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## La Reunion Island (21S, 55.5E) SHADOZ/NDACC station: First re-processed ozonesonde data and comparisons with lidar measurements at the Maïdo Observatory

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# La Reunion Island (21°S, 55°) SHADOZ/NDACC station

First reprocessed ozonesonde data and comparisons with lidar measurements at the Maïdo Observatory

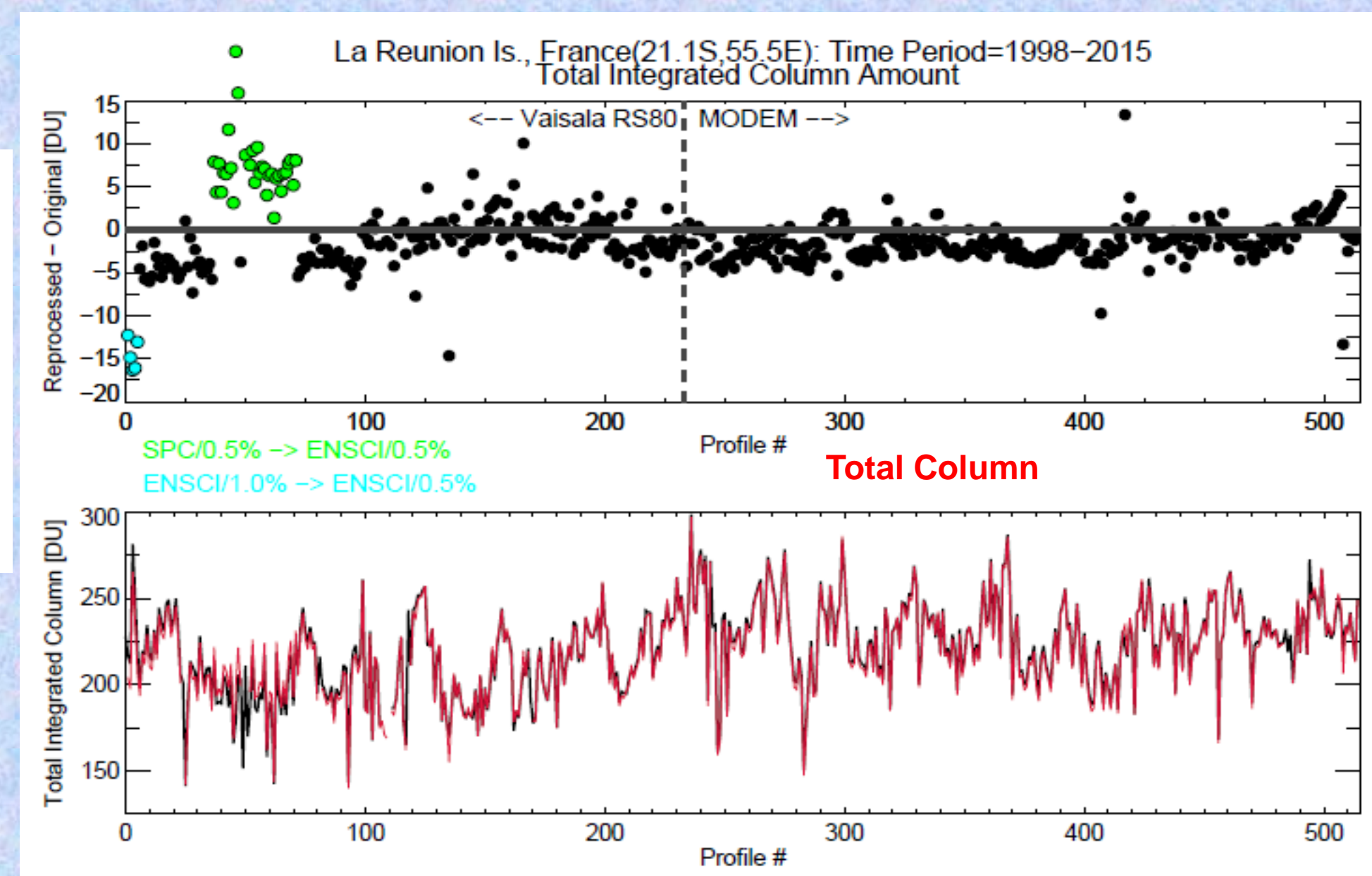
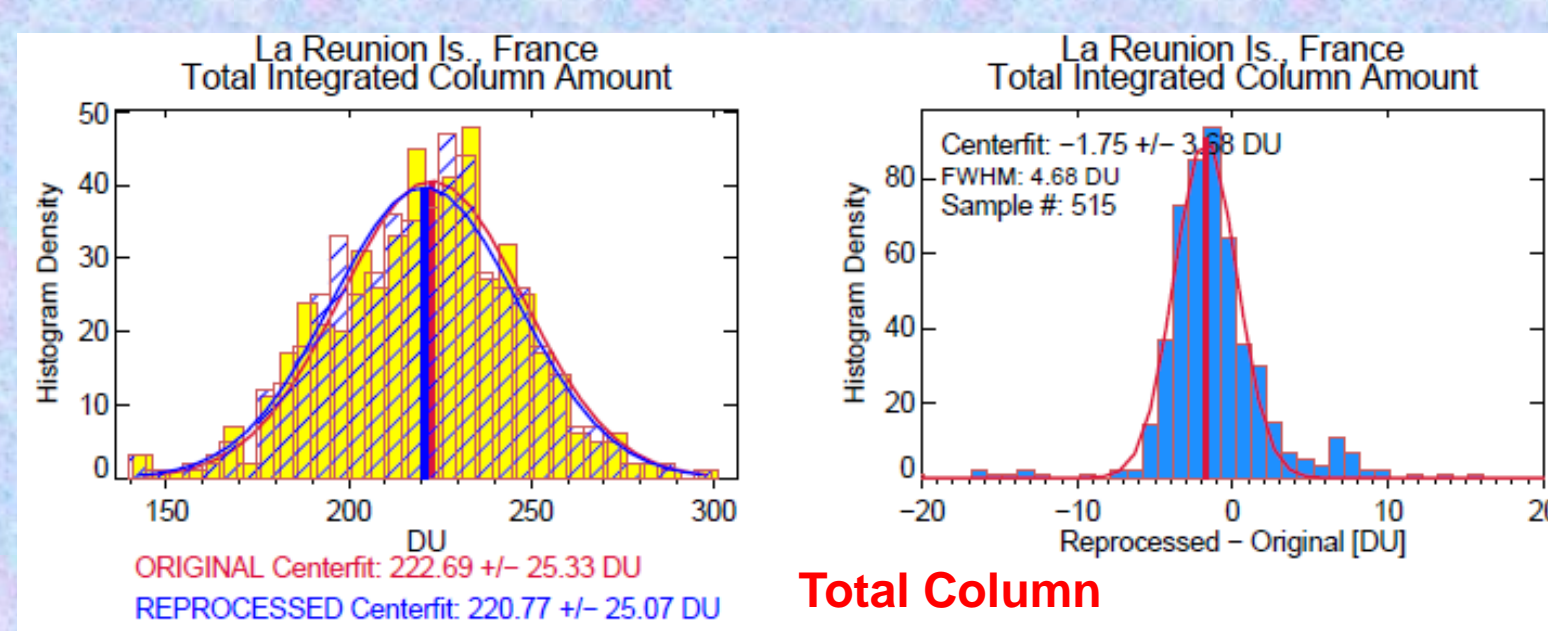
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 (1) LACy/UMR 8105/La Reunion University, FR, (2) NOAA/ESRL/GMD US (3) UMS 3365, OSU-Reunion, FR, (4) CIRES at NOAA/ESRL/GMD US, (5) NASA/GSFC, US, (6) SSAI at NASA/GSFC, ACD, US.

## ★ First reprocessed Ozone data (1998-2015)

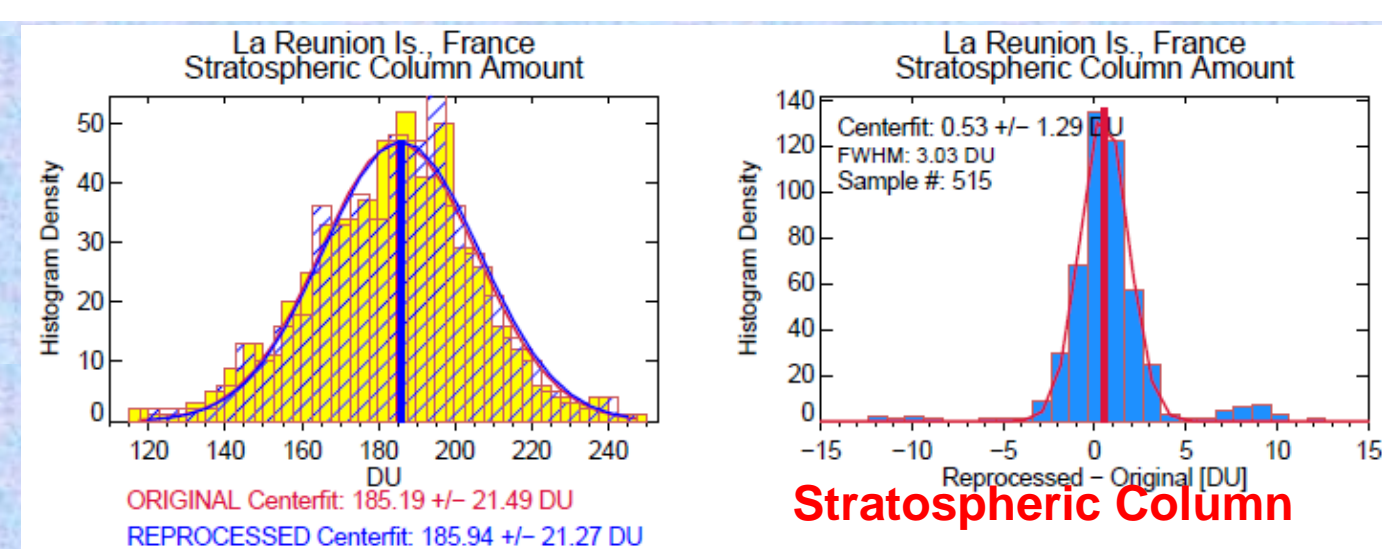
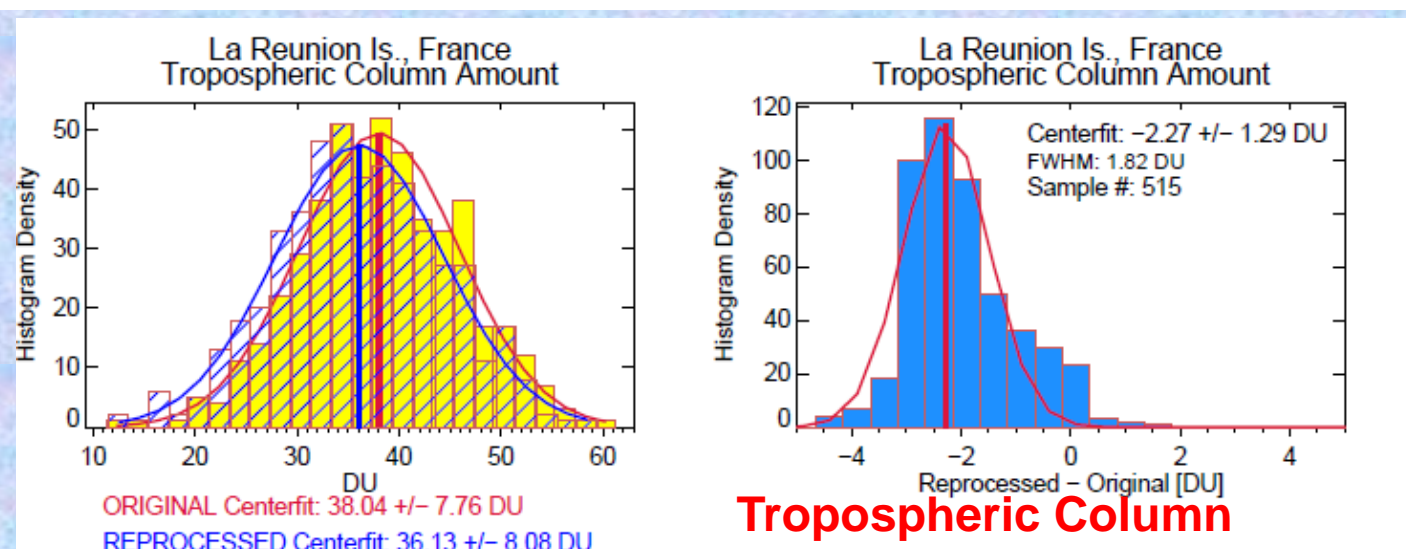
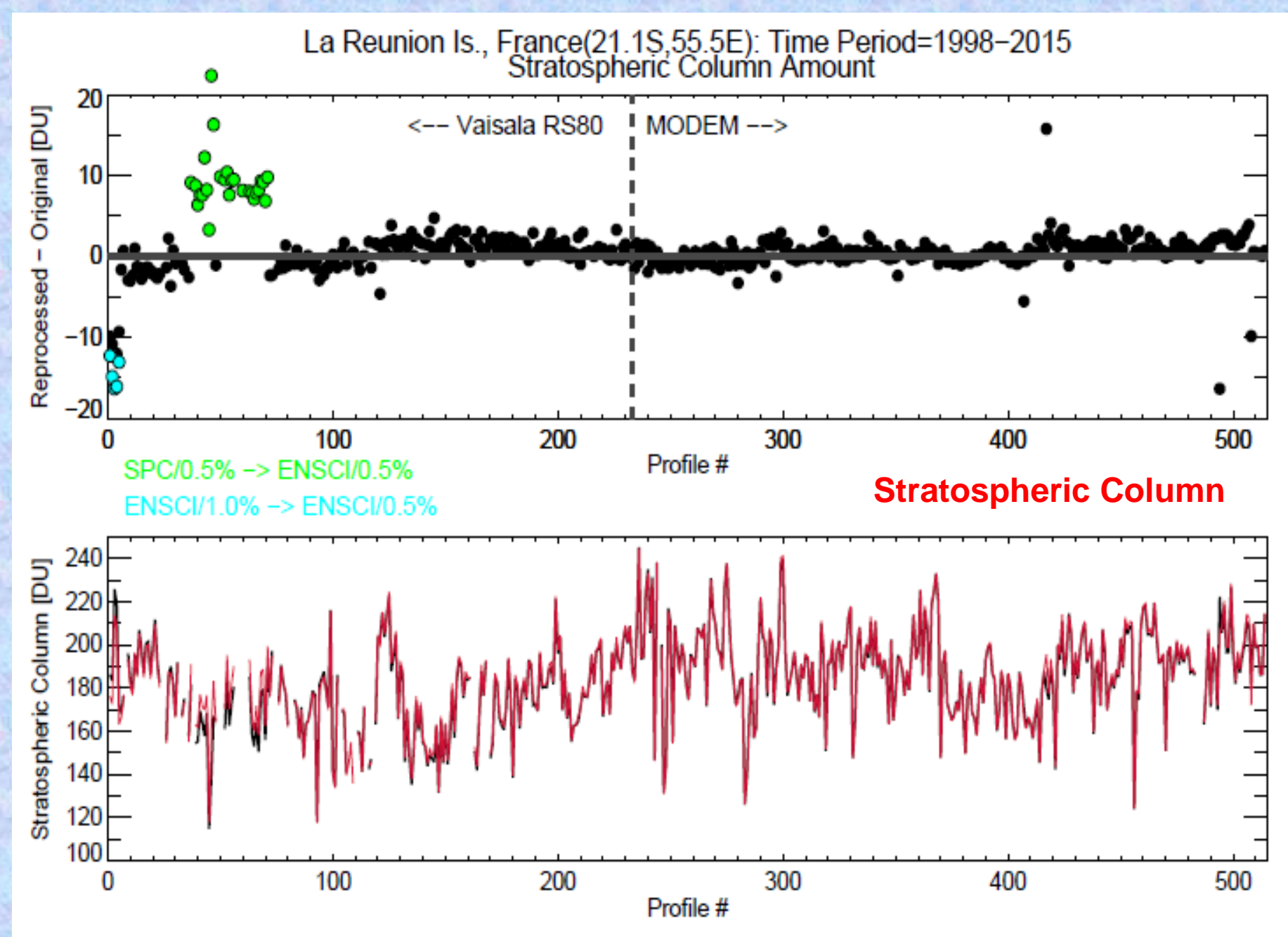
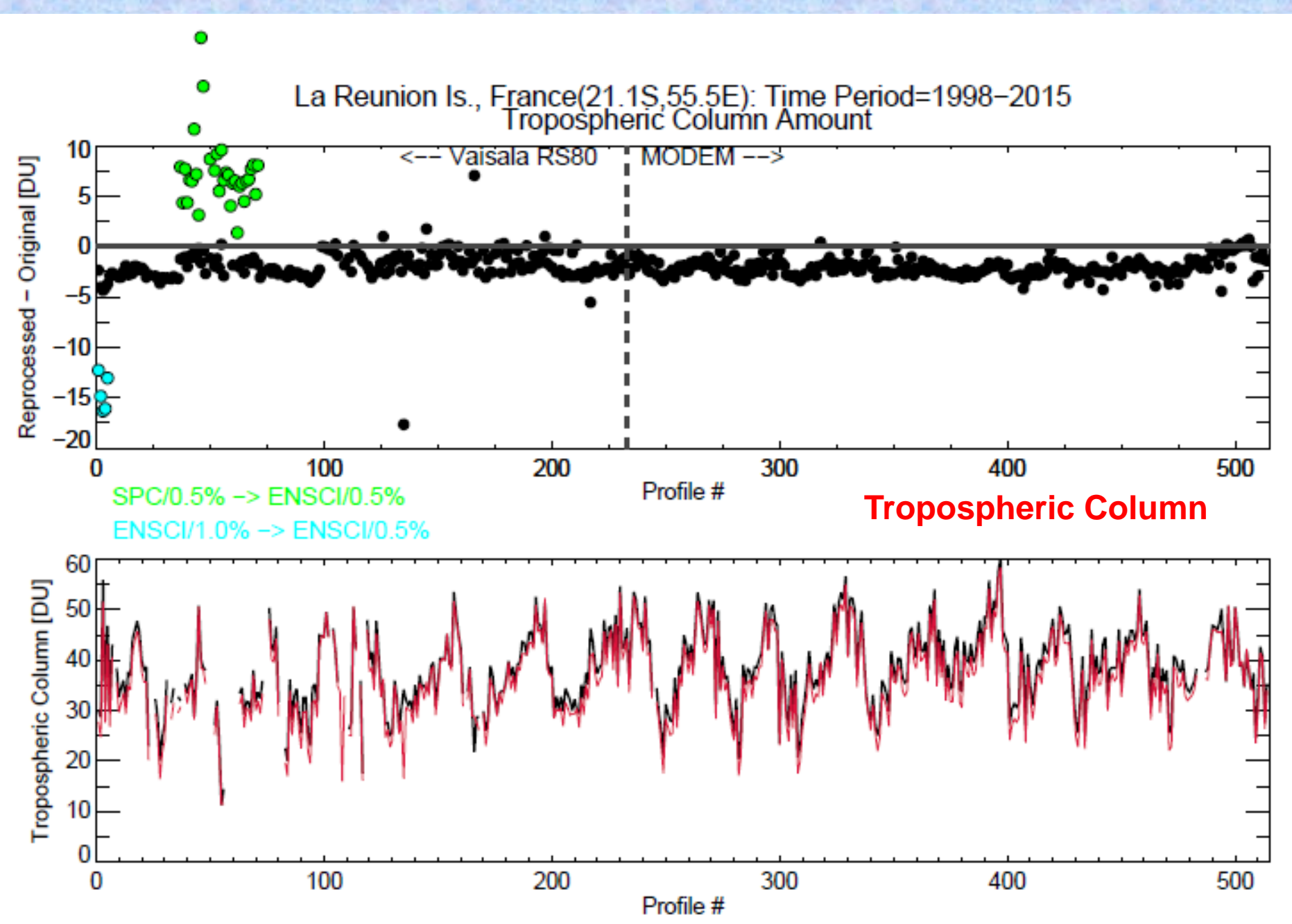
SHADOZ Sites, URL=<http://croc.gsfc.nasa.gov/shadoz>



!! Preliminary results !!



NDACC-SHADOZ station : 20.9°S 55.5° 8 masl (Gillot airport)



### Applied Corrections

La Reunion, France (1998 - 2015)

| Solution            | Type   | Timeline             | Correction (J. Witte)  |
|---------------------|--|----------------------|--|
|                     | 1% Full Buffer with ENSCI                          | First 8 records 1998 | Convert to ENSCI/1% -> ENSCI/0.5%:<br>R=0.96, P <sub>≥30hPa</sub><br>R=0.90+0.041Log <sub>10</sub> (P), P < 30 hPa<br>ENSCI/0.5% = R * ENSCI1%<br>ΔS = ± 0.05 entire profile |
|                     | 0.5% Half Buffer                                   |                      |  |
| Solution Volume     | 2.5 cc   | Entire record        | α (absorption efficiency) = 1.0044-4.4x10 <sup>-5</sup> (P <sub>air</sub> ), 100 < P <sub>air</sub> < 1050 hPa   |
| Instrument          | ENSCI  |                      |  |
|                     | SPC with 0.5% Half Buffer                          | 40 (1999-2000)       | Convert SPC/0.5% -> ENSCI/0.5%<br>R=0.96, P <sub>≥30hPa</sub><br>R=0.764+0.133Log <sub>10</sub> (P), P < 30 hPa<br>ENSCI/0.5% = SPC0.5% / R<br>ΔS = ± 0.05 entire profile    |
| Background Current  | IB0, IB1, and IB2 recorded but mostly not applied. |                      | Use IB=IB2: Thresholds:<br>IB < 0.05 μA ± 0.02 μA<br>IB ≥ 0.05 μA ± 0.04 μA  |
| PCF                 | 4AKOMHYR1986                                       |                      | SAKOMHYR1995   |
| Flowrate Correction | Not applied but Lab T, P, RH available             |                      | Used: T=25C±5, RH=50%±25, P=1000hPa<br>1.58%, ΔC <sub>pb</sub> = 0.003   |
| Pump                | RS80, MODEM  |                      | None (Internal pumpT)  |
| Temperature         |  |                      |  |
| Pressure offset     | RS80   |                      | No GPS data  |
|                     | MODEM  |                      | None (GPS altitude not available)  |

## ★ MORGANE Campaign April-July 2015 (Maïdo ObservatoRy Gas and Aerosol Ndacc Experiment) : blind test intercomparison between lidars (T°, O3, and water vapour) from OPAR and from NASA/GSFC mobile laboratory in view of the (re)labellisation of OPAR lidars in the NDACC :



Maïdo Observatory : 21.0°S 55.4°E 2154 masl

63 day and night balloons launched : 10 ozonesondes, 20 M10 and RS92 radiosondes, 7 CFH, 5 COBALD, 1 LOAC

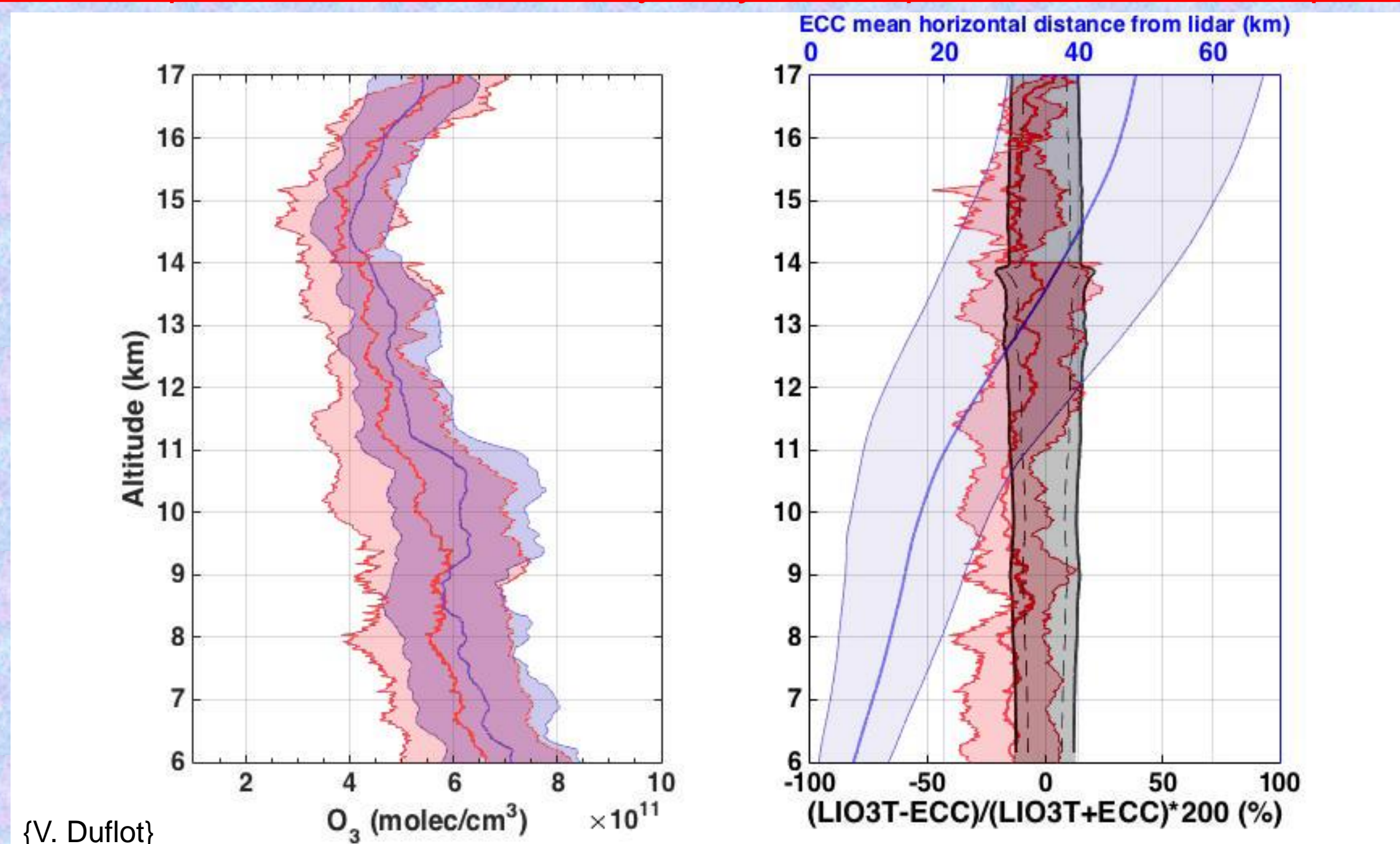
• Intercomparisons between Ozonesondes (ECC), Tropospheric (LiO3T) and Stratospheric (DIAL) lidars

Comparisons between individual profiles show a mean agreement from 10.8% to 19.4% in the troposphere and from 3.1% to 10.3% in the stratosphere

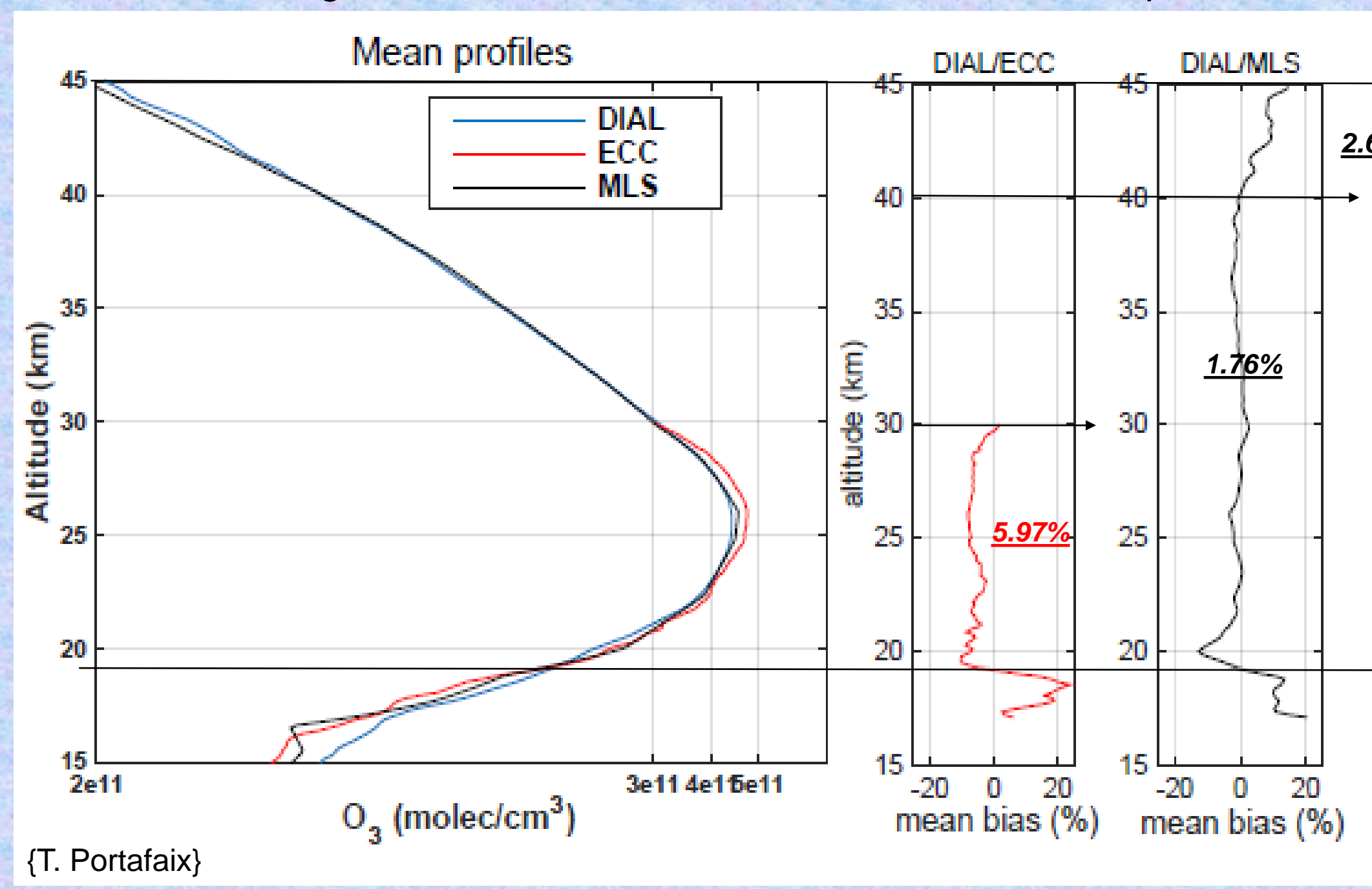
• Comparison of the total ozone integrated column amount between the ozonesonde and OMI : from -6.0% to +5.9% and La Reunion SAOZ : from -4.0% to +4.1%

Between 17 and 20 km the stratospheric lidar's measurements were polluted by the presence of aerosols coming from Chili and due to Calbuco volcano eruption

! In troposphere the displacement of the sonde trajectory with respect to the laser beam position could be large !

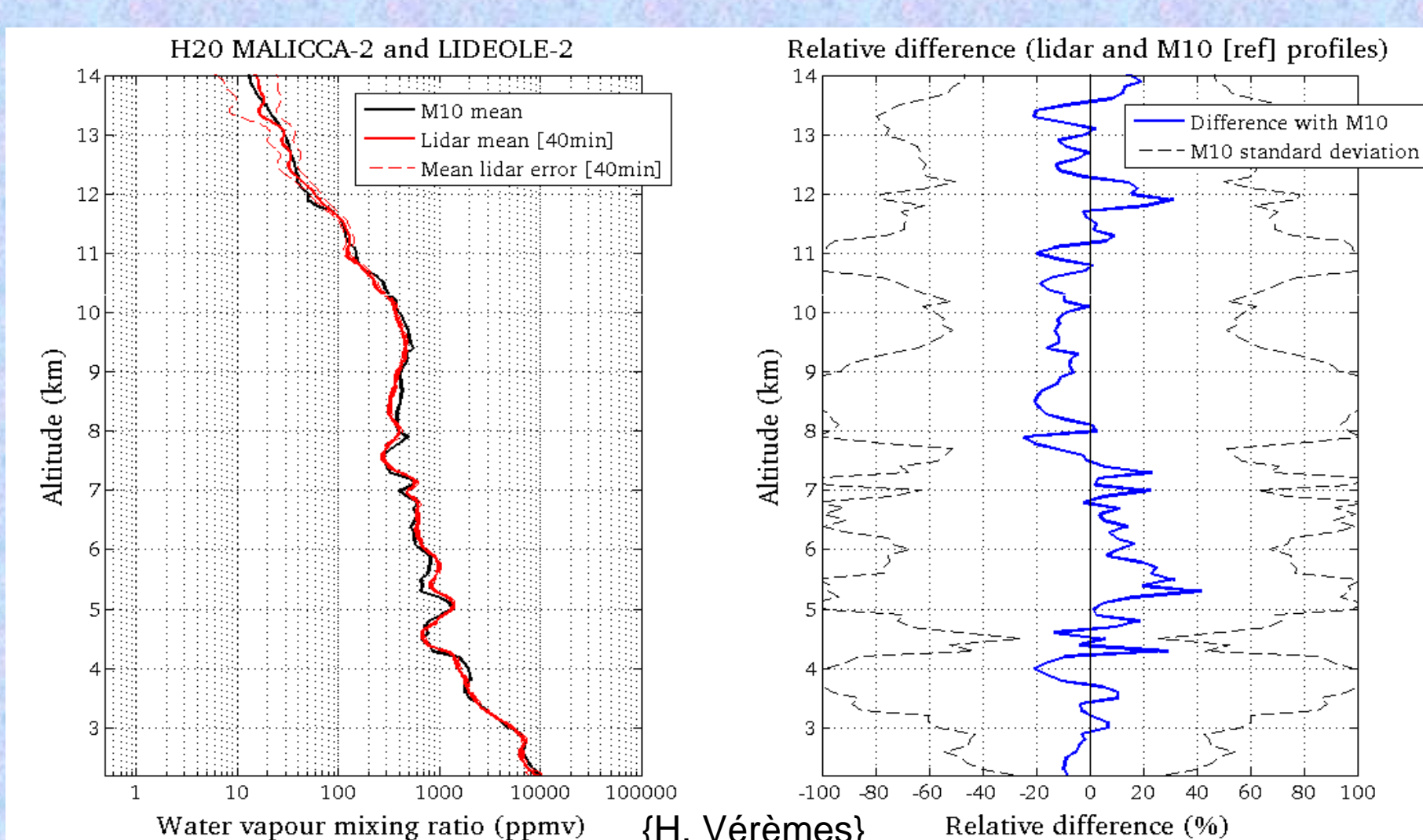


Left: mean ozone profiles (8): LiO3T and ECC +/- 1 sigma  
 Right: mean relative difference LiO3T/ECC +/- 1 sigma

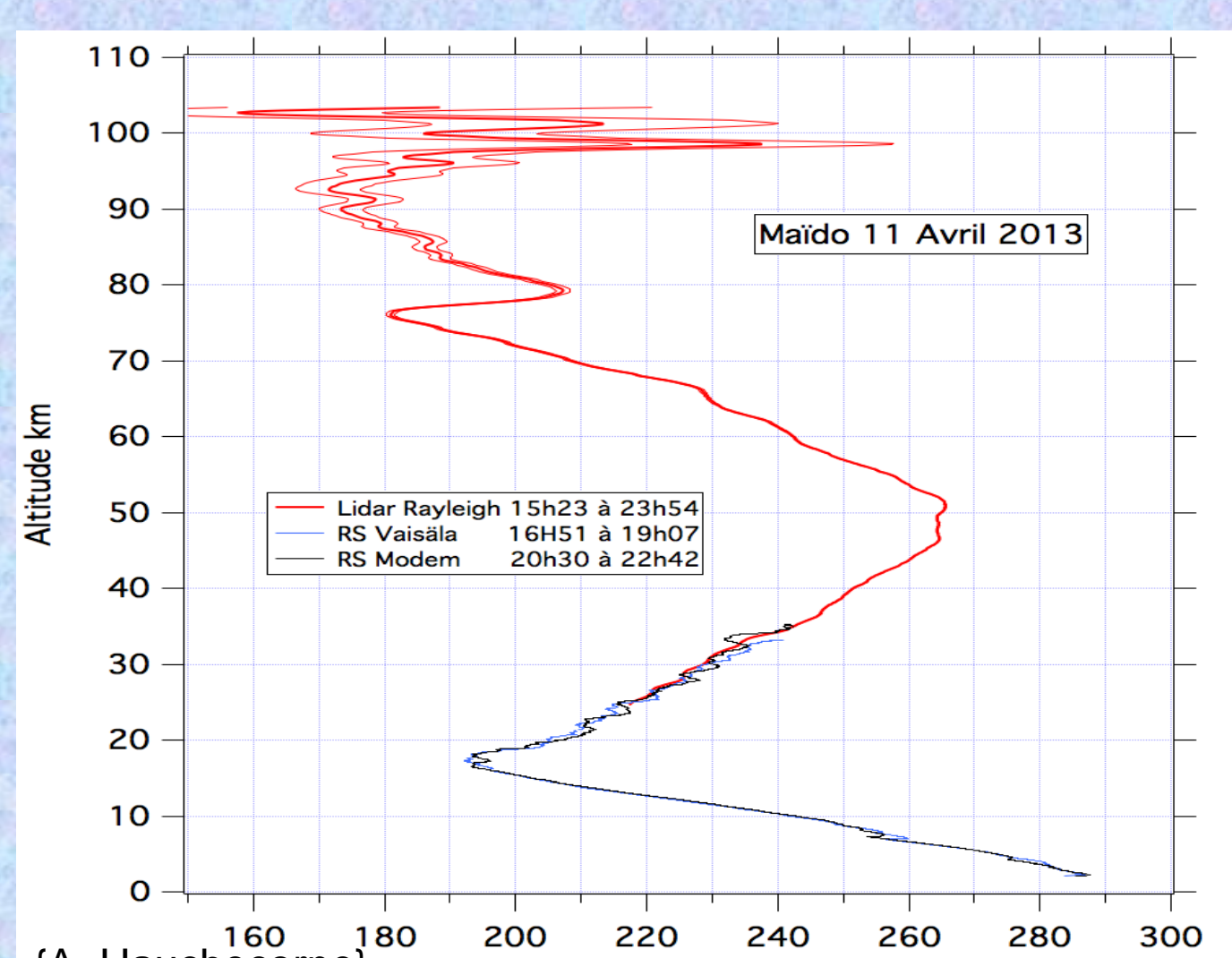


Mean profiles with 19 ECC, 45 DIAL and MLS between May and December 2015 (MORGANE campaign + NDACC routine measurements)

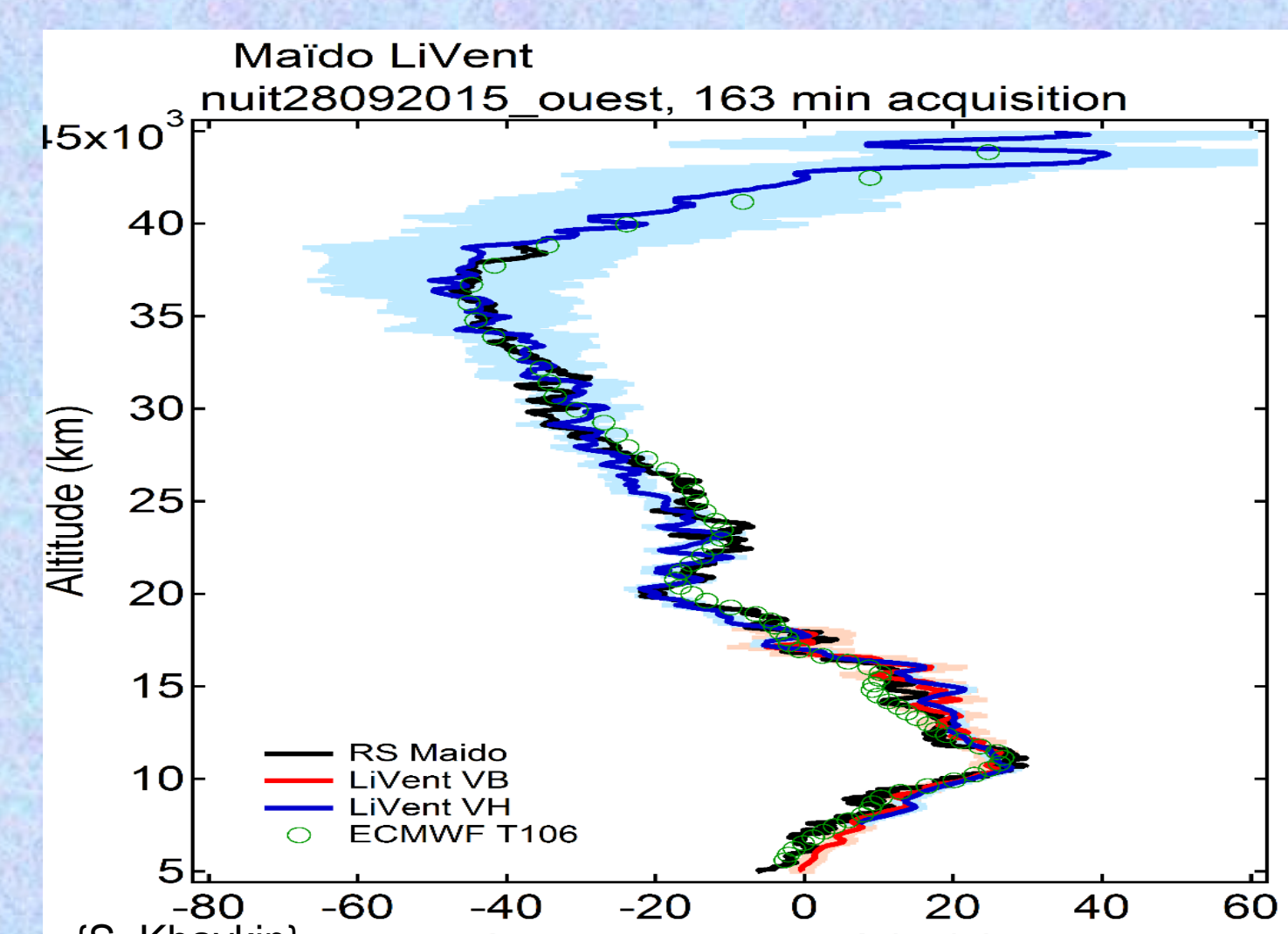
## ★ ANCILLARY COMPARAISONS : Water Vapor, Temperature and zonal wind



Water vapor Raman Lidar1200 and 5 radiosondes Modem M10



T° lidar and 2 radiosondes representative profiles



Wind lidar (45°) and a radiosonde Modem M10 (up to 40km!)