Auxiliary Material for

Four Corners: the largest US methane anomaly viewed from space

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1. text01.pdf, Supplemental text describing in more detail Methods, SCIAMACHY analysis, representativeness, and linear fitting.

2. fs01.pdf, Supplementary Figure 1: Effect of surface altitude correction on SCIAMACHY data. a) Original gridded SCIAMACHY XCH4 data; b) altitude corrected XCH4 anomaly; c) Gridded surface elevation; d): altitude correction (as subtracted from the raw SCIAMACHY data).

3. fs02.pdf, Supplementary Figure 2: Four Corners SCIAMACHY (SCIA) and WRF enhancement for different seasons. Notice the signal persists in both observations and model through all seasons. SCIAMACHY averaged for all years 2003–2009 (number of observations illustrated in right column), WRF averaged from 2012 simulations.

4. fs03.pdf, Supplementary Figure 3: Average annual Four Corners SCIAMACHY enhancement. The average enhancement in each calendar year for the Four Corners region is shown, with error bars indicating 1σ. On the right the box and whiskers plot shows the median enhancements and 1st and 3rd quartiles for each time period. Notice we see no statistically significant change between time periods.

5. fs04.pdf, Supplementary Figure 4: Average methane anomaly from SCIAMACHY for 2003–2005 and 2007–2009 time frames at 1/3 degree resolution. SCIAMACHY retrieval noise increases post–2005 (explaining the larger variability in 2007–2009). Note the similar, persistent feature of enhanced methane over Four Corners, indicative of consistent emissions persistent through the 2000's.

6. fs05.pdf, Supplementary Figure 5: Correlation coefficient between SCIAMACHY and WRF–Chem simulations plotted as function of latitudinal and longitudinal offset. Each unit shift (1 grid point) corresponds to

0.33 degrees. Notice the high correlation close to zero offset, indicating the source location and transport in simulations is representative of the observations.

7. fs06.pdf, Supplementary Figure 6: Scaling factor (slope) found when comparing on indicated subset of simulations with SCIAMACHY observations. Error bars are 2σ. Jul/Aug shows additionally in gray the slope and uncertainty when removing outliers in that month. Using all simulated days results in the scaling and uncertainty bound shown in the horizontal line and gray band.

8. fs07.pdf, Supplementary Figure 7: Average diurnal cycle seen at Four Corners TCCON site. a) Days when XCH4 exceeds 1.85 ppm (20% days). b) Days when XCH4 exceeds 1.82 ppm (51% days). Red indicates average, error bars are 1σ, and gray dots show all data points.