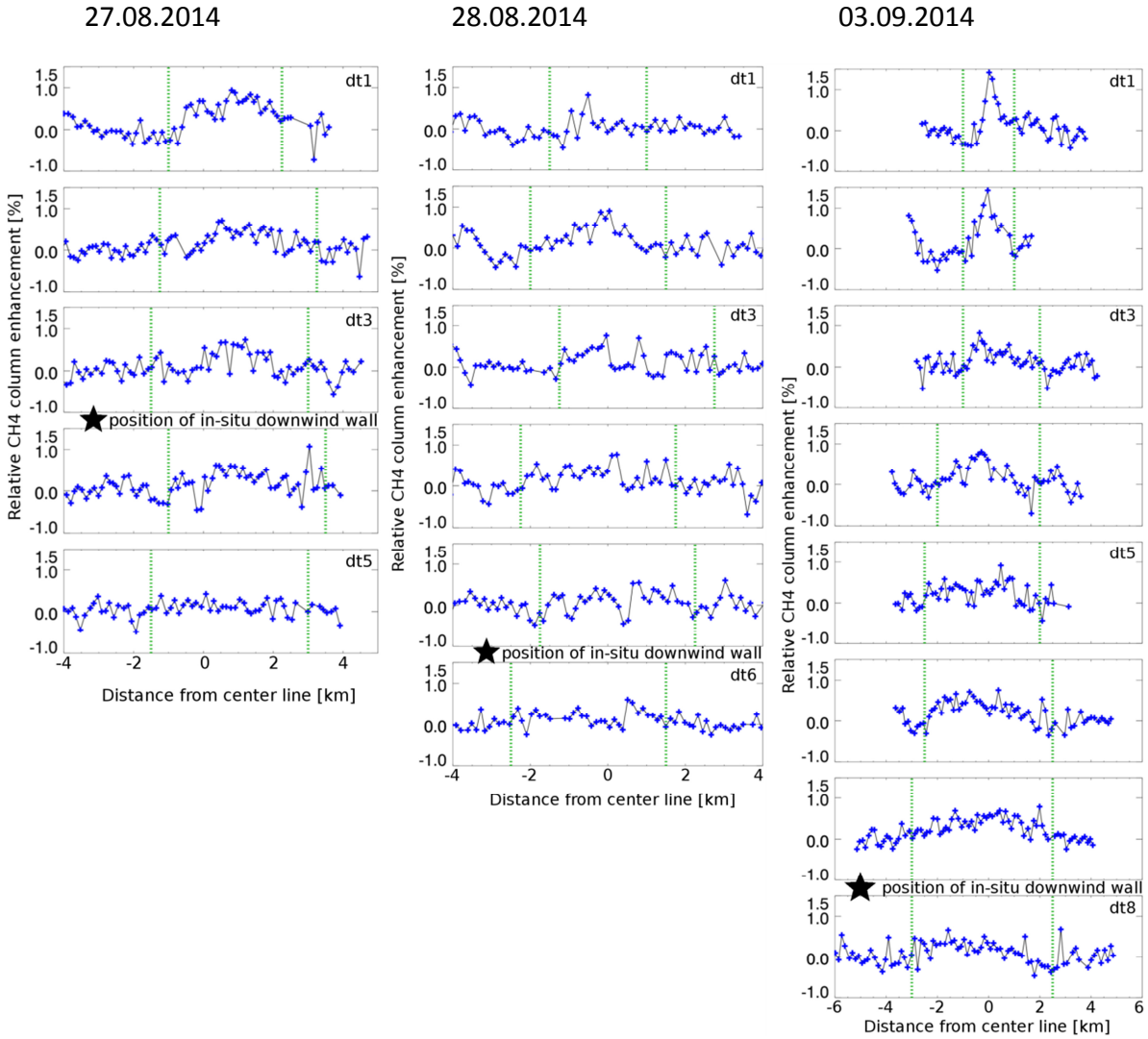

Figure S 4. As Fig. 6 (left column) but for the three other days (from left to right): 27.08.2014, 28.08.2014 and 03.09.2014.

S2 Picarro in-situ dry gas mixing ratis of CH_4

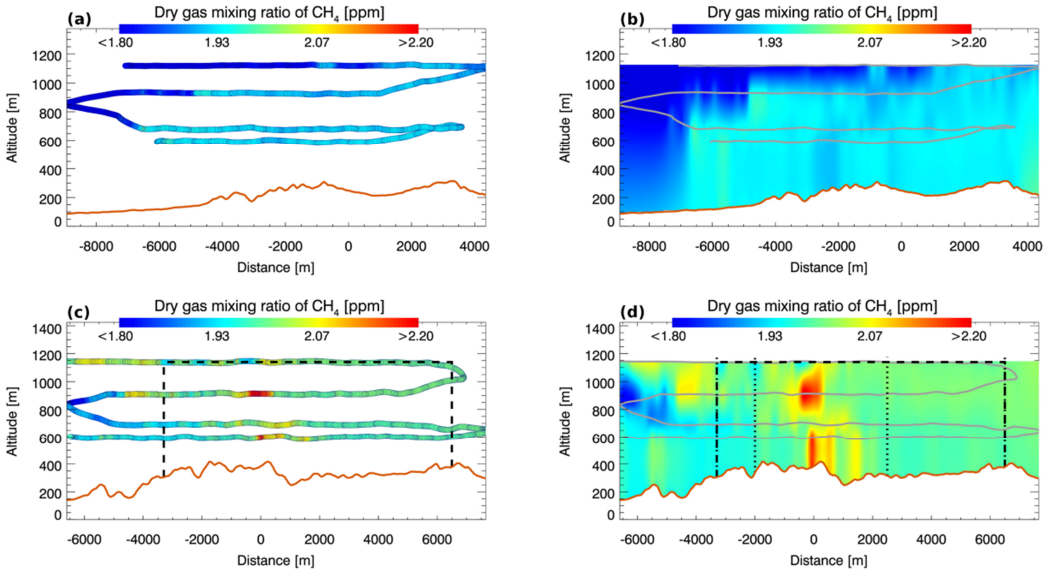

Figure S 5. Dry gas mixing ratios of CH_4 for the upwind (a,b) and downwind (c,d) wall on 27.08.2014. X-axis gives the distance from the approximate plume centre in m (only for bottom panels) and y-axis gives the altitude in m above mean sea level (m amsl). Solid orange line depicts the surface elevation at the position of the wall (based on SRTM). Dashed black line depicts the area, which was used in the mass balance approach for estimating the emission rate. Dotted black line shows limits, which were used to define the background area (here: from - 3300 to - 2000 m and 2500 to 7000 m). Solid grey line depicts the flight track. (a,c) Measured dry gas mixing ratios of CH_4 along the flight track. Each circle represents one measurement. (b,d) Kriged dry gas mixing ratios of CH_4 based on the measurements shown in (a) and (b) and an additionally added pseudo surface track (not shown).

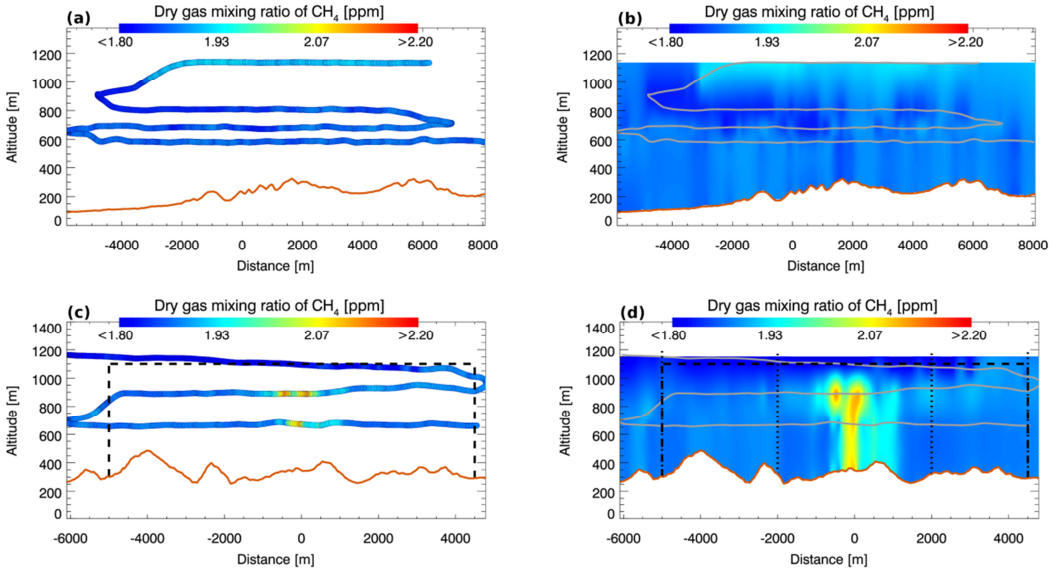

Figure S 6. As for Fig. S5 but for the 28.08.2014. (a,b) Upwind wall. (c,d) Downwind wall.

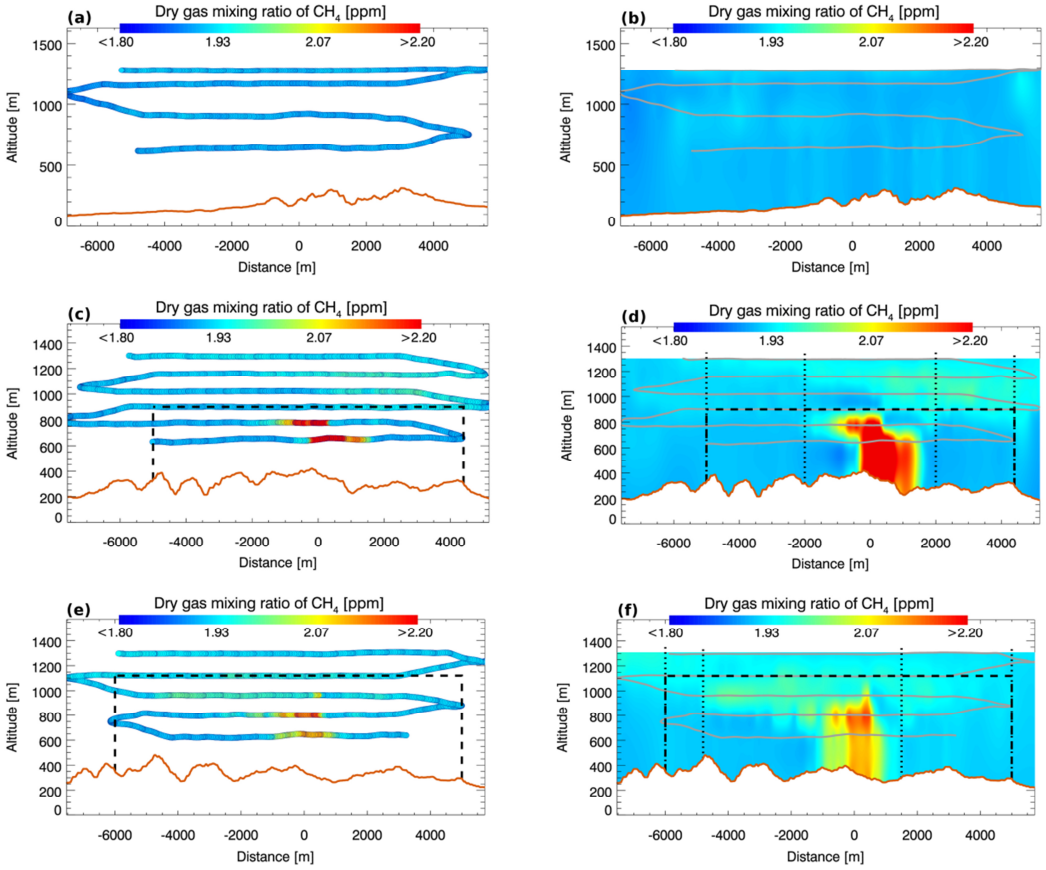

Figure S 7. As for Fig. S5 but for the 01.09.2014. (a,b) Upwind wall. (c,d) First downwind wall. (e,f) Second downwind wall.

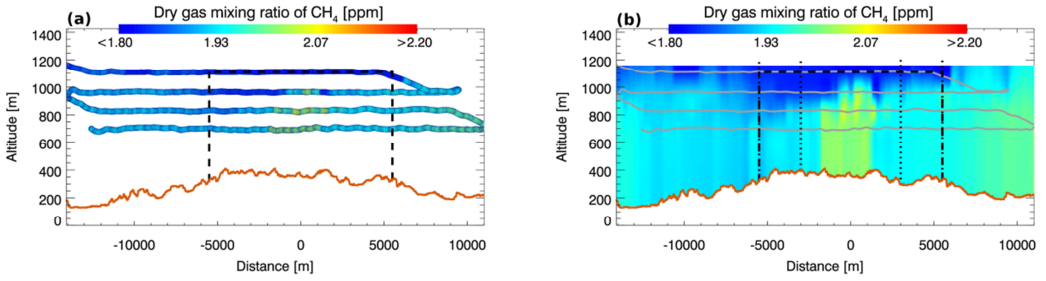

Figure S 8. As for Fig. S5 but for the 03.01.2014. (a,b) Downwind wall.

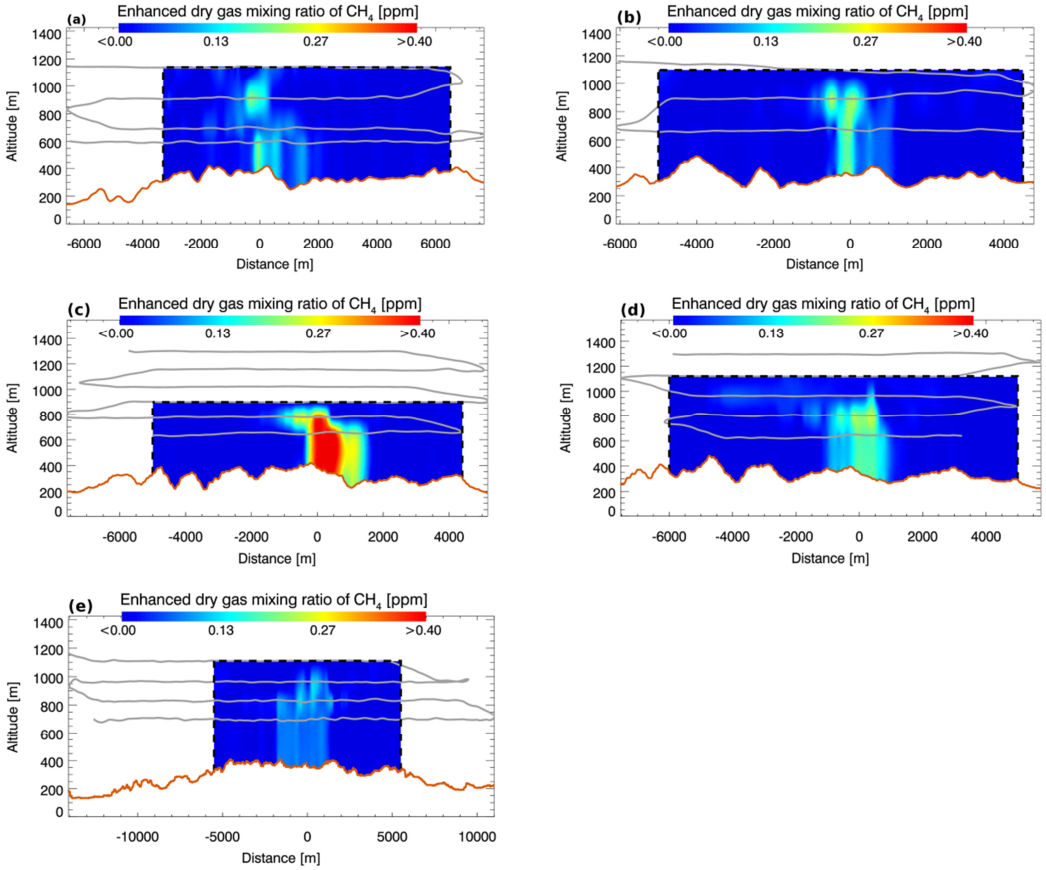

Figure S 9. Shown are enhanced dry gas mixing ratios of CH_4 of the five downwind walls acquired on the four different flight days 27.08.2014 (a), 28.08.2014 (b), 01.09.2014 (c, first downwind wall; d, second downwind wall) and 03.09.2014 (e). Only the area, which was used in the mass balance approach, is shown (dashed black line). Solid orange line depicts the surface elevation at the position of the wall (based on SRTM). Solid grey line shows the flight track.

S3 Picarro in-situ dry gas mixing ratios of CO_2

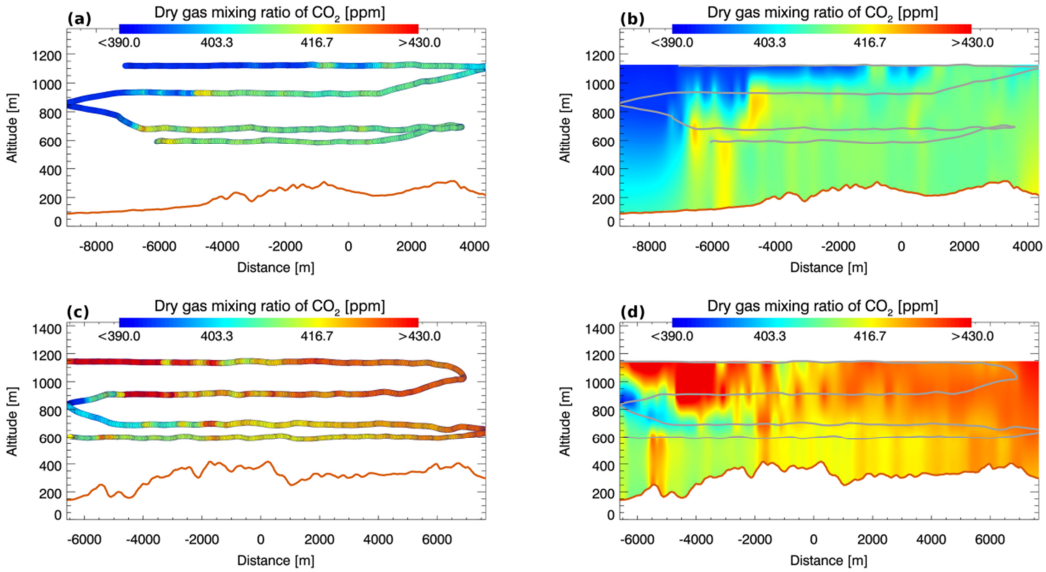

Figure S 10. As Fig. S5 but for the dry gas mixing ratios of CO_2 on 27.08.2014 and without dashed and dotted lines. (a,b) Upwind wall. (c,d) Downwind wall.

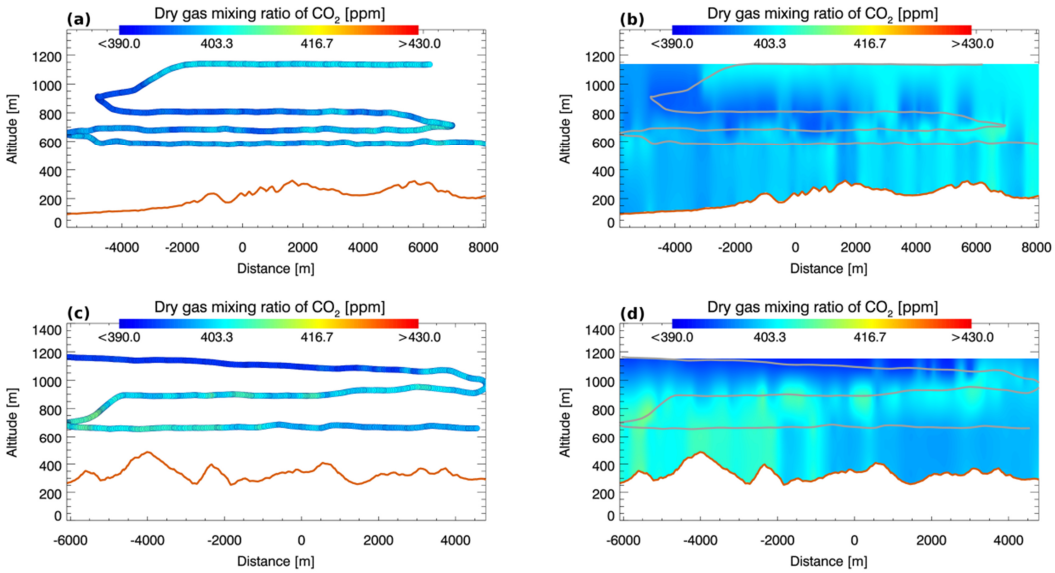

Figure S 11. As for Fig. S10 but for the 28.08.2014. (a,b) Upwind wall. (c,d) Downwind wall.

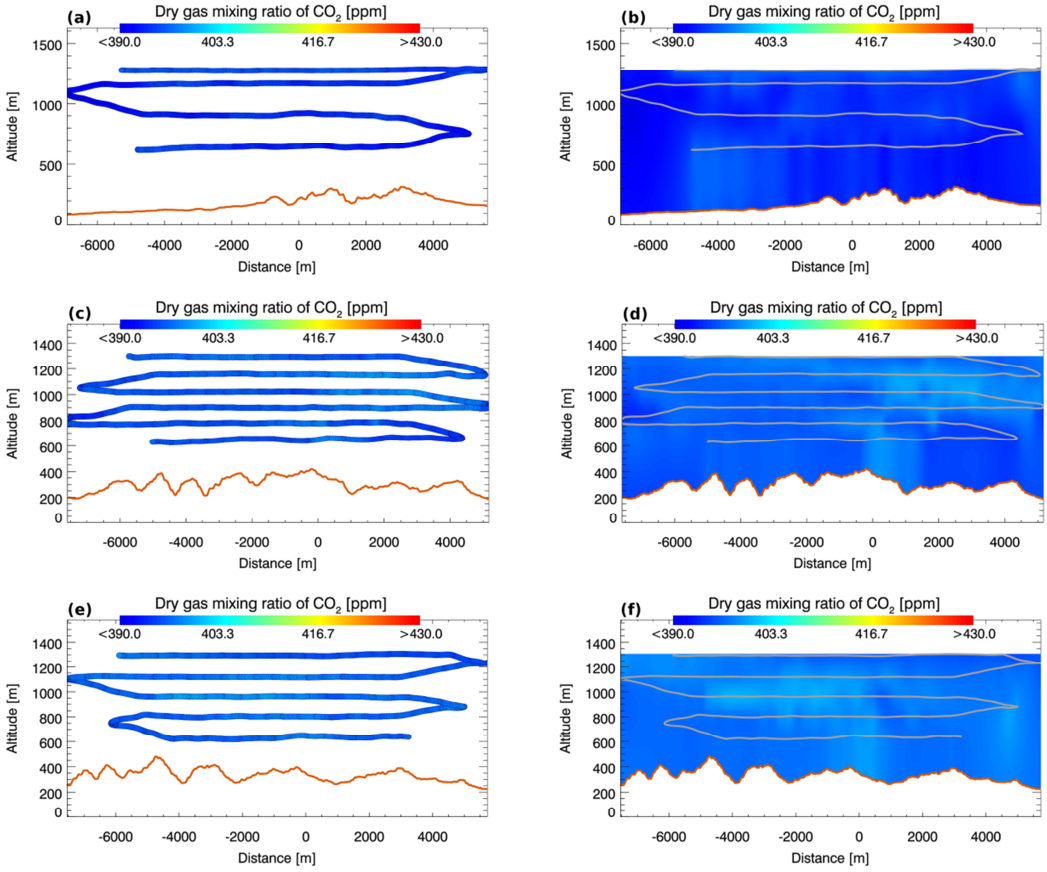

Figure S 12. As for Fig. S10 but for the 01.09.2014. (a,b) Upwind wall. (c,d) First downwind wall. (e,f) Second downwind wall.

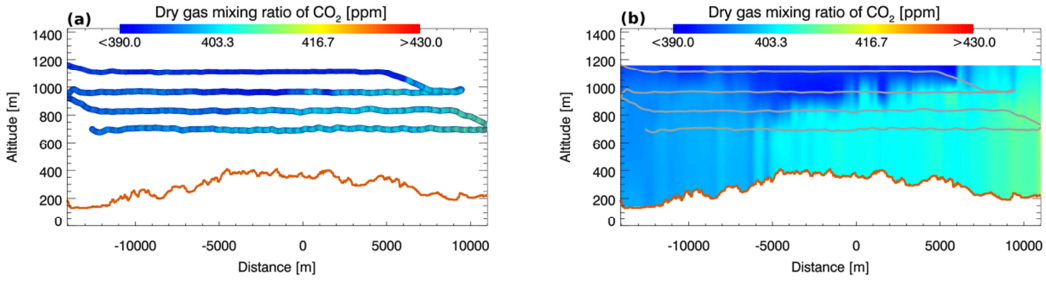

Figure S 13. As for Fig. S10 but for the 03.01.2014. (a,b) Downwind wall.

S4 Horizontal wind fields u_{eff} used in the mass balance approach

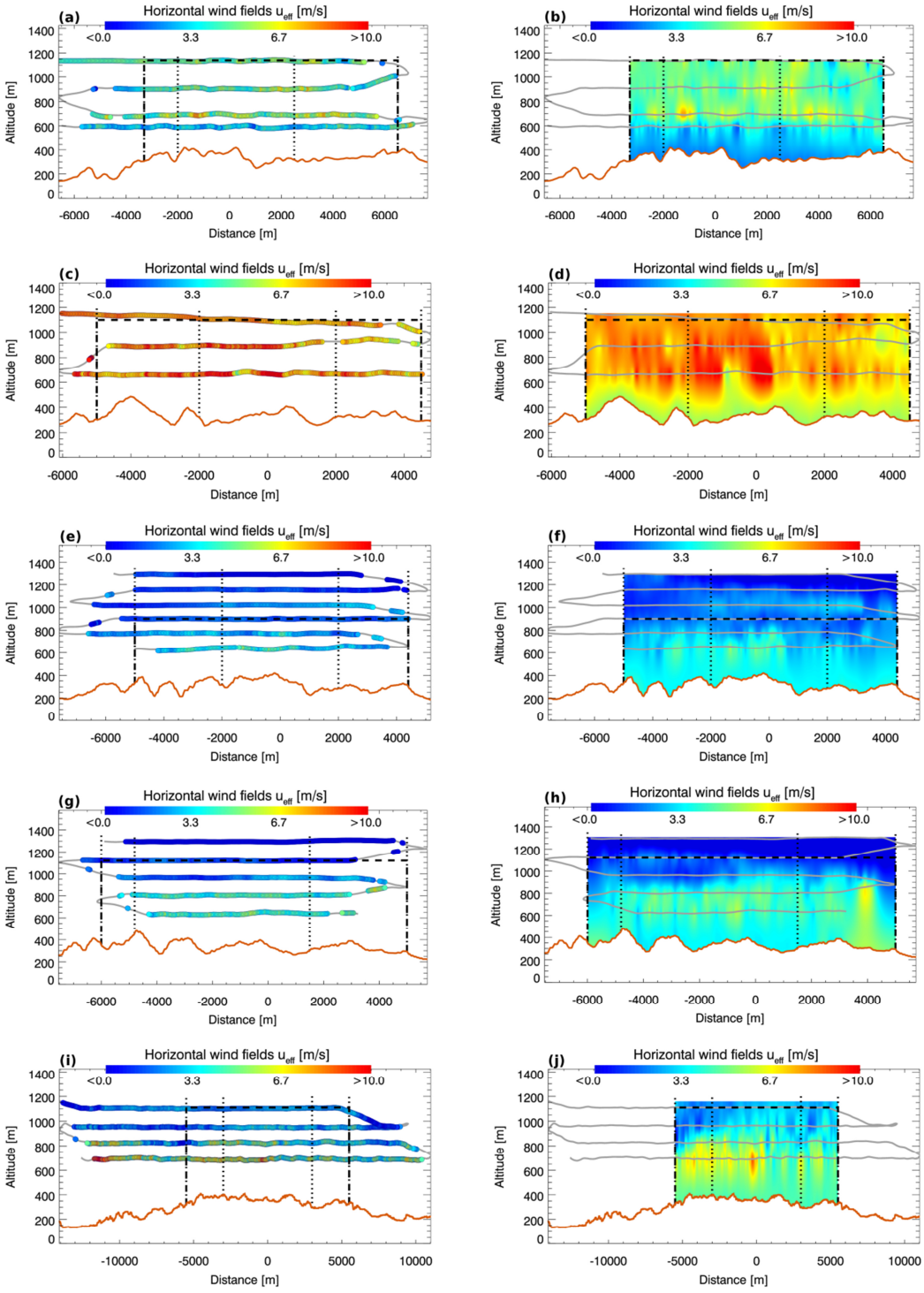

Figure S 14. Shown are the horizontal wind fields u_{eff} of the five downwind walls used in the mass balance approach acquired on the four flight days 27.08.2014 (a,b), 28.08.2014 (c,d), 01.09.2014 (e,f, first downwind wall; g,h, second downwind wall) and 03.09.2014 (i,j). Measurements are filtered by an inclination of 5° (see also main text). The area used in the mass balance approach is bordered by a dashed black line. Dotted black line shows limits, which were used to define the CH_4 background area. Solid orange line depicts the surface elevation at the position of the wall (based on SRTM). Solid grey line shows the flight track.

S5 Integrated in-situ columns (IISC)

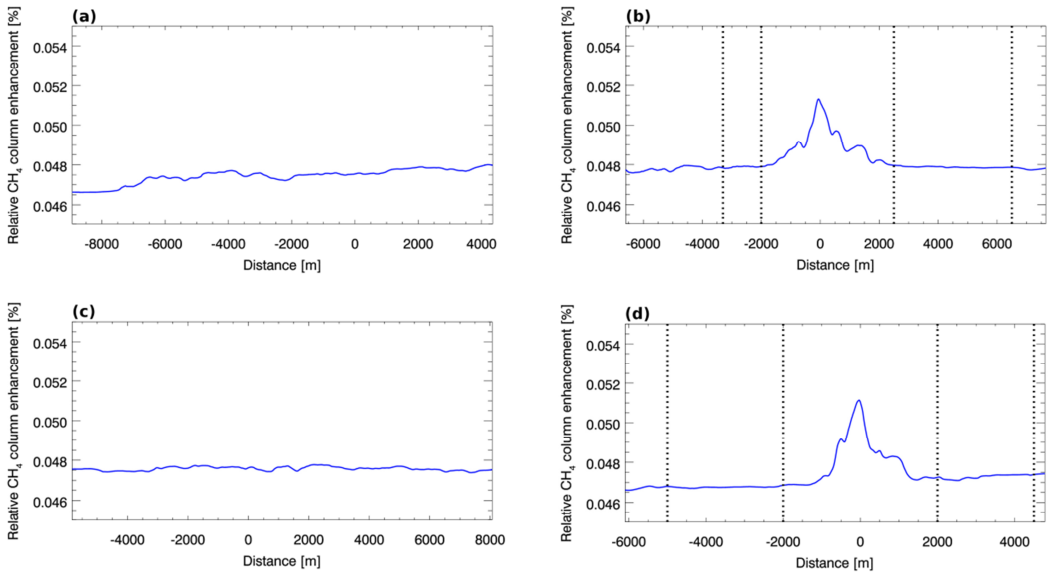

Figure S 15. Ratios of the integrated in-situ columns of CH4 and CO2 for the upwind walls (a,c) and downwind walls (b,d) on the 27.08.2014 (a,b) and 28.08.2014 (c,d). The measurements enclosed by the black dotted lines and located at the flanks / edges of the plume are used for normalization (compare to Fig. S17).

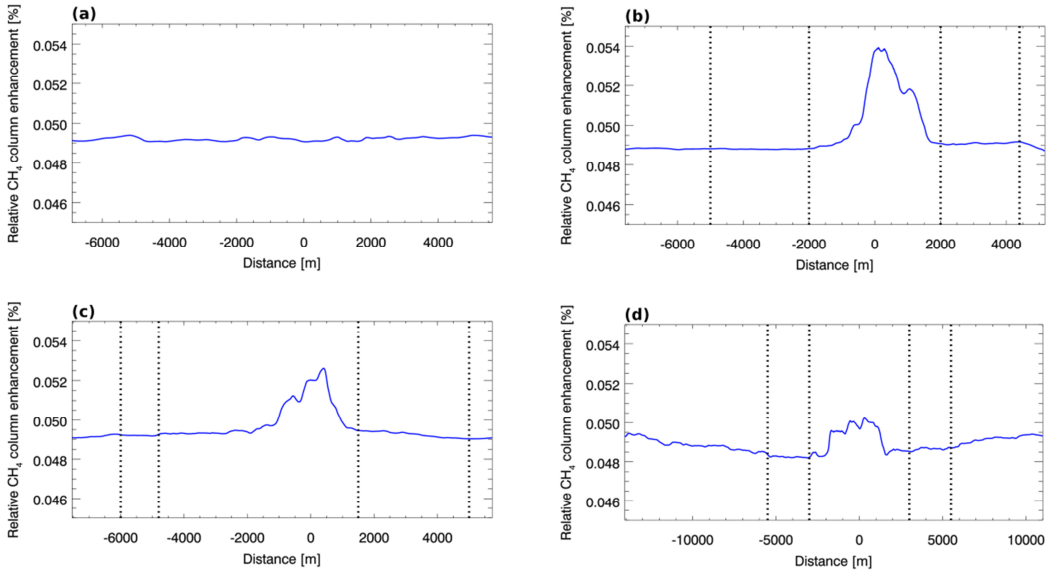

Figure S 16. As Fig. S15 but for the upwind wall (a), first downwind wall (b) and second downwind wall (c) on the 01.09.2014 and the downwind wall (d) on the 03.09.2014 (also compare to Fig. S17).

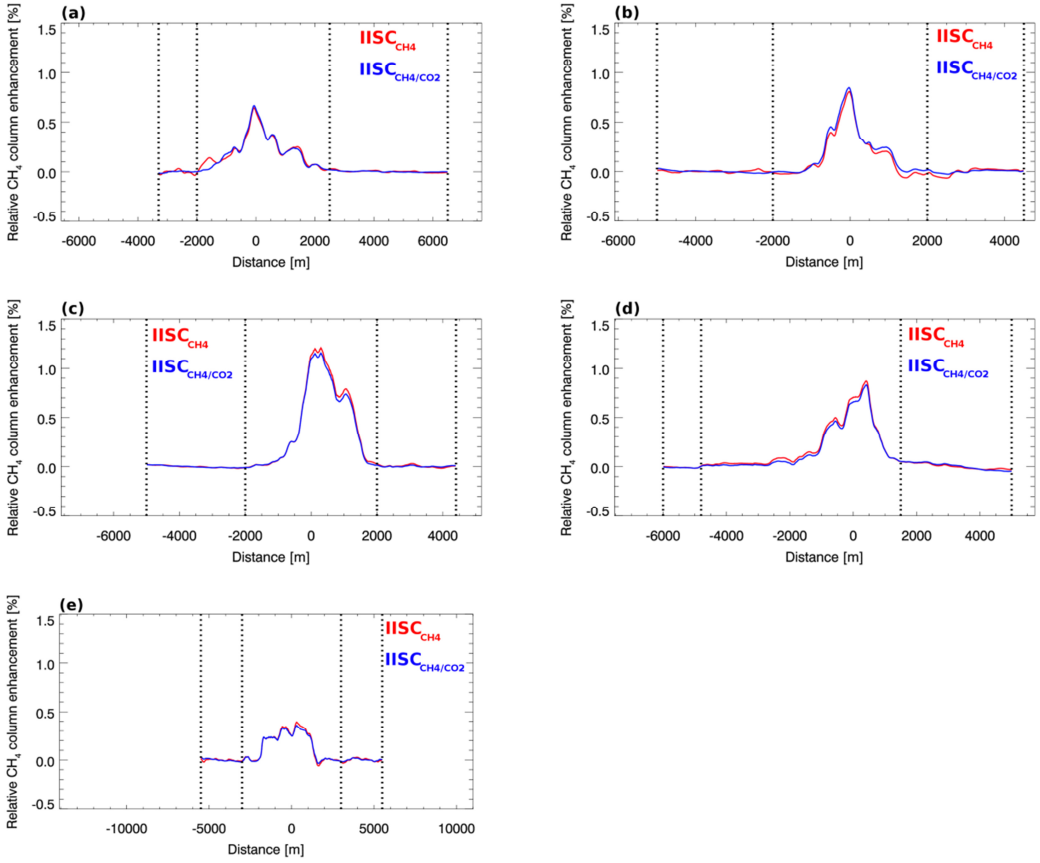

Figure S 17. As Fig . 7 but for all downwind walls. (a) 27.08.2014. (b) 28.08.2014. (c) 01.09.2014, first downwind wall (as in Fig. 7, a). (d) 03.09.2014, second downwind wall (as in Fig. 7, b). (e) 03.09.2014.

S6 AVIRIS-NG CH4 retrieval results (Google Earth overlays)

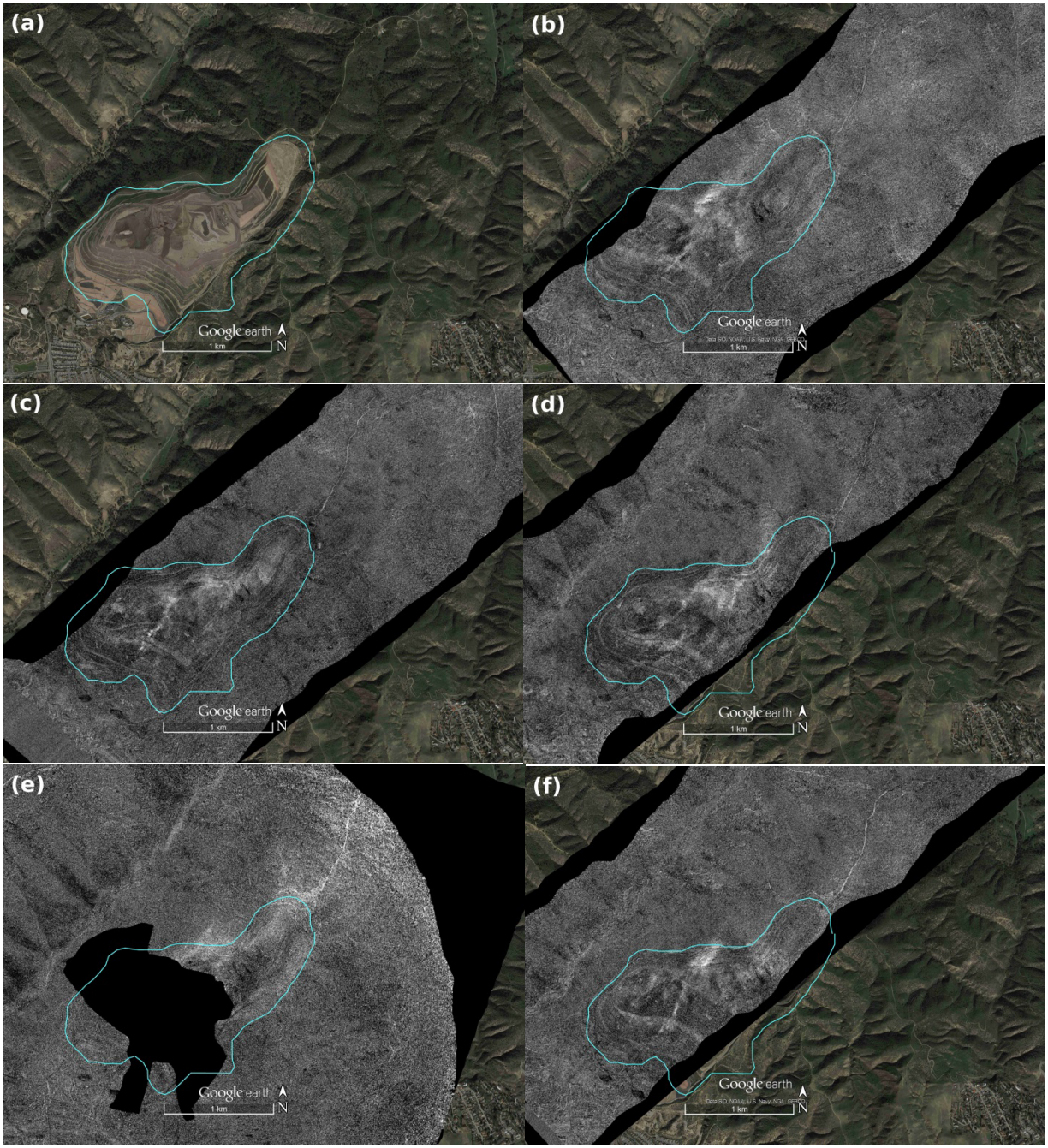

Figure S 18. Overview of the methane retrieval results from the AVIRIS-NG observations from different overflight times [local time]: a) Underlying Google Earth Map of the Olinda Alpha Landfill which is emphasized by the cyan solid line. (b) 13:31. (c) 13:33, same overflight as shown in Fig. 9 in the main part. (d) 13:38. (e) 13:48. (f) 14:06.