Ground-Based, Integrated Path Differential Absorption LIDAR Measurement of CO_2, CH_4, and H_2O near 1.6 μm

Supplemental

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Supplementary material.
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Note: Amazon data bucket file links will be updated; NetCDF file upload (ongoing)

OCIS codes: *(280.1910) DIAL, differential absorption lidar; (280.3640) Lidar.*

http://dx.doi.org/10.1364/ao.XX.XXXXXX

SUPPLEMENTARY MATERIAL

- PMT dark counts versus PMT box temperature: this document, Figure 1 .
- IPDA LIDAR: data are available in NetCDF file format at https://www.123456790.com .
- Aerosol backscatter LIDAR: data are available in NetCDF file format at https://www.123456790.com .
- CRD sensor (Picarro G2301): data are available in NetCDF file format at https://www.123456790.com .
- Weather sensor (Vaisala WXT520): data are available in NetCDF file format at https://www.123456790.com .
- Thorlabs temperature sensor (TSP01): data are available in NetCDF file format at https://www.123456790.com .

Table 1. Overview of measurements [1].
(A) IPDA LIDAR Data, (B) Detected Species, (C) Backscatter LIDAR Data, (D) Picarro G2301 Data, (E) Vaisala WXT520 Data, (F) Thorlabs TSP01 Data.

Date (UTC)	Fig.	(A)	(B)	(C)	(D)	(E)	(F)
Oct. 09, 2015	2	yes	CO_2, H_20	yes	yes	yes	yes
Oct. 10, 2015	3	yes	CO_2, H_20	yes	yes	yes	yes
Oct. 11, 2015	4	yes	CO_2, H_20	yes	yes	yes	yes
Oct. 12, 2015	5	yes	CO_2, H_20	yes	yes	yes	yes
Oct. 13, 2015	6	yes	CO_2, H_20	yes	yes	yes	yes
Oct. 14, 2015	7	yes	CO_2, H_20	yes	yes	yes	yes
Oct. 15, 2015	8	yes	CH_4, H_20	yes	yes	yes	yes
Oct. 16, 2015	9	yes	CH_4, H_20	yes	yes	yes	yes
Oct. 17, 2015	10	yes	CH_4, H_20	yes	yes	yes	yes
Oct. 18, 2015	11	yes	CH_4, H_20	yes	yes	yes	yes
Oct. 19, 2015	12	yes	CH_4, H_20	yes	yes	yes	yes

REFERENCES

1. Certain equipment, instruments or materials are identified in this paper in order to adequately specify the experimental details. Such identification does not imply recommendation by the National Institute of Standards and Technology nor does it imply the materials are necessarily the best available for the purpose.
2. K. O. Douglass, S. E. Maxwell, G.-W. Truong, R. D. van Zee, J. R. Whetstone, J. T. Hodges, D. A. Long, and D. F. Plusquellic, "Rapid scan absorption spectroscopy using a waveform-driven electro-optic phase modulator in the 1.6-1.65 μm region," JOSA B **30**, 2696–2703 (2013).
3. K. O. Douglass, S. E. Maxwell, D. A. Long, J. T. Hodges, and D. F. Plusquellic, "Fast switching arbitrary frequency light source for broadband spectroscopic applications," U.S. patent 13/827,476 (March 14, 2013).
4. G. Wagner, S. Maxwell, and D. Plusquellic, "Integrated Path Detection

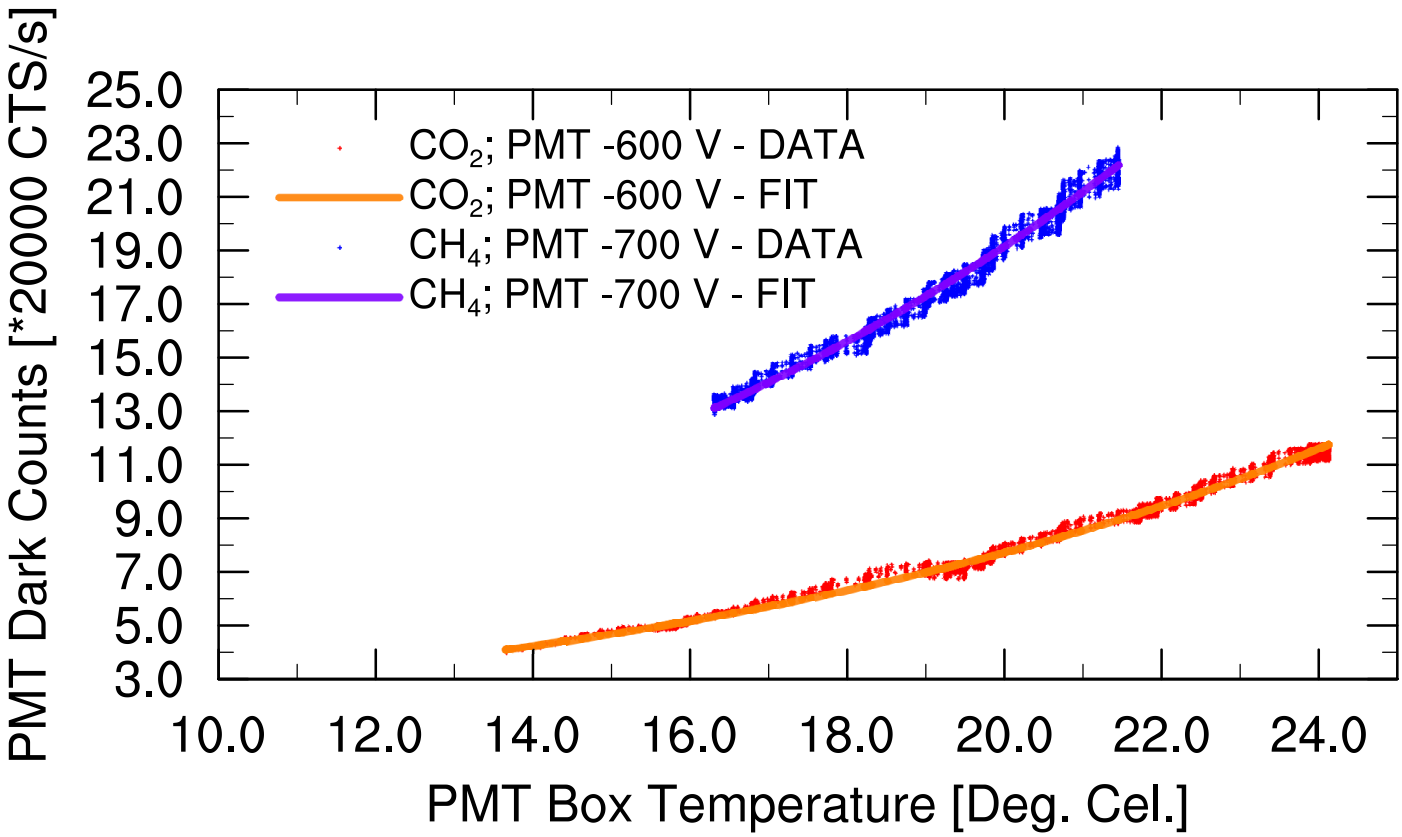

Fig. 1. PMT dark counts as a function of PMT box temperature for CO_2 (-600 V) and CH_4 (-700 V) measurement configuration. FIT (CO_2): $f(x) = 0.92077 * exp(0.10467 * x) + 0.25927$; FIT ($CH_4$): $g(x) = 2.8518 * exp(0.097403 * x) - 0.84751$.

of CH_4 and CO_2 using a waveform driven electro-optic single sideband laser source," in Proceedings of the 27th International Laser and Radar Conference (ILRC), New York, USA, 5-10 July, paper S13-02.

5. G. A. Wagner and D. F. Plusquellic, "Integrated Path Differential Absorption LIDAR Measurement of CO_2, CH_4, and H_2O near 1.6 μm - Supplemental," http://doi.org/10.18434/T49W2V

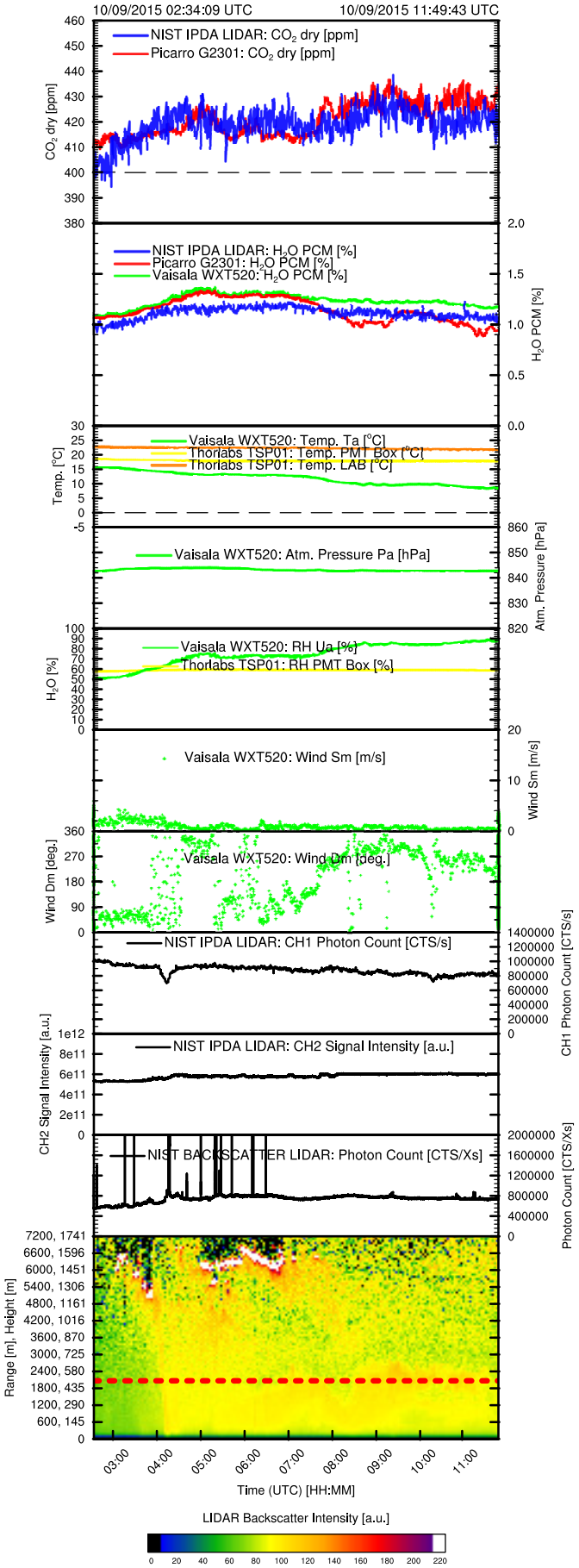

Fig. 2. IPDA LIDAR CO_2 dry concentrations in μmol/mol (ppm) on October 09, 2015.

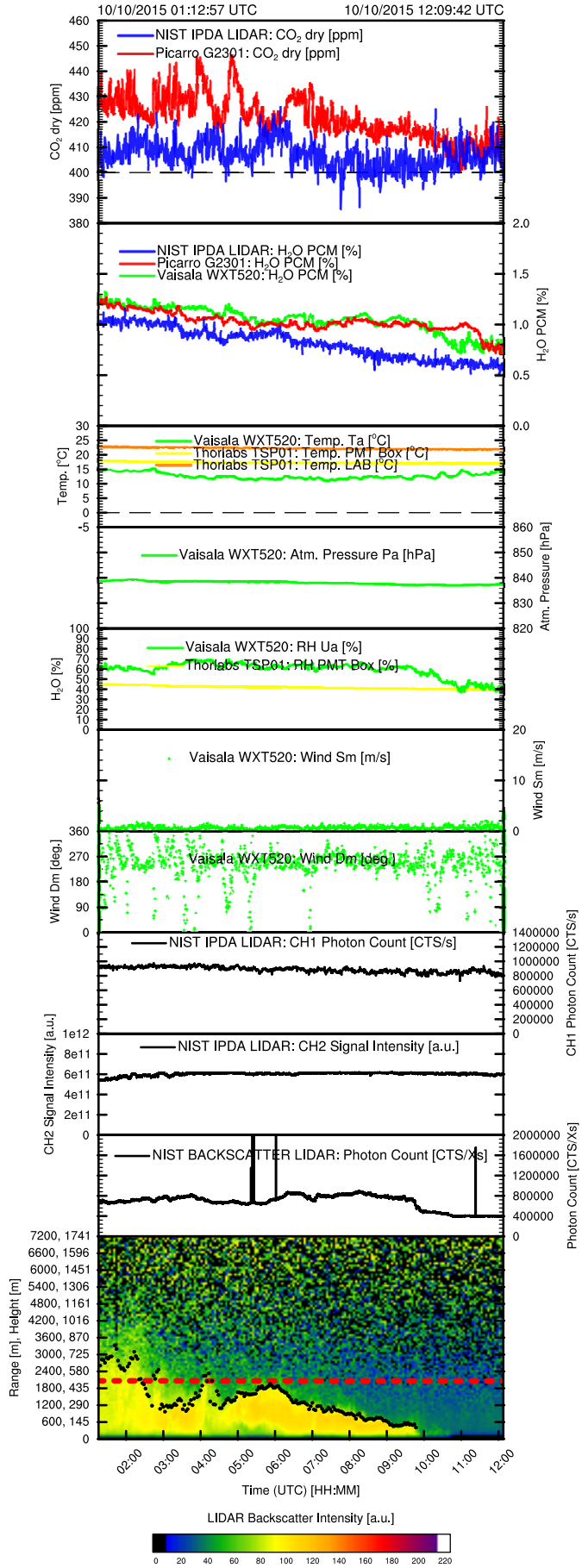

Fig. 3. IPDA LIDAR CO_2 dry concentrations in μmol/mol (ppm) on October 10, 2015.

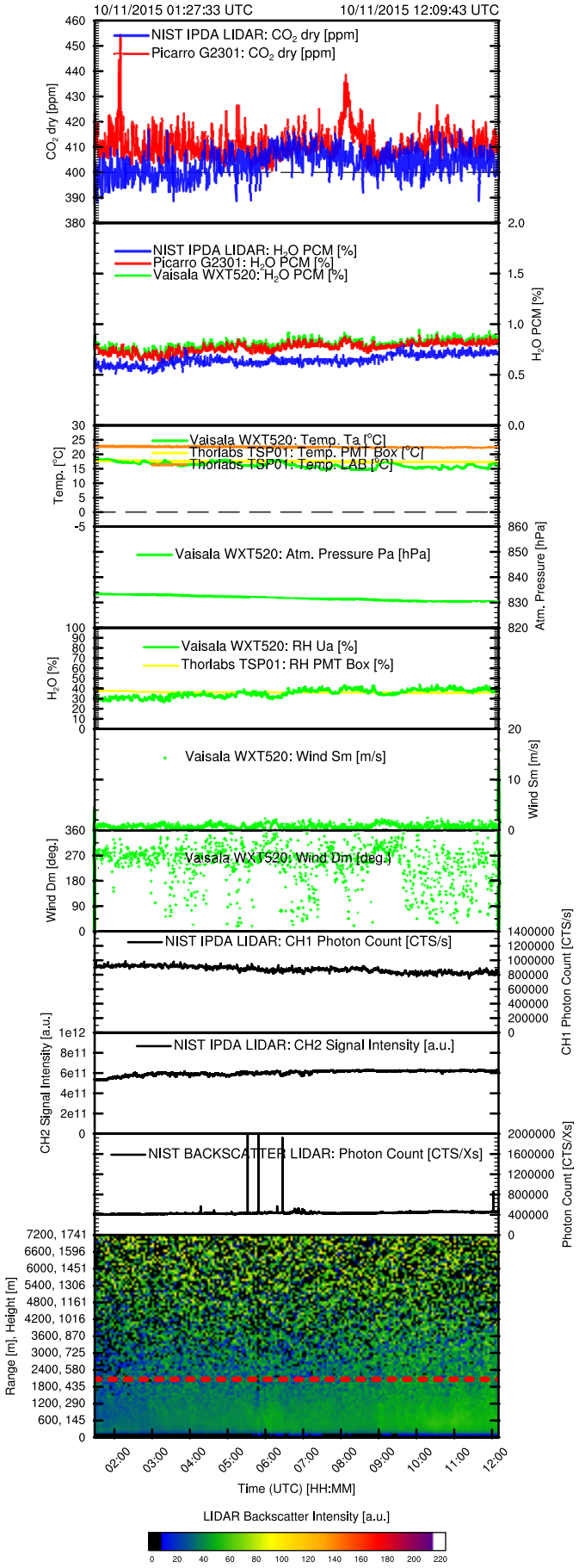

Fig. 4. IPDA LIDAR CO_2 dry concentrations in μmol/mol (ppm) on October 11, 2015.

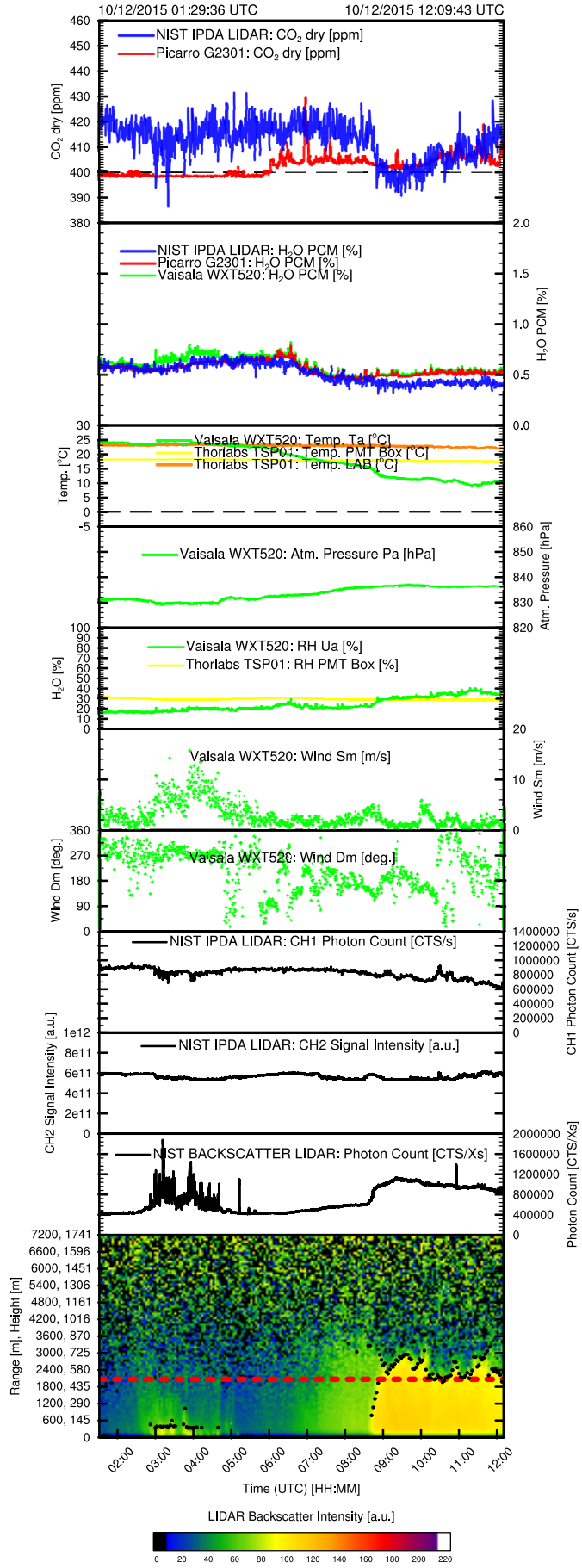

Fig. 5. IPDA LIDAR CO_2 dry concentrations in μmol/mol (ppm) on October 12, 2015.

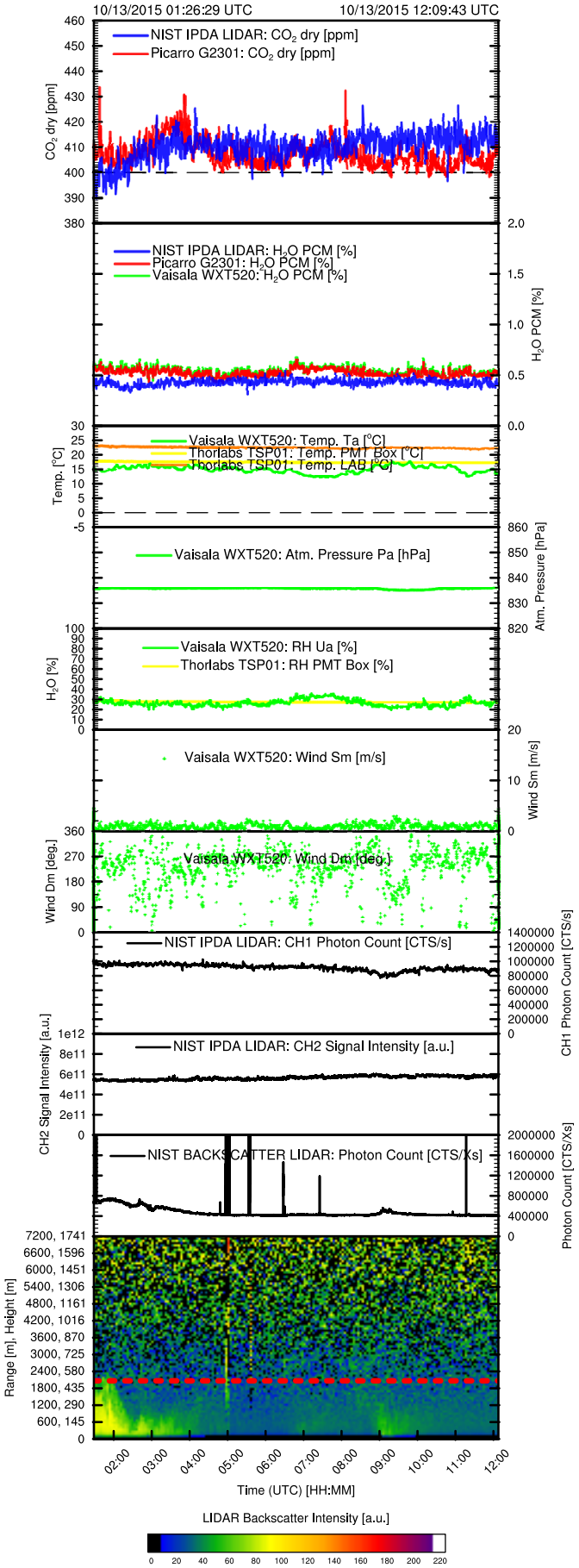

Fig. 6. IPDA LIDAR CO_2 dry concentrations in μmol/mol (ppm) on October 13, 2015.

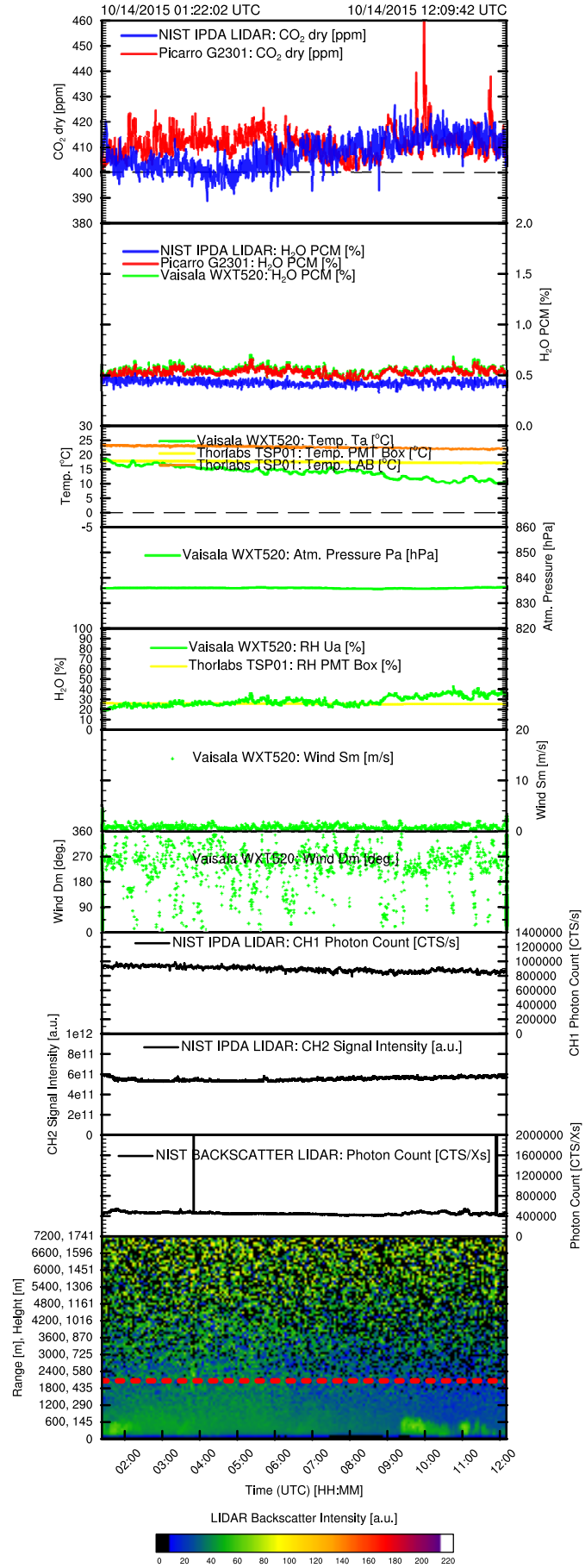

Fig. 7. IPDA LIDAR CO_2 dry concentrations in μmol/mol (ppm) on October 14, 2015.

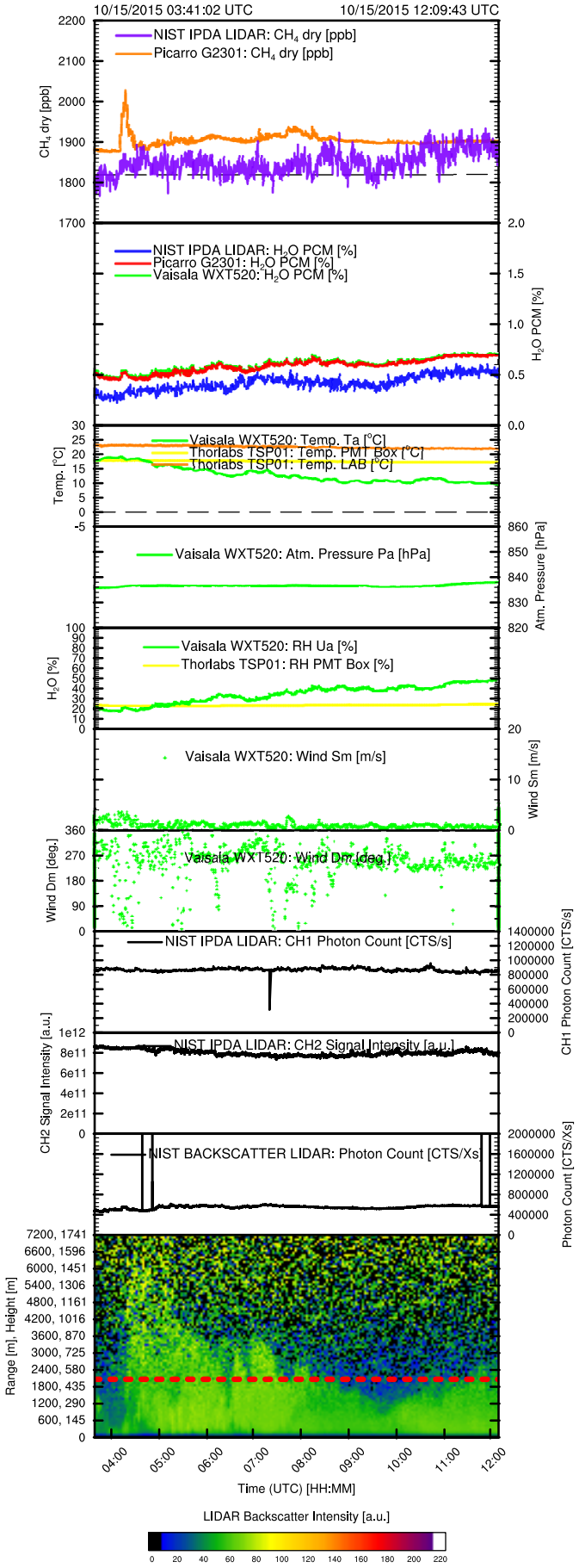

Fig. 8. IPDA LIDAR CH_4 dry concentrations in nmol/mol (ppb) on October 15, 2015.

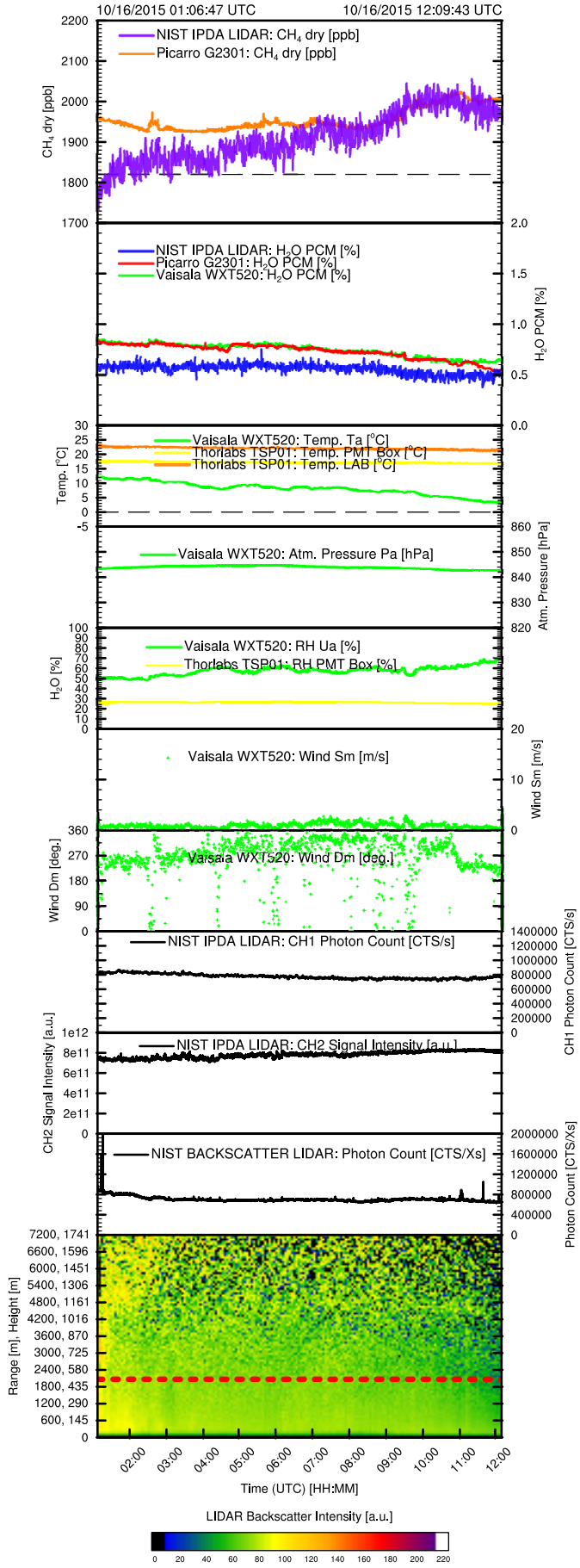

Fig. 9. IPDA LIDAR CH_4 dry concentrations in nmol/mol (ppb) on October 16, 2015.

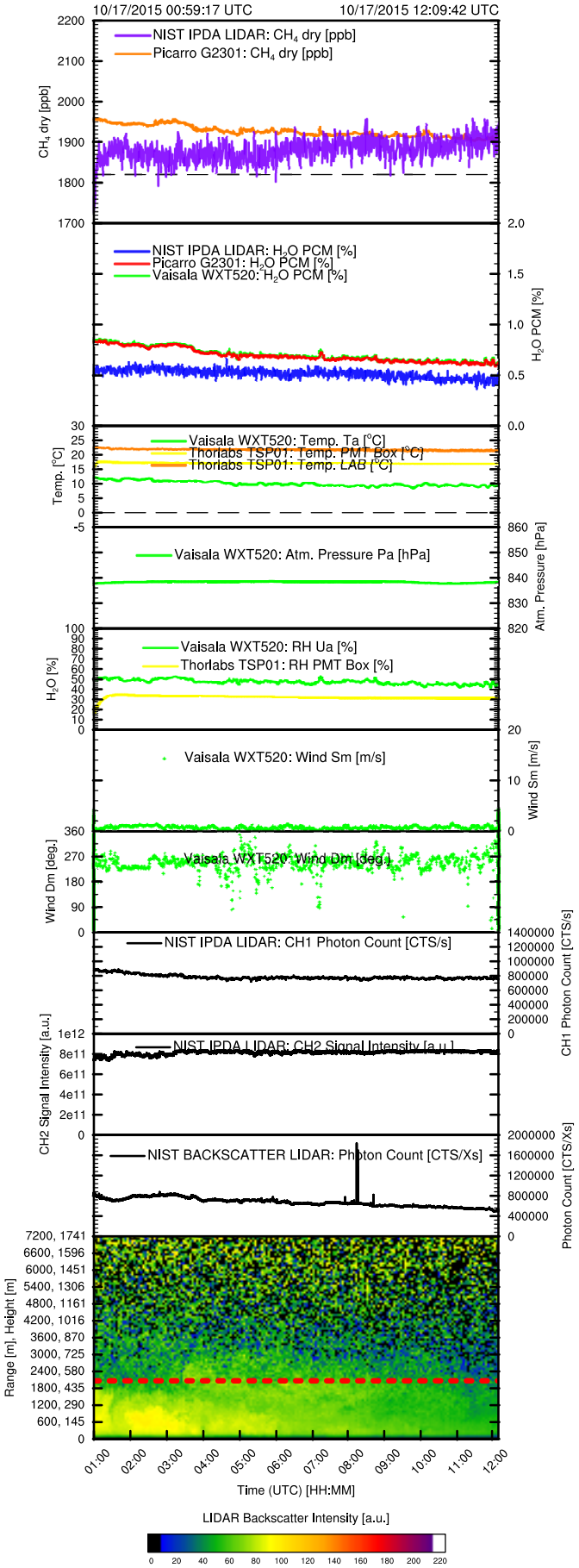

Fig. 10. IPDA LIDAR CH_4 dry concentrations in nmol/mol (ppb) on October 17, 2015.

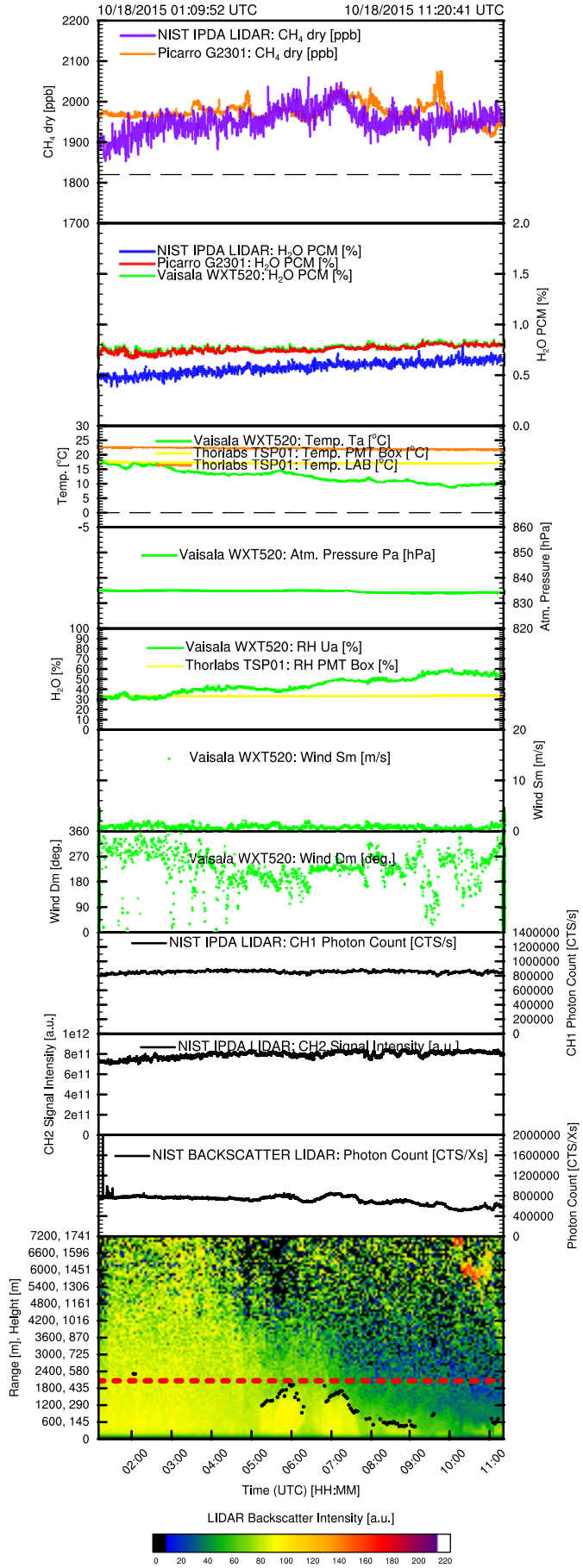

Fig. 11. IPDA LIDAR CH_4 dry concentrations in nmol/mol (ppb) on October 18, 2015.

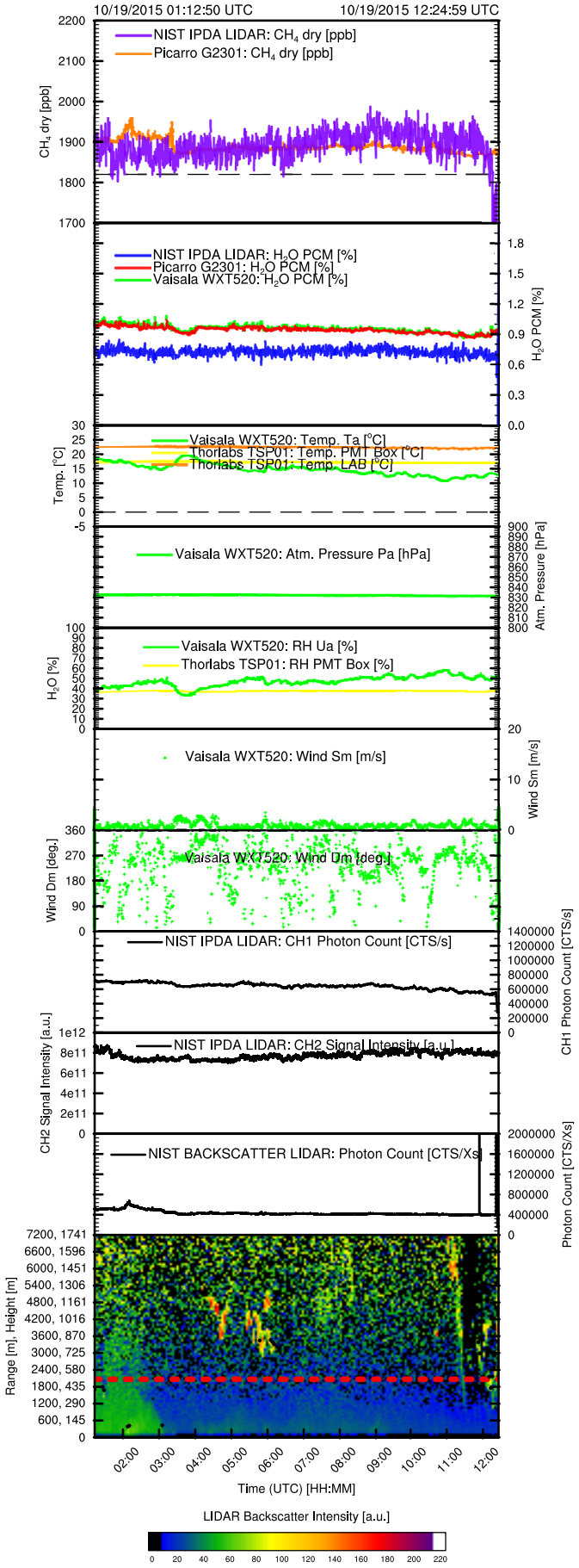

Fig. 12. IPDA LIDAR CH_4 dry concentrations in nmol/mol (ppb) on October 19, 2015.