



Supplement of

**To what extent are the IASI and ERA5 water vapour profiles
representative of the conditions in the autumn 2022
during the WaLiNeAs field campaign**

Patrick Chazette et al.

Correspondence to: Patrick Chazette (patrick.chazette@lsce.ipsl.fr)

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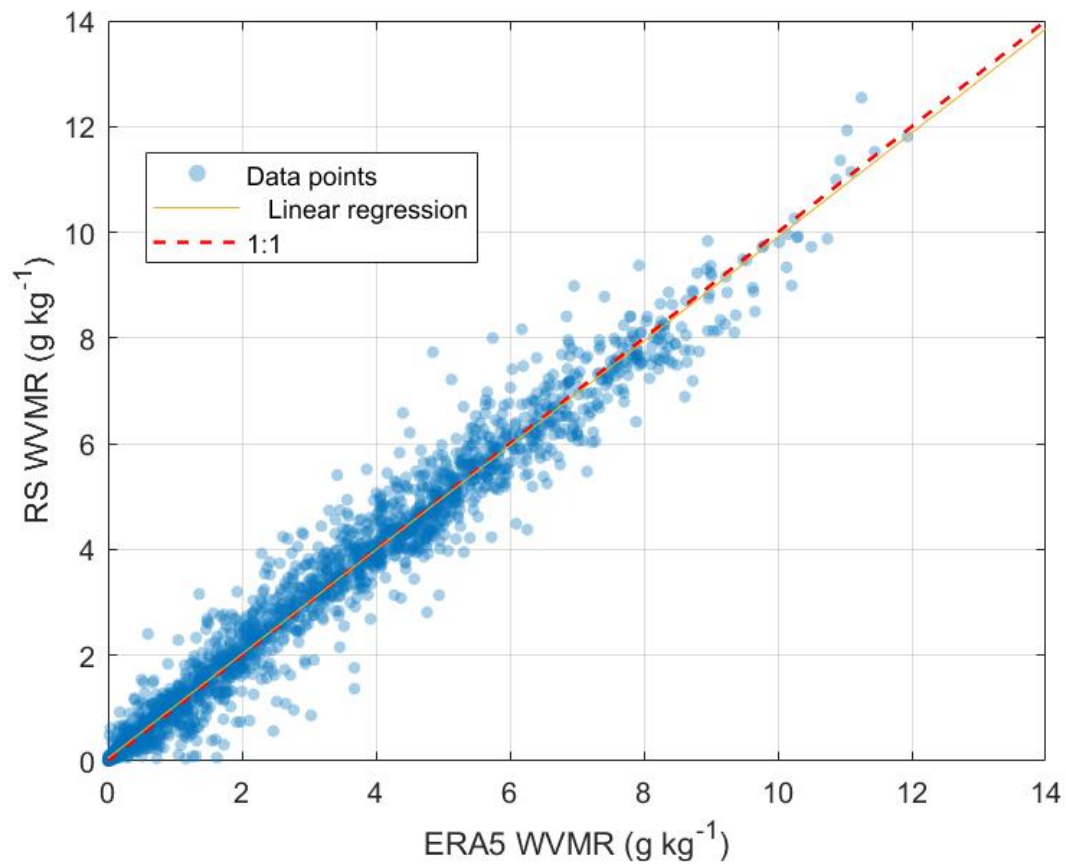
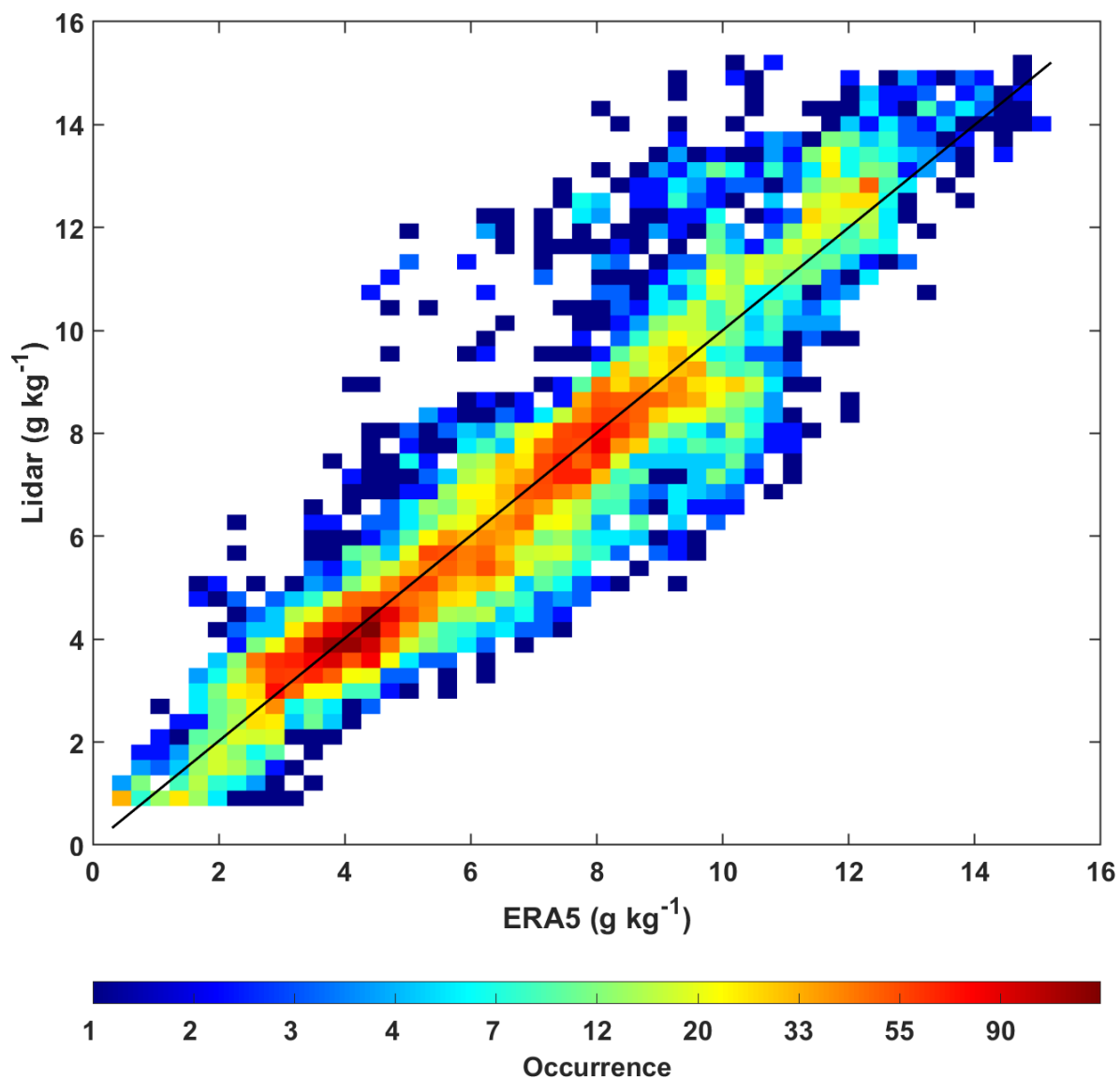


Figure S1: Example of correspondence between radiosonde measurements (RS) and ERA5 reanalyses for the Meto-France station in Nîmes for November and December 2022. (MB = 0.02 g kg⁻¹, RMSD = 0.36 g kg⁻¹, COR = 0.99, $y = 0.99x + 0.054$).



5 **Figure S2: TONET lidar (RL1).** Bidirectional histogram of matches between lidar measurements and ERA5 products. The black line represents the linear regression curve, which has a slope close to 1. The statistical parameters of the regression are shown in Table 2. Only values measured with a standard deviation of less than 0.4 g kg^{-1} were considered.

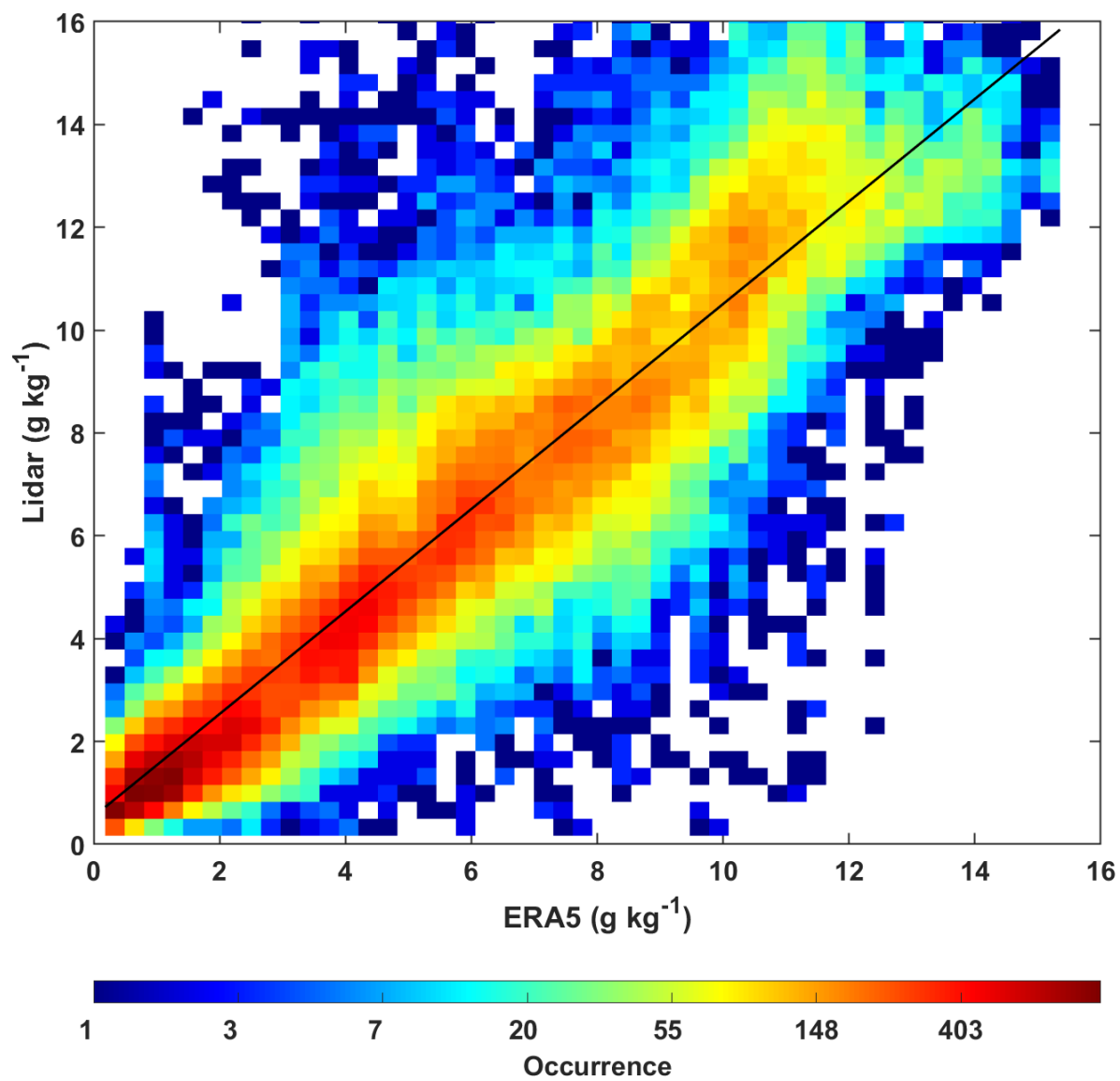


Figure S3: TIBIDABO lidar (RL2). Same as Figure S2.

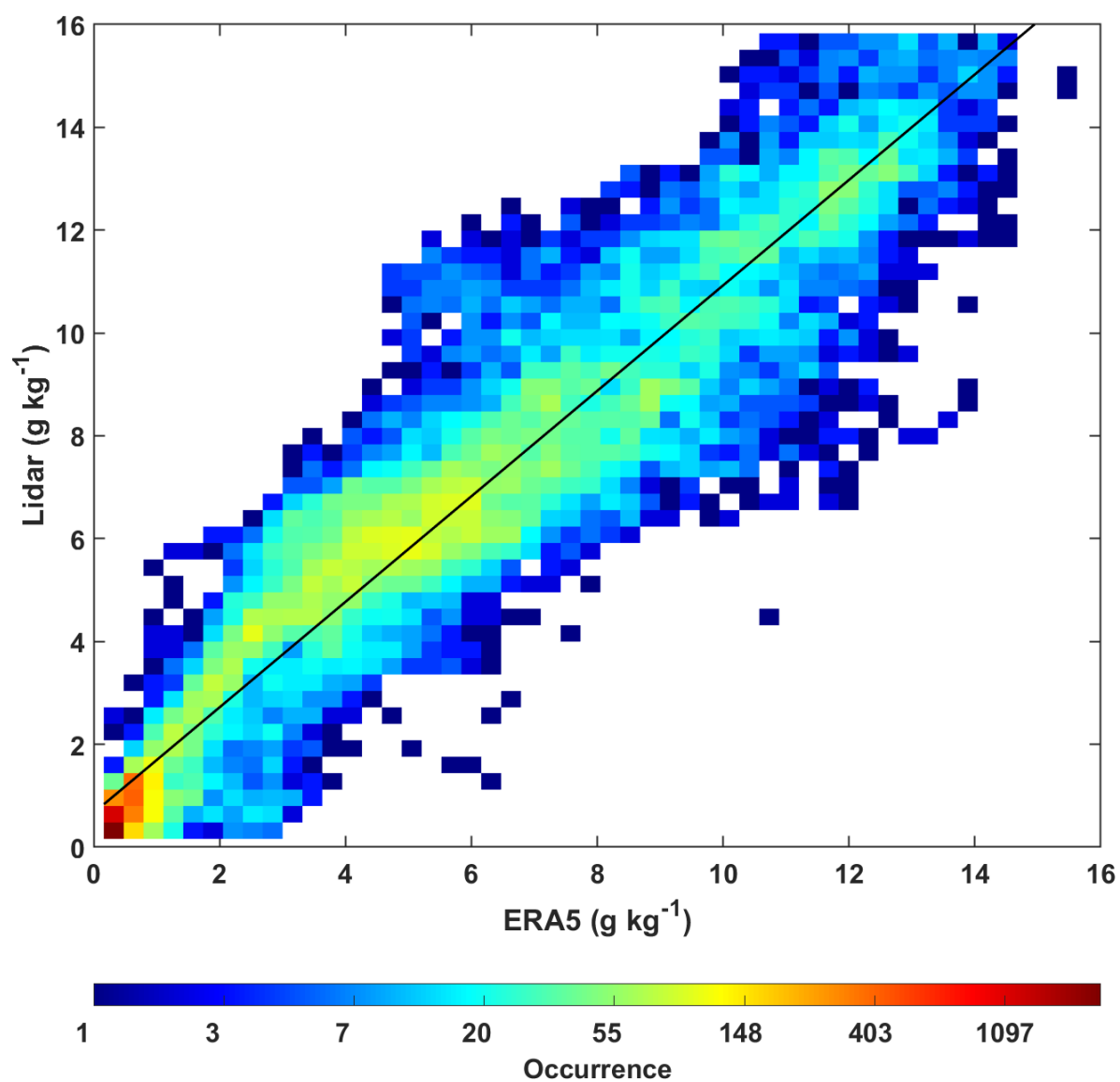
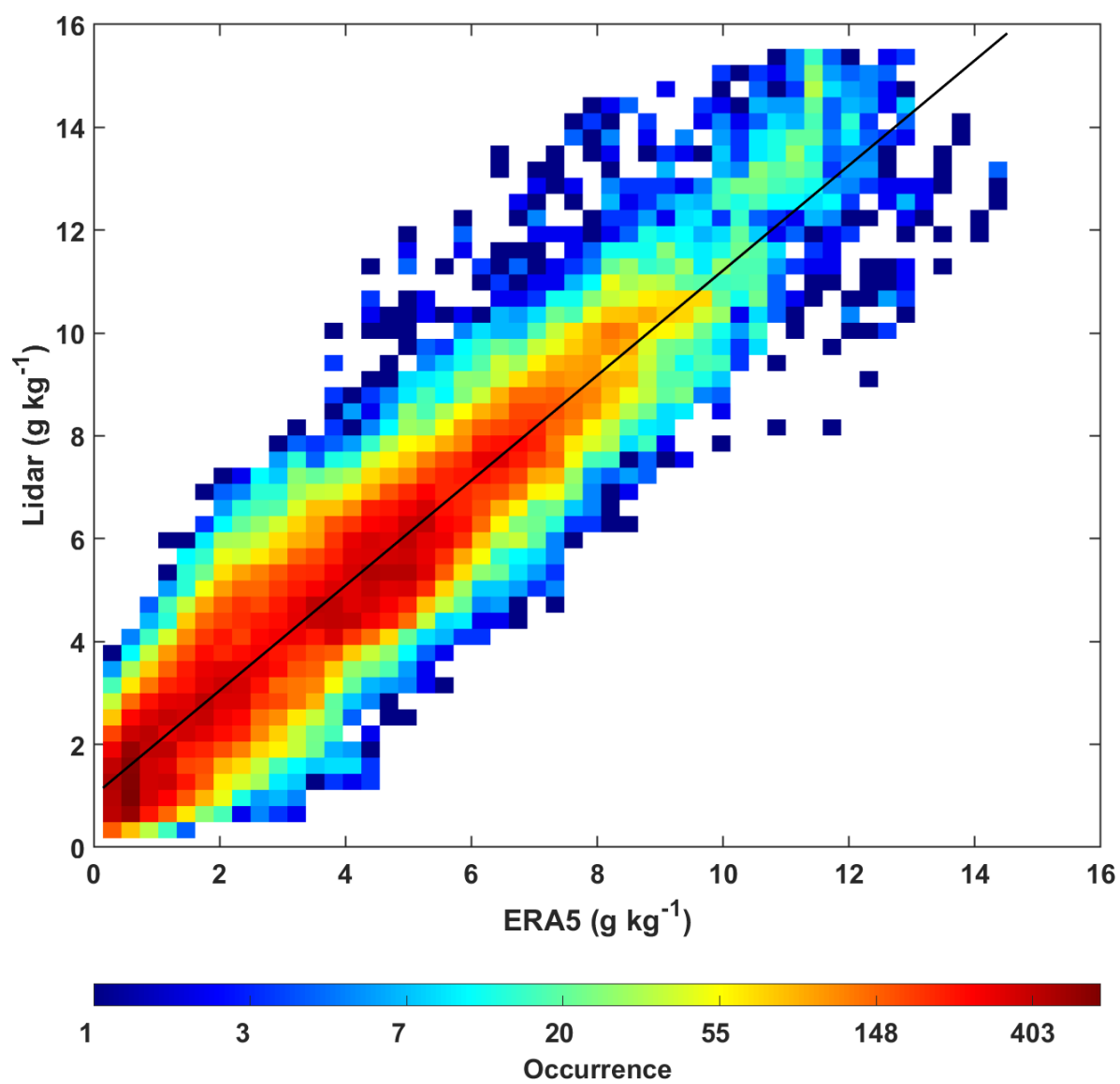


Figure S4: HORUS-2 lidar (RL3). Same as Figure S2.



15 Figure S5: HORUS-1 lidar (RL4). Same as Figure S2.

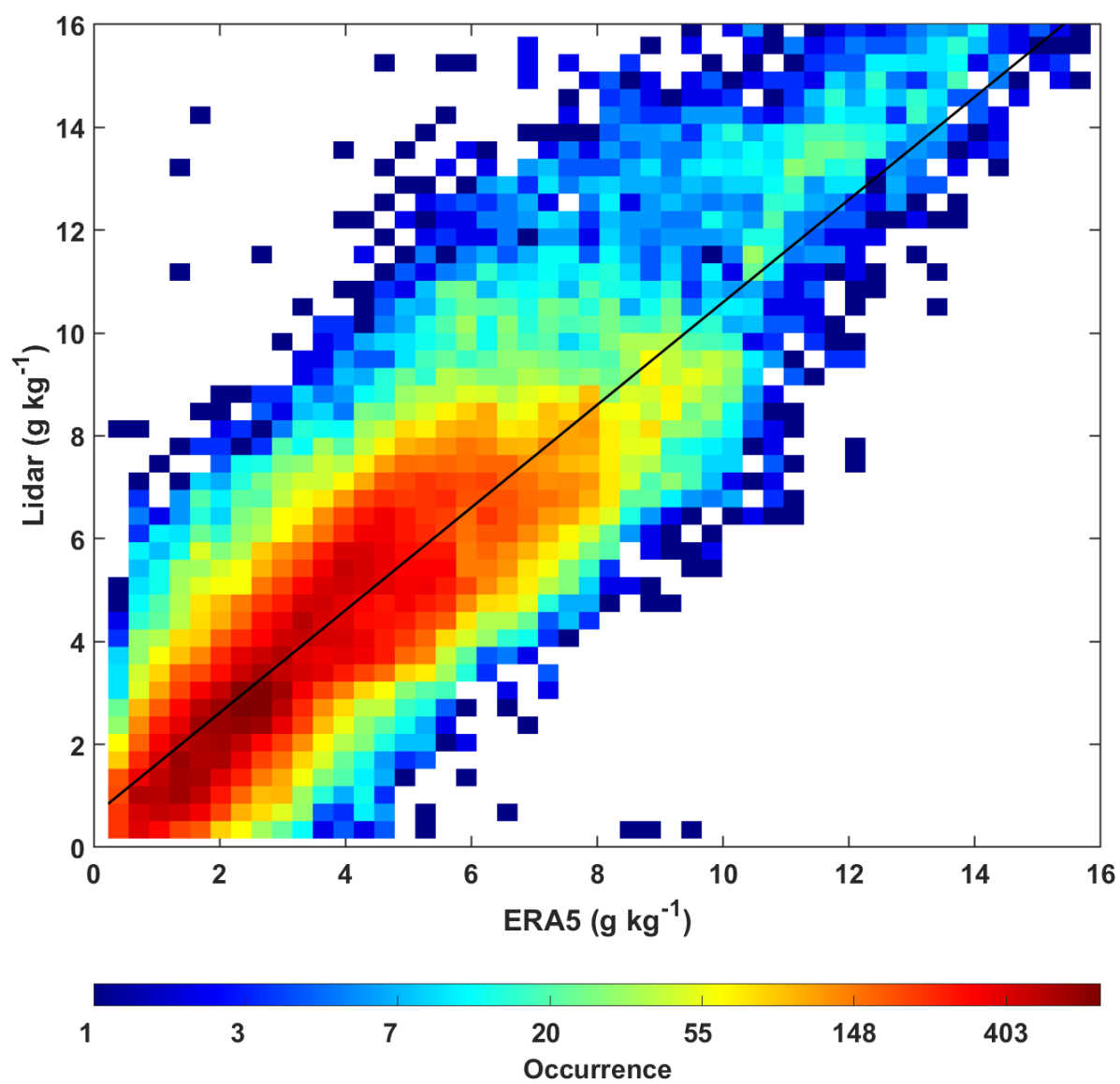
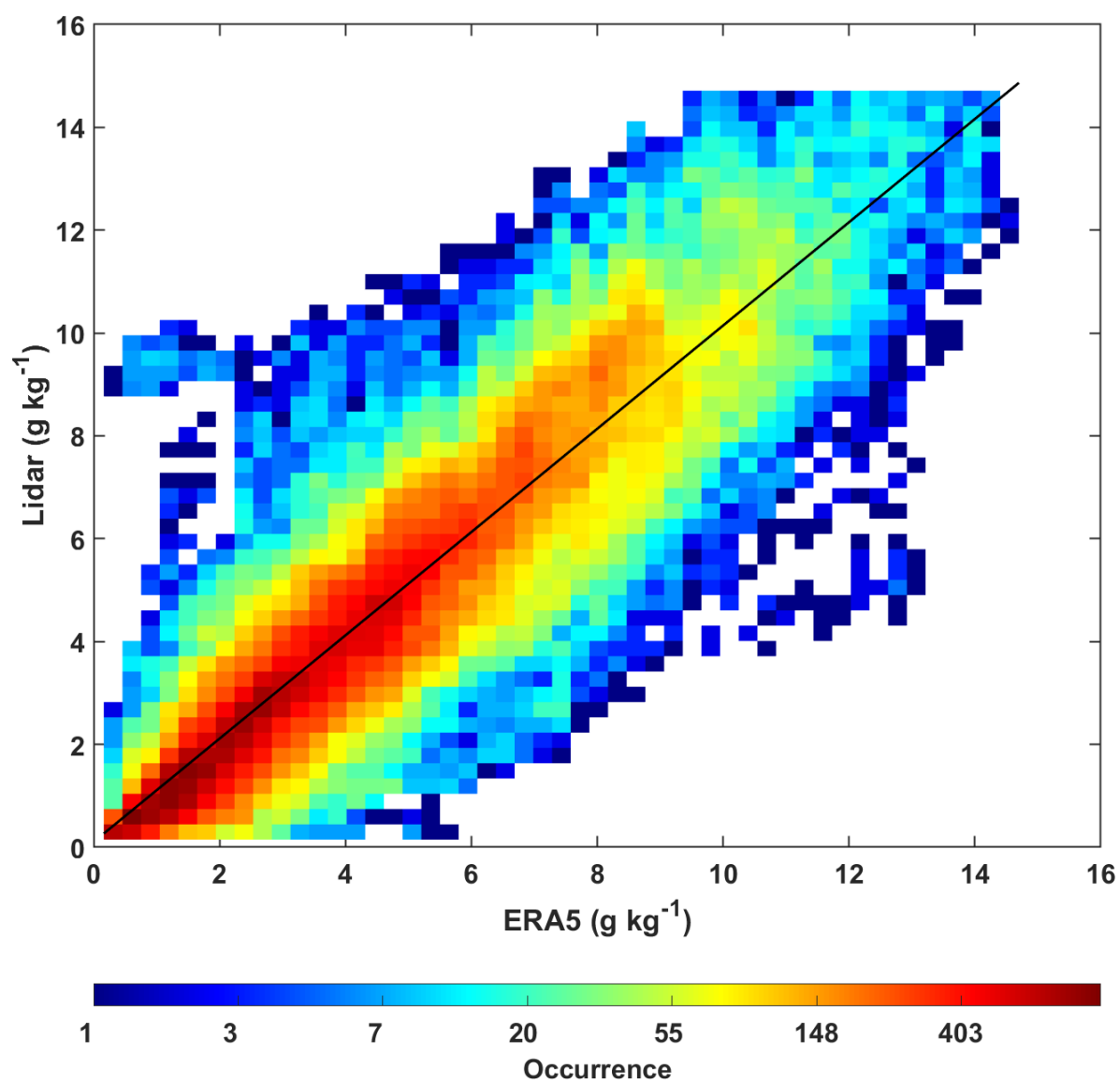


Figure S6: MARCO lidar (RL5). Same as Figure S2.



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Figure S7: CONCERNING lidar (RL6). Same as Figure S2.

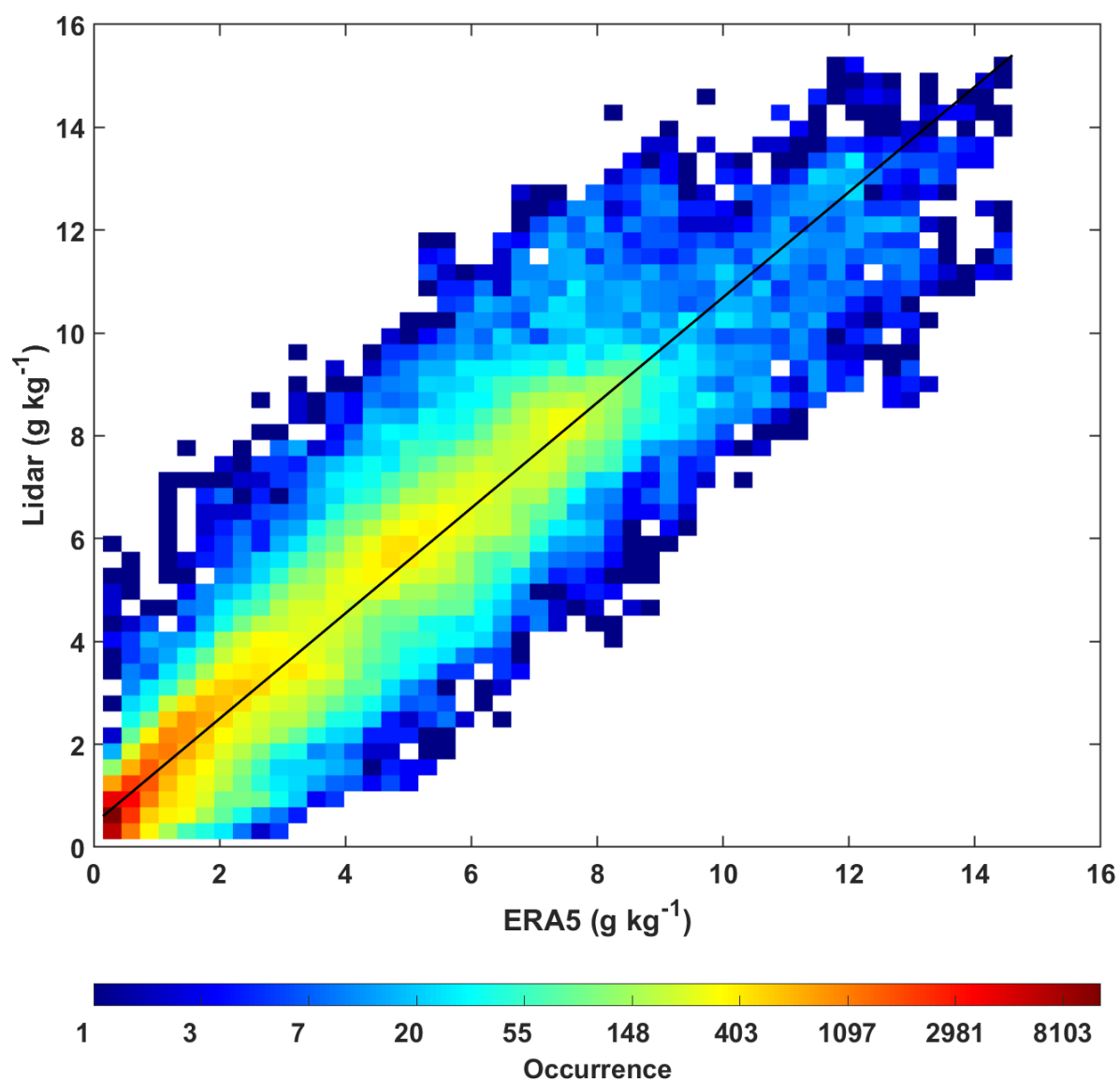


Figure S8: WALI lidar (RL7). Same as Figure S2.

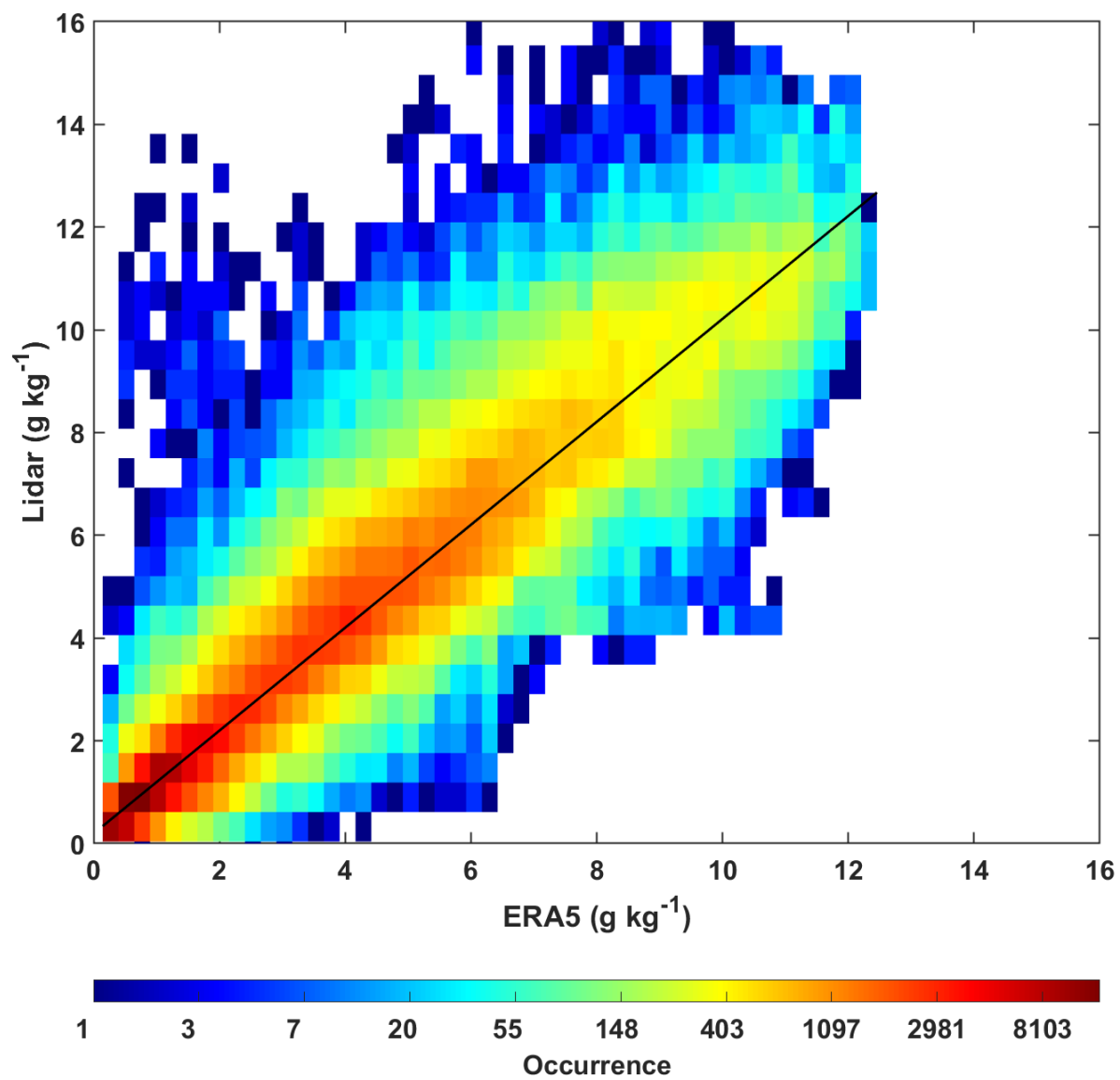
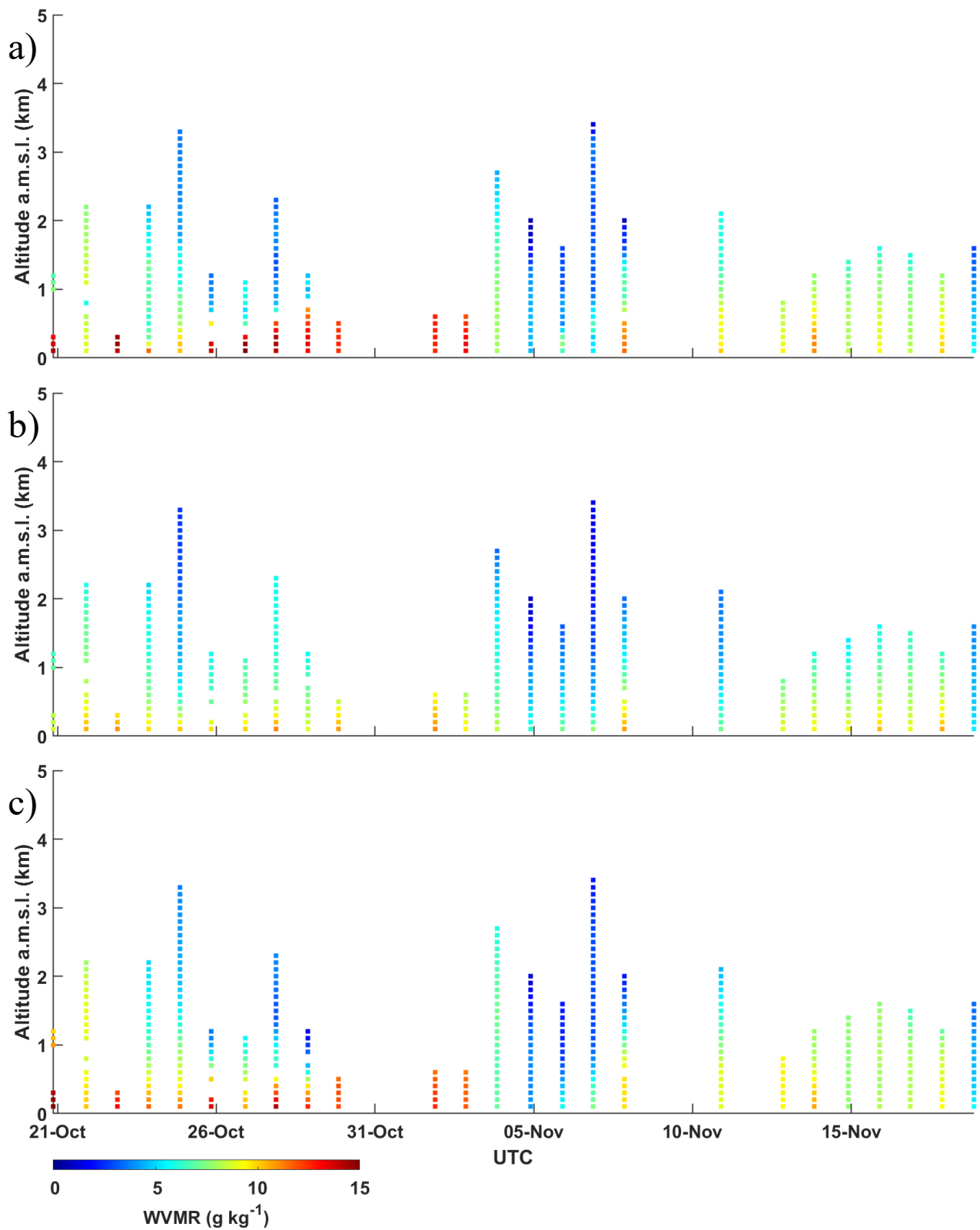
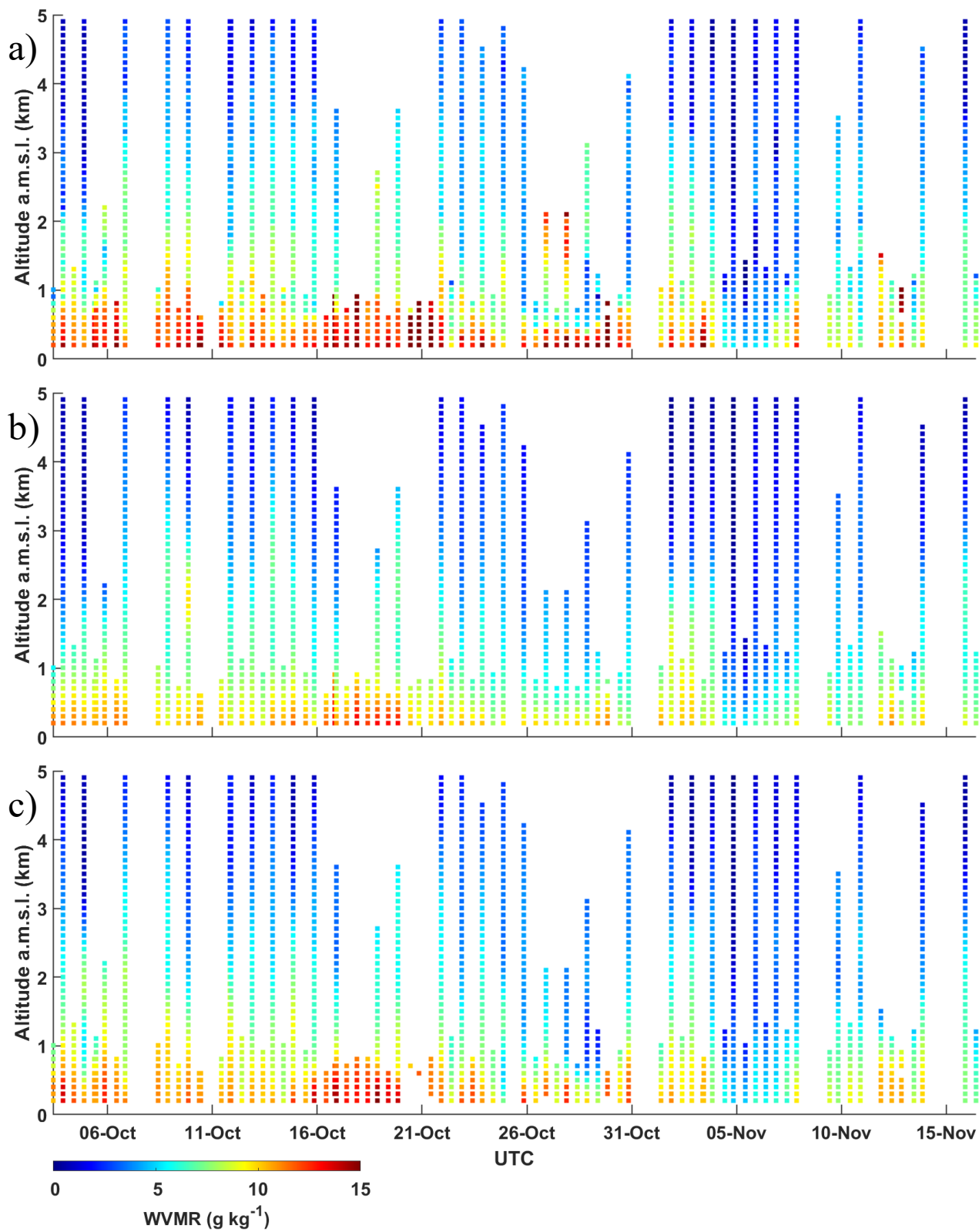


Figure S9: ARTHUS lidar (RL8). Same as Figure S2.



30 **Figure S10: TONET lidar (RL1).** Temporal evolution of the vertical profiles of the water vapor mixing ratio (WVMR) derived from a) the Raman lidar, b) IASI and c) ERA5. The profiles correspond only to average measurements coinciding with IASI at ± 30 minutes and lidar data with a standard deviation of less than 0.4 g kg^{-1} .



35 Figure S11: TIBIDABO lidar (RL2). Same as Figure S10.

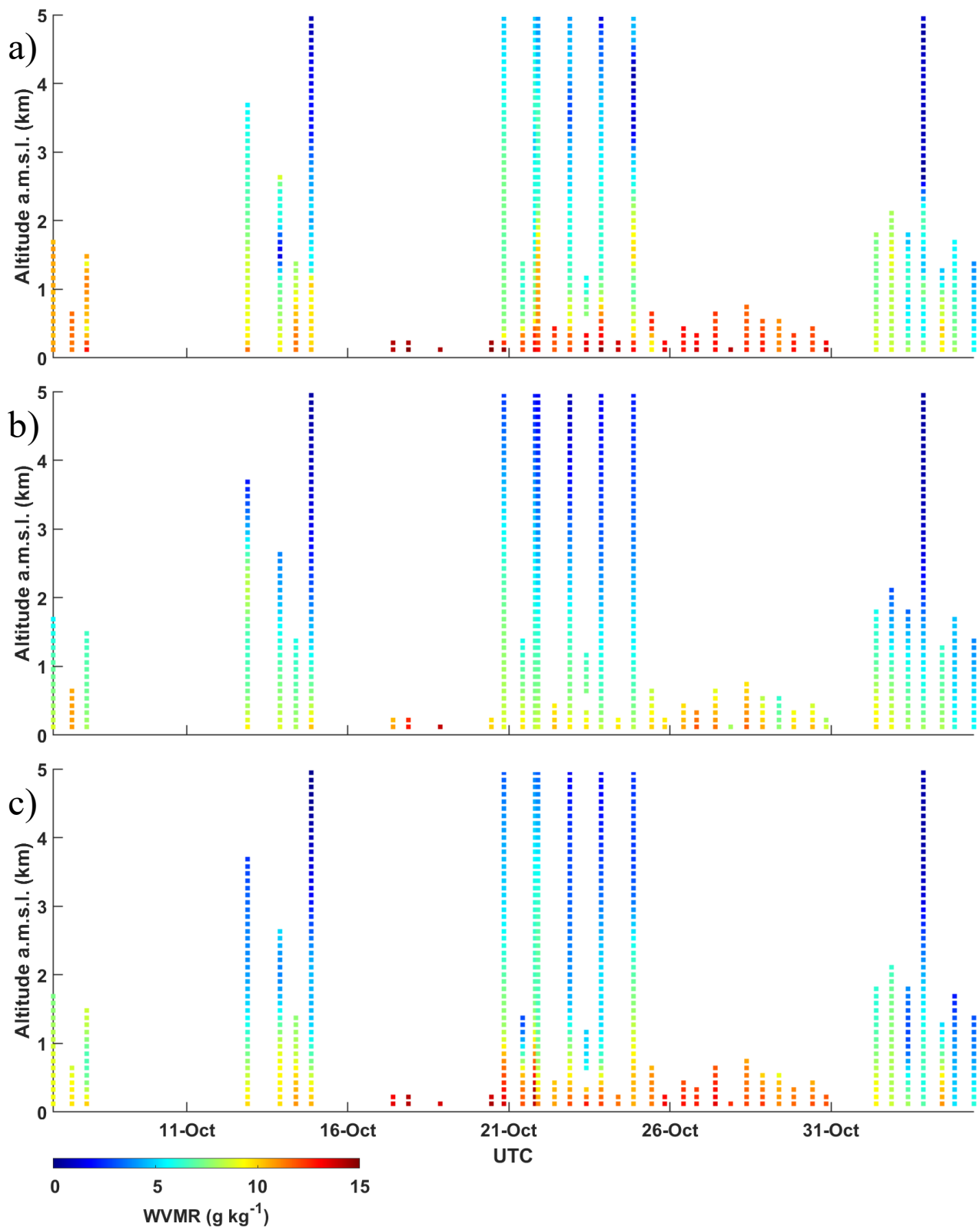


Figure S12: HORUS-2 lidar (RL3). Same as Figure S10.

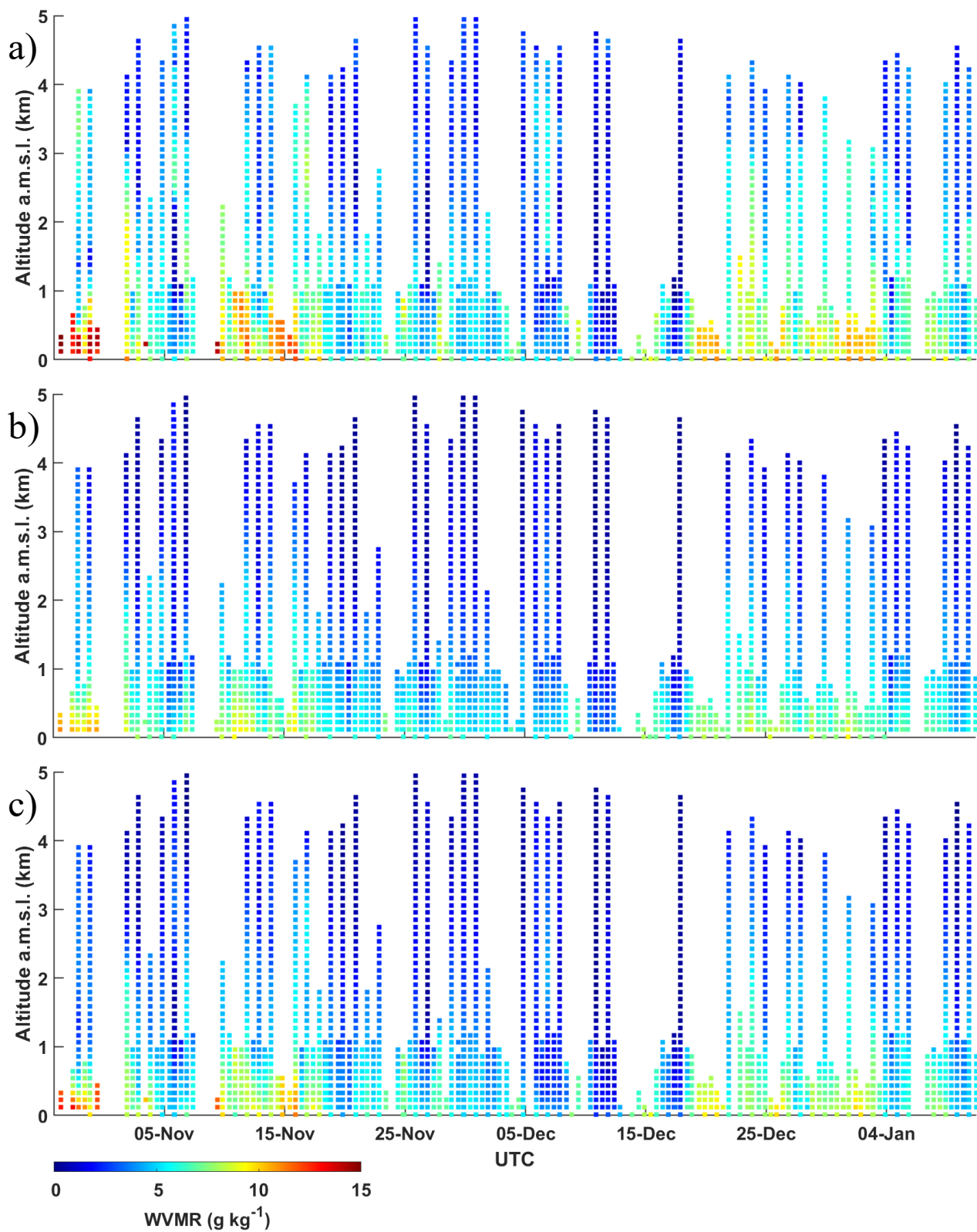


Figure S13: HORUS-1 lidar (RL4). Same as Figure S10.

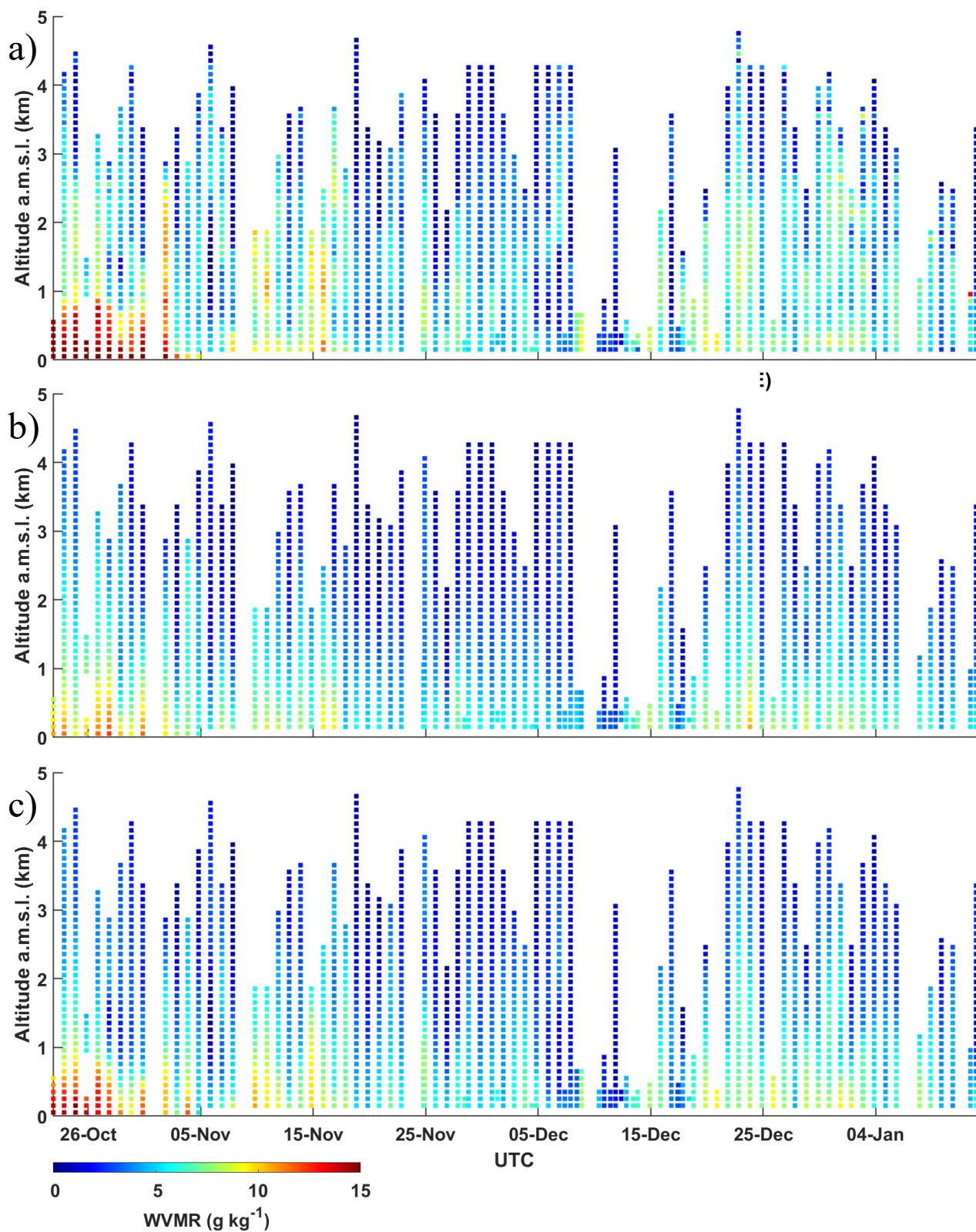


Figure S14: MARCO lidar (RL5). Same as Figure S10.

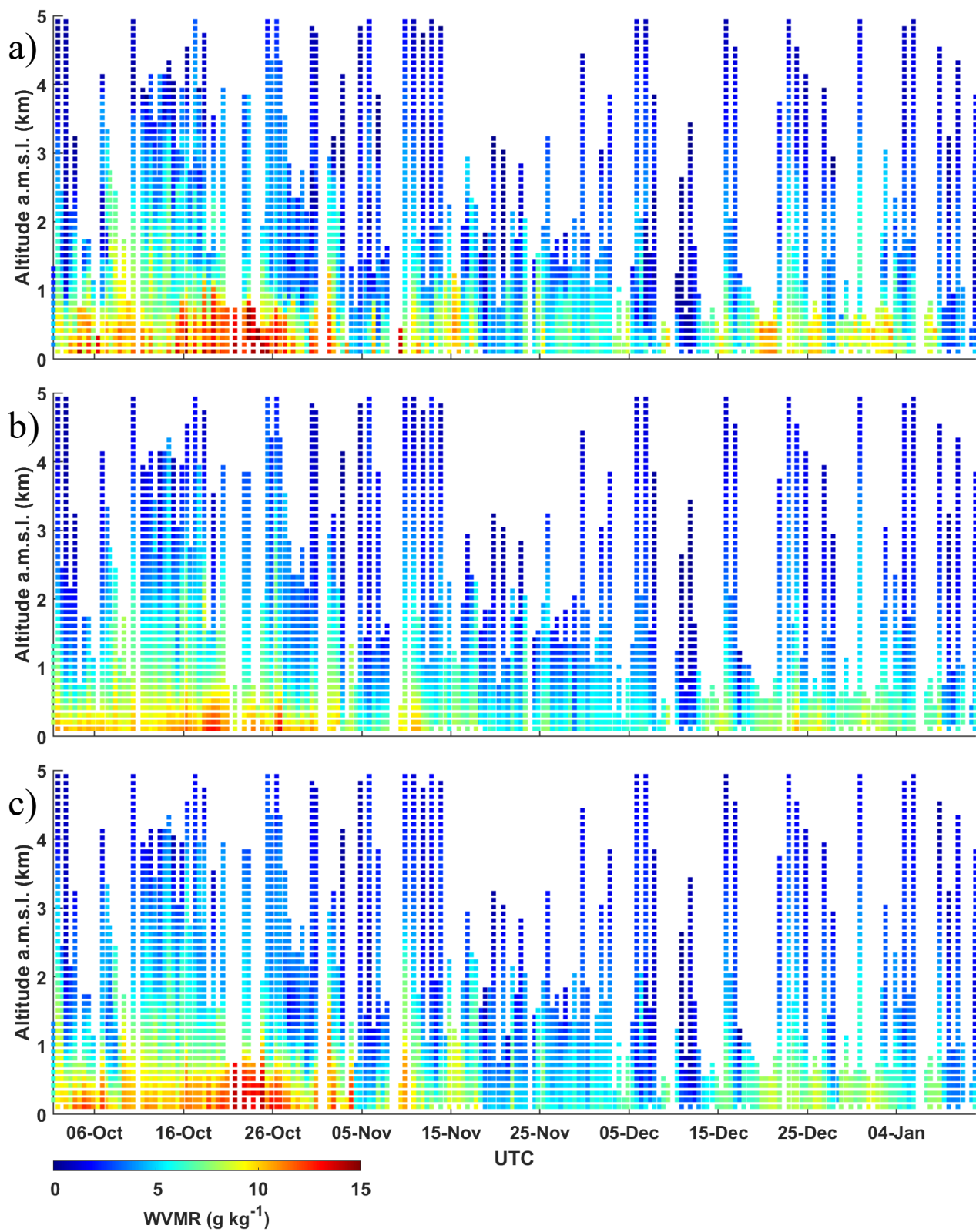
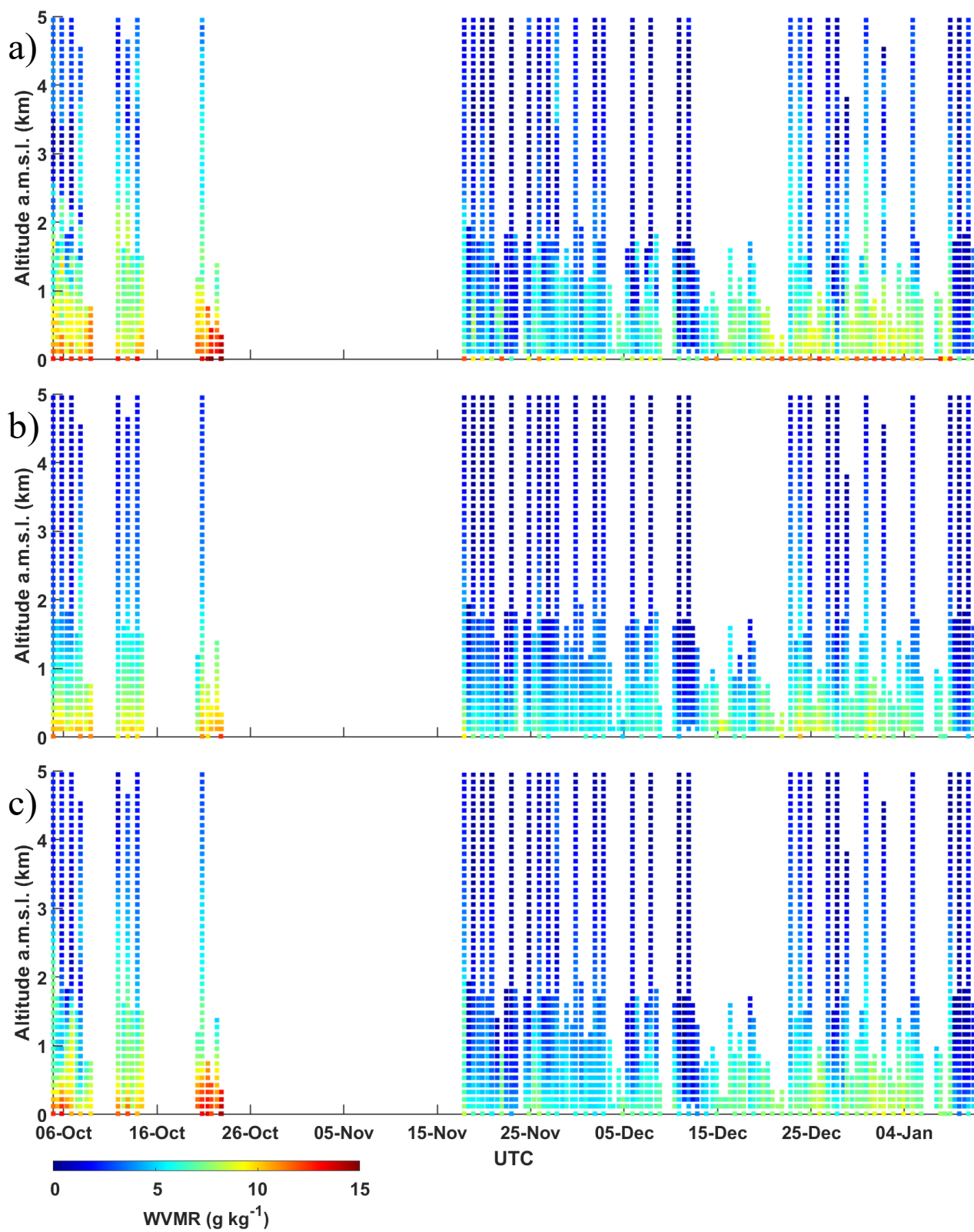


Figure S15: CONCERNING lidar (RL6). Same as Figure S10.



50 Figure S16: WALI lidar (RL7). Same as Figure S10.

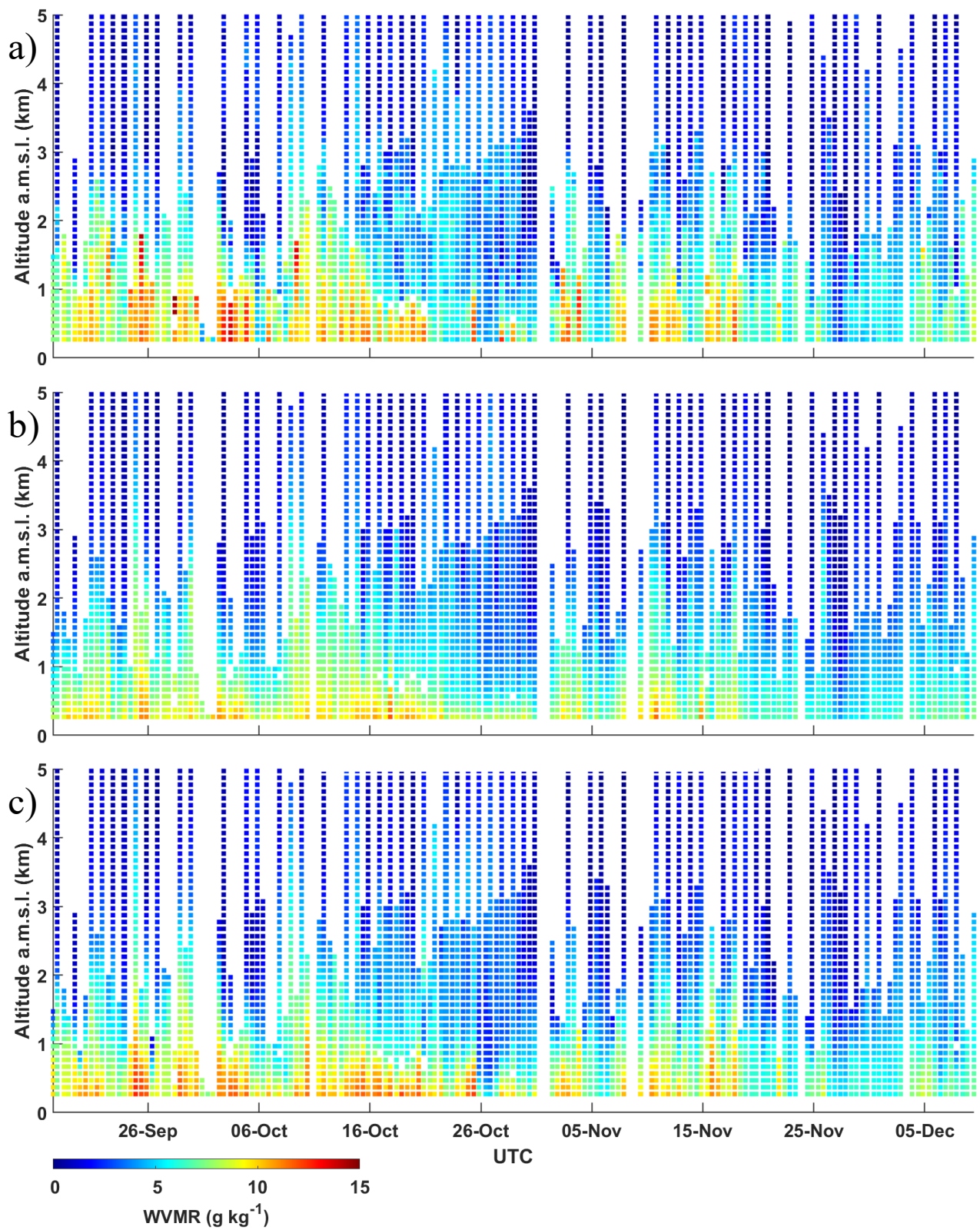


Figure S17: ARTHUS lidar (RL8). Same as Figure S10.

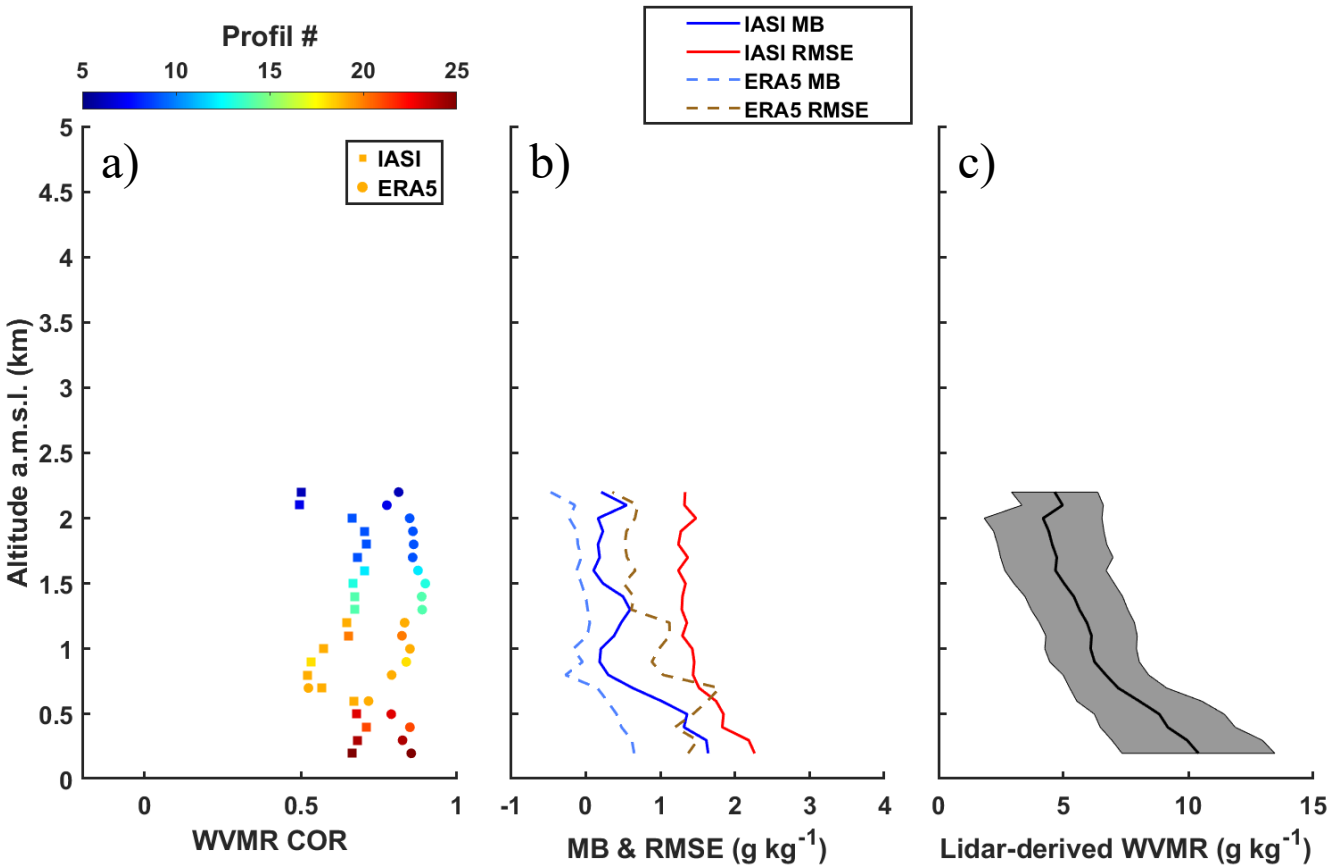


Figure S18: Synthesis for the TONET lidar (RL1), when comparing lidar measurements with IASI and ERA5 products: The vertical profiles show: a) the correlation coefficient (COR); b) the mean bias (MB, lidar - IASI and lidar - ERA5) and the root mean square error (RMSE); c) the mean water vapour mixing ratio (WVMR) profile of all the overpasses of IASI. The definitions of COR, MB and RMSE are given in the main text. The contributions of aerosols and temperature to the bias are not considered.

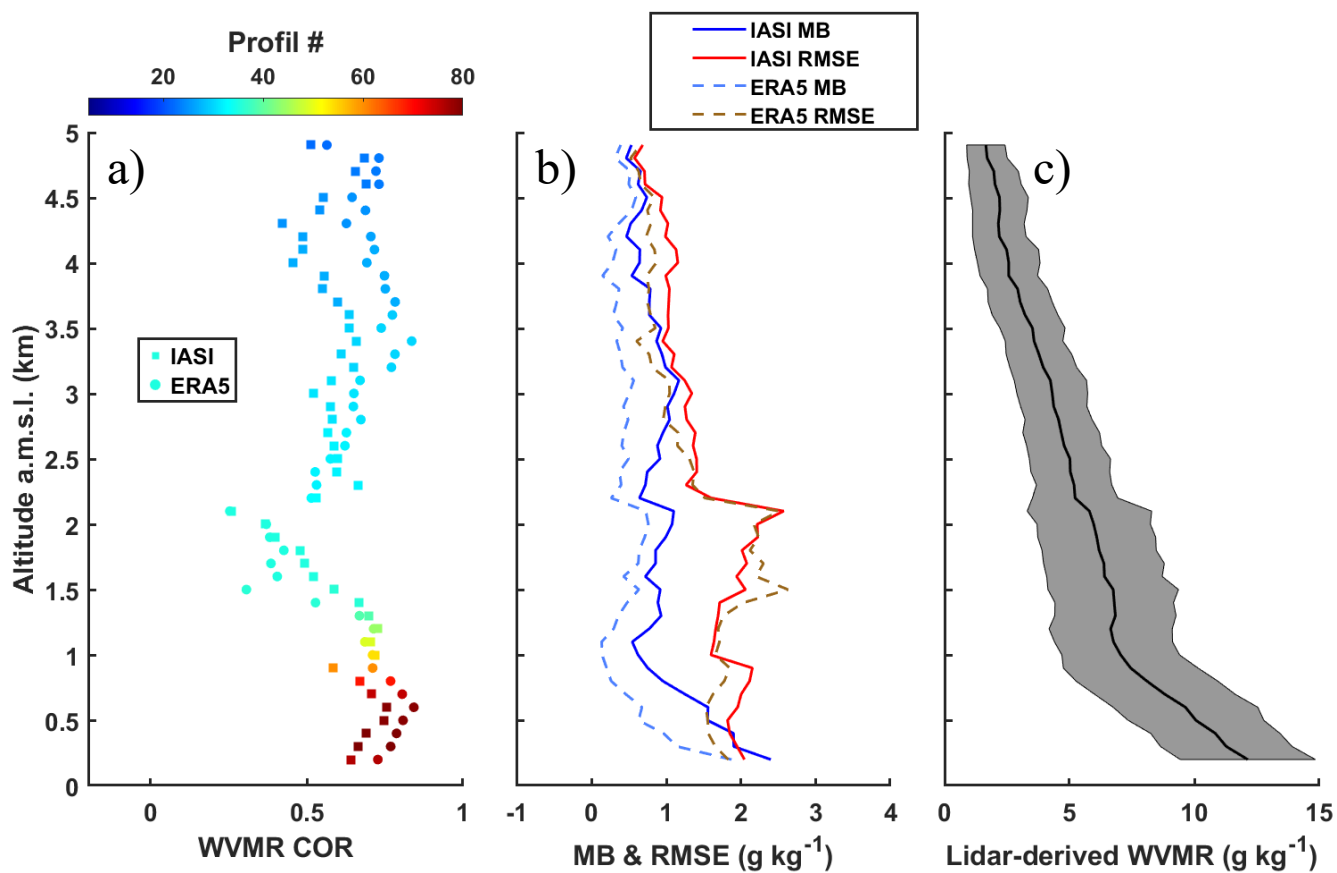


Figure S19: TIBIDABO lidar (RL2). Same as Figure S18.

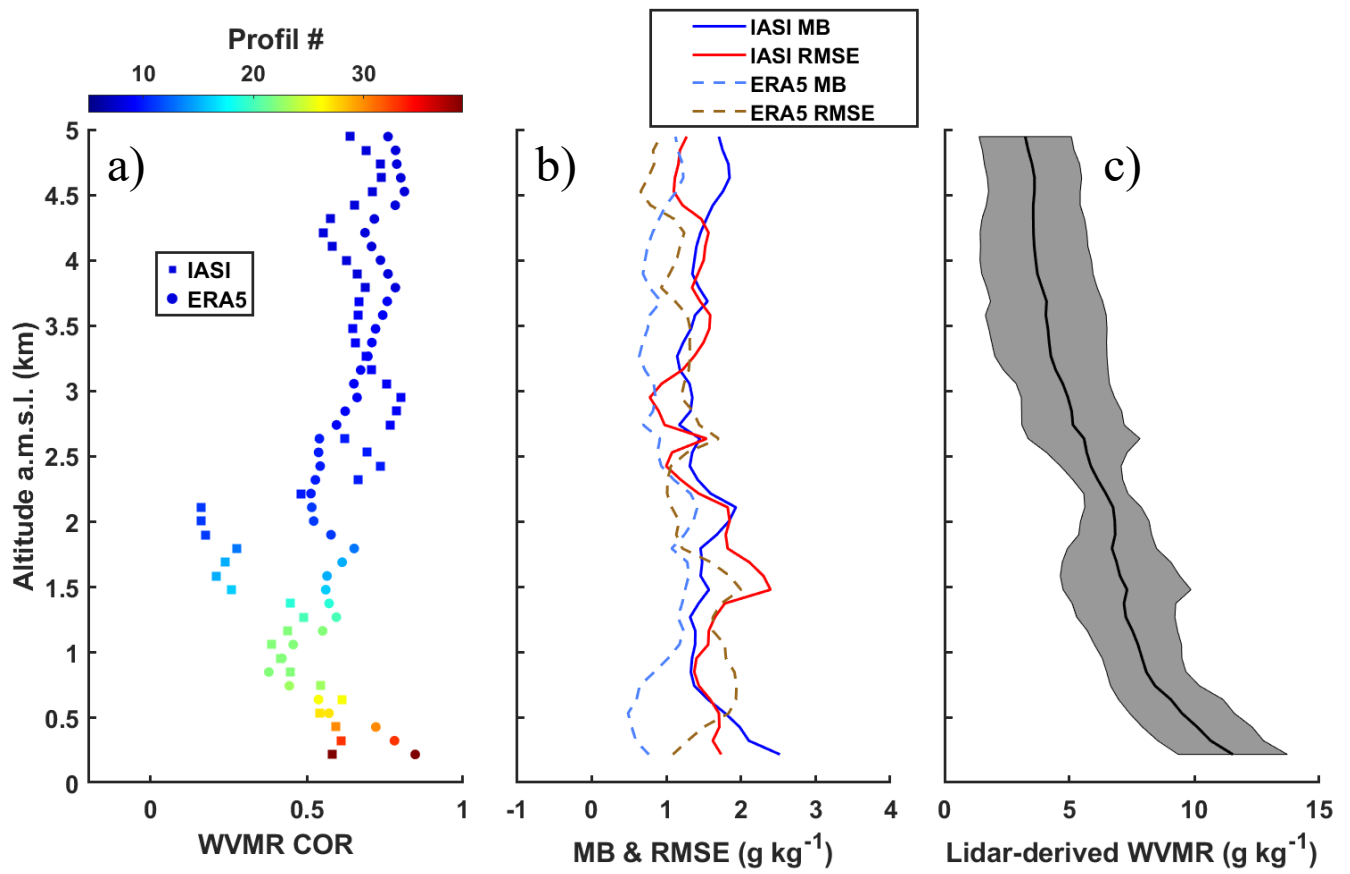


Figure S20: HORUS-2 lidar (RL3). Same as Figure S18.

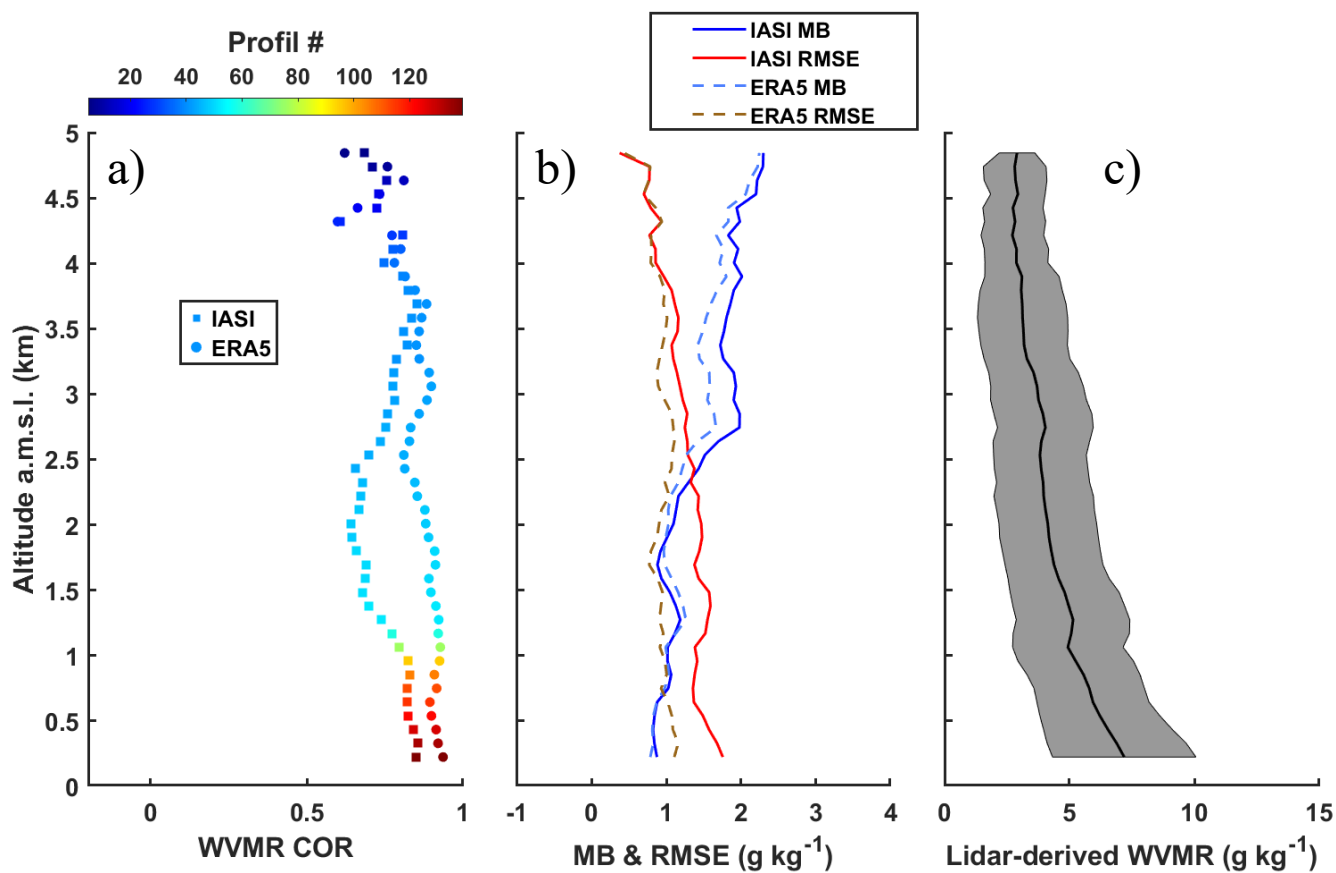


Figure S21: HORUS-1 lidar (RL4). Same as Figure S18.

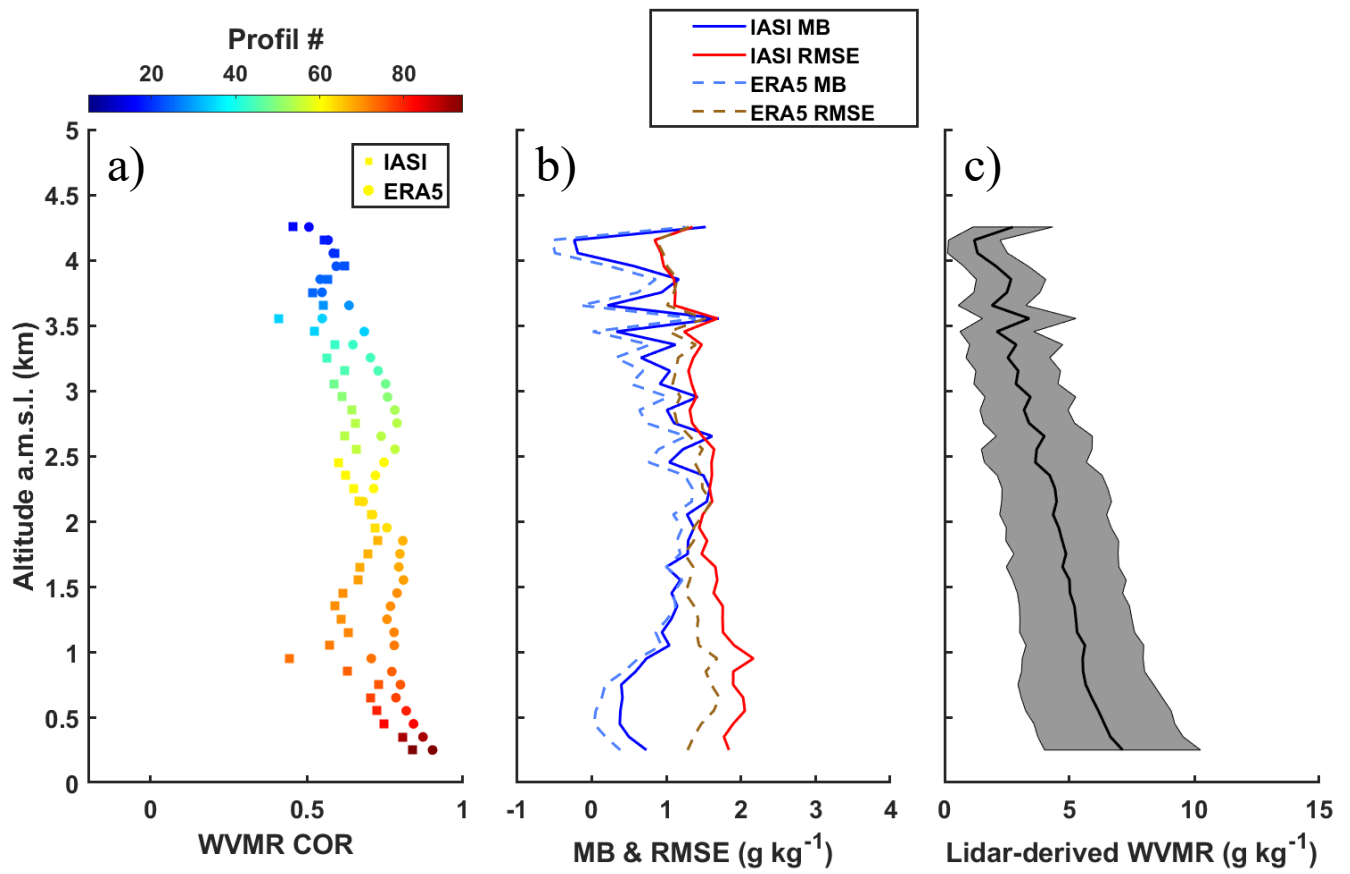
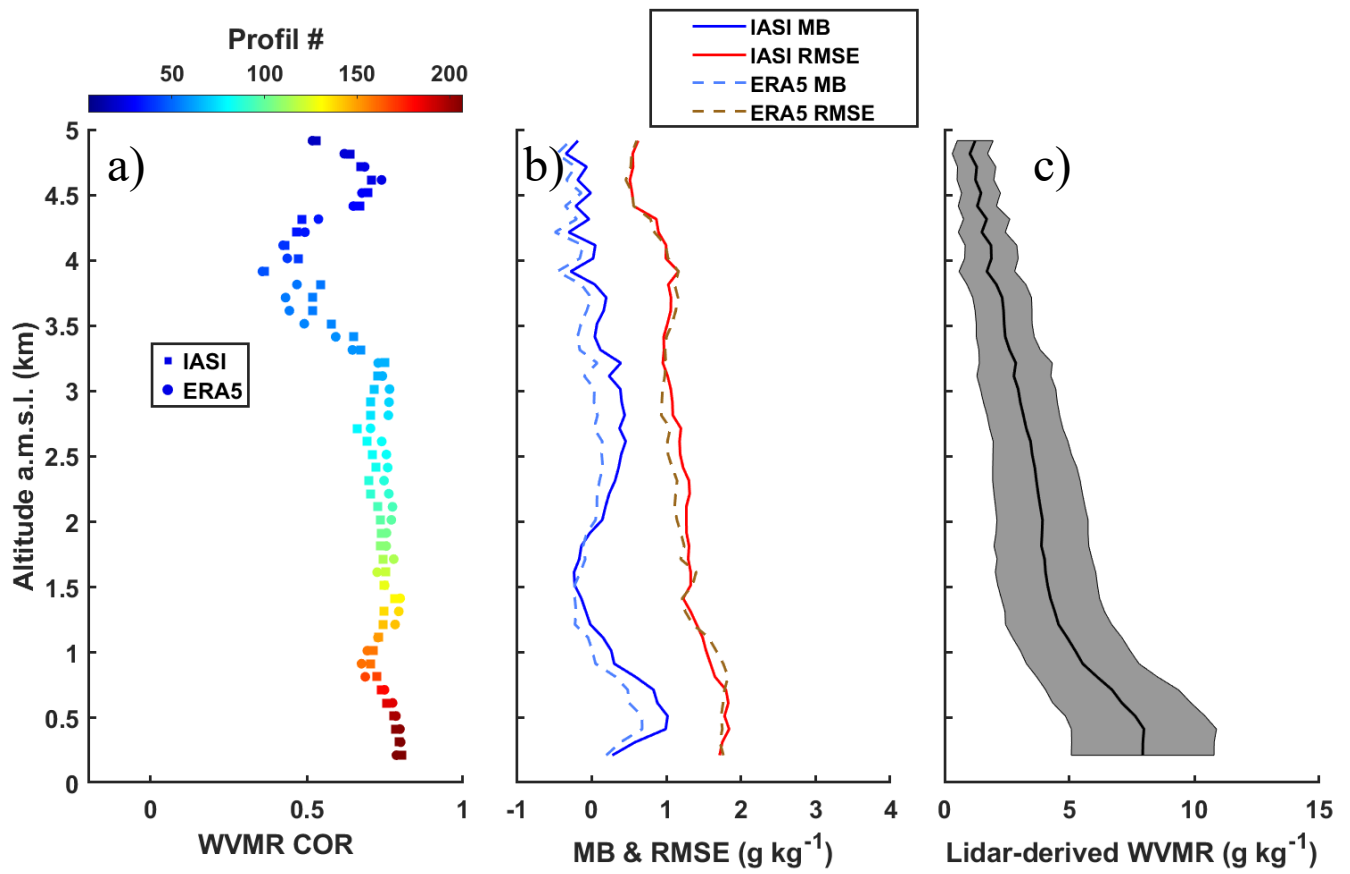


Figure S22: MARCO lidar (RL5). Same as Figure S18.



75 Figure S23: CONCERNING lidar (RL6). Same as Figure S18.

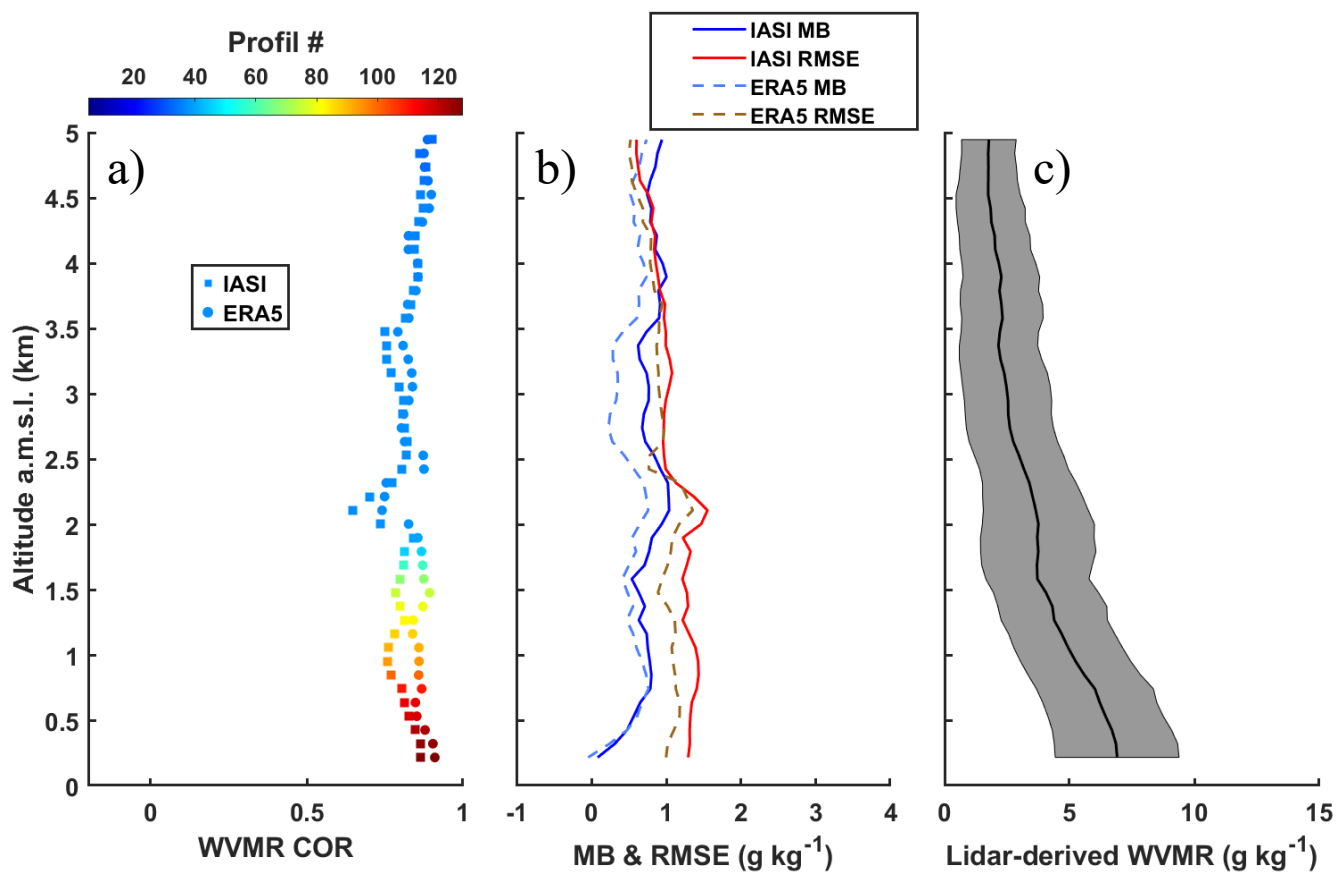


Figure S24: WALI lidar (RL7). Same as Figure S18.

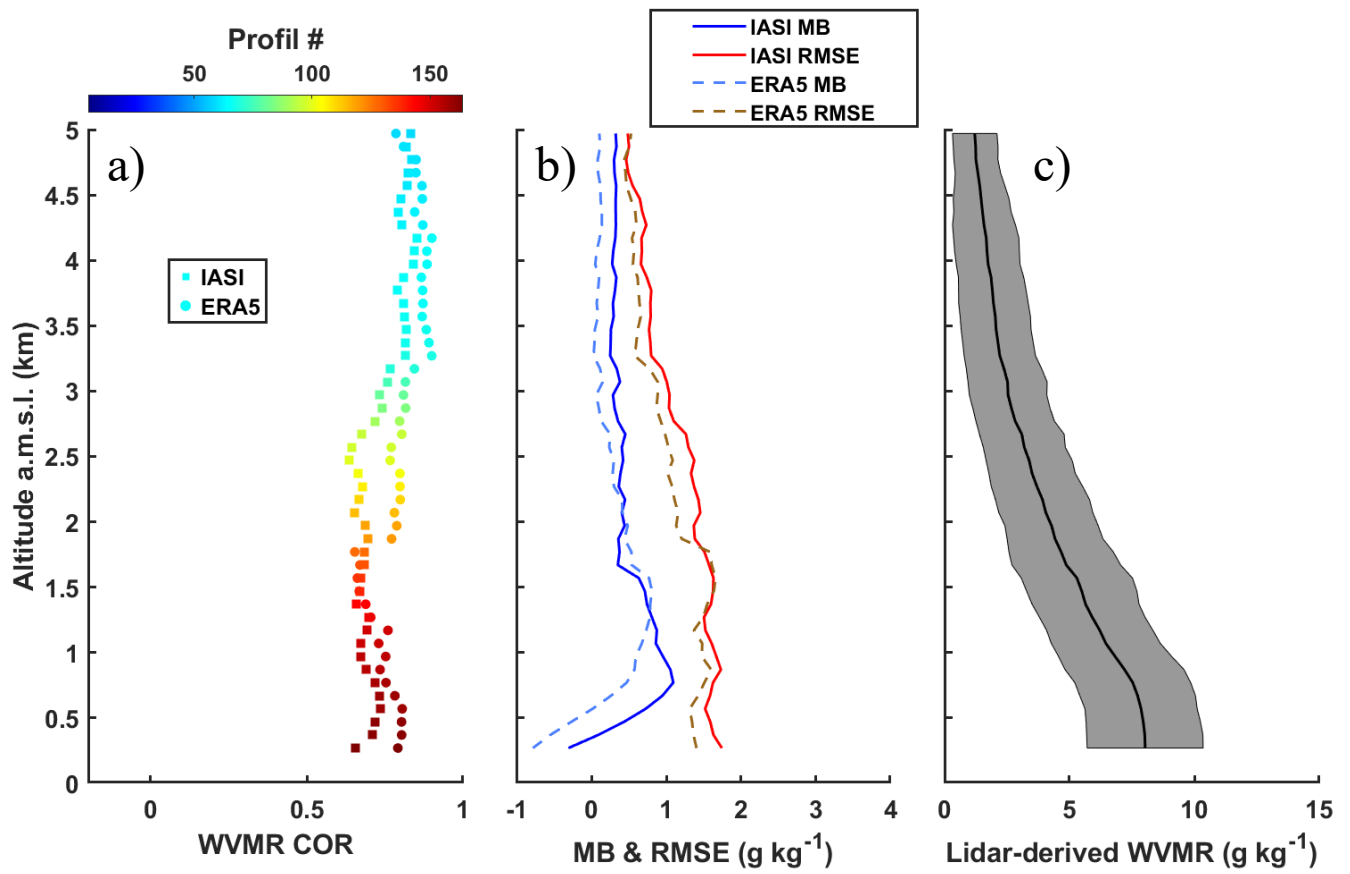


Figure S25: ARTHUS lidar (RL8). Same as Figure S18.