

Supplement

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CH₄ column densities and plume cross-sections

Each page in the following chapter features two figures: one showing CH₄ column densities and another illustrating across-plume cross-sections. The first figure displays CH₄ column densities, with the top row in red presenting the RGB scene at the AVIRIS-4 overpass, the retrieved CH₄ column enhancement at native resolution, and the same retrieval at the coarser MicroHH grid. The lower blue panels show MicroHH-simulated CH₄ enhancements at 20-second intervals around the overpass, highlighting plume evolution and transport. The second figure shows cross-sections of the plume across all 3-meter-wide subpolygons along the 50-meter length, comparing observed and modelled plumes.

Release 57 kg h⁻¹

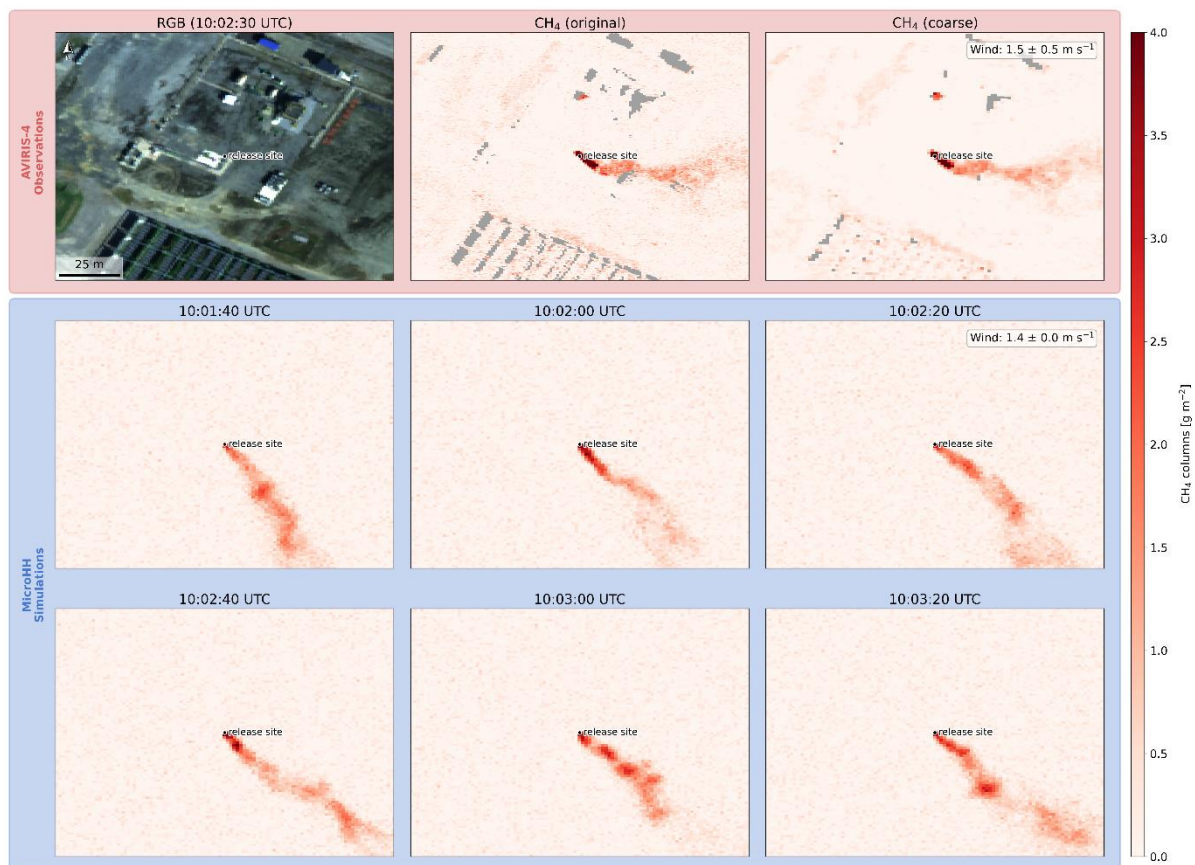


Figure S1: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 16.09.2024 at 10:02 UTC during a release with 57 kg CH₄ h⁻¹.

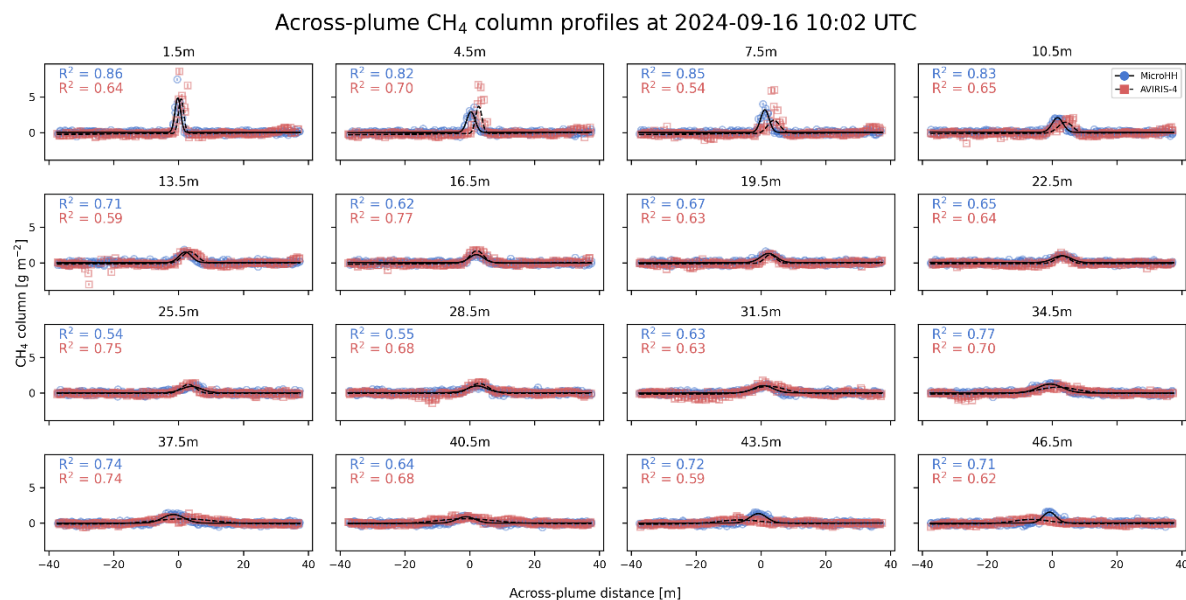


Figure S2: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 16.09.2024 at 10:02 UTC during a release with 57 kg CH₄ h⁻¹.

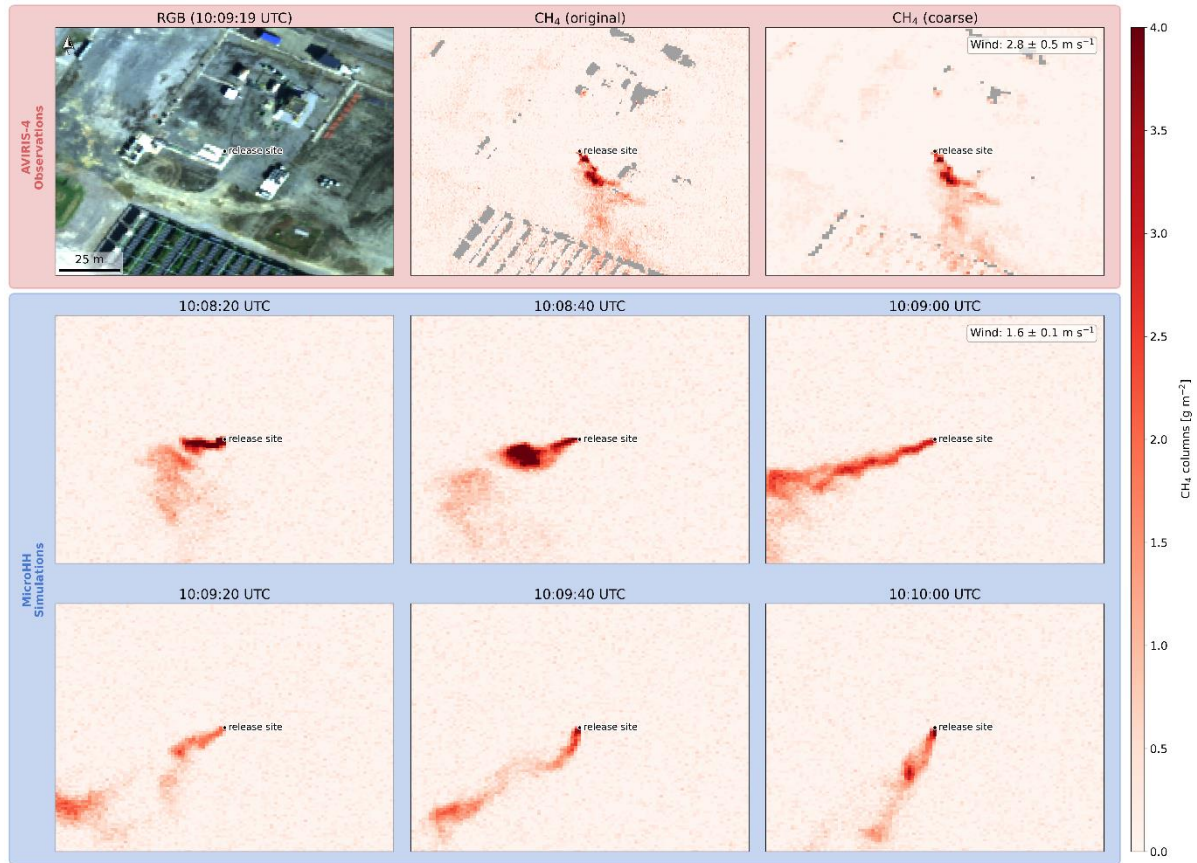


Figure S3: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 16.09.2024 at 10:09 UTC during a release with 57 kg CH₄ h⁻¹.

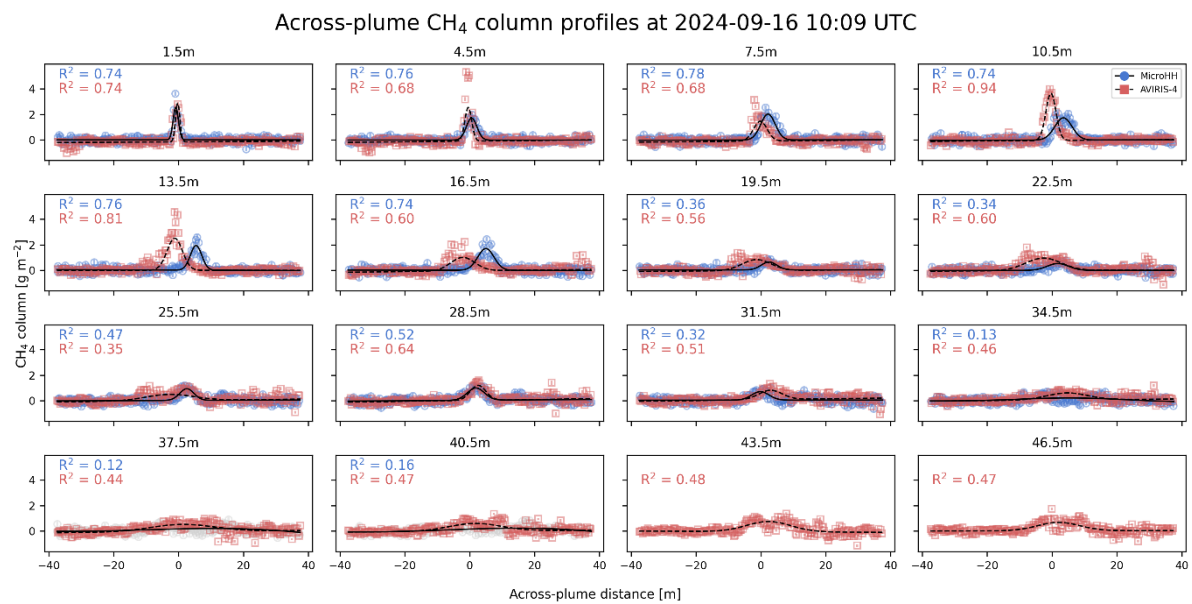


Figure S4: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 16.09.2024 at 10:09 UTC during a release with 57 kg CH₄ h⁻¹.

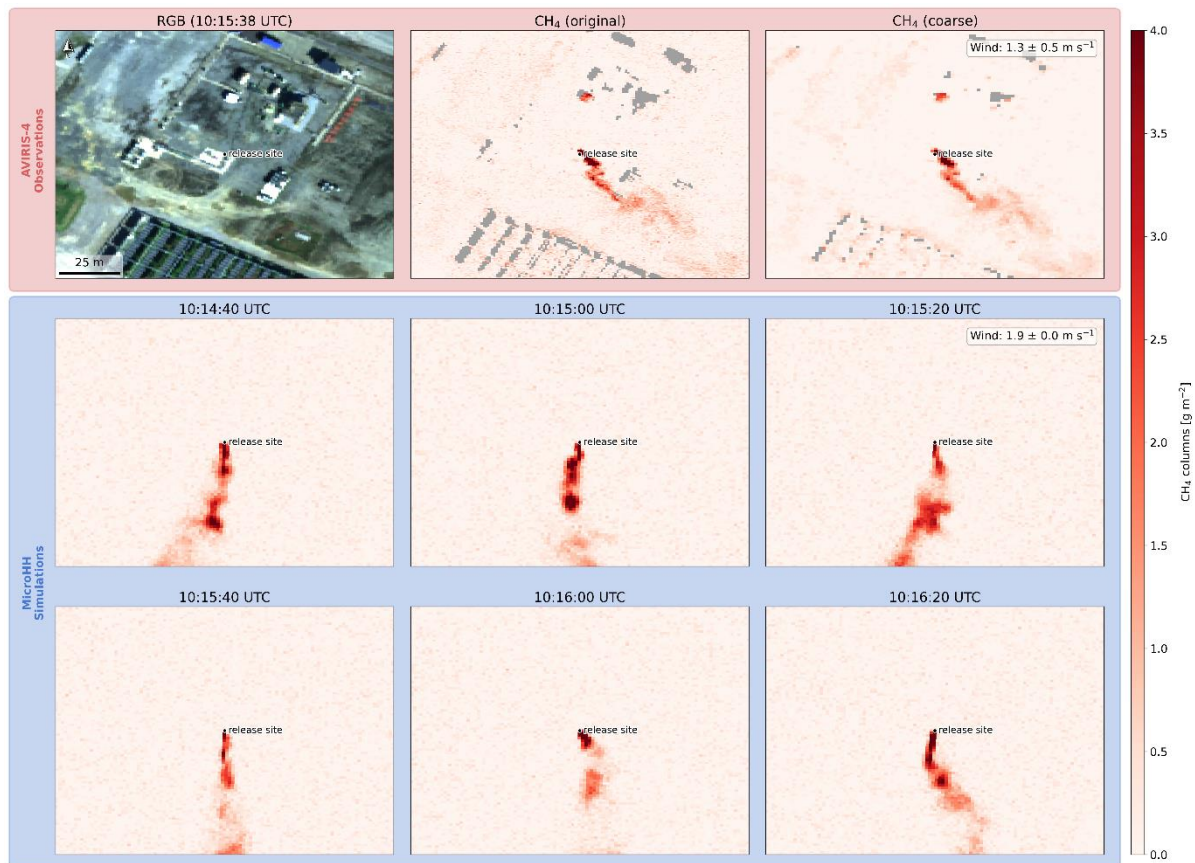


Figure S5: Observed and modelled CH_4 maps for the AVIRIS-4 overpass on the 16.09.2024 at 10:15 UTC during a release with $57 \text{ kg } \text{CH}_4 \text{ h}^{-1}$.

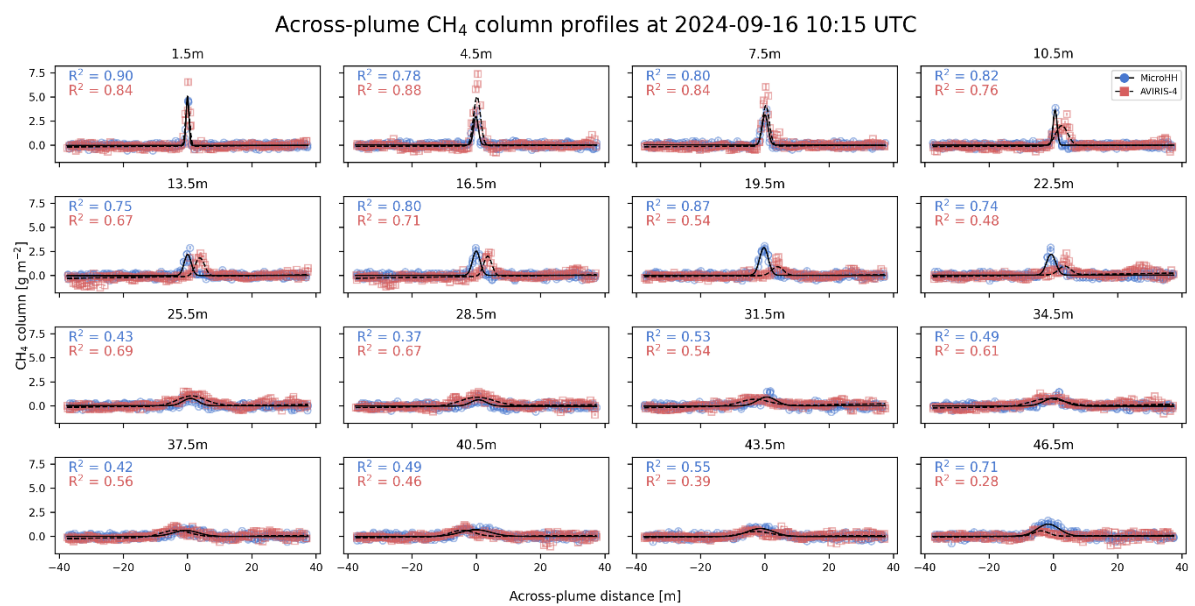


Figure S6: Across-plume CH_4 cross-sections for the AVIRIS-4 overpass on the 16.09.2024 at 10:15 UTC during a release with $57 \text{ kg } \text{CH}_4 \text{ h}^{-1}$.

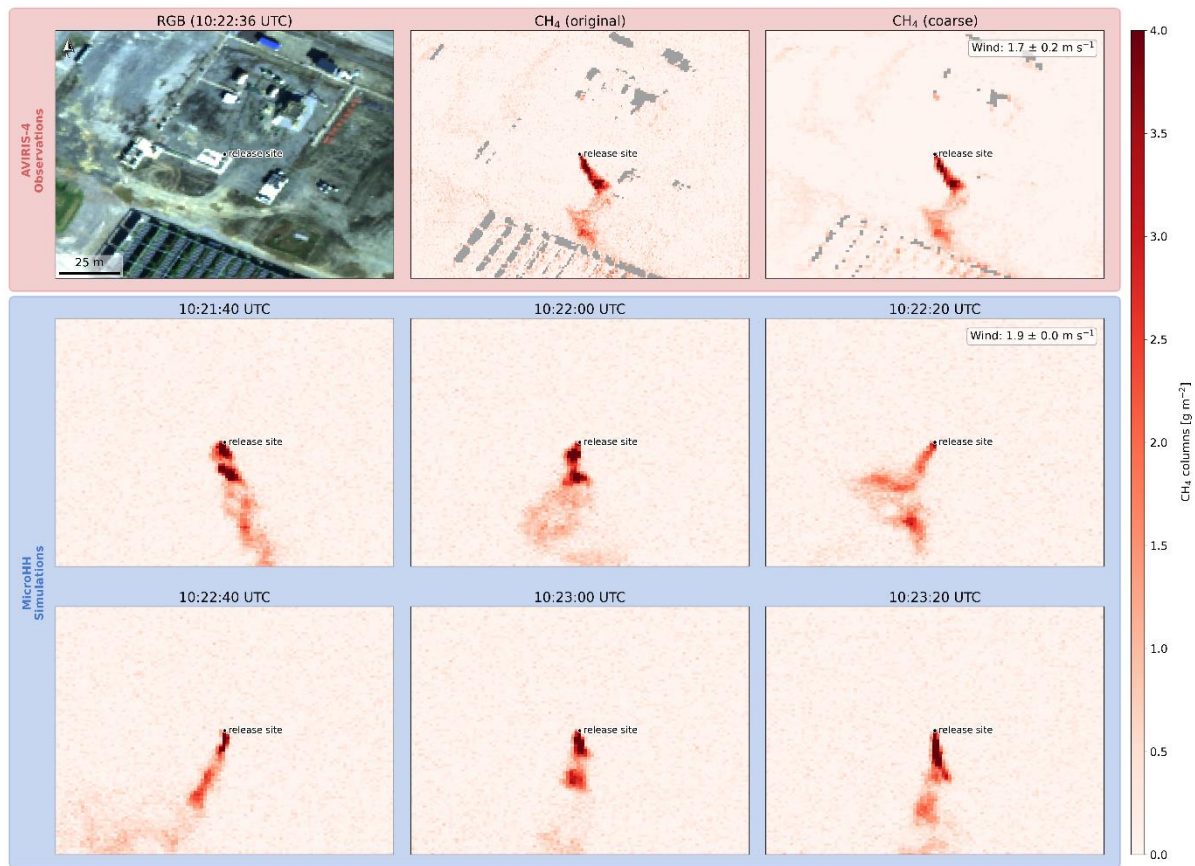


Figure S7: Observed and modelled CH_4 maps for the AVIRIS-4 overpass on the 16.09.2024 at 10:22 UTC during a release with $57 \text{ kg } \text{CH}_4 \text{ h}^{-1}$.

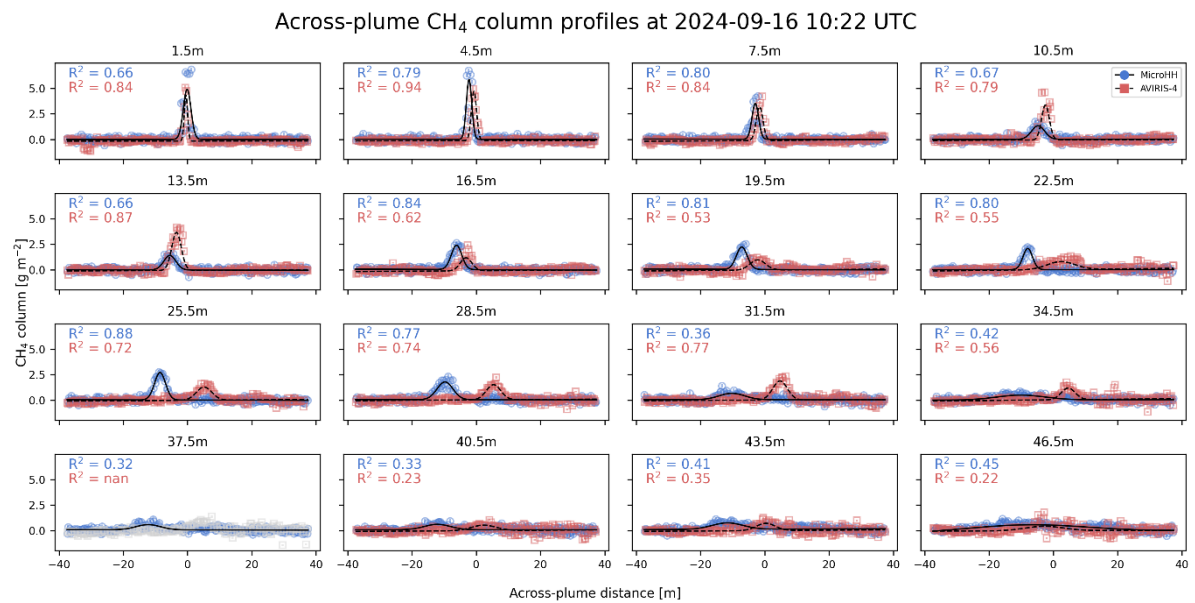


Figure S8: Across-plume CH_4 cross-sections for the AVIRIS-4 overpass on the 16.09.2024 at 10:22 UTC during a release with $57 \text{ kg } \text{CH}_4 \text{ h}^{-1}$.

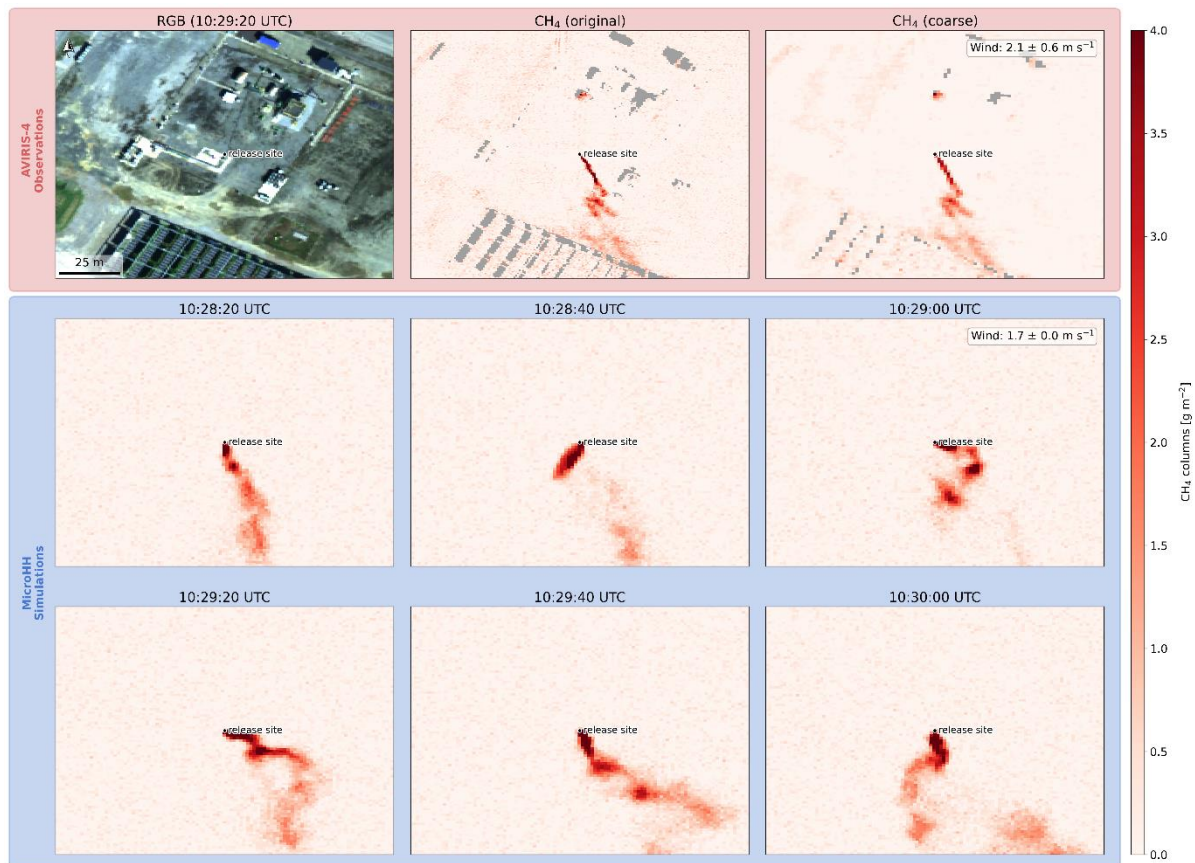


Figure S9: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 16.09.2024 at 10:29 UTC during a release with 57 kg CH₄ h⁻¹.

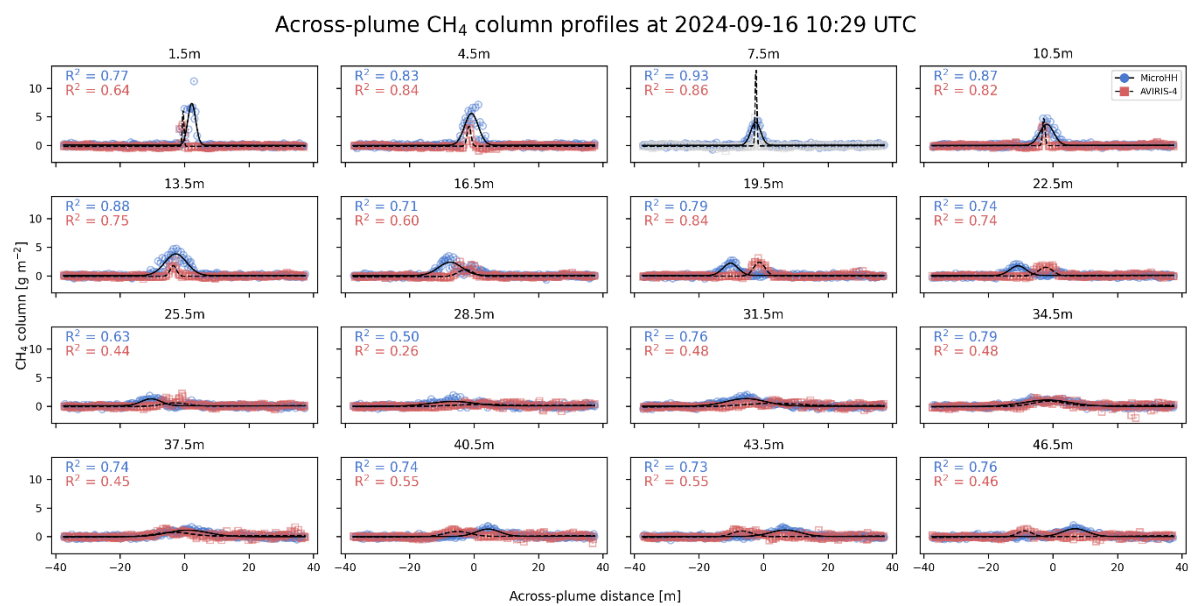


Figure S10: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 16.09.2024 at 10:29 UTC during a release with 57 kg CH₄ h⁻¹.

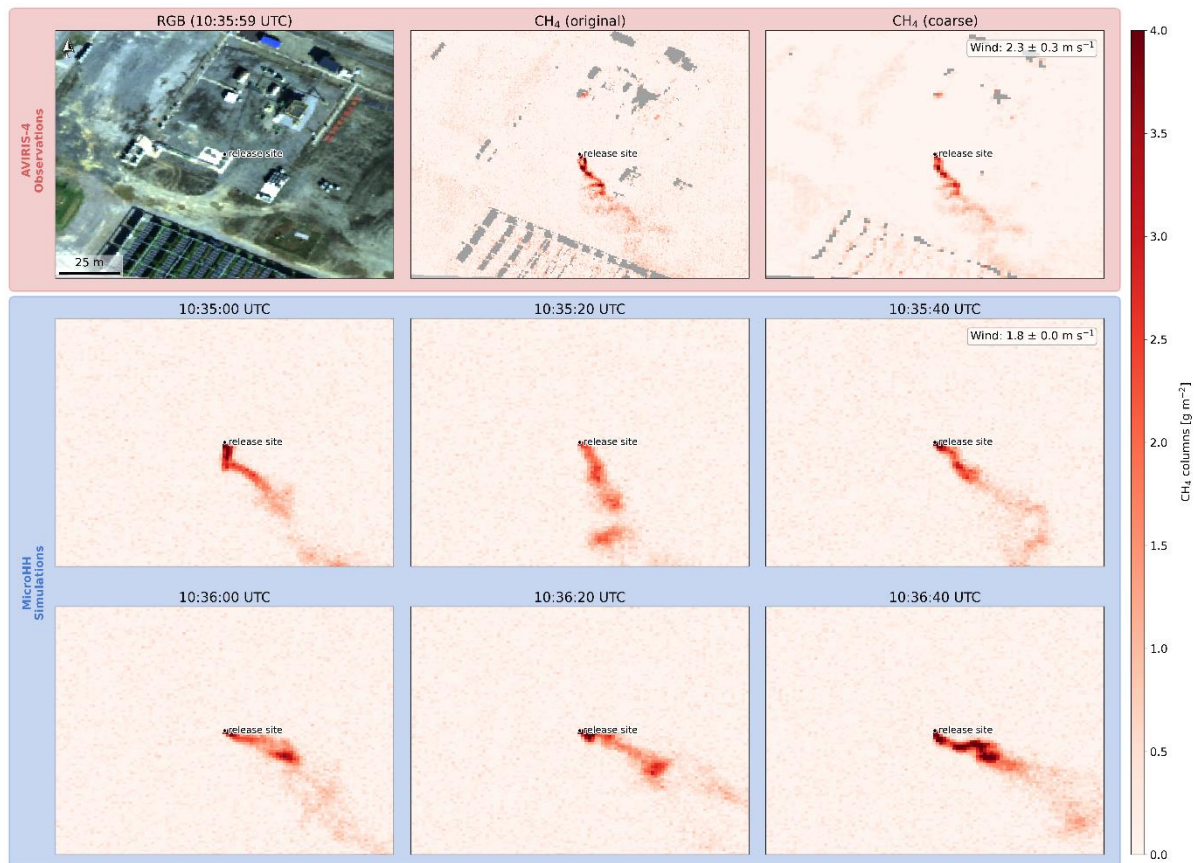


Figure S11: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 16.09.2024 at 10:35 UTC during a release with 57 kg CH₄ h⁻¹.

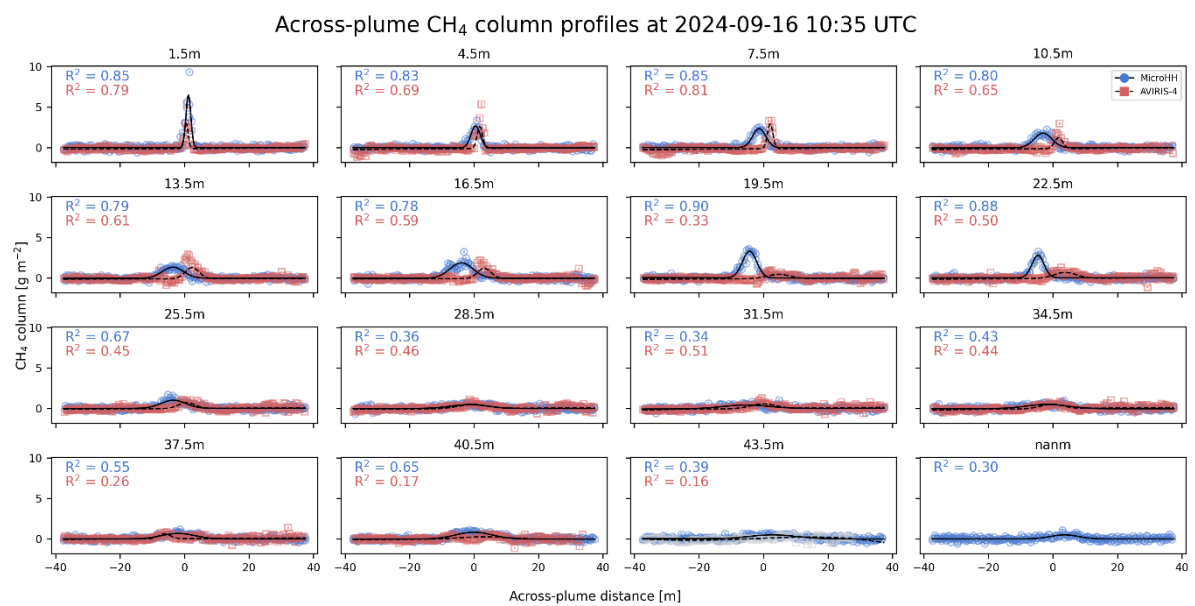


Figure S12: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 16.09.2024 at 10:35 UTC during a release with 57 kg CH₄ h⁻¹.

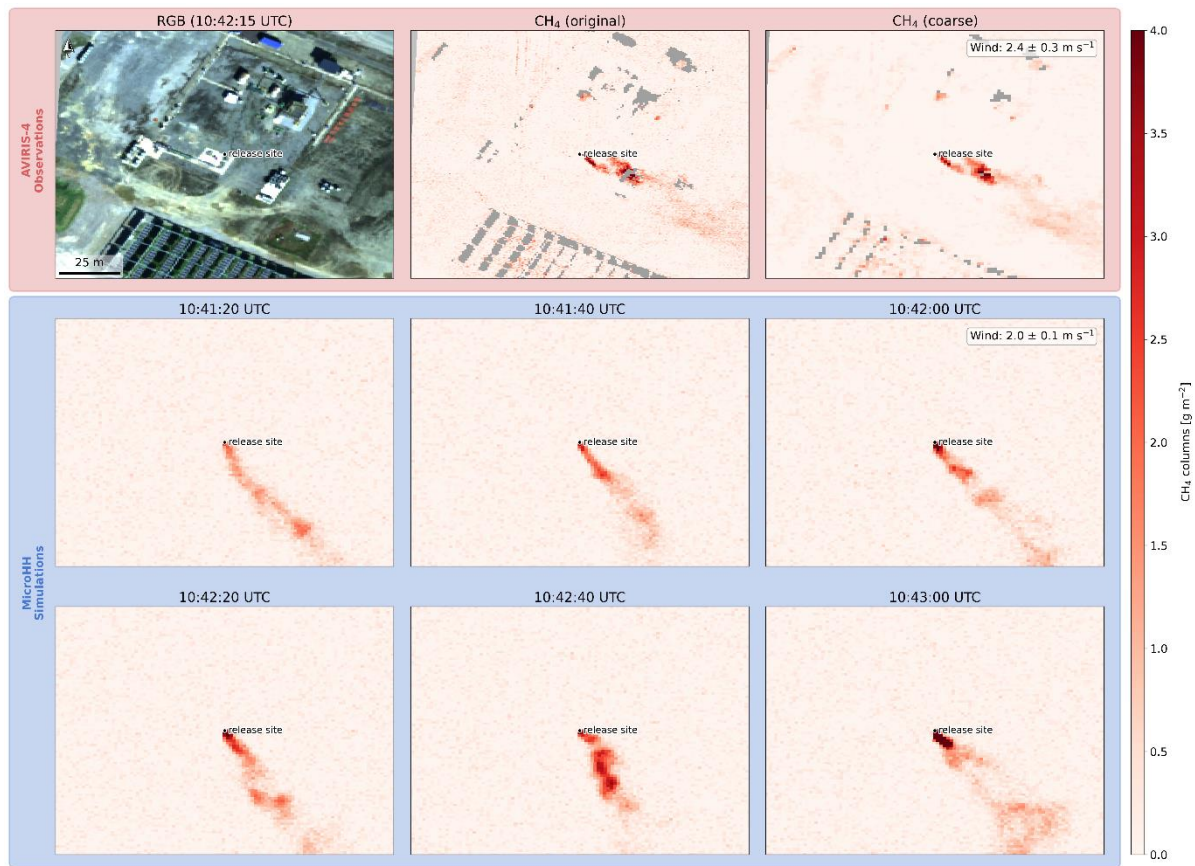


Figure S13: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 16.09.2024 at 10:42 UTC during a release with 57 kg CH₄ h⁻¹.

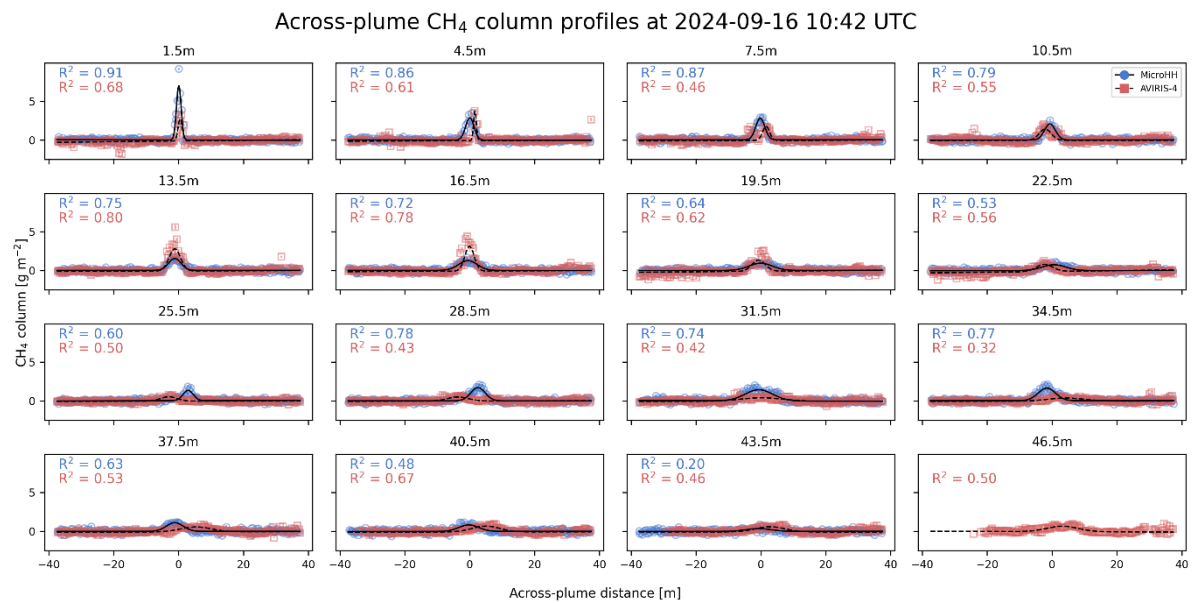


Figure S14: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 16.09.2024 at 10:42 UTC during a release with 57 kg CH₄ h⁻¹.

Release 53 kg h⁻¹

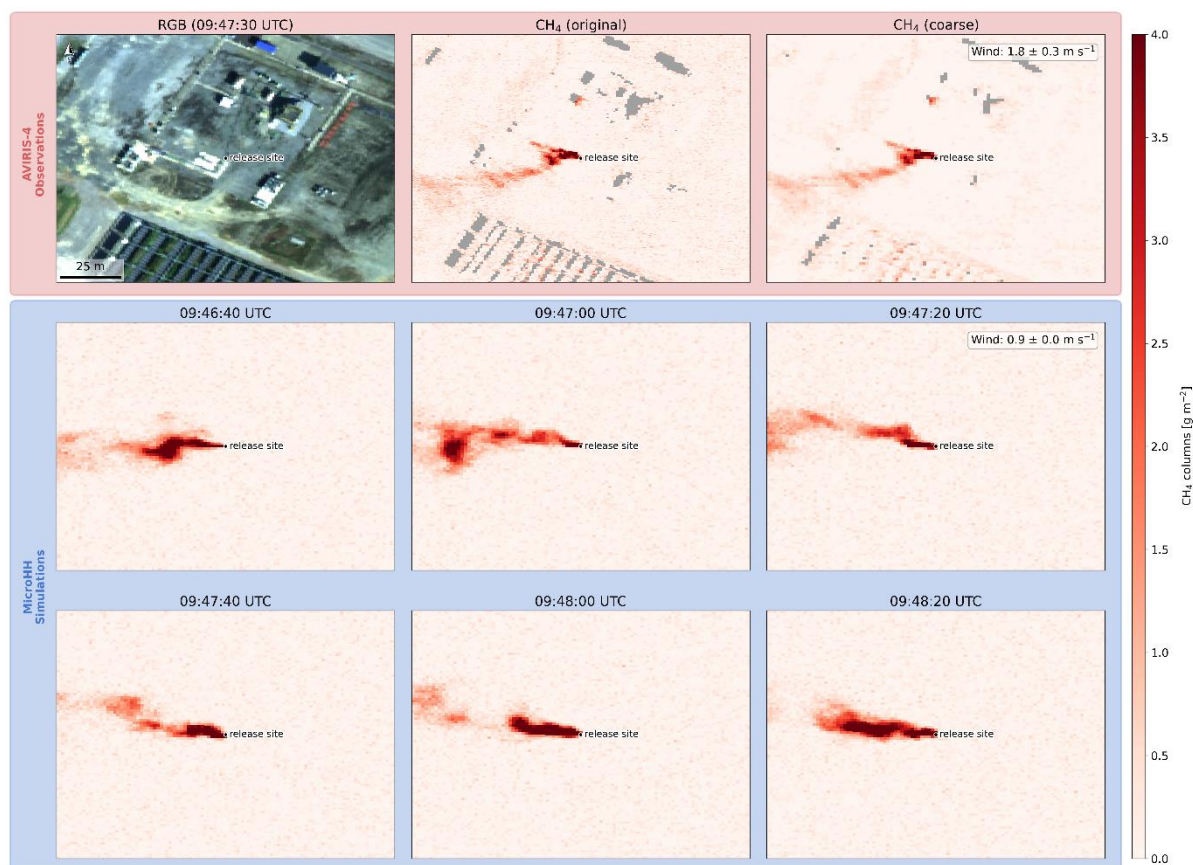


Figure S15: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 09:47 UTC during a release with 53 kg CH₄ h⁻¹.

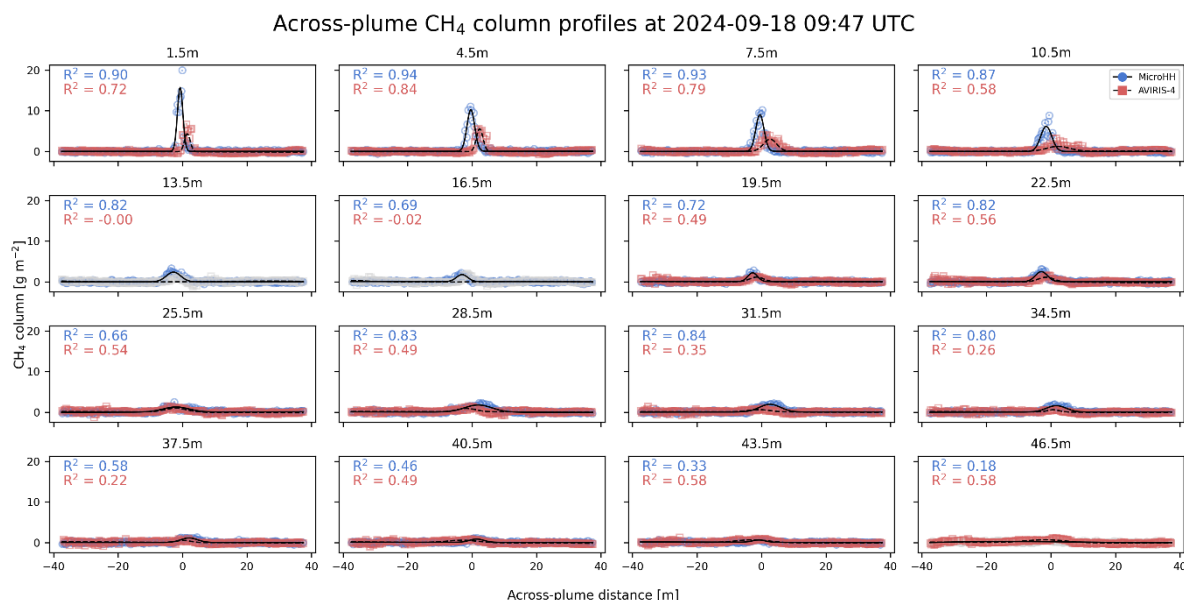


Figure S16: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 09:47 UTC during a release with 53 kg CH₄ h⁻¹.

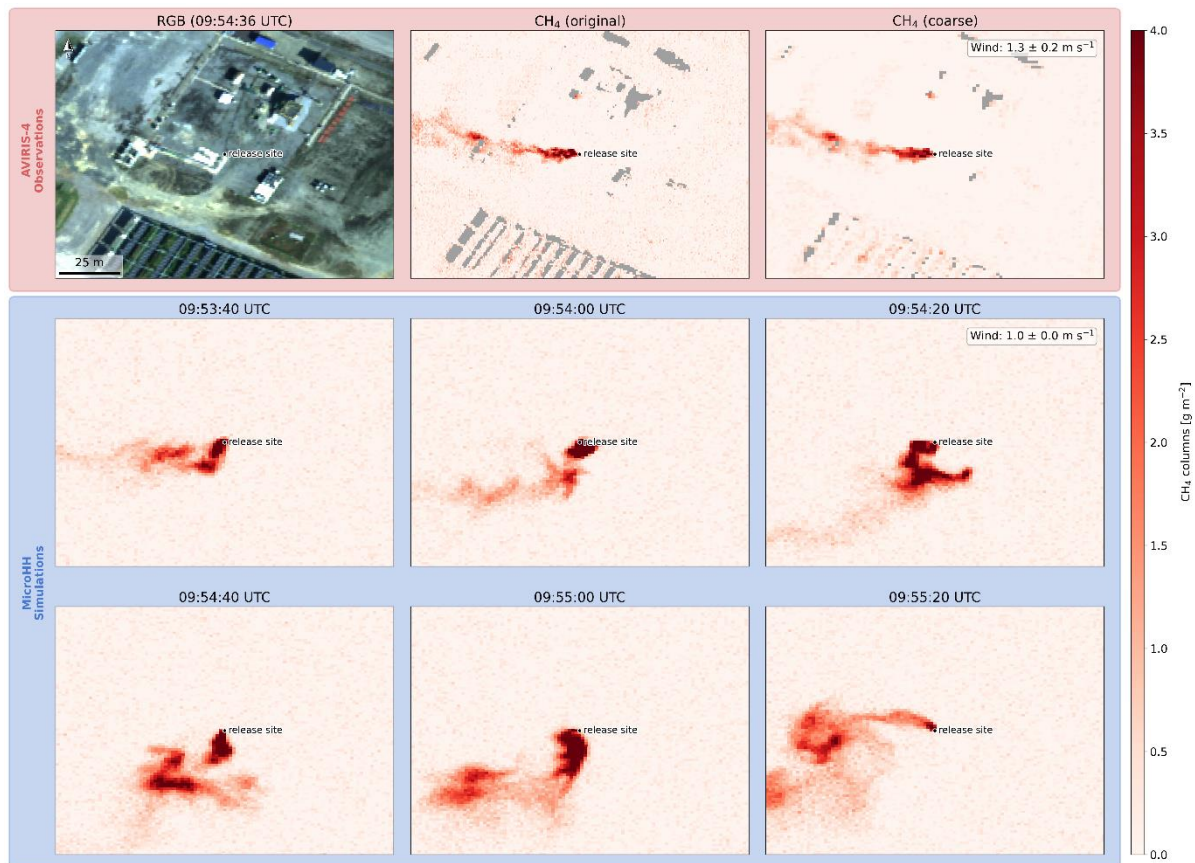


Figure S17: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 09:54 UTC during a release with 53 kg CH₄ h⁻¹.

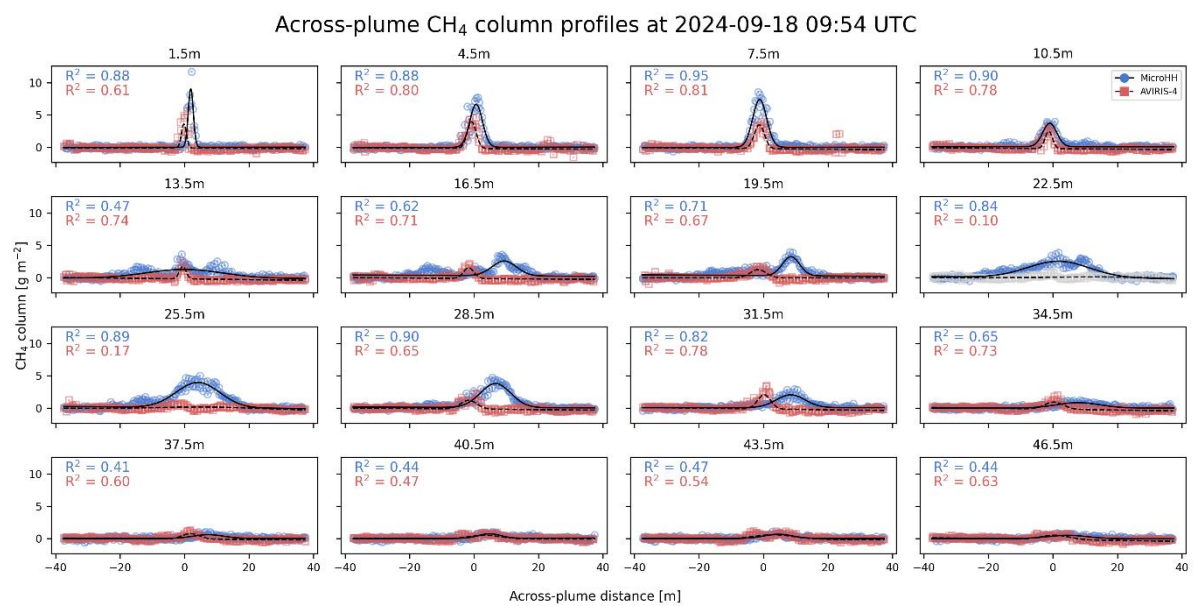


Figure S18: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 09:54 UTC during a release with 53 kg CH₄ h⁻¹.

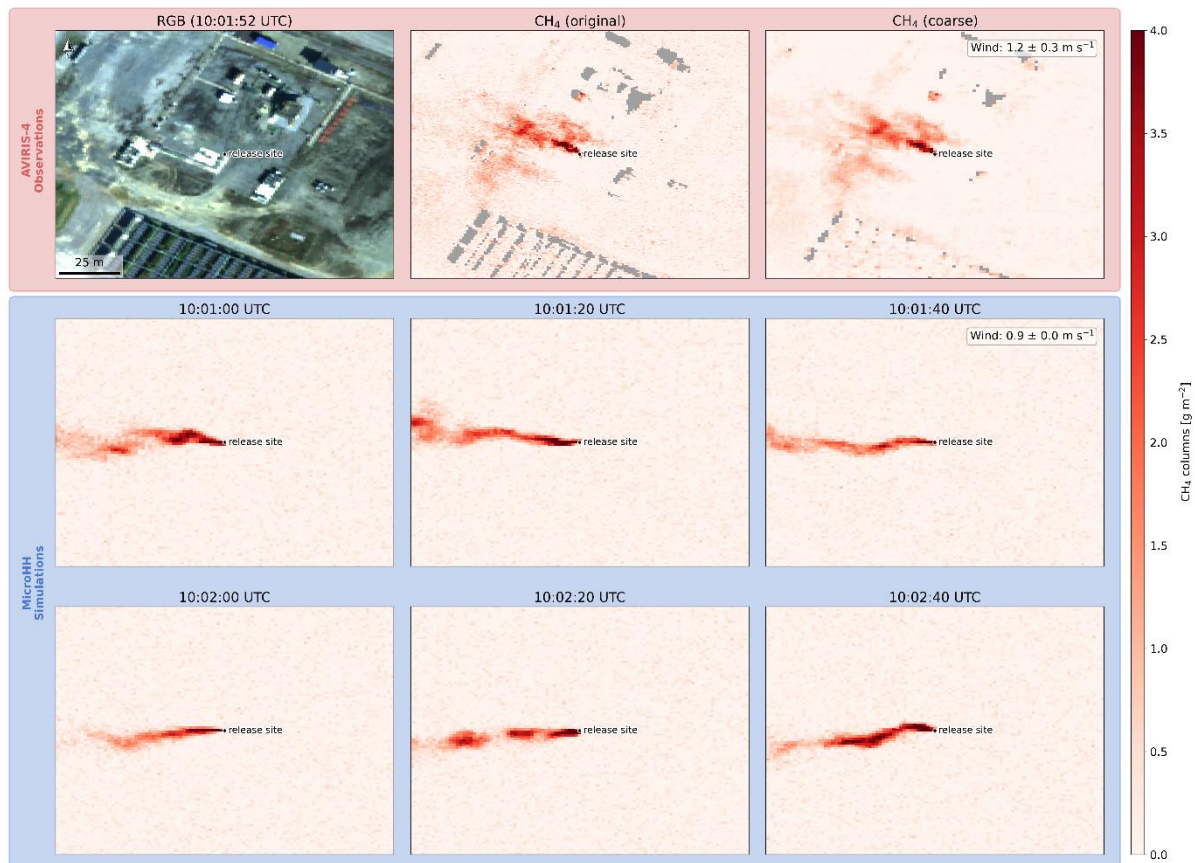


Figure S19: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 10:01 UTC during a release with 53 kg CH₄ h⁻¹.

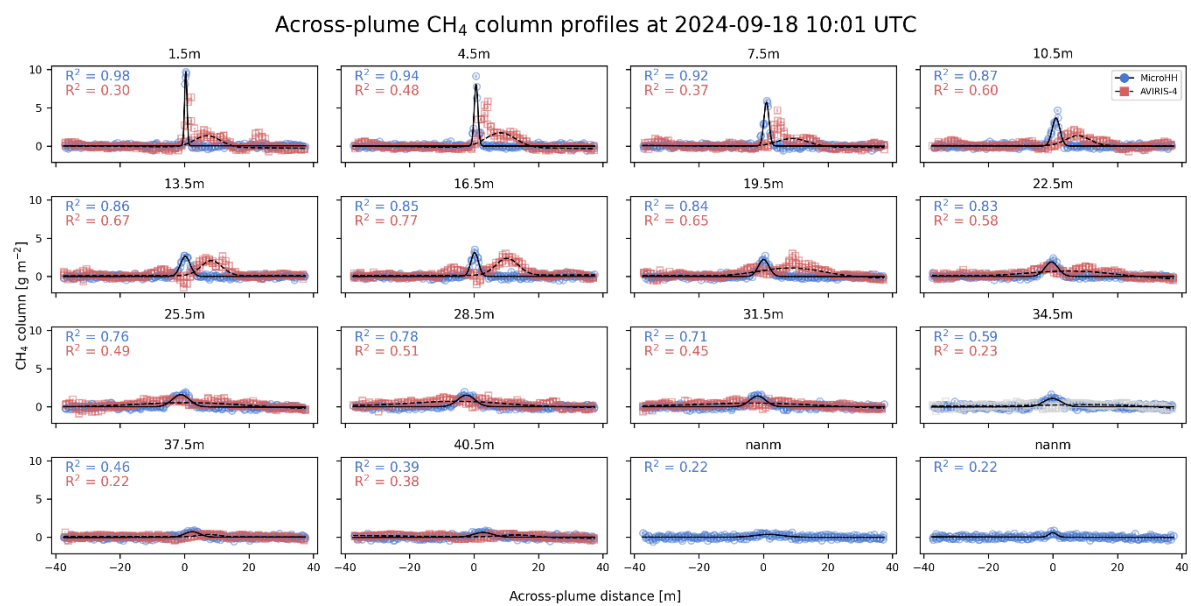


Figure S20: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 10:01 UTC during a release with 53 kg CH₄ h⁻¹.

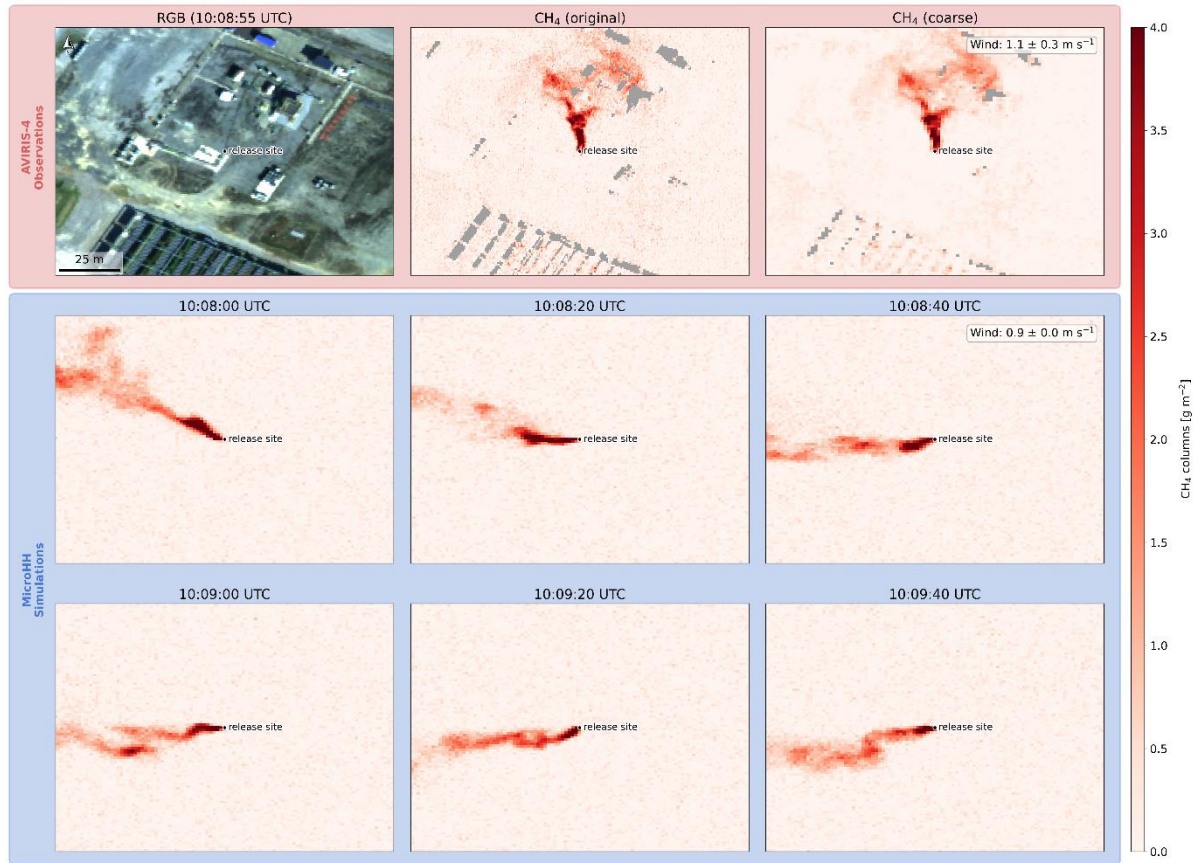


Figure S21: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 10:08 UTC during a release with 53 kg CH₄ h⁻¹.

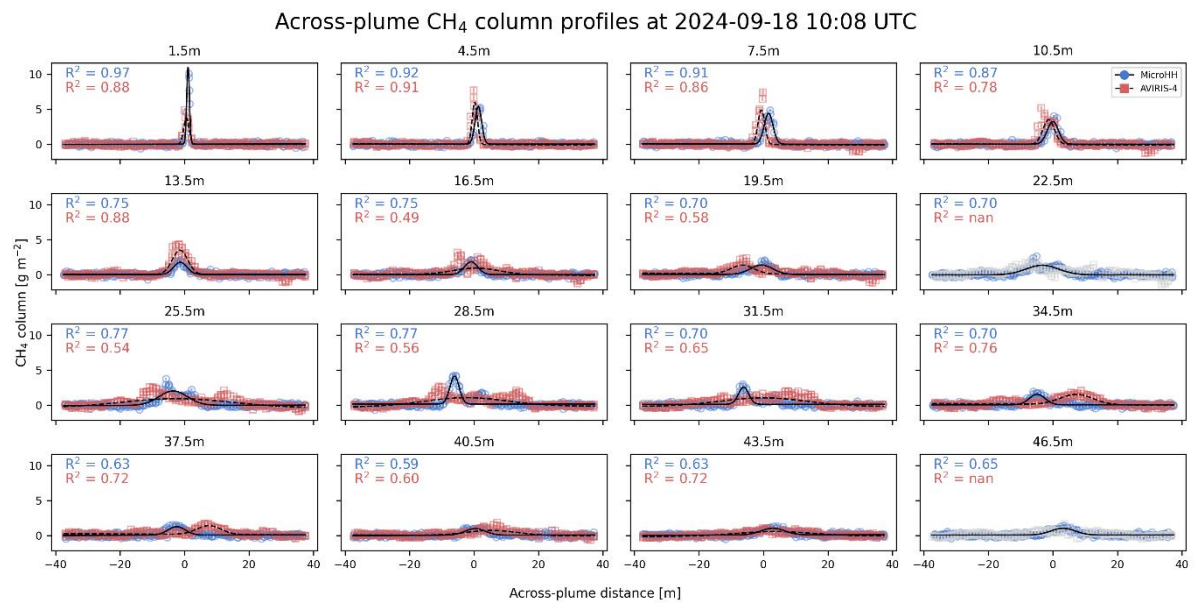


Figure S22: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 10:08 UTC during a release with 53 kg CH₄ h⁻¹.

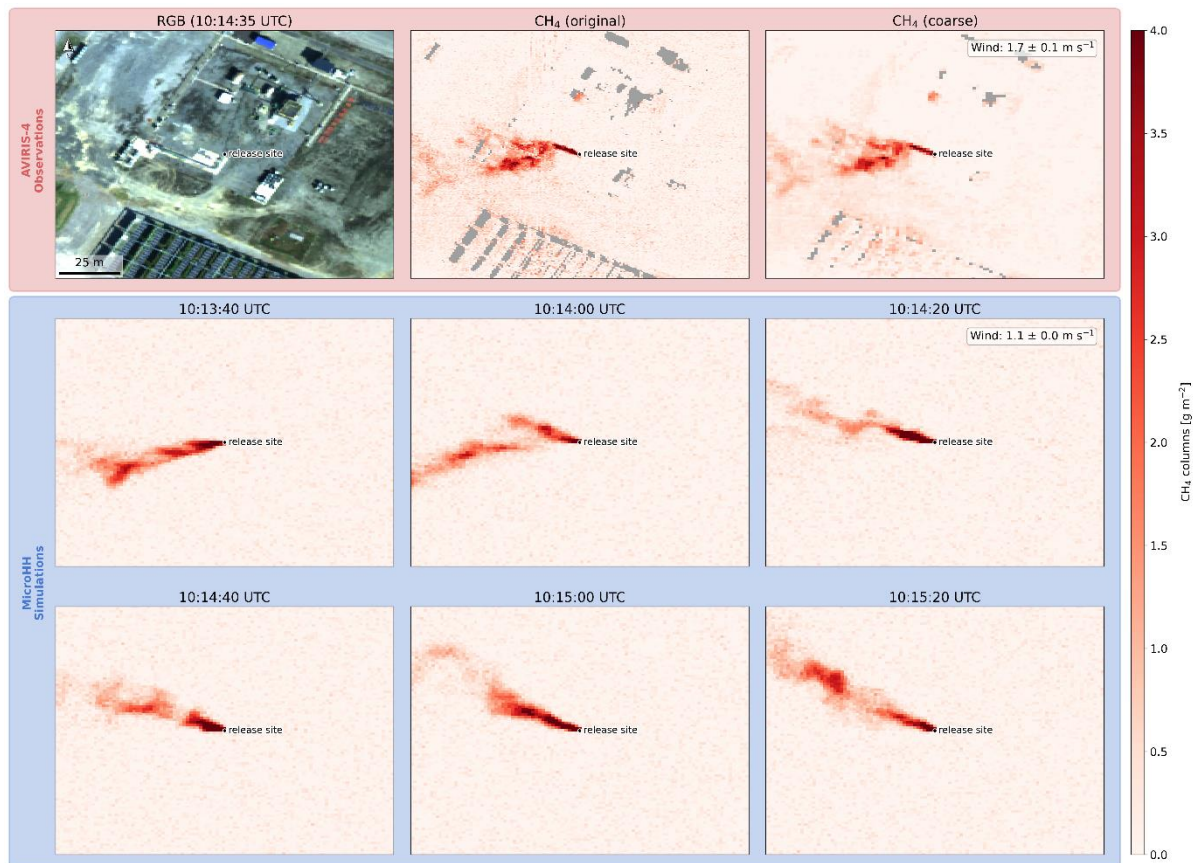


Figure S23: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 10:14 UTC during a release with 53 kg CH₄ h⁻¹.

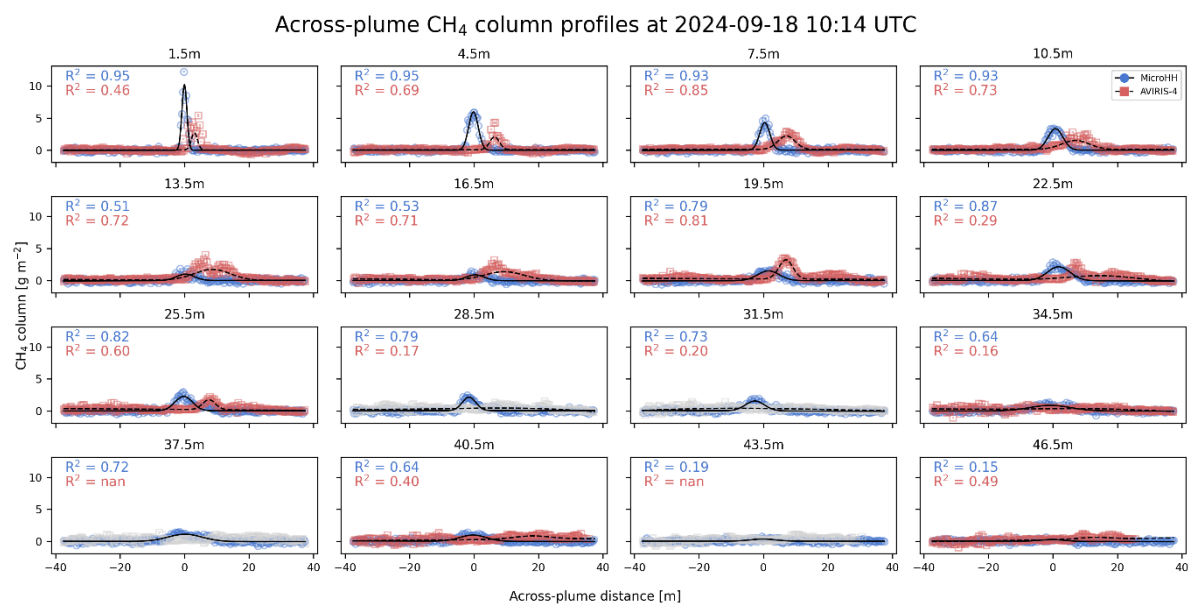


Figure S24: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 10:14 UTC during a release with 53 kg CH₄ h⁻¹.

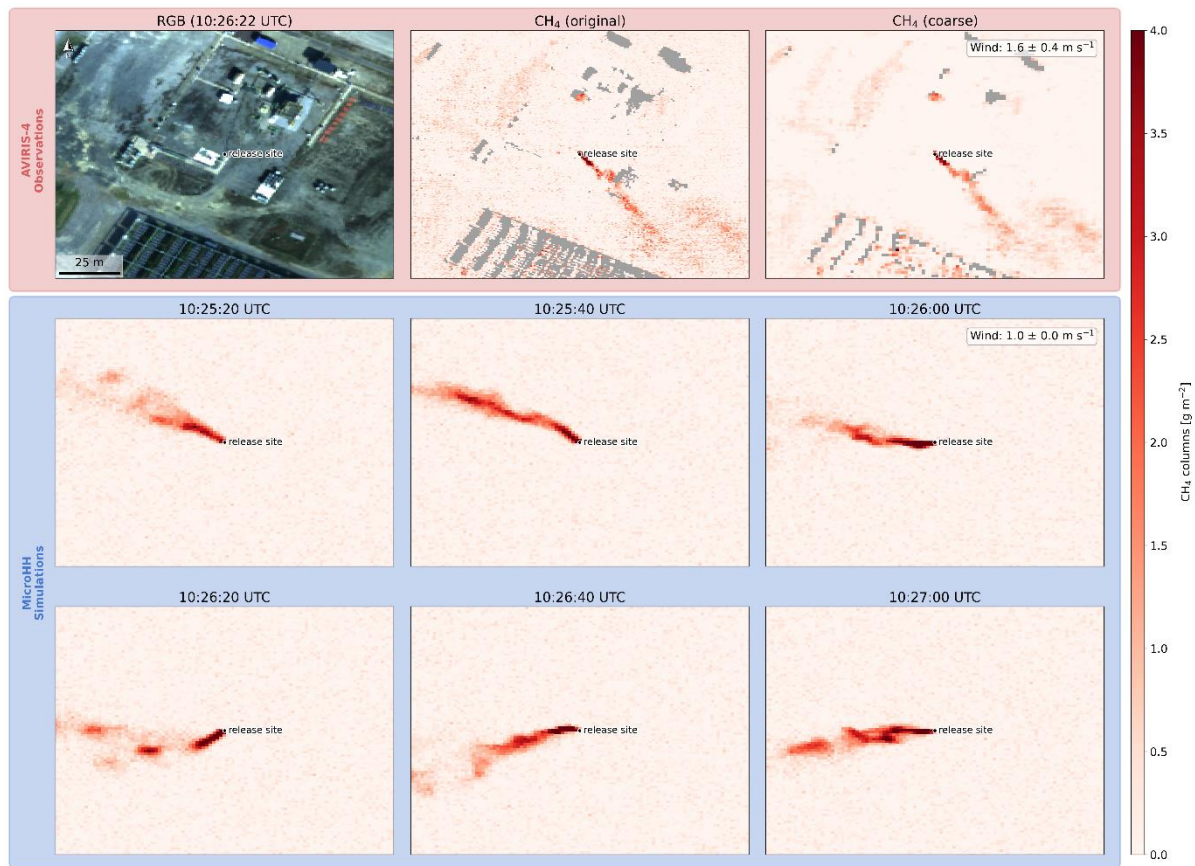


Figure S25: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 10:26 UTC during a release with 53 kg CH₄ h⁻¹.

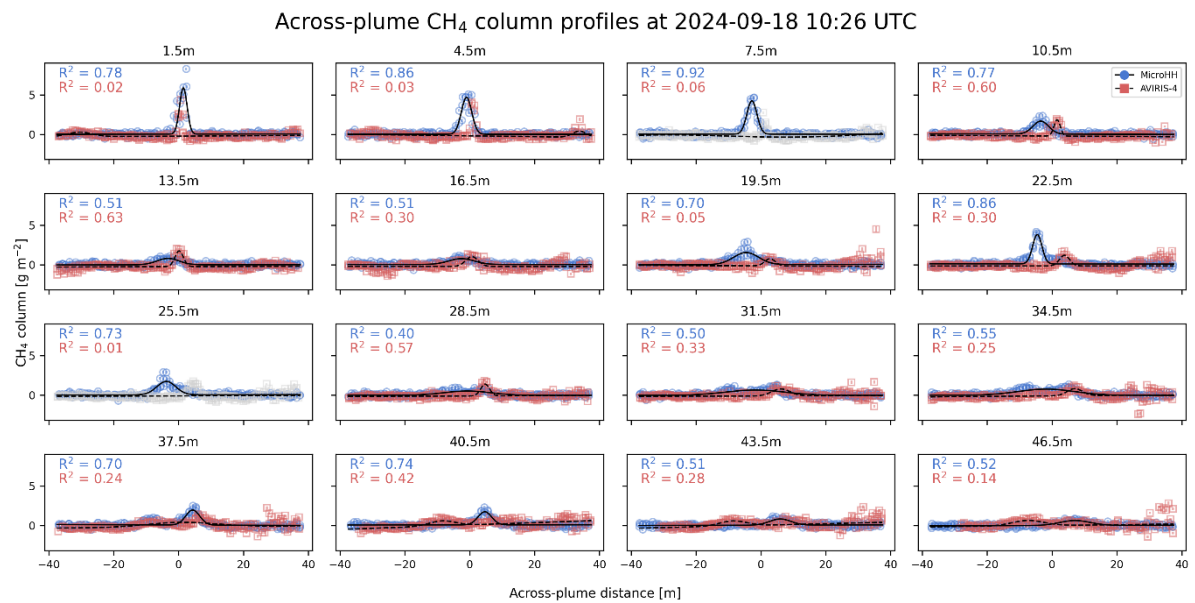


Figure S26: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 10:26 UTC during a release with 53 kg CH₄ h⁻¹.

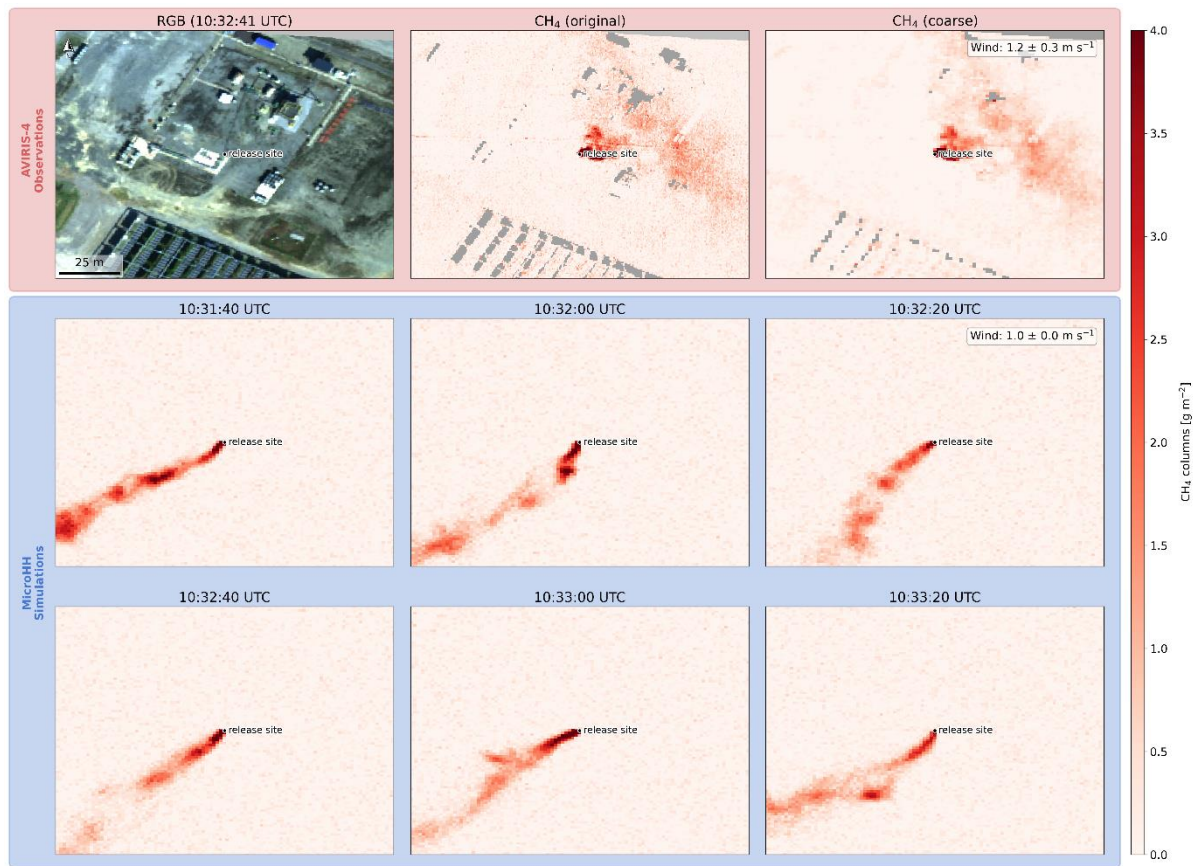


Figure S27: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 10:32 UTC during a release with 53 kg CH₄ h⁻¹.

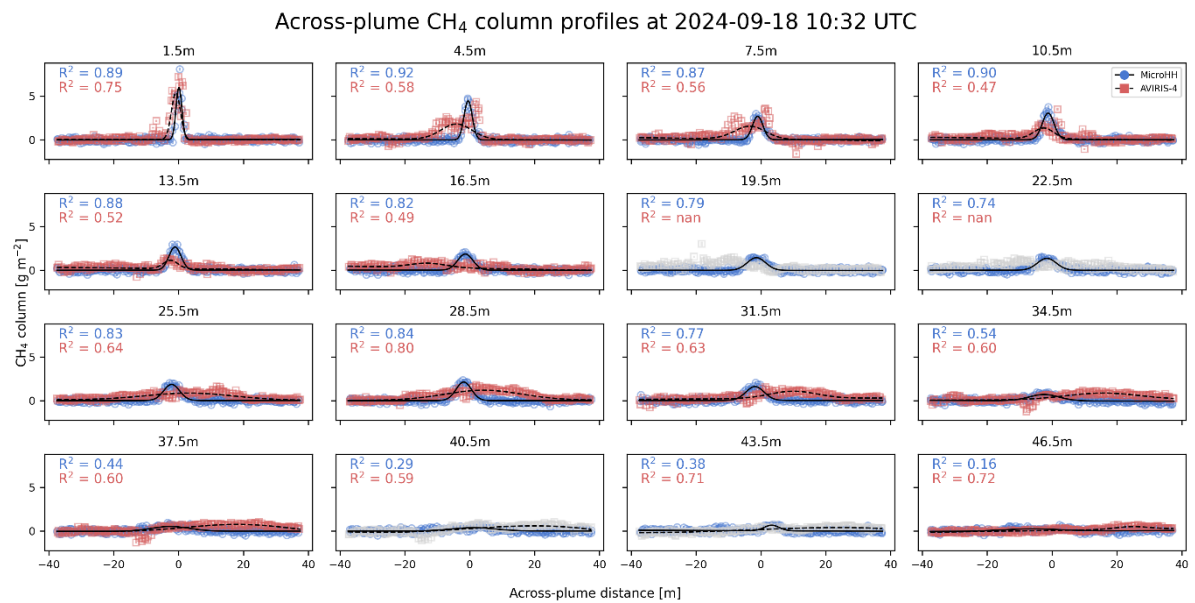


Figure S28: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 10:32 UTC during a release with 53 kg CH₄ h⁻¹.

Release 290 kg h⁻¹

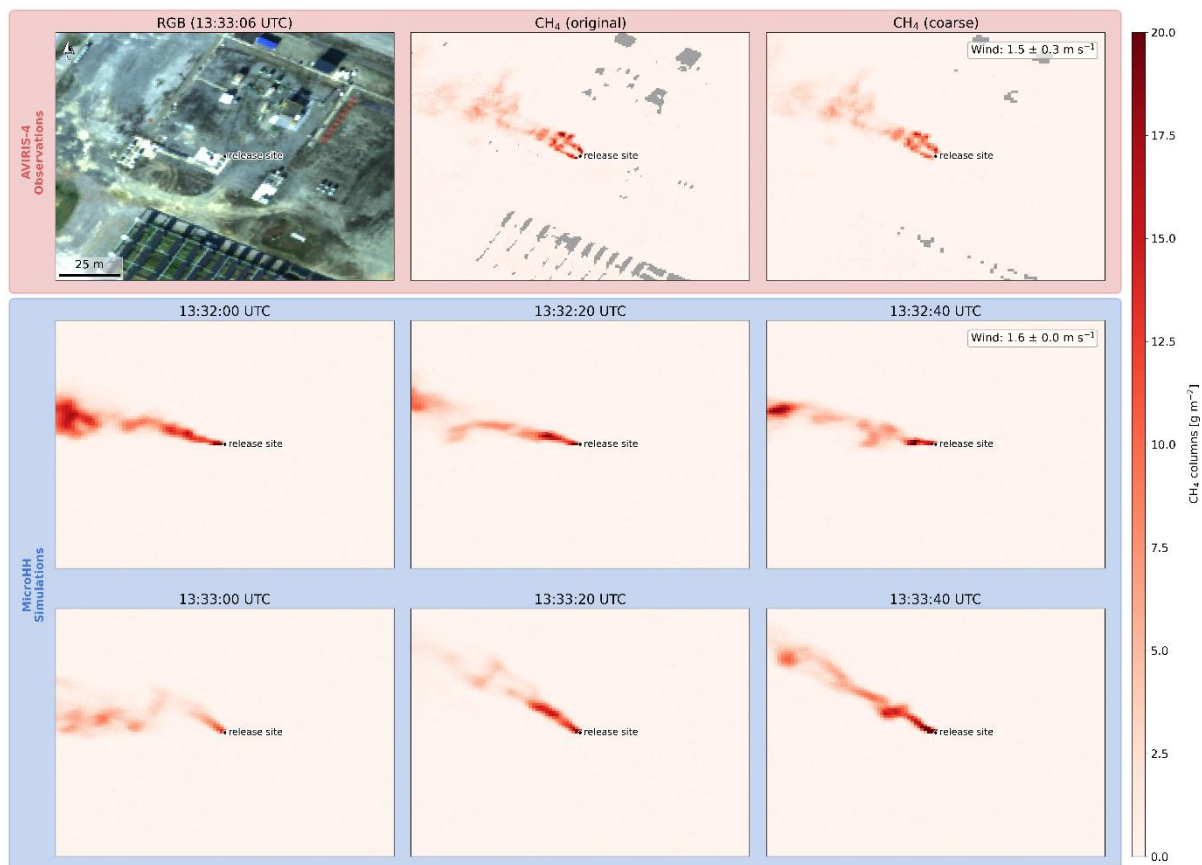


Figure S29: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 13:33 UTC during a release with 290 kg CH₄ h⁻¹.

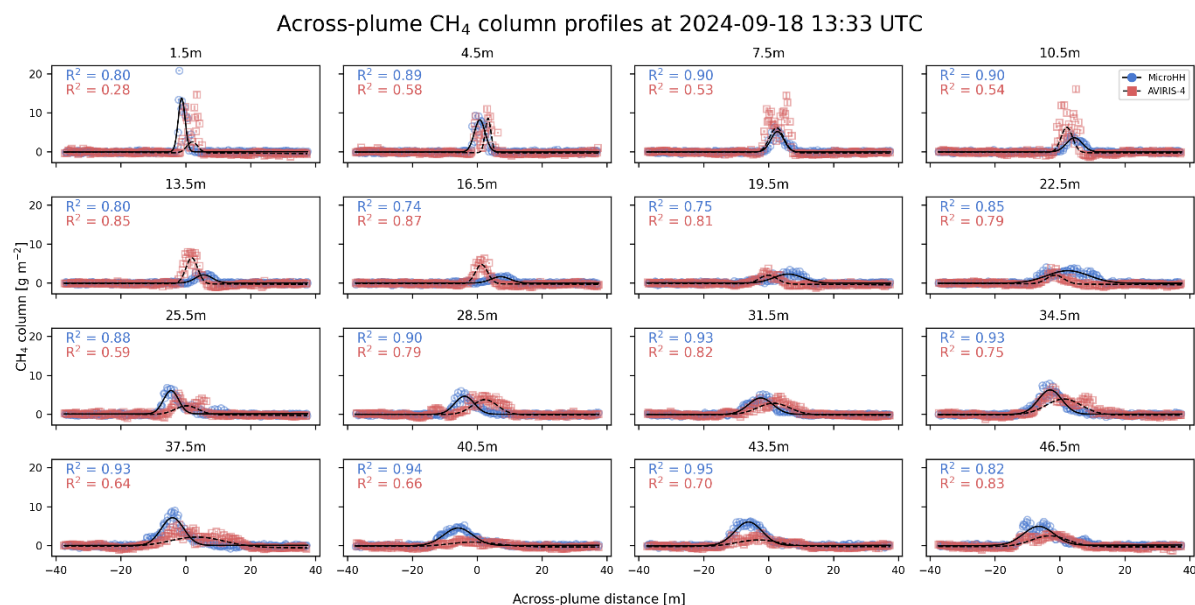


Figure S30: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 13:33 UTC during a release with 290 kg CH₄ h⁻¹.

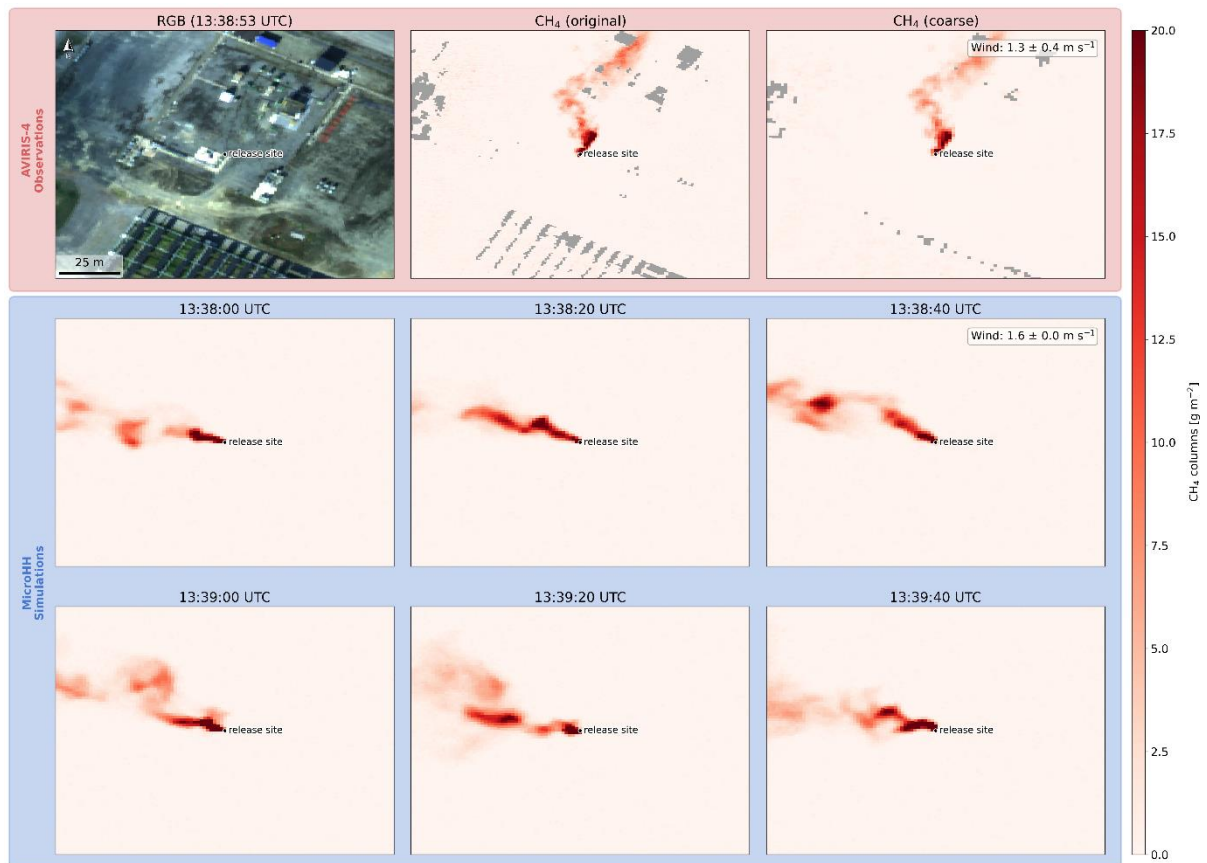


Figure S31: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 13:38 UTC during a release with 290 kg CH₄ h⁻¹.

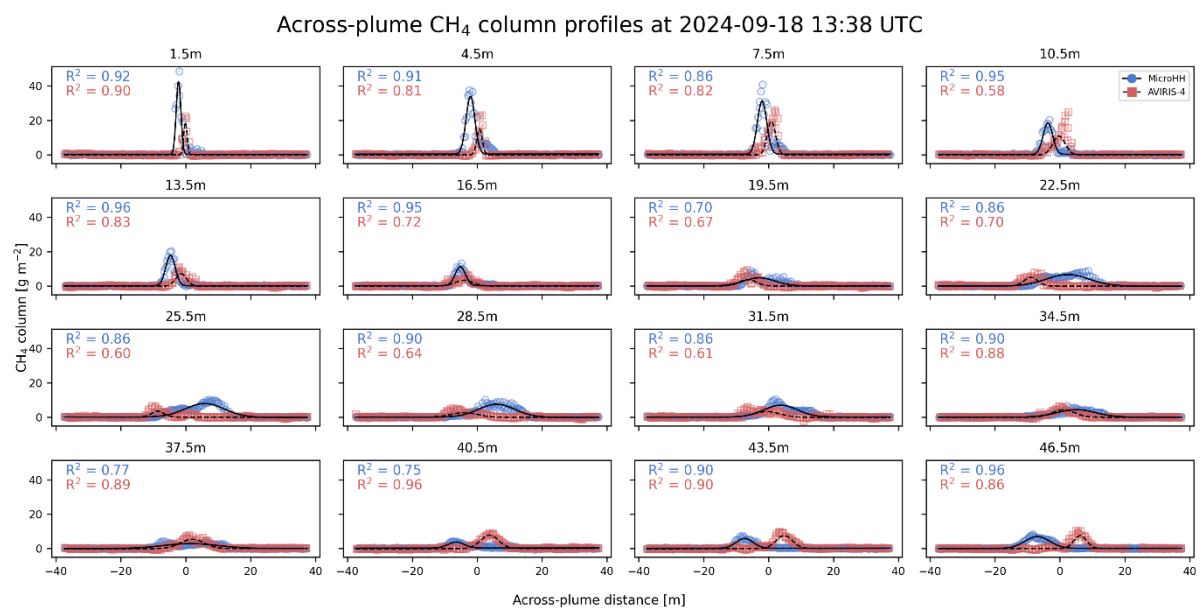


Figure S32: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 13:38 UTC during a release with 290 kg CH₄ h⁻¹.

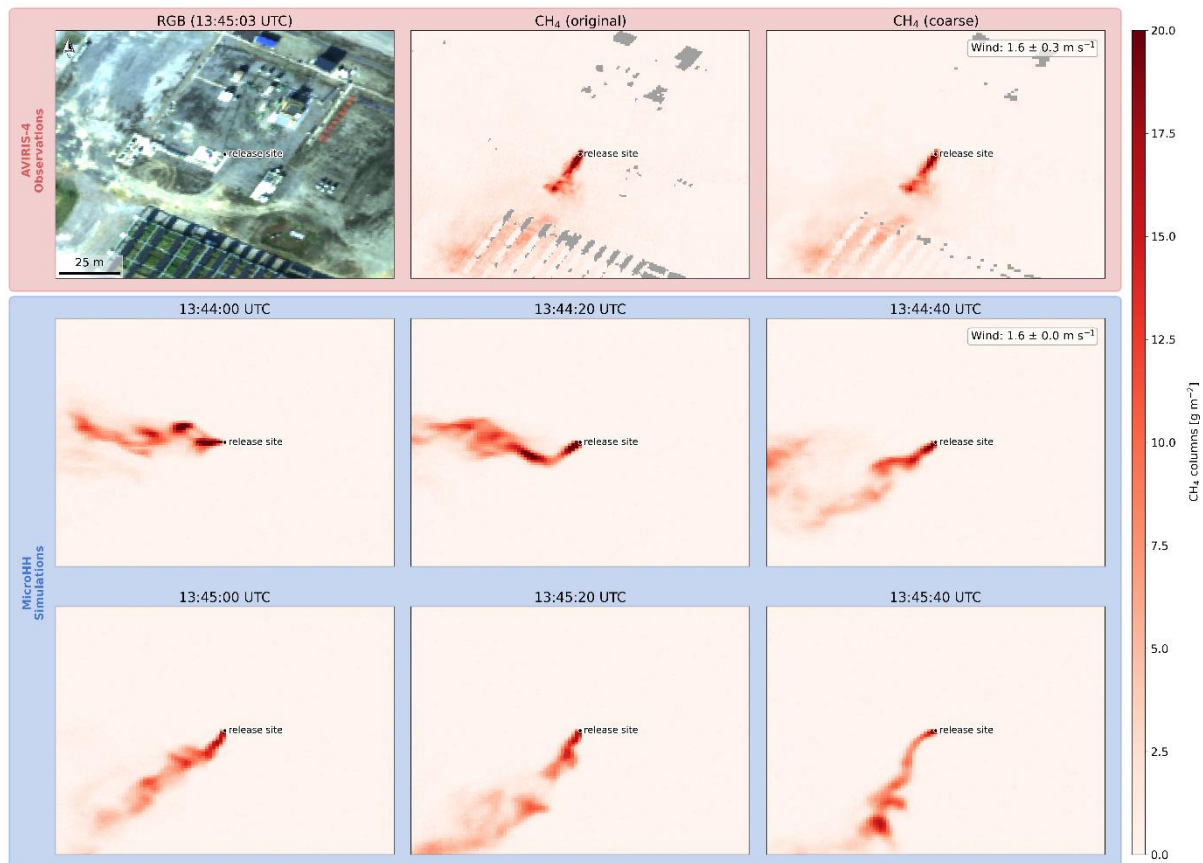


Figure S33: Observed and modelled CH_4 maps for the AVIRIS-4 overpass on the 18.09.2024 at 13:45 UTC during a release with $290 \text{ kg CH}_4 \text{ h}^{-1}$.

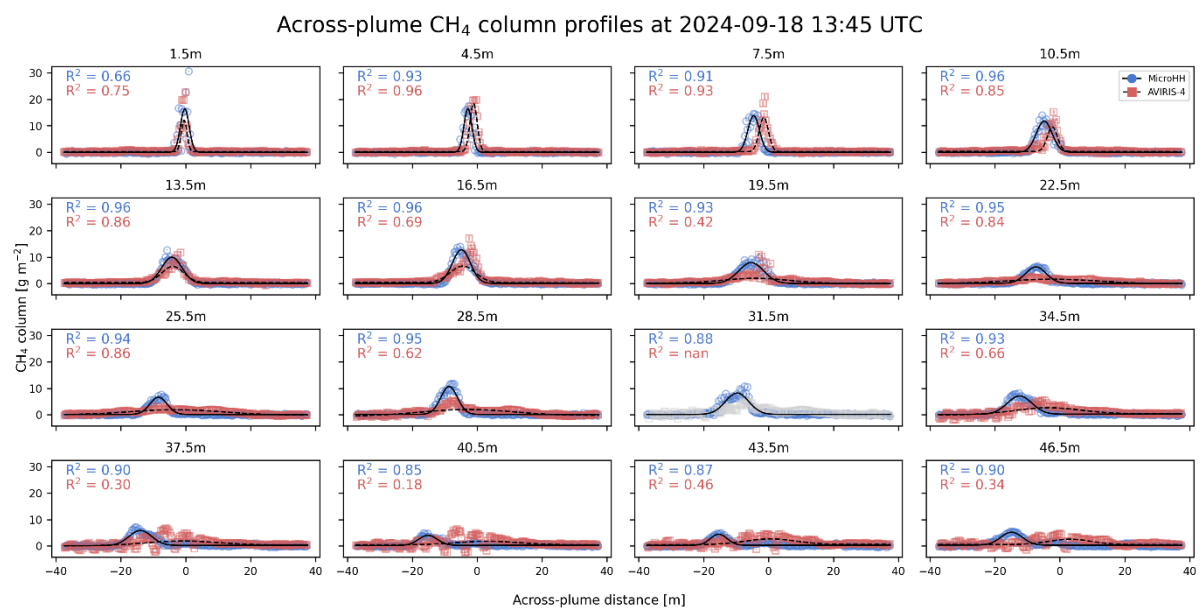


Figure S34: Across-plume CH_4 cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 13:45 UTC during a release with $290 \text{ kg CH}_4 \text{ h}^{-1}$.

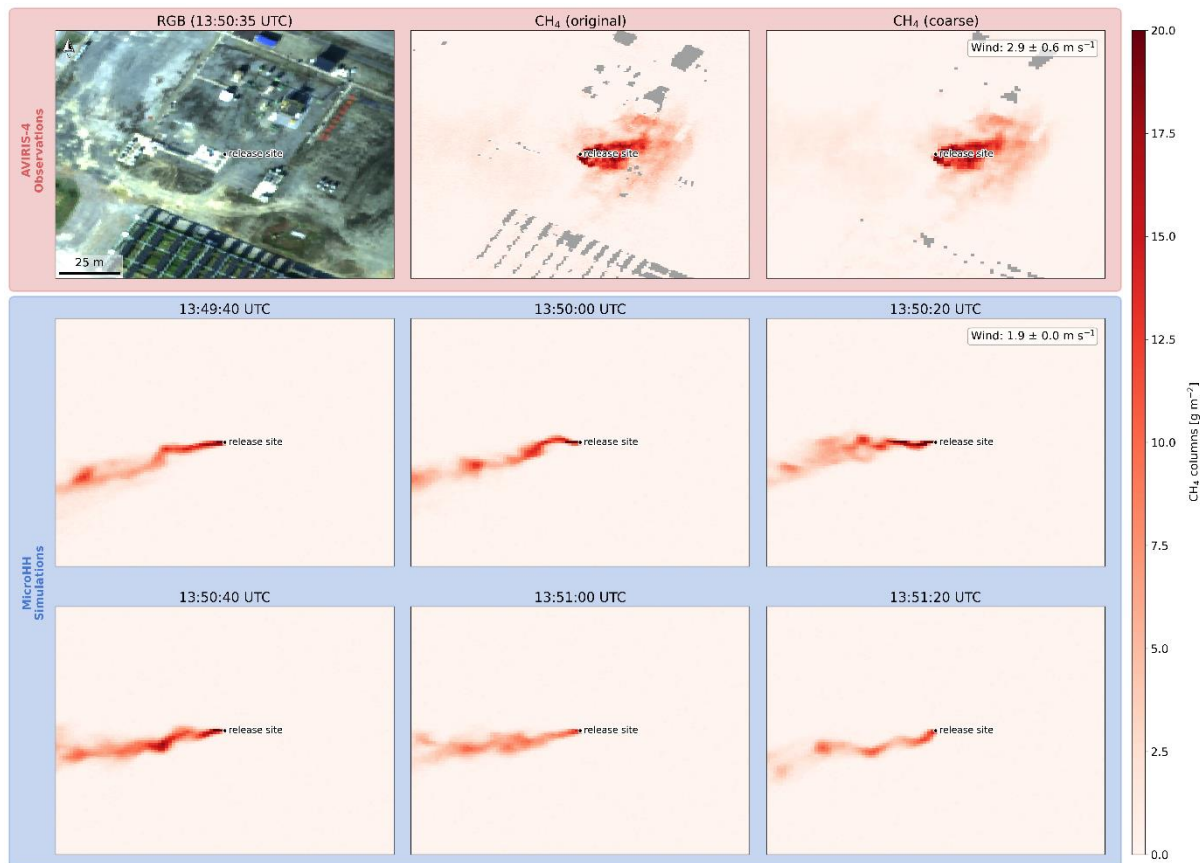


Figure S35: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 13:50 UTC during a release with 290 kg CH₄ h⁻¹.

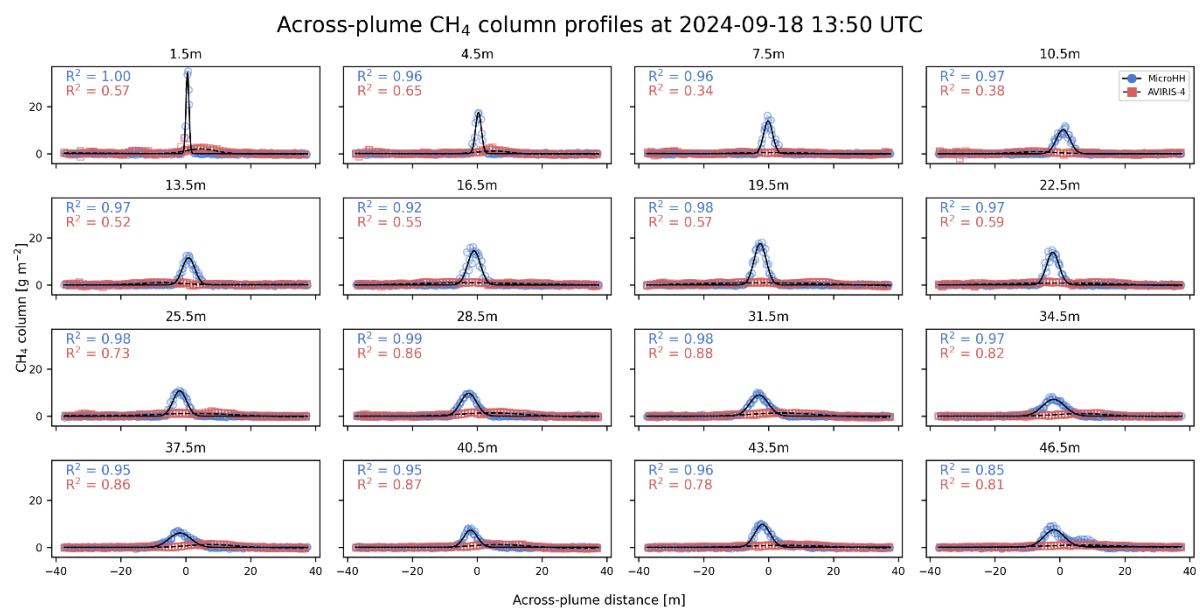


Figure S36: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 13:50 UTC during a release with 290 kg CH₄ h⁻¹.

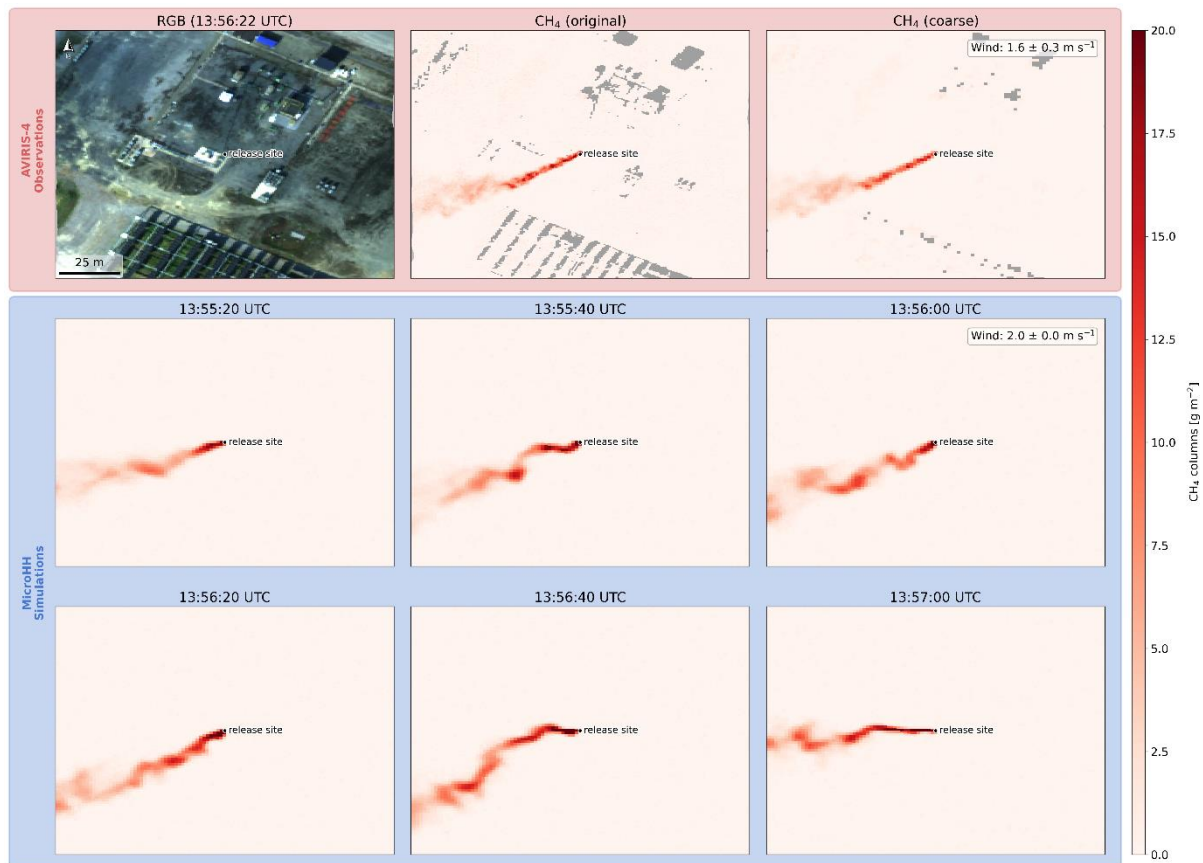


Figure S37: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 13:56 UTC during a release with 290 kg CH₄ h⁻¹.

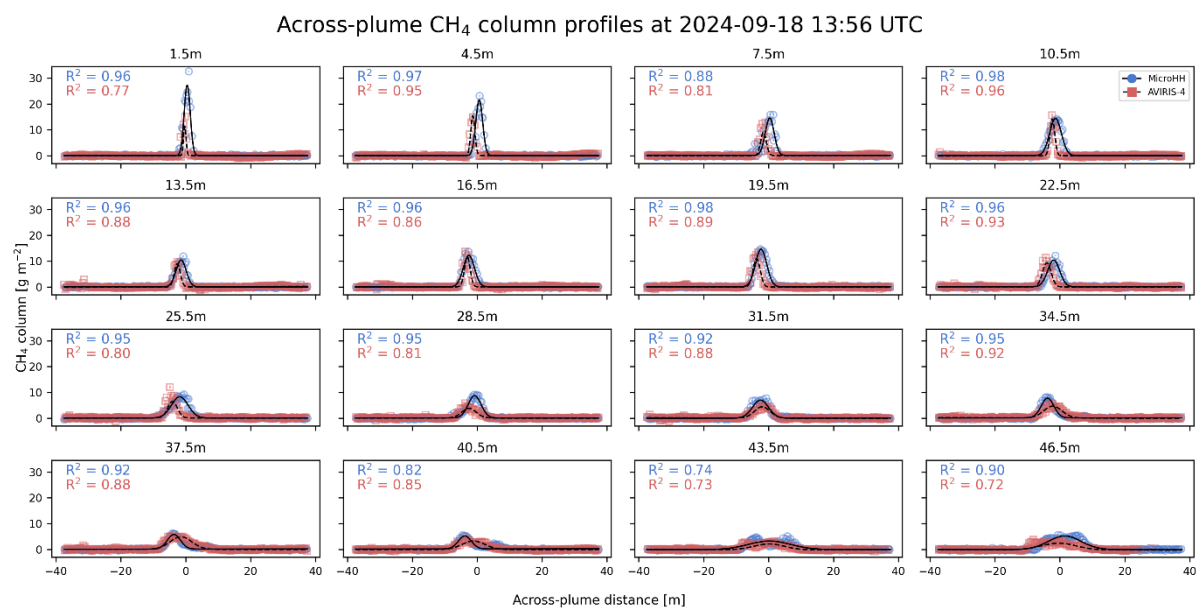


Figure S38: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 13:56 UTC during a release with 290 kg CH₄ h⁻¹.

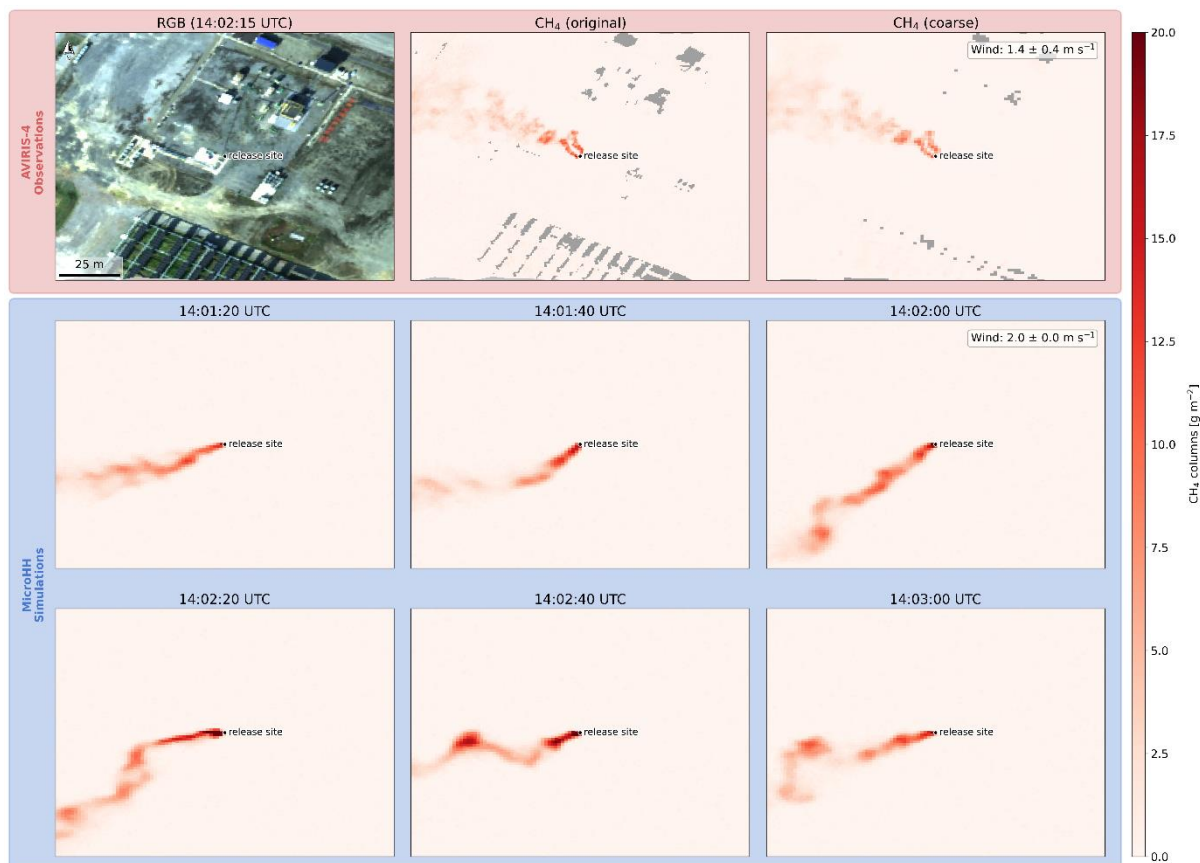


Figure S39: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 14:02 UTC during a release with 290 kg CH₄ h⁻¹.

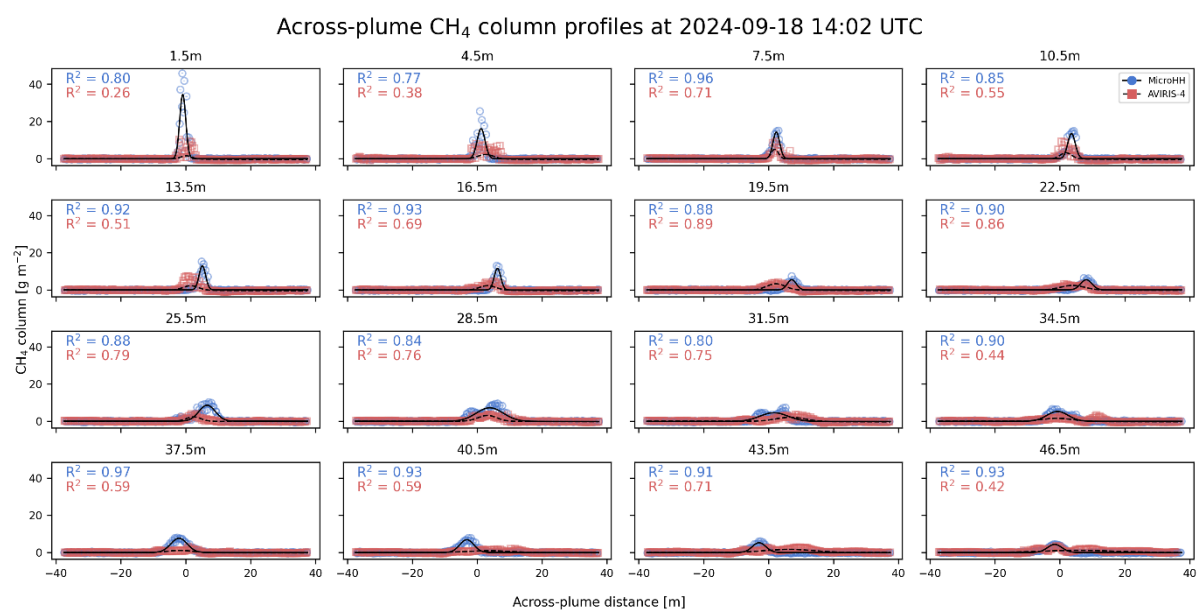


Figure S40: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 14:02 UTC during a release with 290 kg CH₄ h⁻¹.

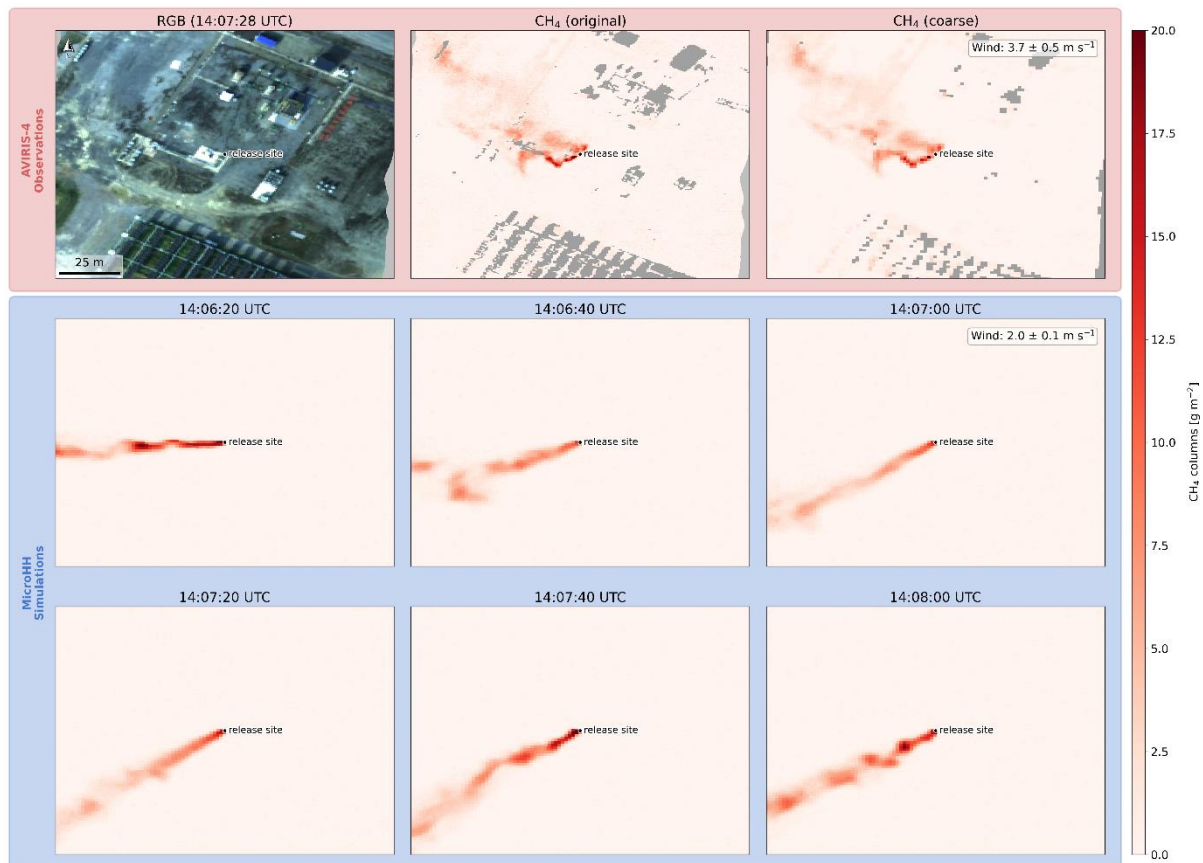


Figure S41: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 18.09.2024 at 14:07 UTC during a release with 290 kg CH₄ h⁻¹.

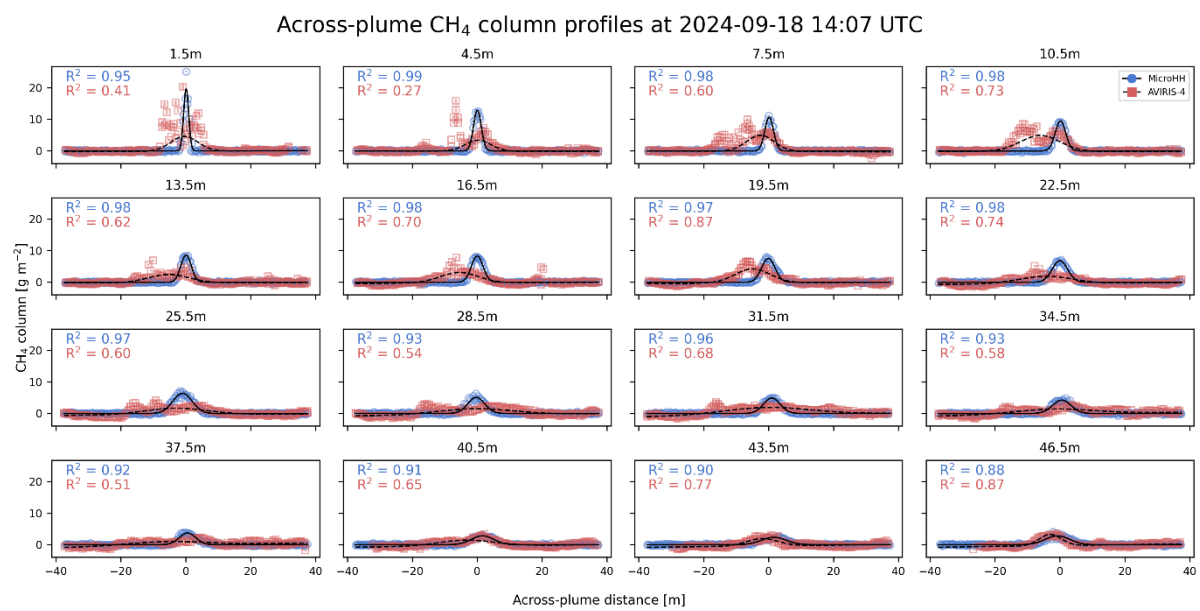


Figure S42: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 14:07 UTC during a release with 290 kg CH₄ h⁻¹.

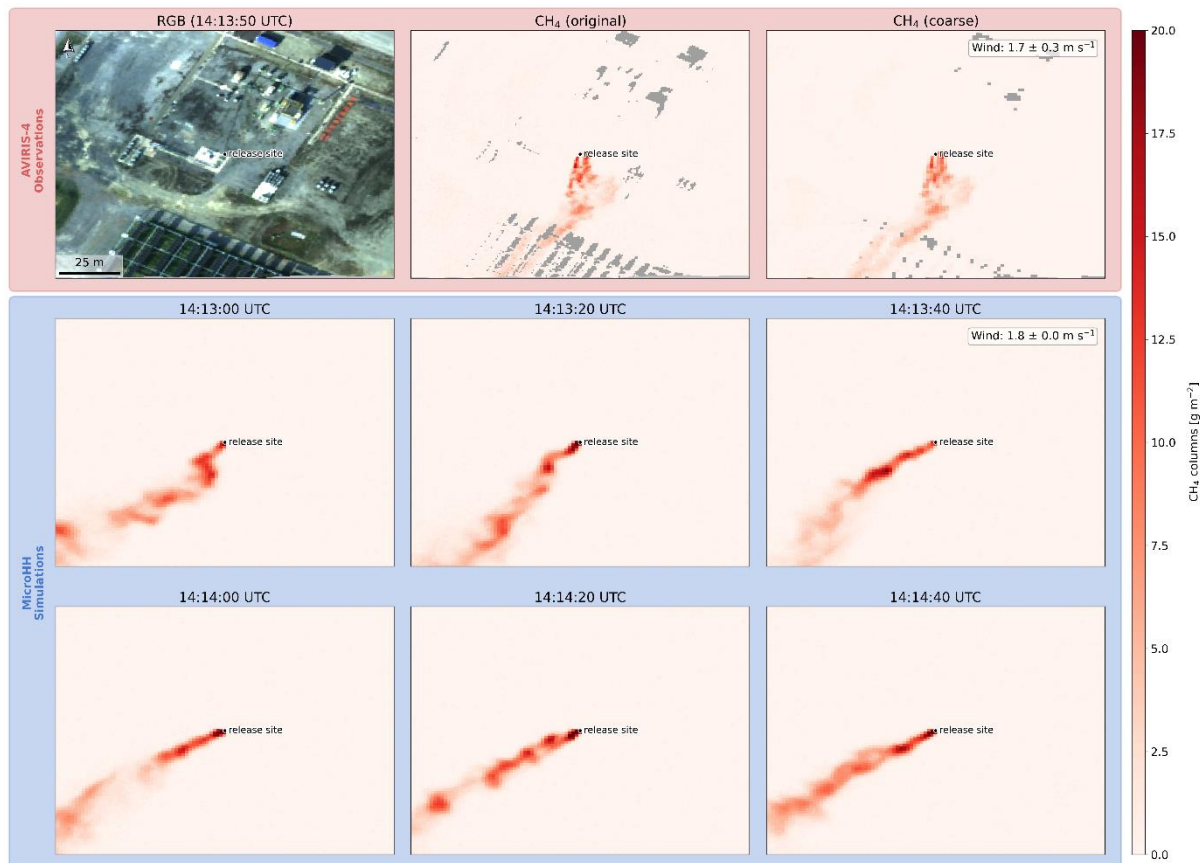


Figure S43: Observed and modelled CH_4 maps for the AVIRIS-4 overpass on the 18.09.2024 at 14:13 UTC during a release with $290 \text{ kg CH}_4 \text{ h}^{-1}$.

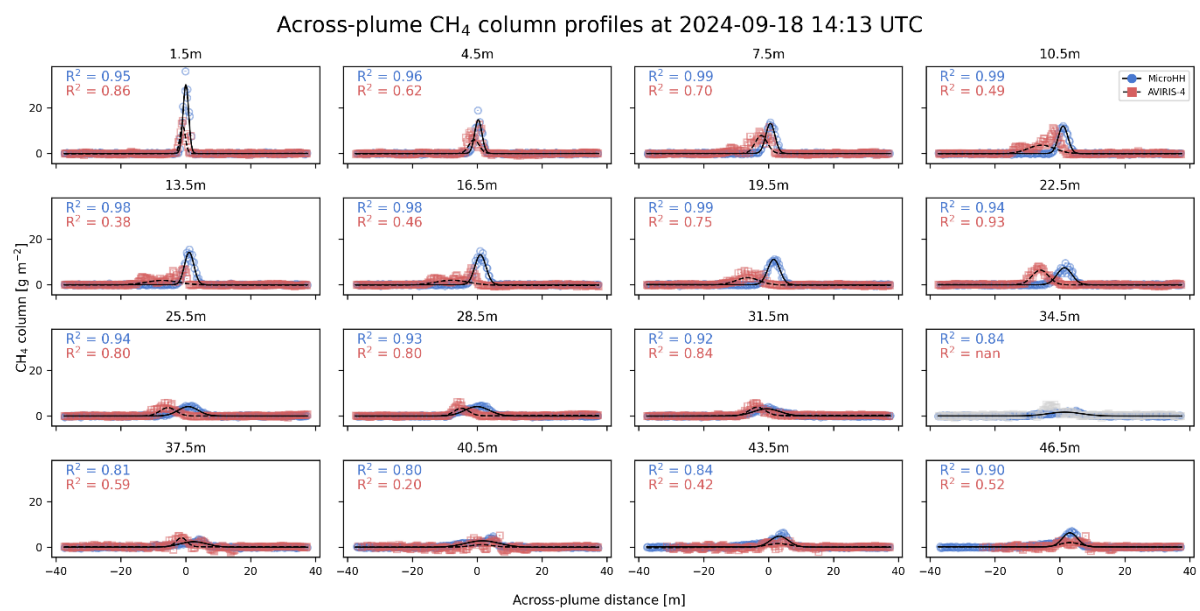


Figure S44: Across-plume CH_4 cross-sections for the AVIRIS-4 overpass on the 18.09.2024 at 14:13 UTC during a release with $290 \text{ kg CH}_4 \text{ h}^{-1}$.

Release 80 kg h⁻¹

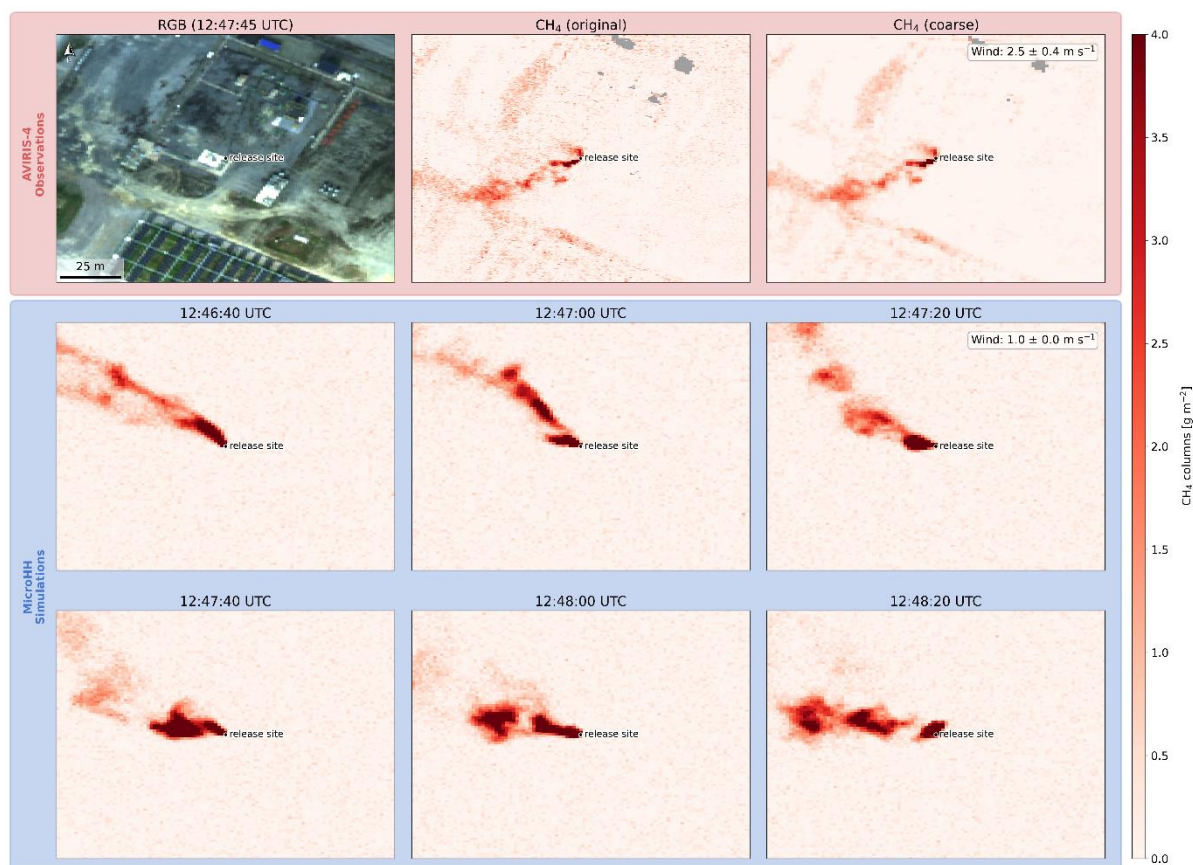


Figure S45: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 19.09.2024 at 12:47 UTC during a release with 80 kg CH₄ h⁻¹.

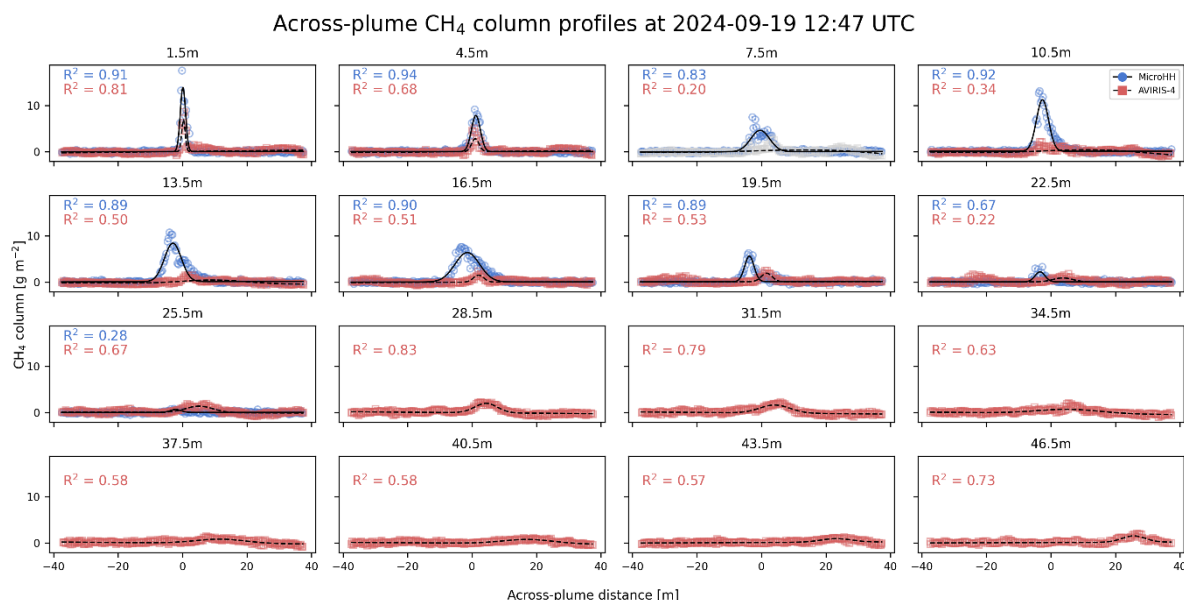


Figure S46: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 19.09.2024 at 12:47 UTC during a release with 80 kg CH₄ h⁻¹.

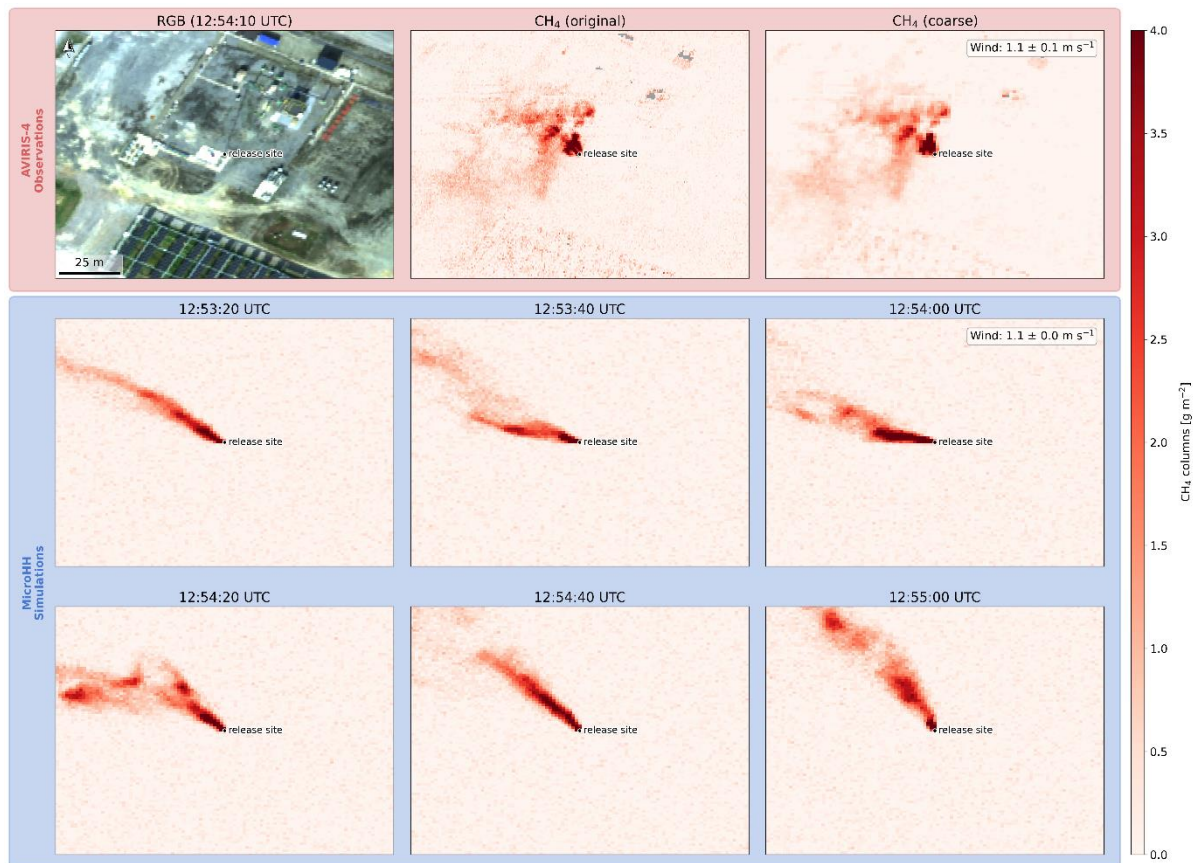


Figure S47: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 19.09.2024 at 12:54 UTC during a release with 80 kg CH₄ h⁻¹.

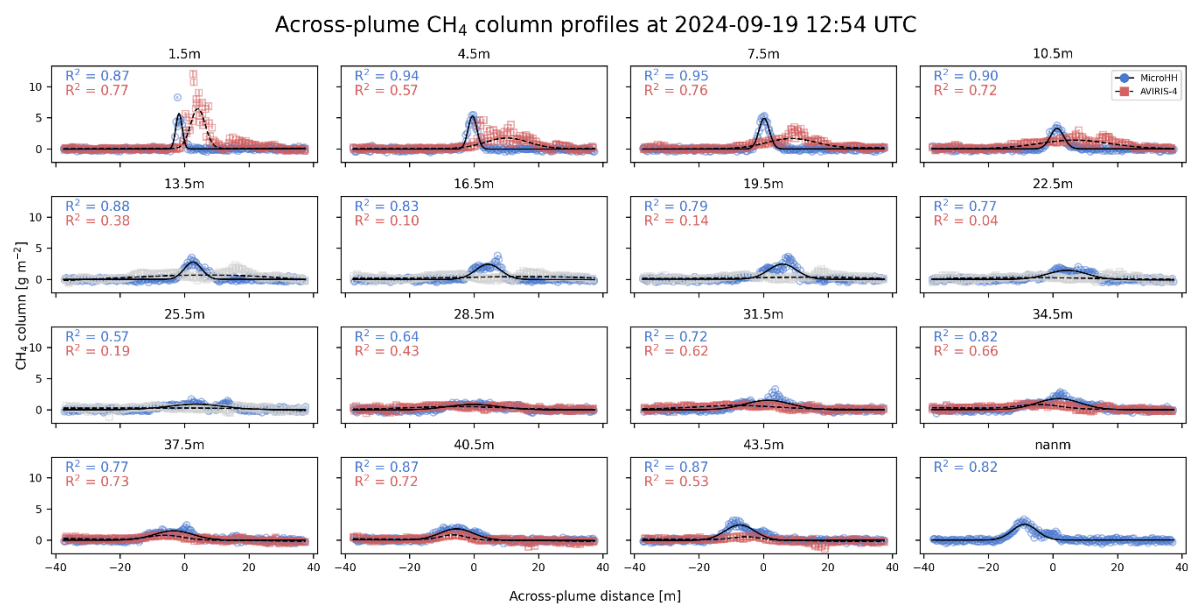


Figure S48: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 19.09.2024 at 12:54 UTC during a release with 80 kg CH₄ h⁻¹.

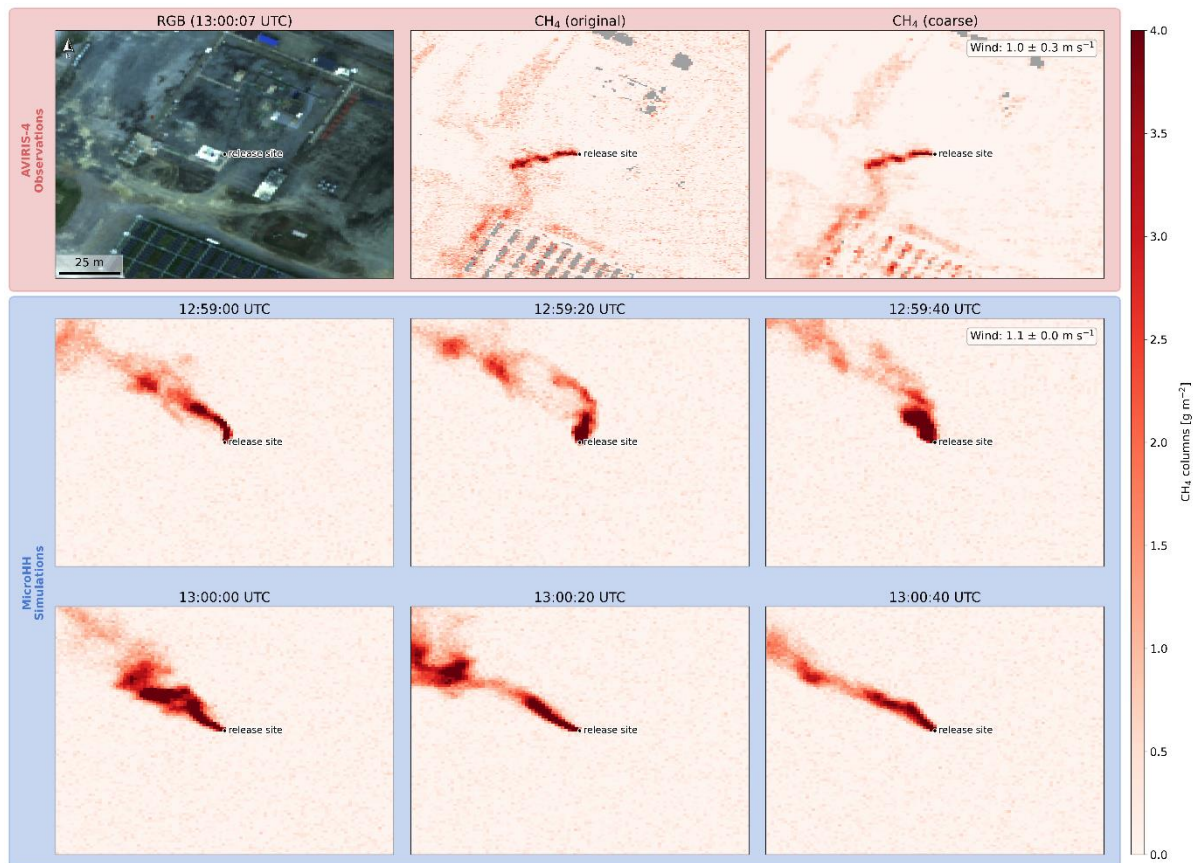


Figure S49: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 19.09.2024 at 13:00 UTC during a release with 80 kg CH₄ h⁻¹.

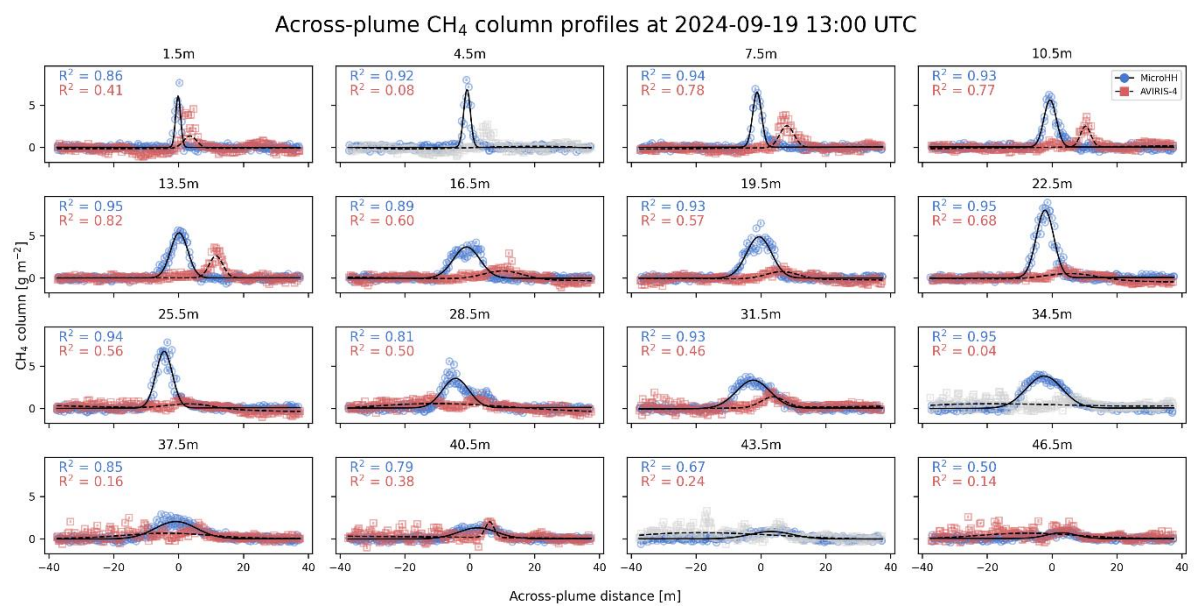


Figure S50: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 19.09.2024 at 13:00 UTC during a release with 80 kg CH₄ h⁻¹.

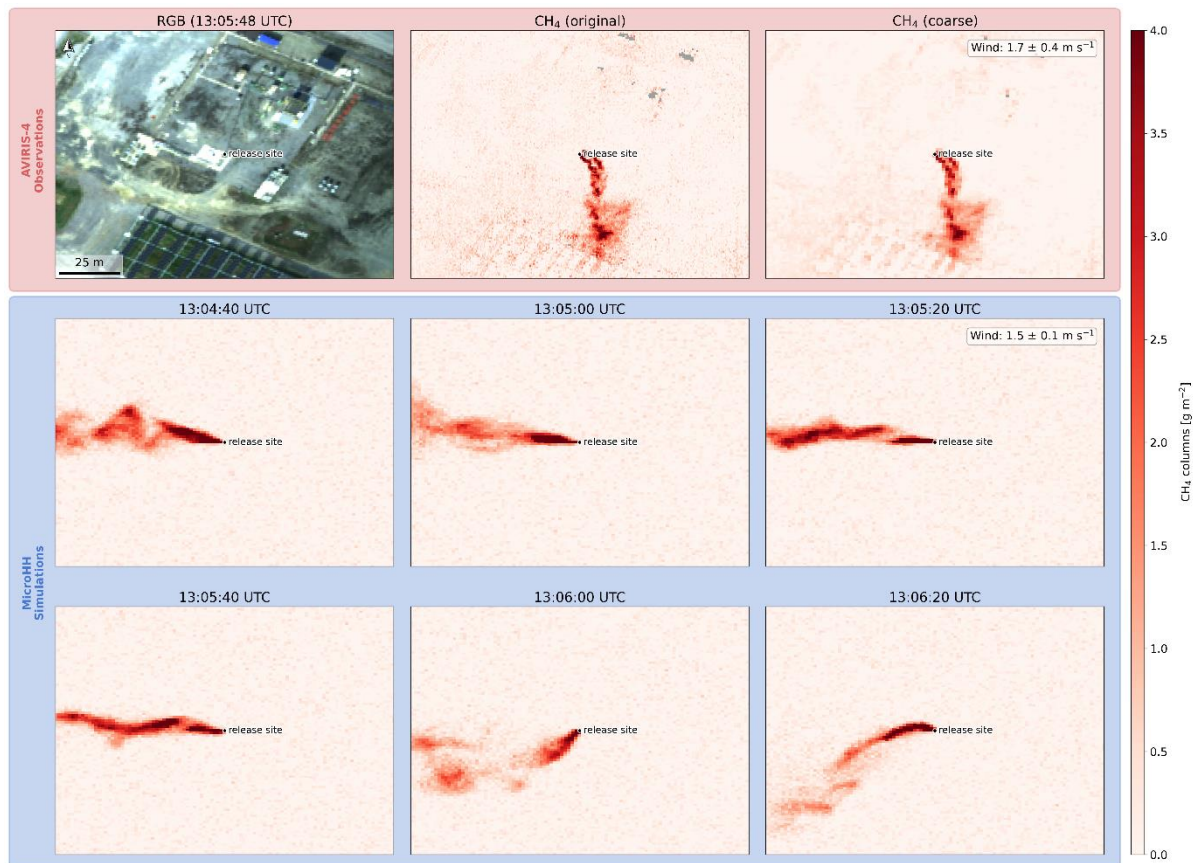


Figure S51: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 19.09.2024 at 13:05 UTC during a release with 80 kg CH₄ h⁻¹.

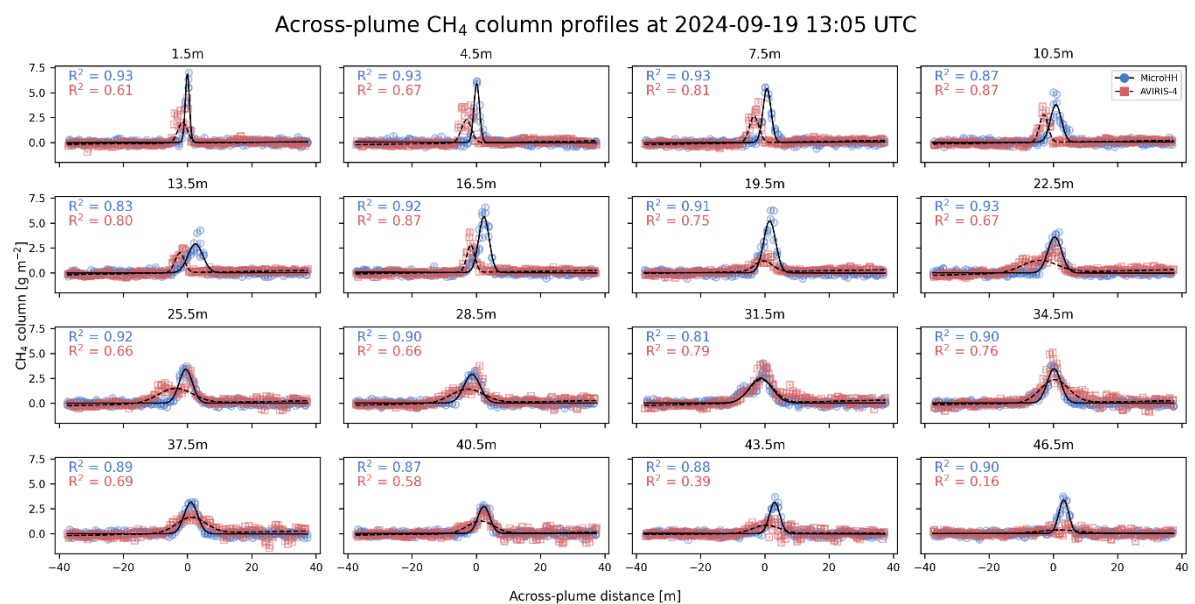


Figure S52: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 19.09.2024 at 13:05 UTC during a release with 80 kg CH₄ h⁻¹.

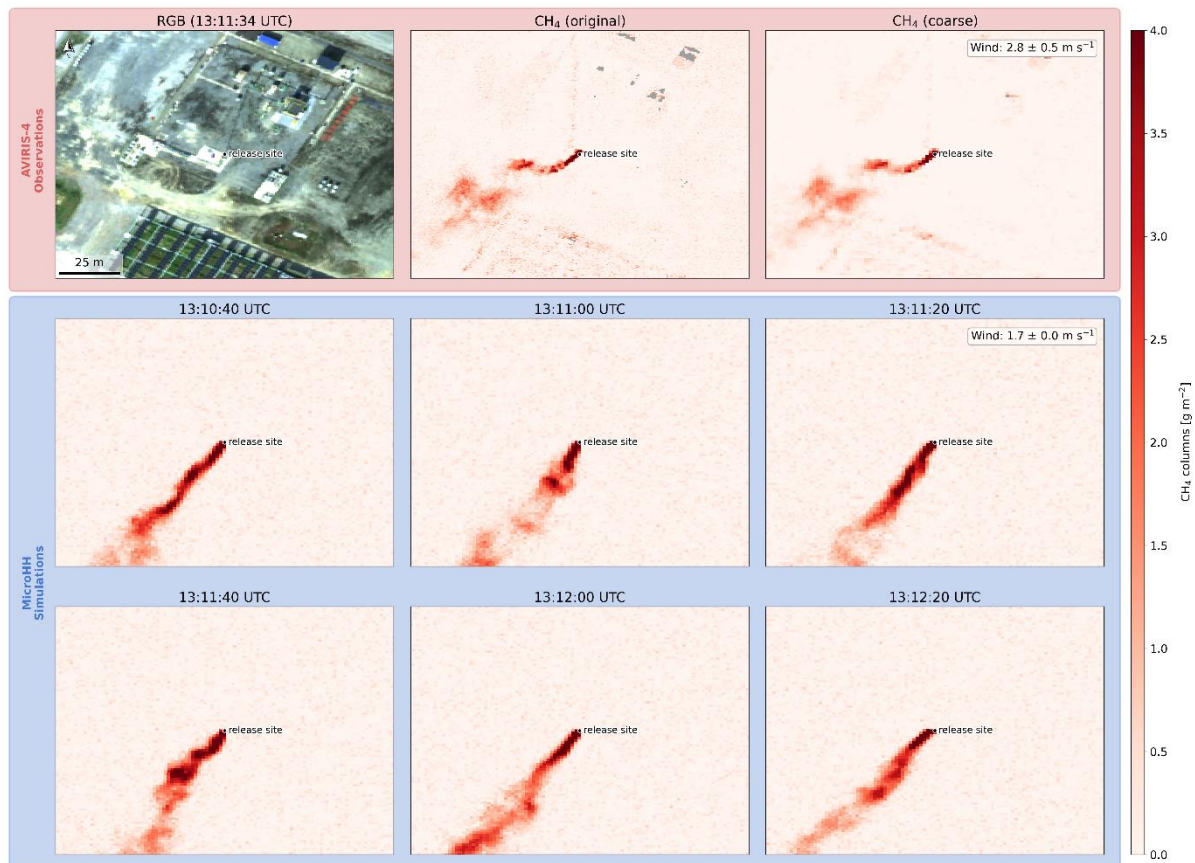


Figure S53: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 19.09.2024 at 13:11 UTC during a release with 80 kg CH₄ h⁻¹.

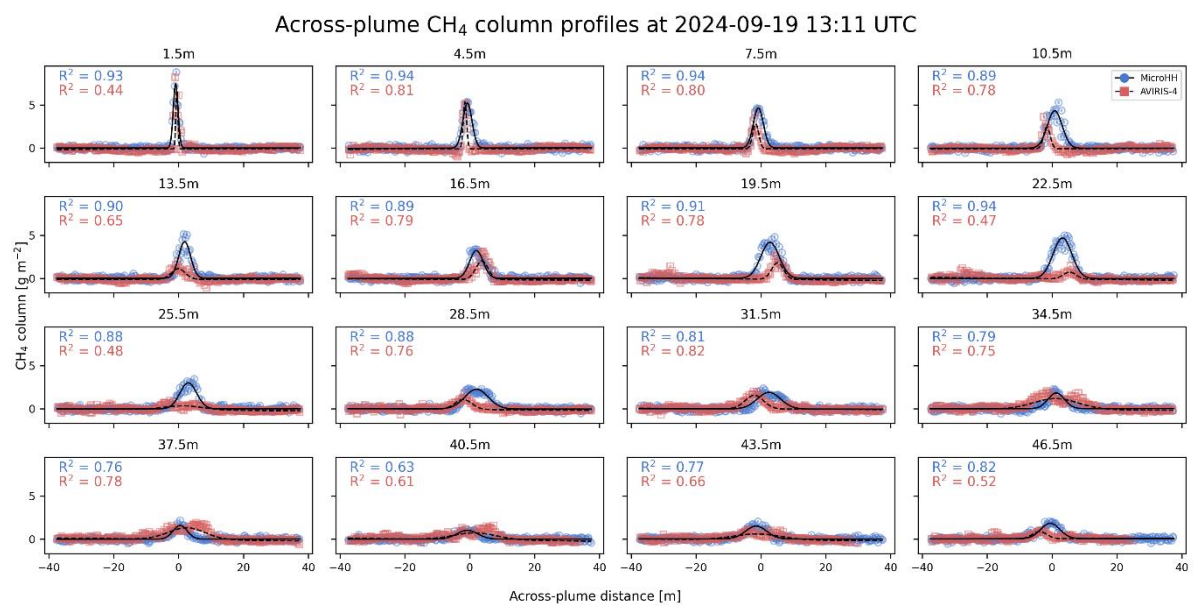


Figure S54: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 19.09.2024 at 13:11 UTC during a release with 80 kg CH₄ h⁻¹.

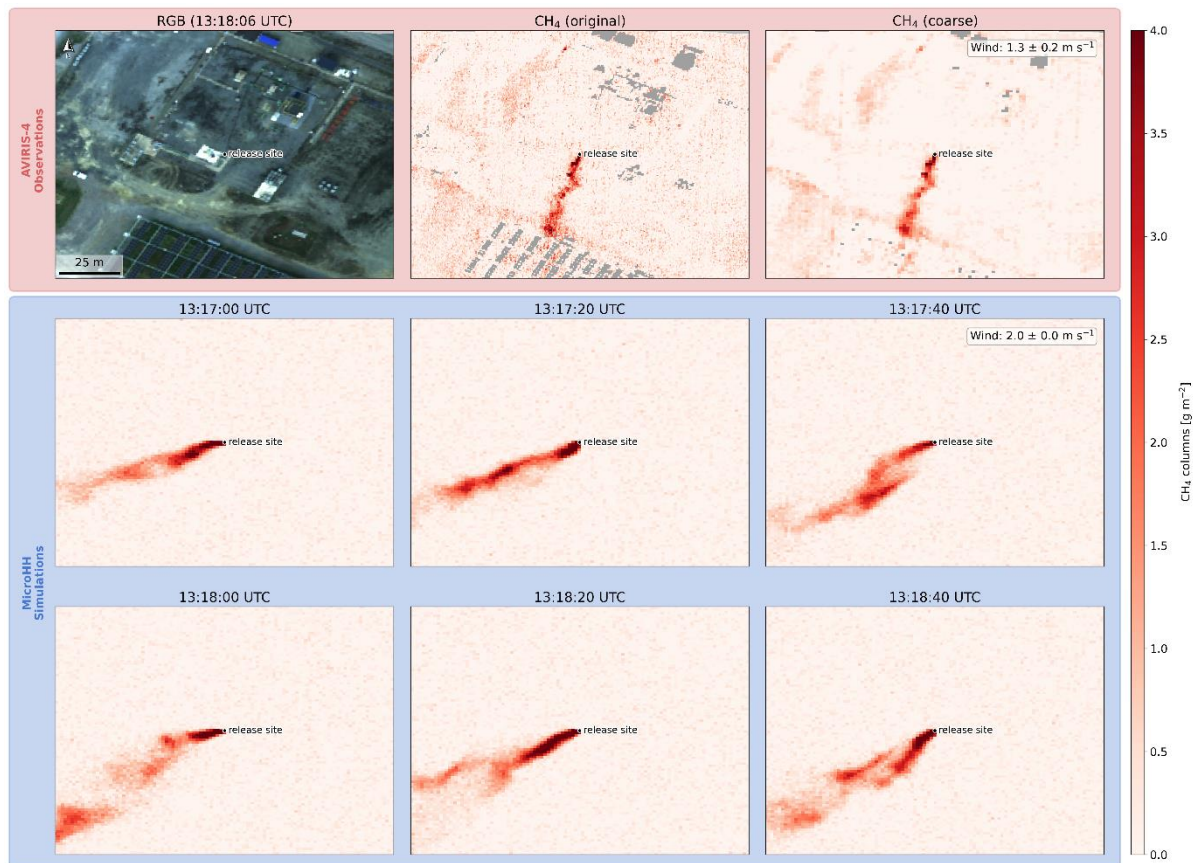


Figure S55: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 19.09.2024 at 13:18 UTC during a release with 80 kg CH₄ h⁻¹.

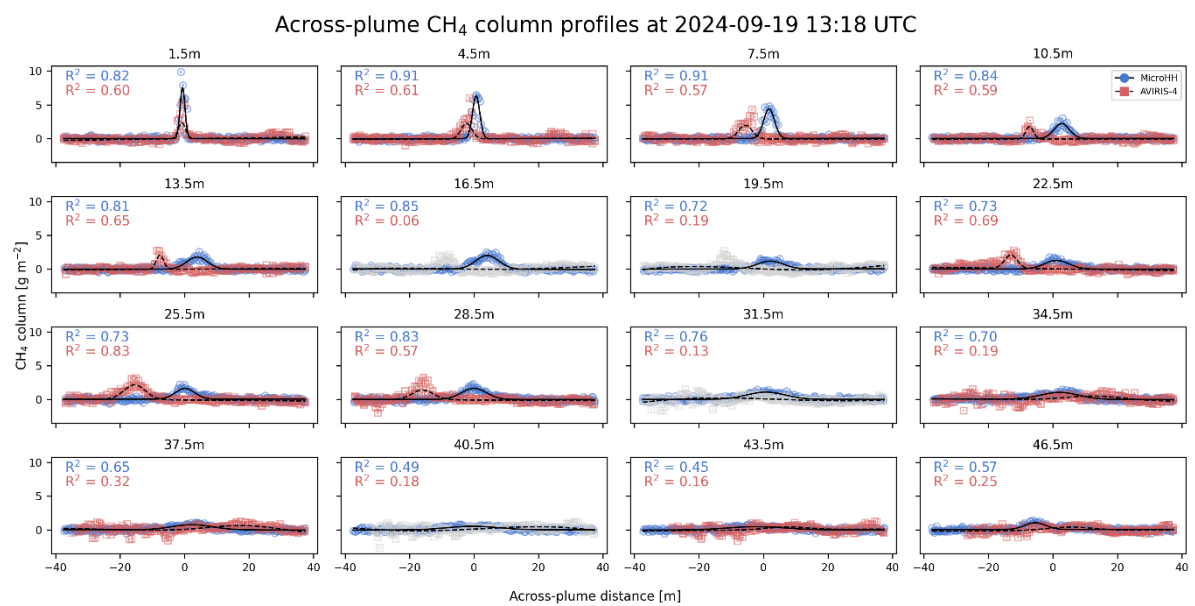


Figure S56: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 19.09.2024 at 13:18 UTC during a release with 80 kg CH₄ h⁻¹.

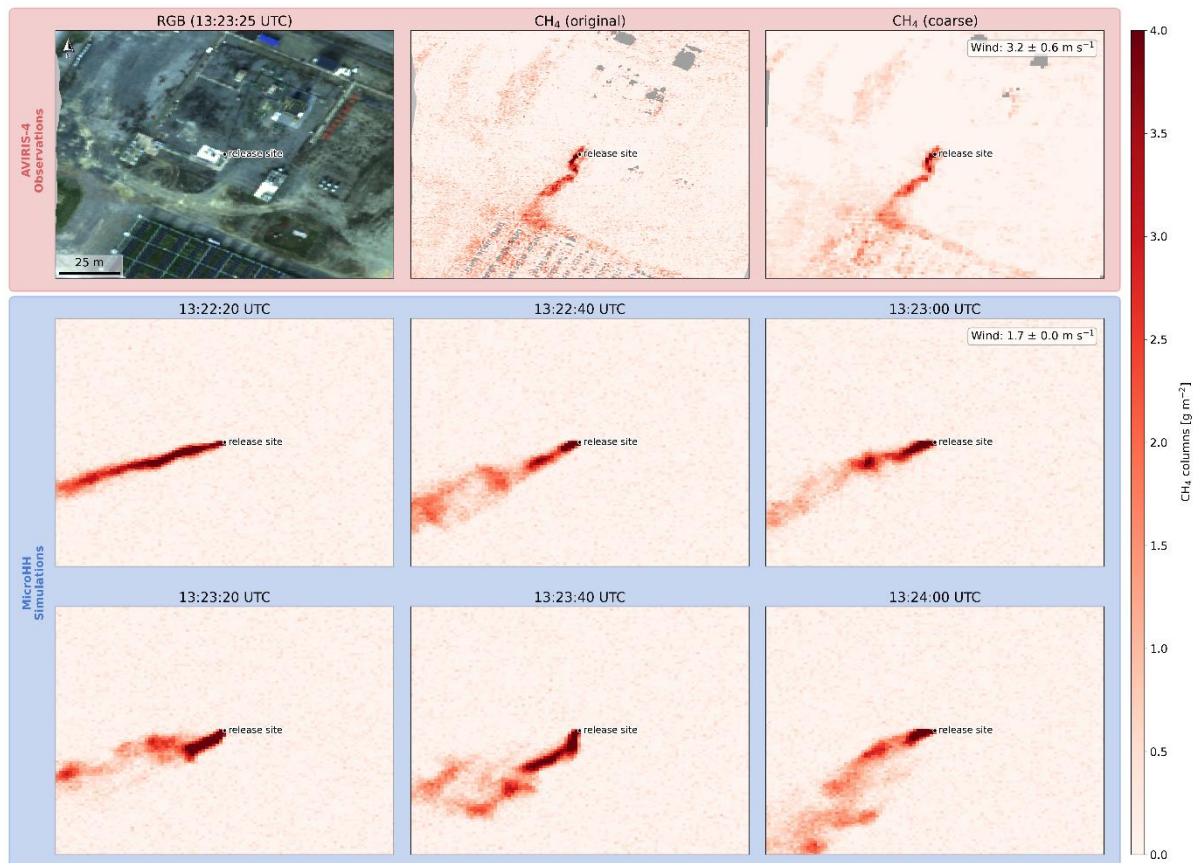


Figure S57: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 19.09.2024 at 13:23 UTC during a release with 80 kg CH₄ h⁻¹.

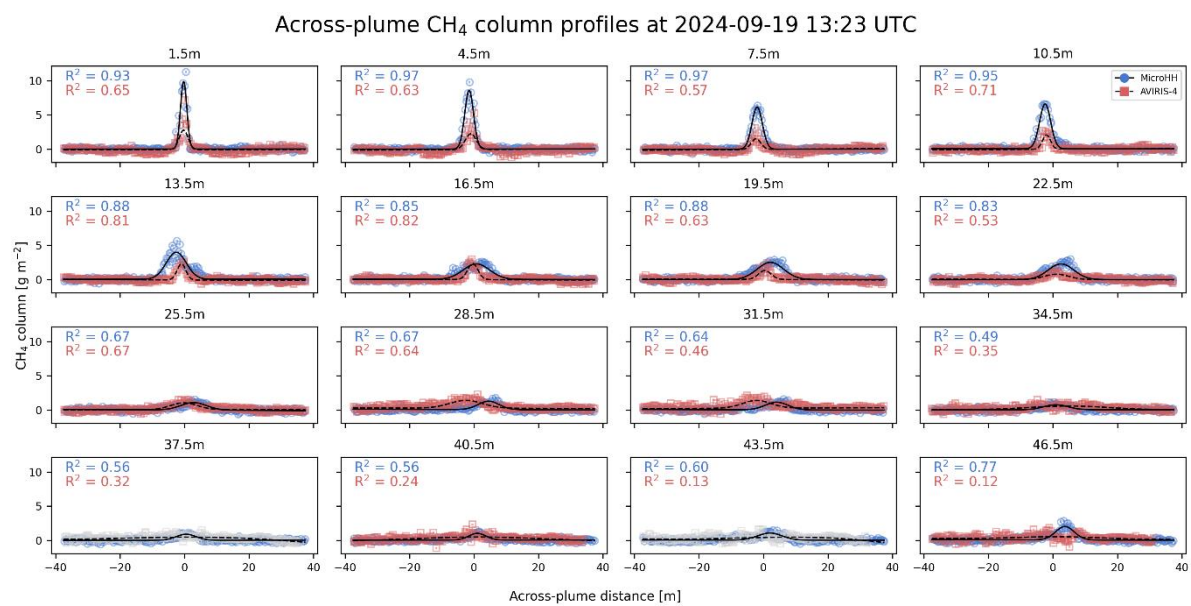


Figure S58: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 19.09.2024 at 13:23 UTC during a release with 80 kg CH₄ h⁻¹.

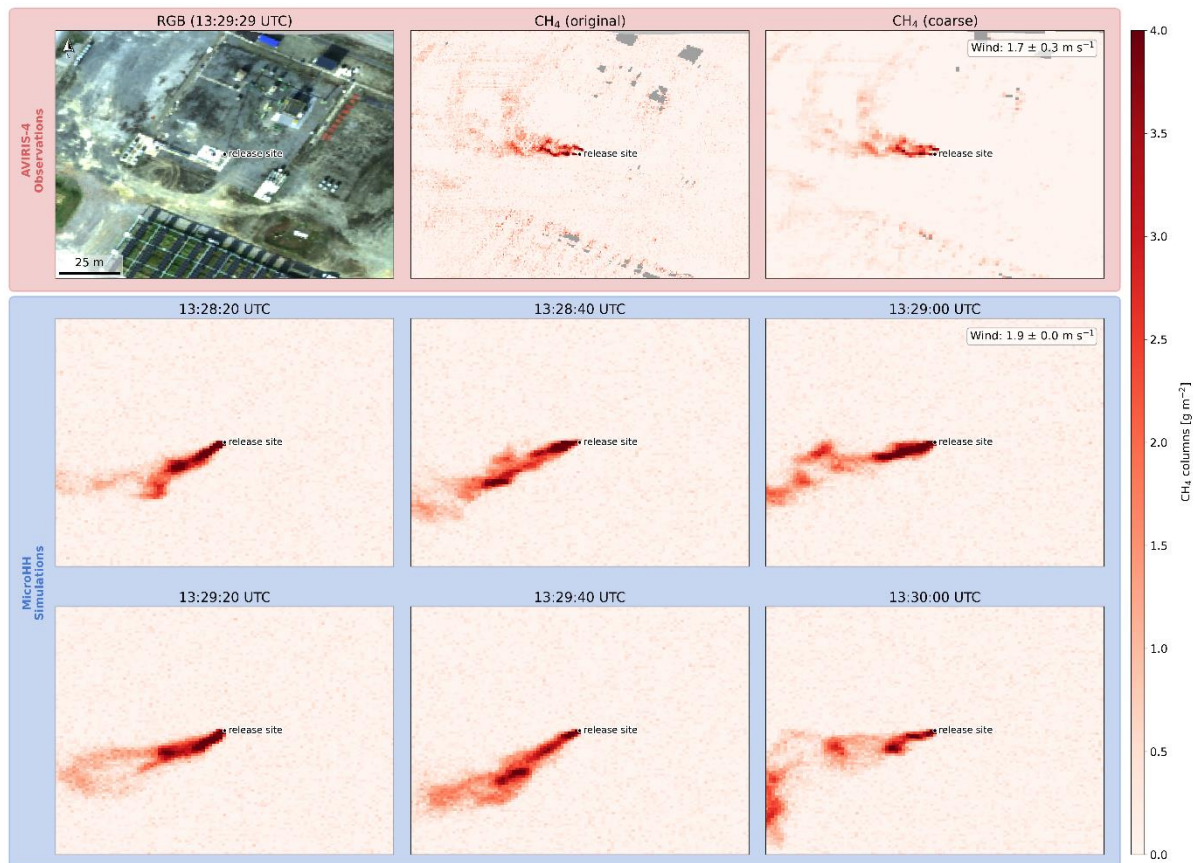


Figure S59: Observed and modelled CH₄ maps for the AVIRIS-4 overpass on the 19.09.2024 at 13:29 UTC during a release with 80 kg CH₄ h⁻¹.

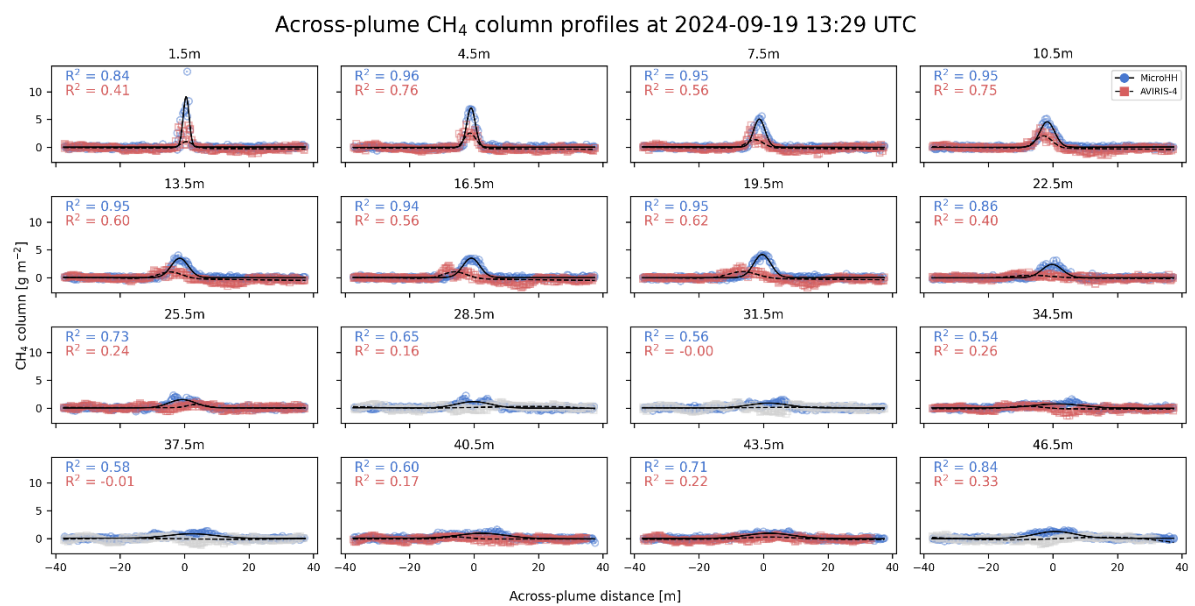


Figure S60: Across-plume CH₄ cross-sections for the AVIRIS-4 overpass on the 19.09.2024 at 13:29 UTC during a release with 80 kg CH₄ h⁻¹.