

Signal distortions in the free troposphere

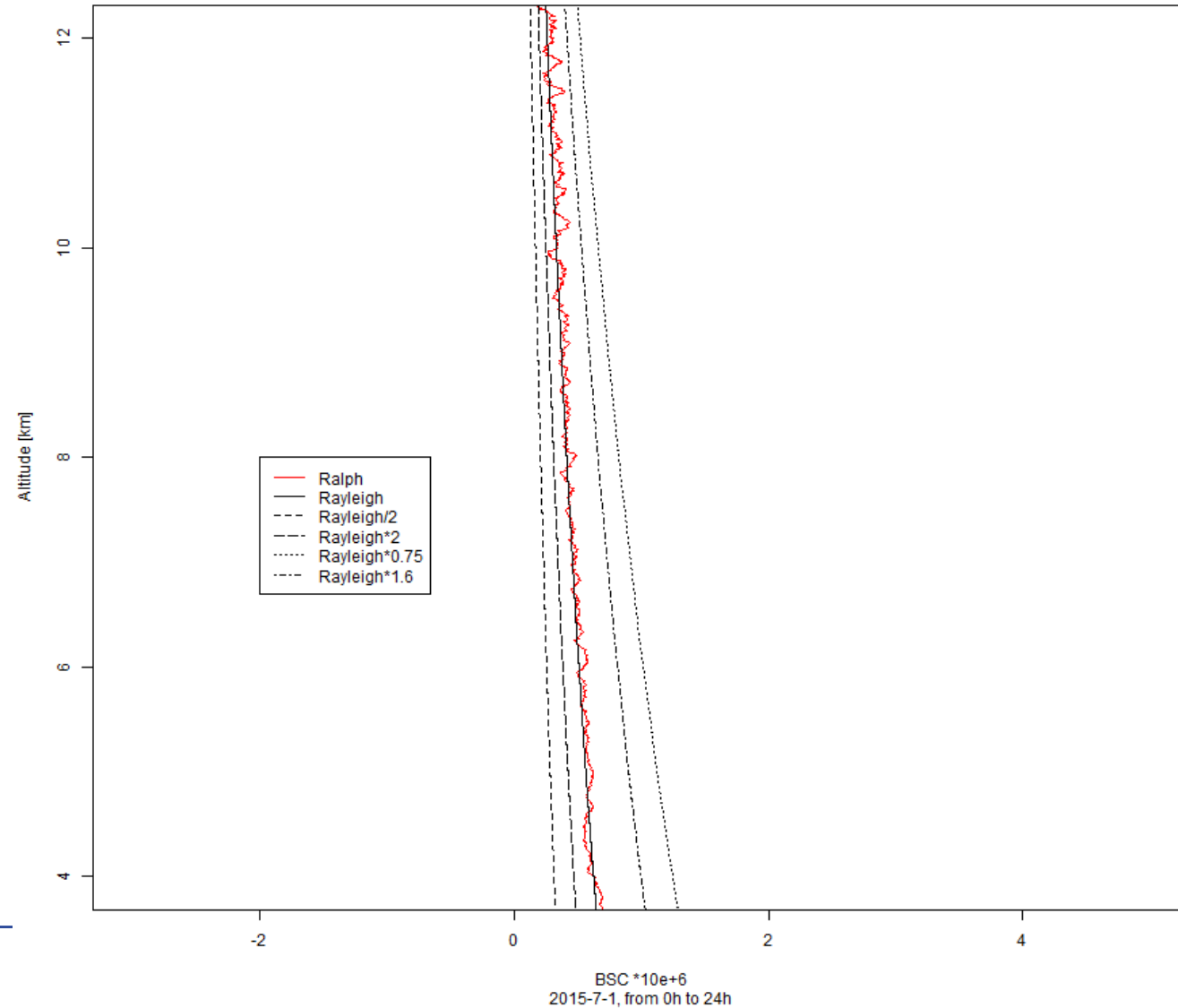
Ina Mattis, Margit Pattantyús-Ábrahám, Frank Wagner, Christoph Münkel



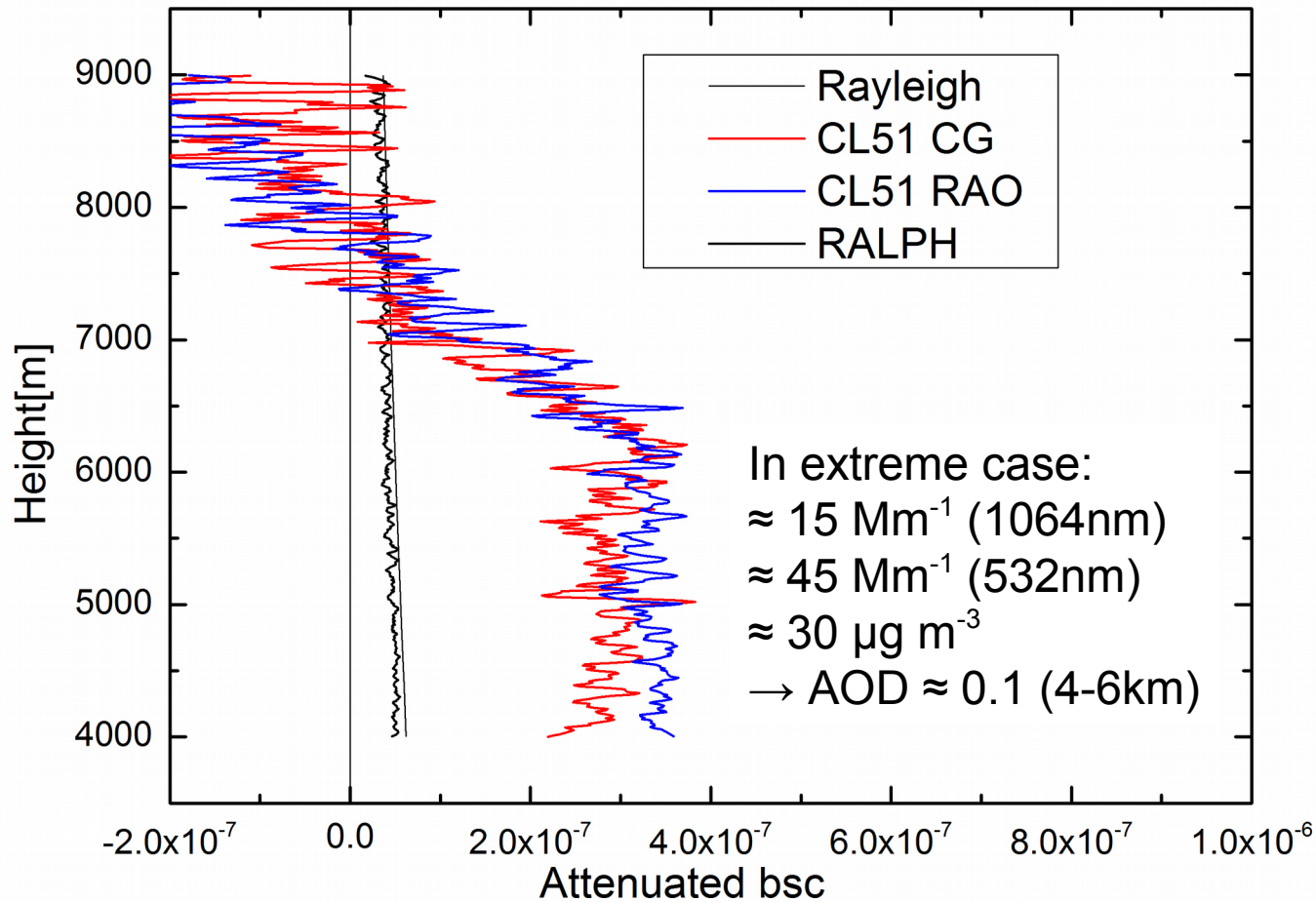
Motivation 1

good signal quality for Rayleigh calibration

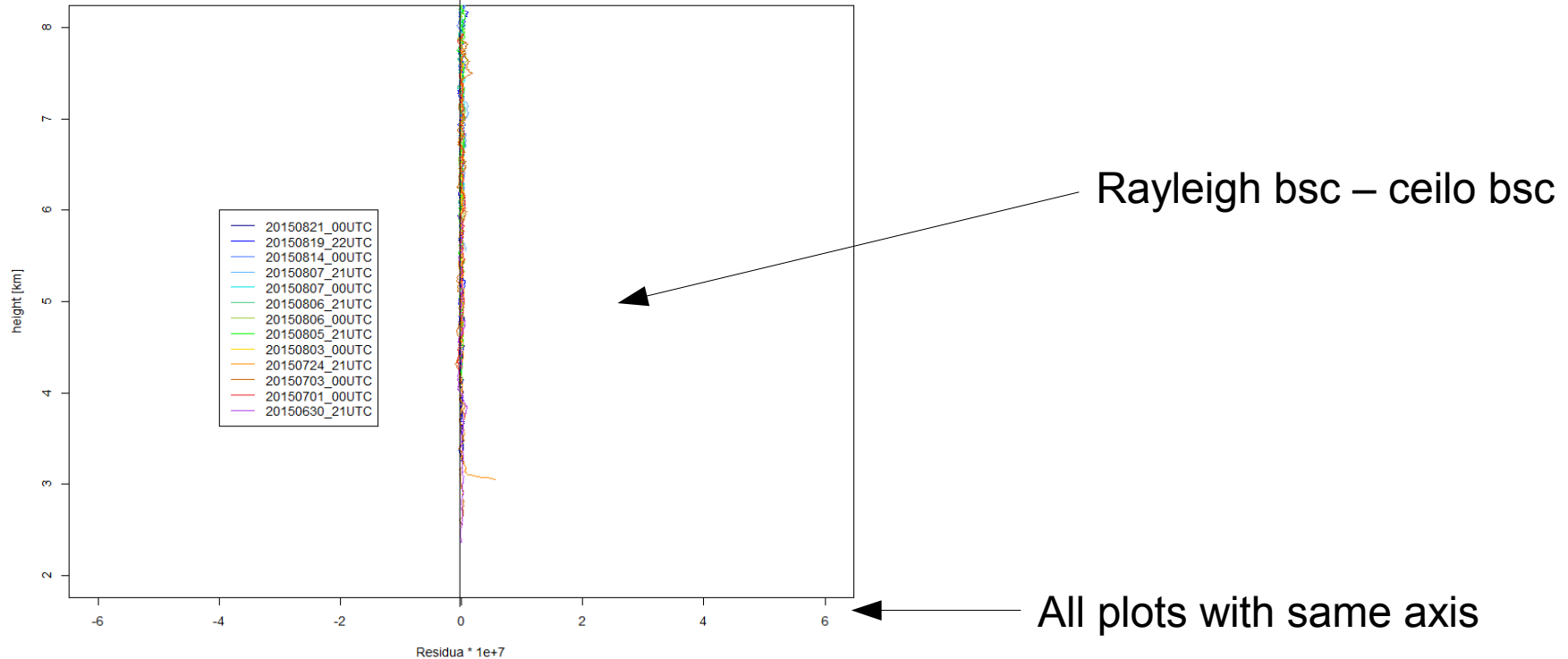
RALPH and Rayleigh backscatter



5 Aug 2015 21:00 UTC, Lindenberg

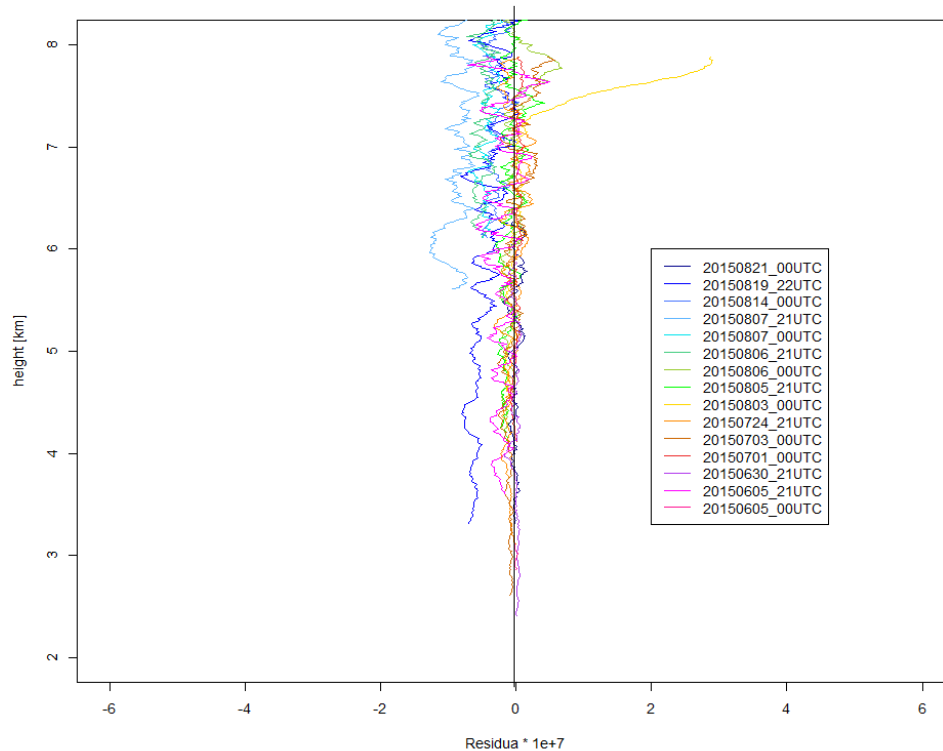


Residua of RALPH compared to Rayleigh backscatter profile

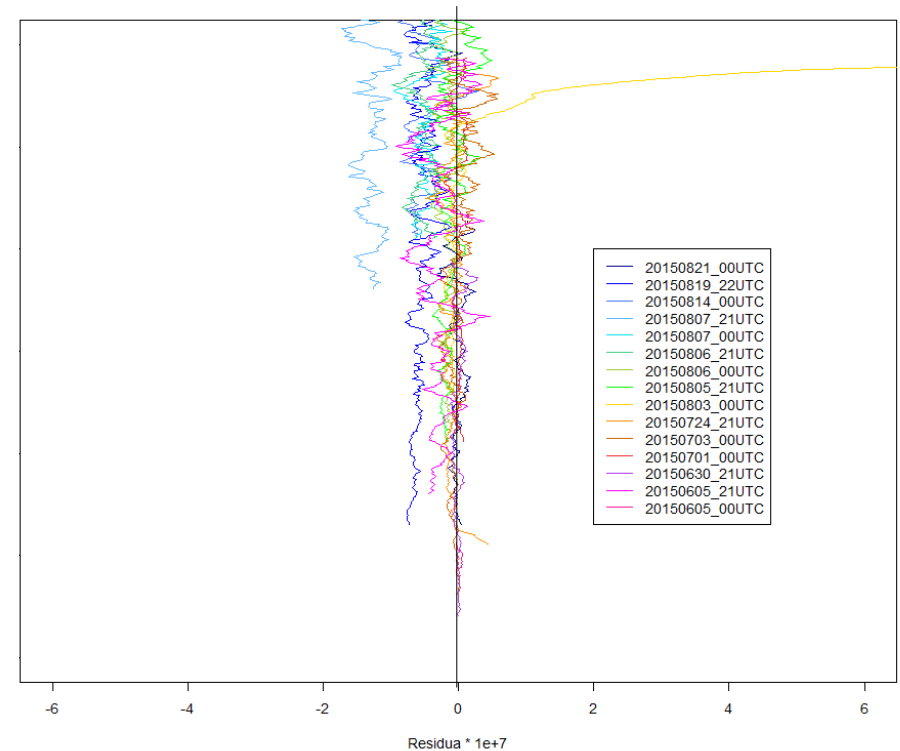


- ➔ Very low noise
- ➔ No vertical structures
- ➔ RALPH can provide a reference for signal shape in free troposphere

Residua of CHM100110 compared to Rayleigh backscatter profile

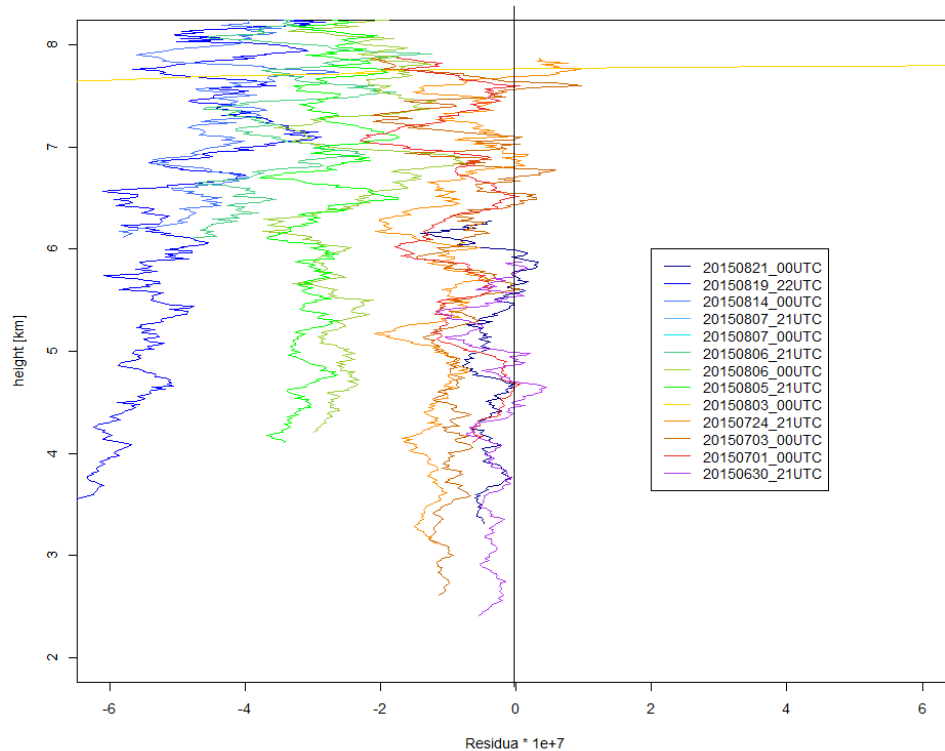


Residua of CHM140101 compared to Rayleigh backscatter profile

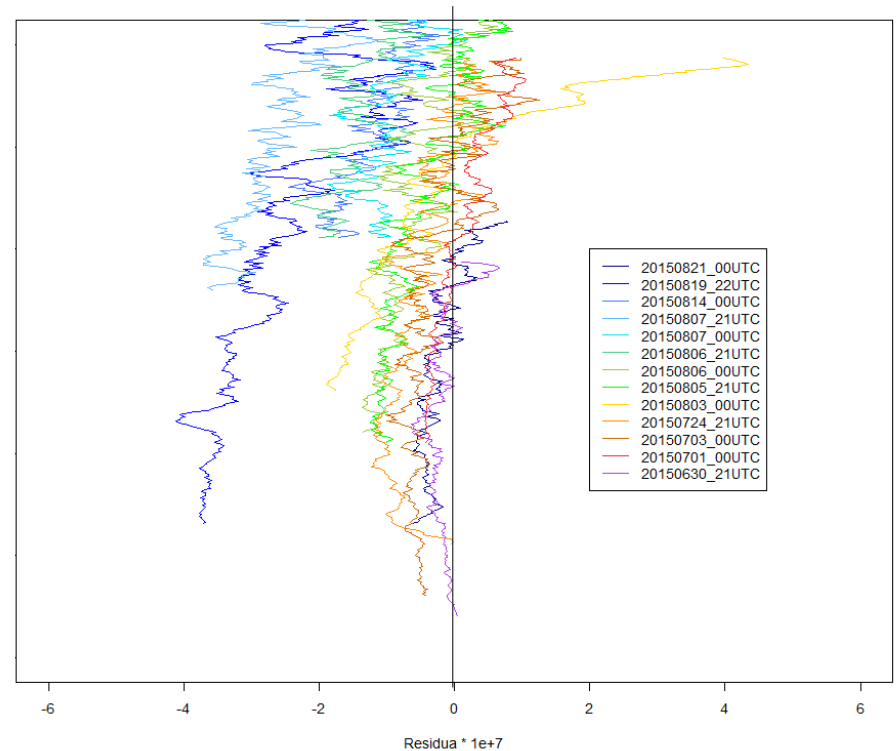


- ➔ Noisier than RALPH
- ➔ Problems with normalization
- ➔ No dependence on altitude

Residua of CHX080082 compared to Rayleigh backscatter profile

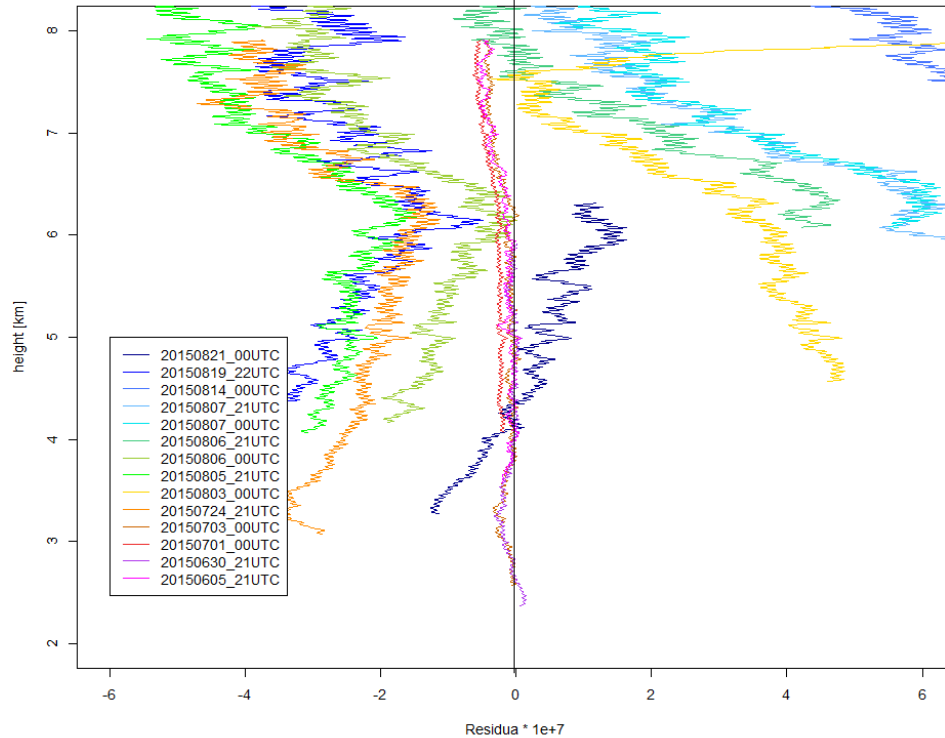


Residua of CHXLMU compared to Rayleigh backscatter profile

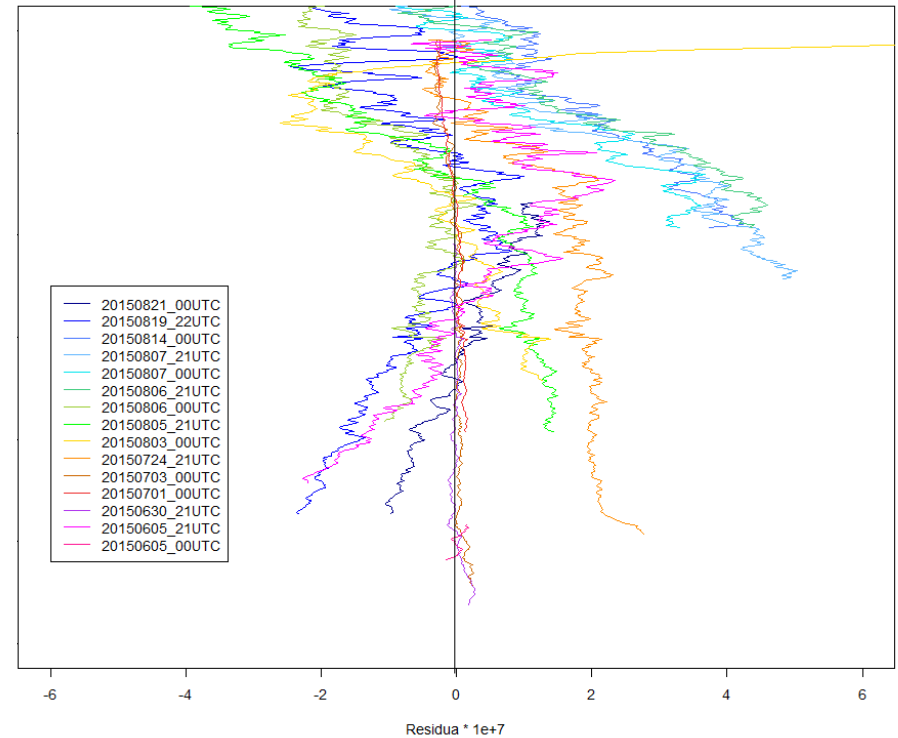


- ➔ Very noisy
- ➔ → problems with normalization
- ➔ No dependence on altitude

Residua of CL51CG compared to Rayleigh backscatter profile

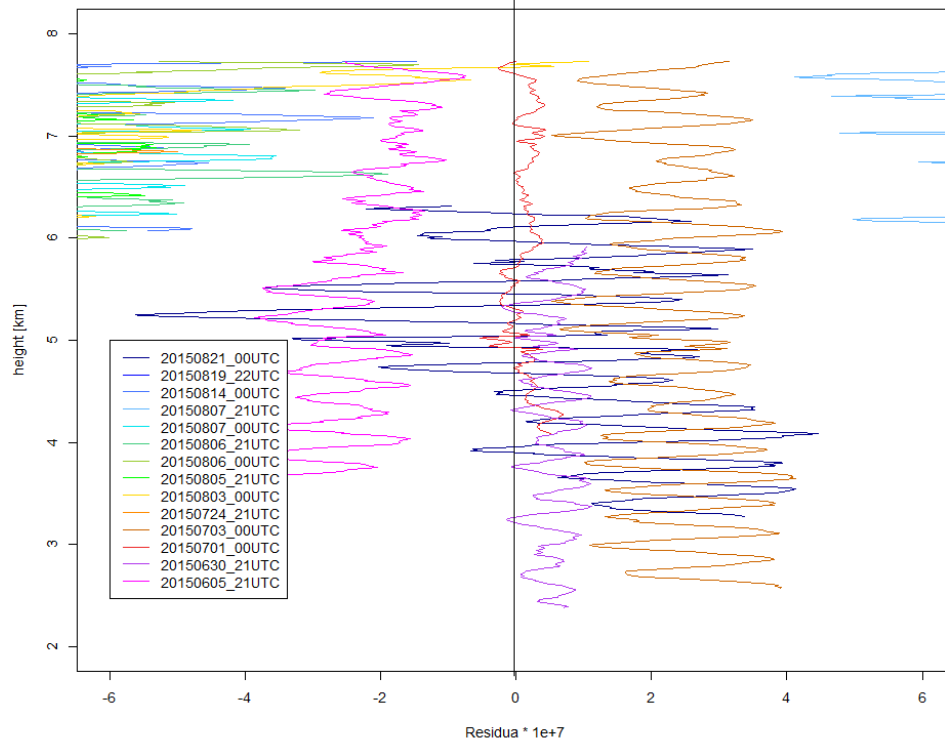


Residua of CL51RAO compared to Rayleigh backscatter profile

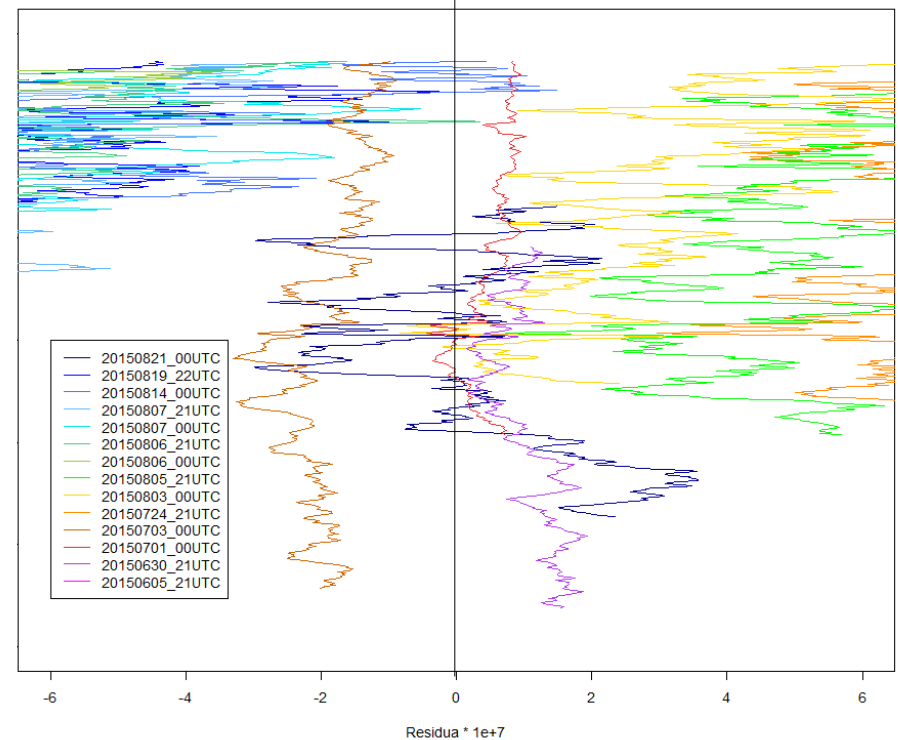


- ➔ Some profiles good, some less good
- ➔ Characteristic, altitude dependent shapes

Residua of CL31RAO compared to Rayleigh backscatter profile

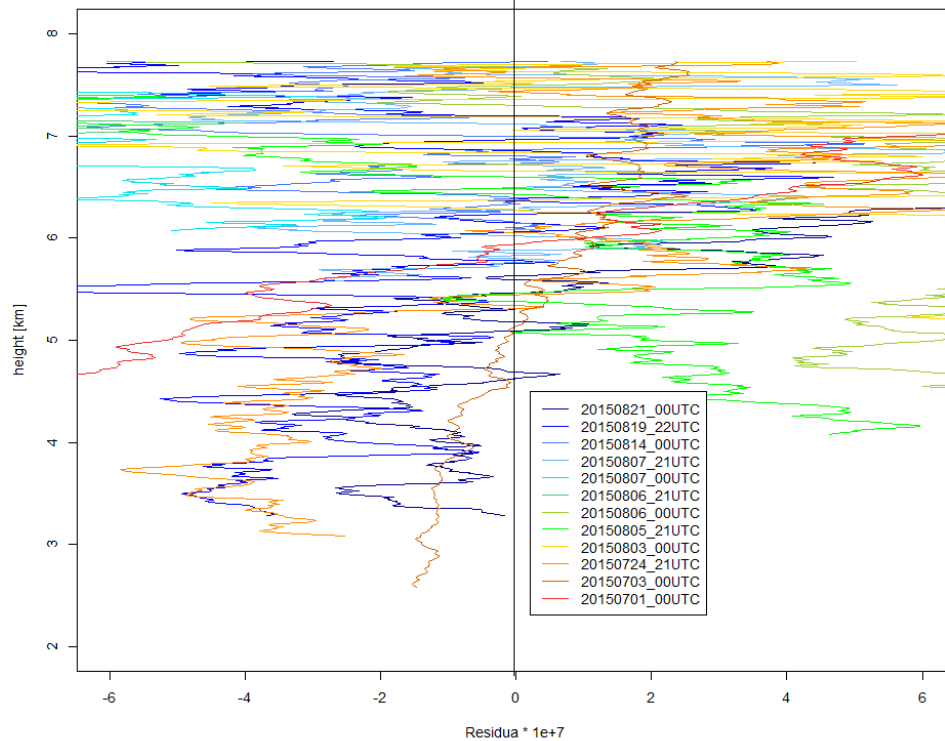


Residua of CL31RUB compared to Rayleigh backscatter profile

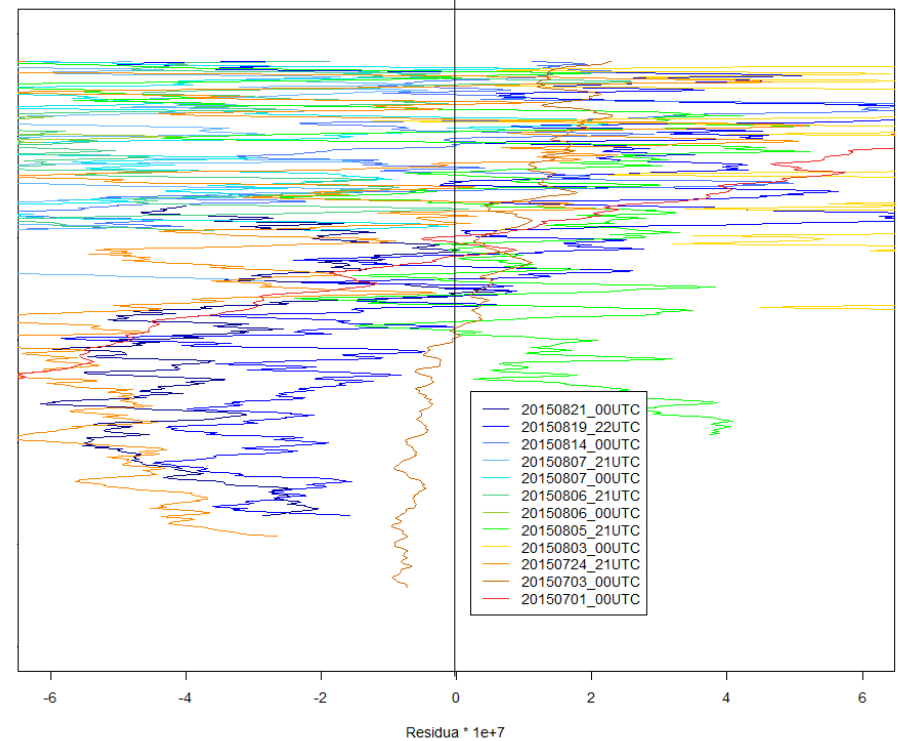


- ➔ profiles only up to 8km
- ➔ Very noisy
- ➔ “ringing structures” (from our smoothing?)

Residua of CS1 compared to Rayleigh backscatter profile



Residua of CS2 compared to Rayleigh backscatter profile

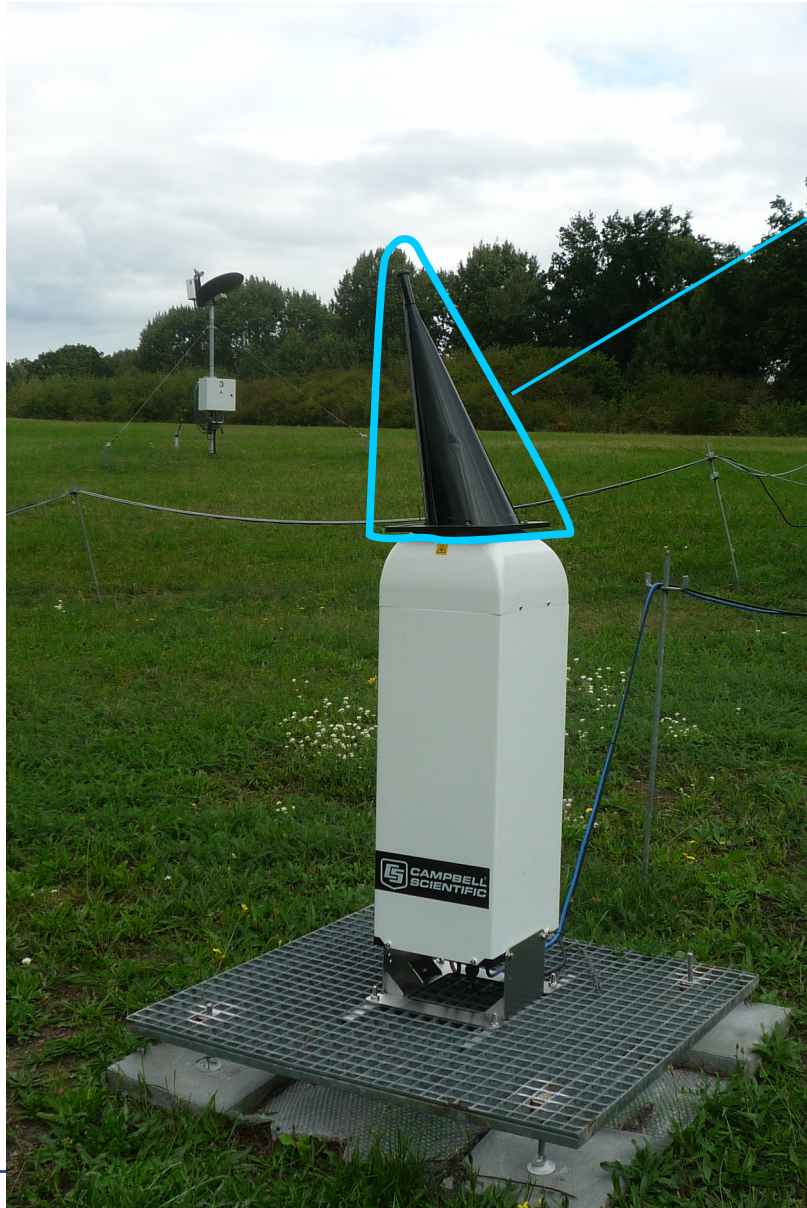


- ➔ profiles only up to 8km (instruments in “Vaisala mode”)
- ➔ Very noisy
- ➔ Characteristic, altitude dependent shapes

Signal distortions in free troposphere

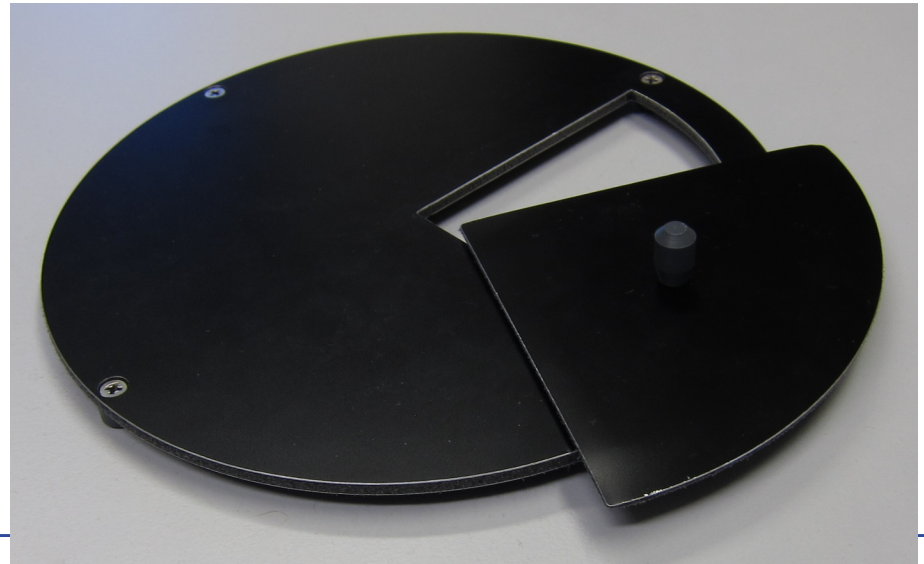
- Quantification of the effect? (→ Error of Rayleigh-fit, error of bsc profiles)
 - From the residuals
 - Possible in CEILINEX because reference instrument shows that there are no aerosols in the corresponding altitude region
 - From dark current measurements
 - Can be applied also to stand-alone instruments
 - Tools provided by manufacturers?
 - Temporal stability?





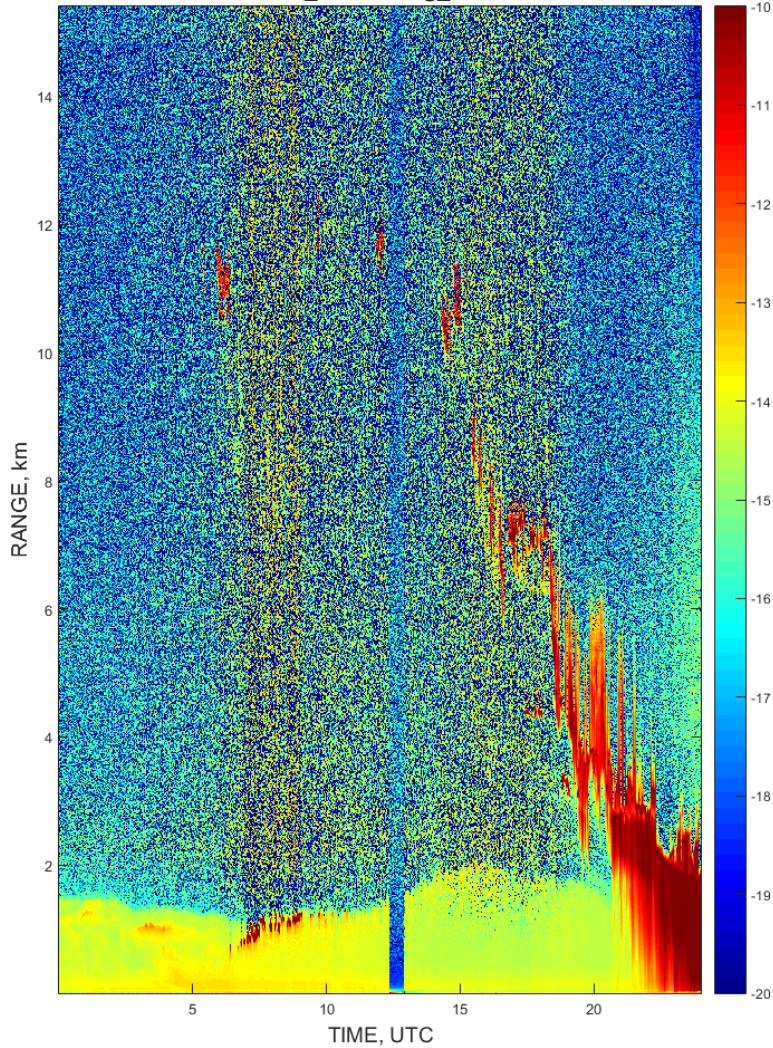
„Termination hood“ (Vaisala)

„Telecover tool“ (DWD)
for Luft instruments

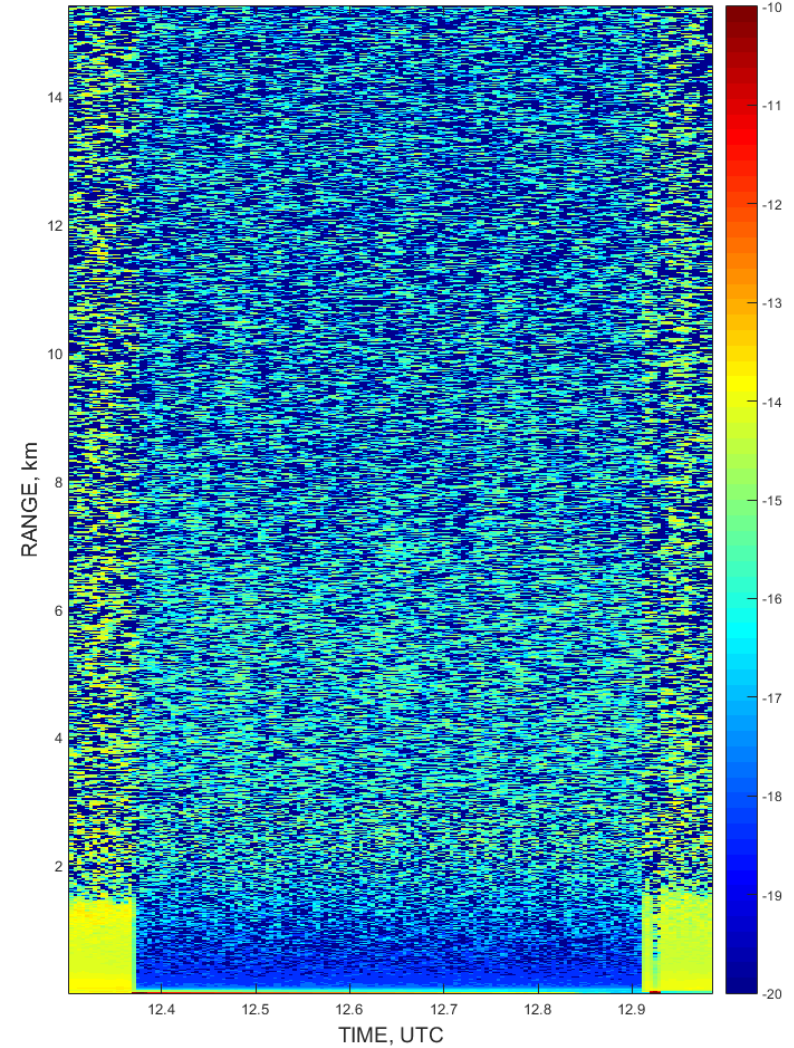


Dark-current measurement -example

20150617_lindenberg_CL51RAO

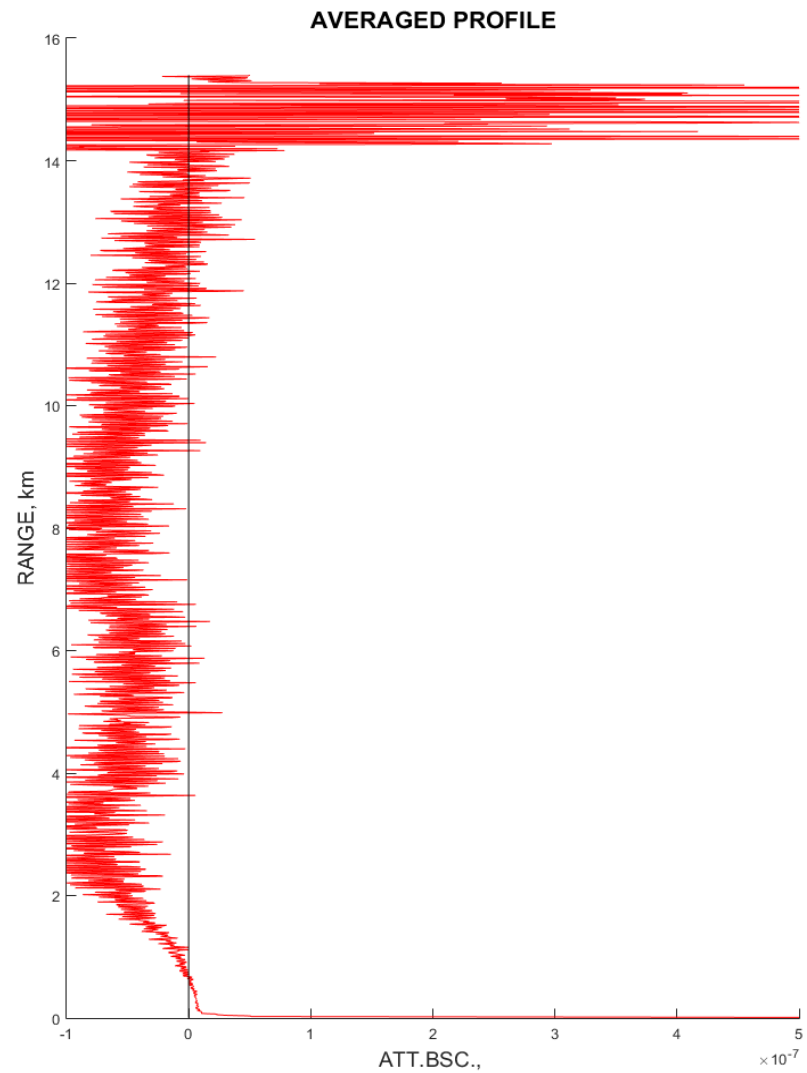
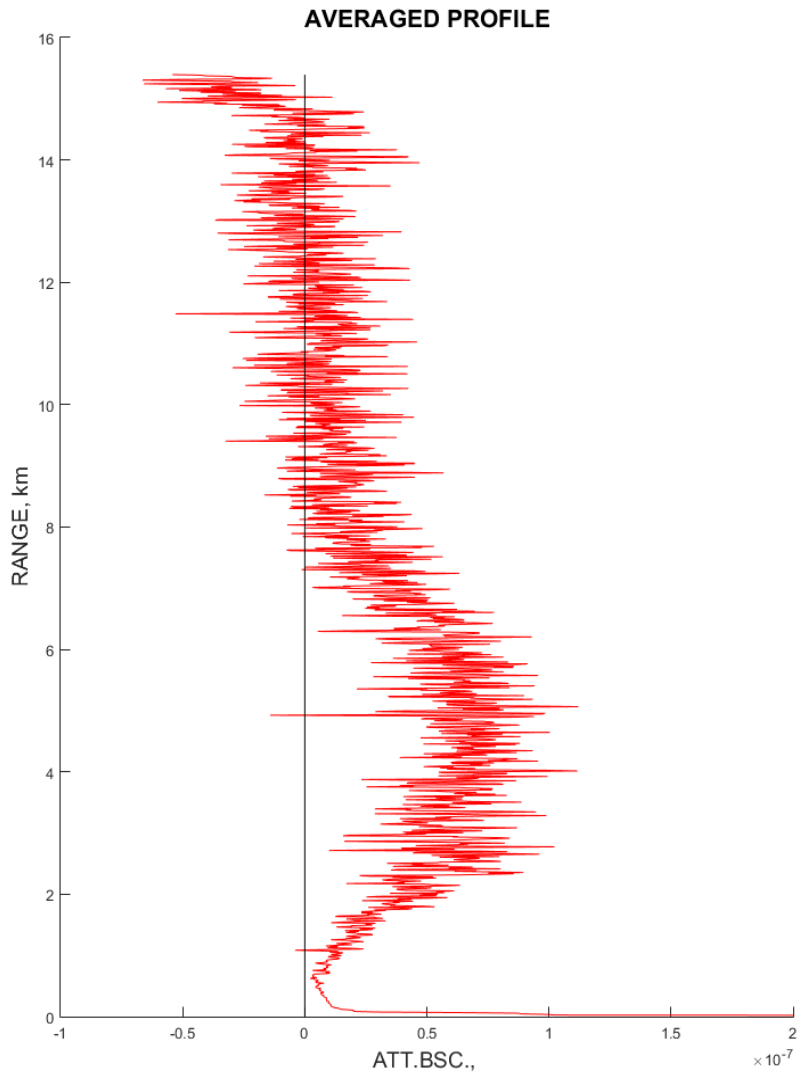


DARK CURRENT => PN: 2973 - 3096 ### PT: 12.3872 - 12.8997



20150708 CL51RAO

20150707 CL51 CG





Dark current measuremets ... x
ceilnex2015.de/special-topics/dark-current-measurements
Suchen

Log in

only in current section

CeilInEx2015

Ceilometer Performance Experiment at Lindenberg 2015

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Measurements
Logbook
Special topics
Participants
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Events

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- Cloud detection
- Water vapor absorption
- Signal distortion in the free troposphere
- Calibration
- Overlap
- PBL retrievals
- Any other topic
- instrument-to-instrument variability
- Rain
- Dark current measuremets
- Detector

Dark current measuremets

from time to time dark current measurements are performed; overview of results are shown here

Frank Wagner is responsible for this page

	Quicklook	Profiles	TimeSeries	Extra Plots
17.06.2015: CL51 - RAO				
17.06.2015: CL51 - CG				
17.06.2015: CL31 - RAO				
17.06.2015: CL31 - RUB				
07.07.2015: CL51 - CG				
07.07.2015: CS1				

News

14 September 2015: Horizontal measurements with CHX-LMU and CL51-CG
Sep 18, 2015

9-10 September 2015: Horizontal measurements with CHM-140110 and CL31-RUB
Sep 14, 2015

08 September 2015, CL31RAO, CL51RAO change of algorithm options
Sep 08, 2015

04 September 2015: Telecovertest mit CHM
Sep 07, 2015

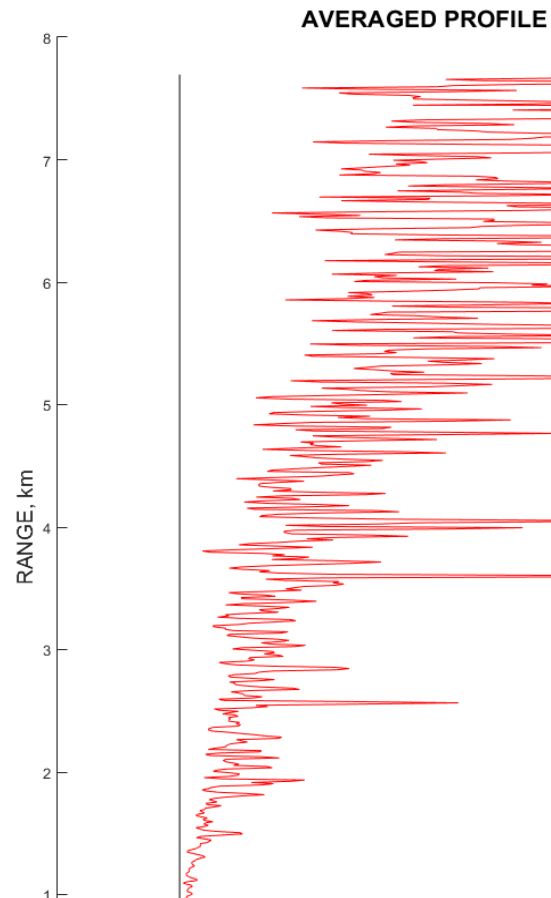
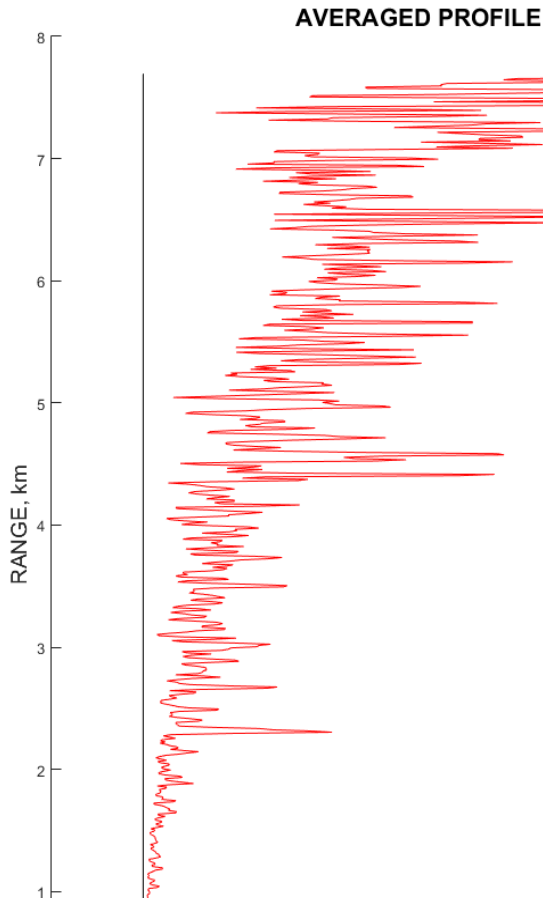
Problem solved.
Sep 03, 2015

Upcoming Events

CeilInEx2015 SWG
Oct 08, 2015 09:00

20150707 CS1

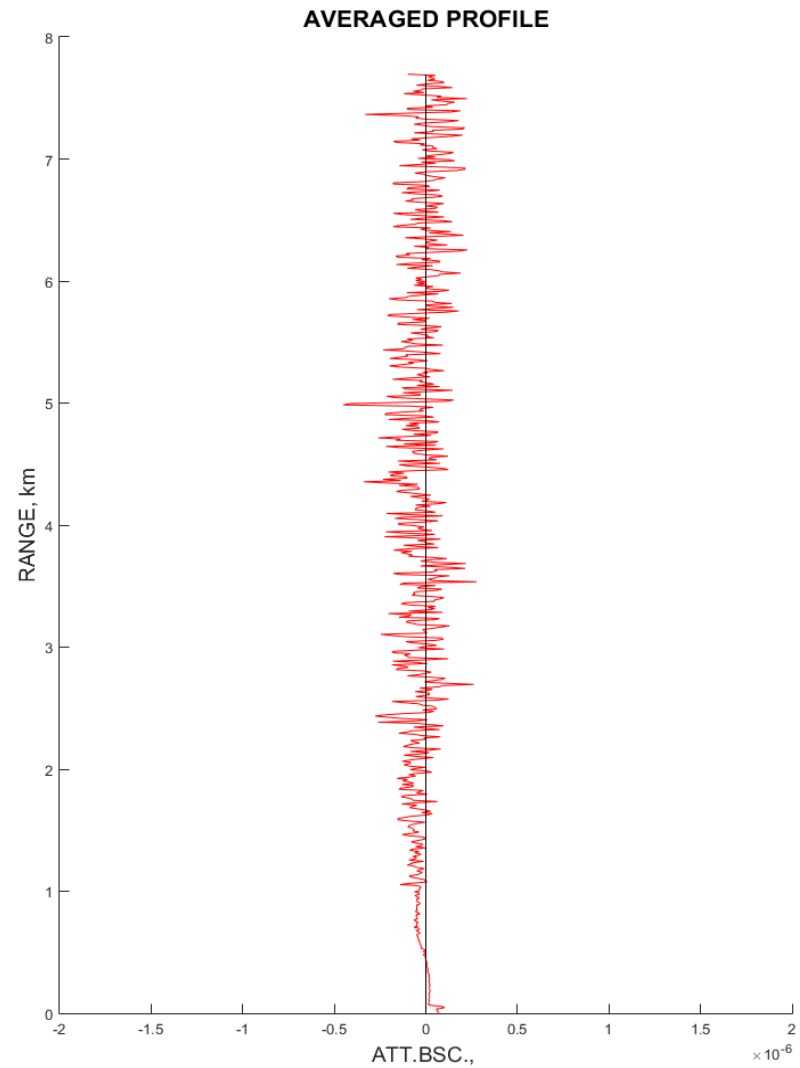
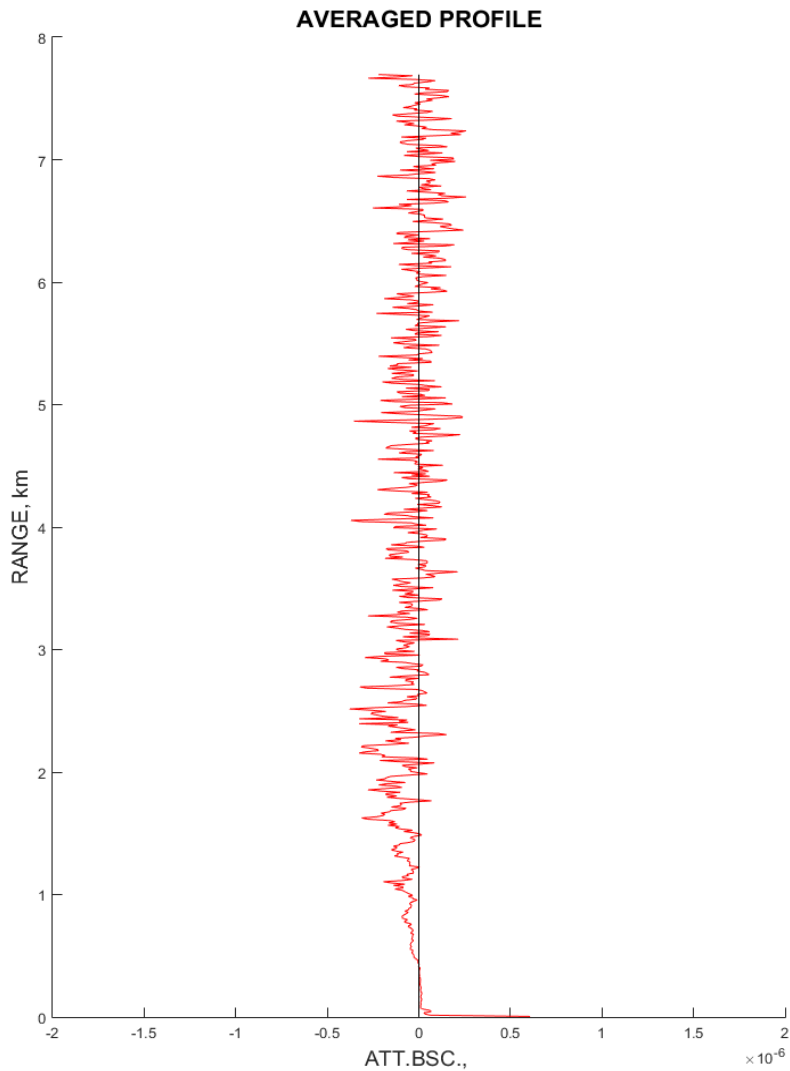
20150707 CS2



- ➔ Only positive values (noise gate = on)
- ➔ Another measurement with nose gate = off → not yet analyzed

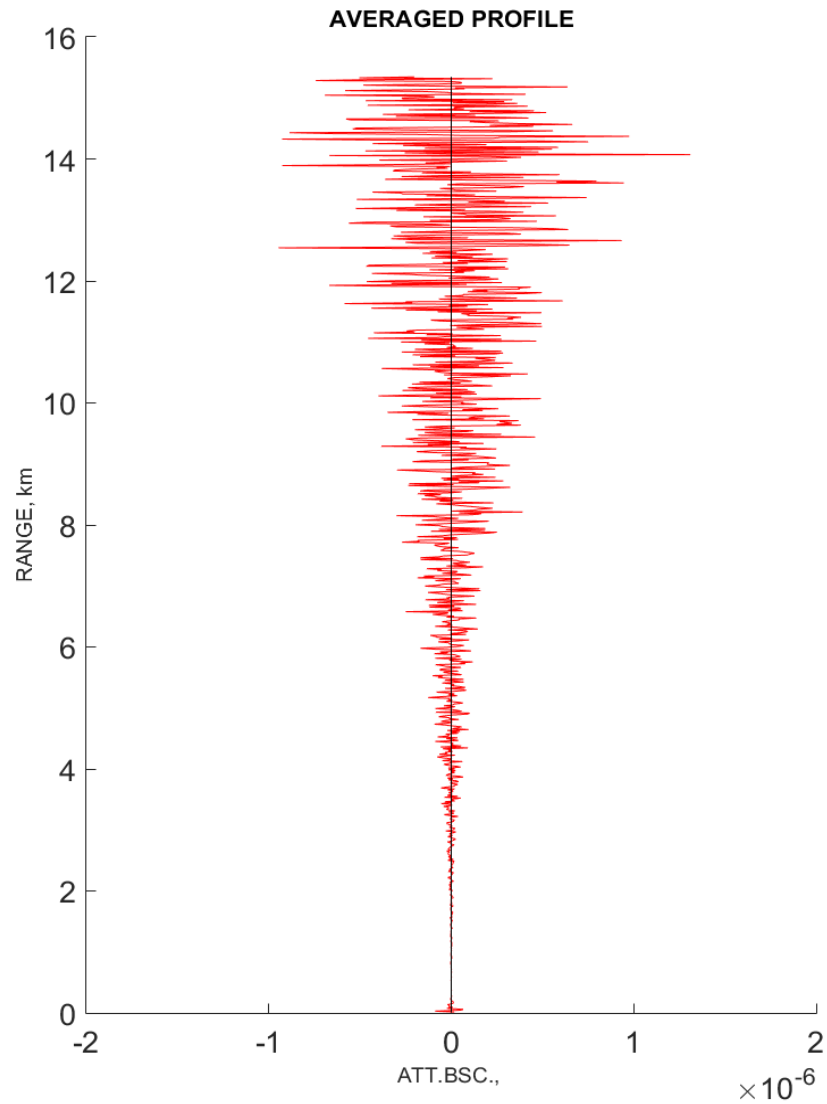
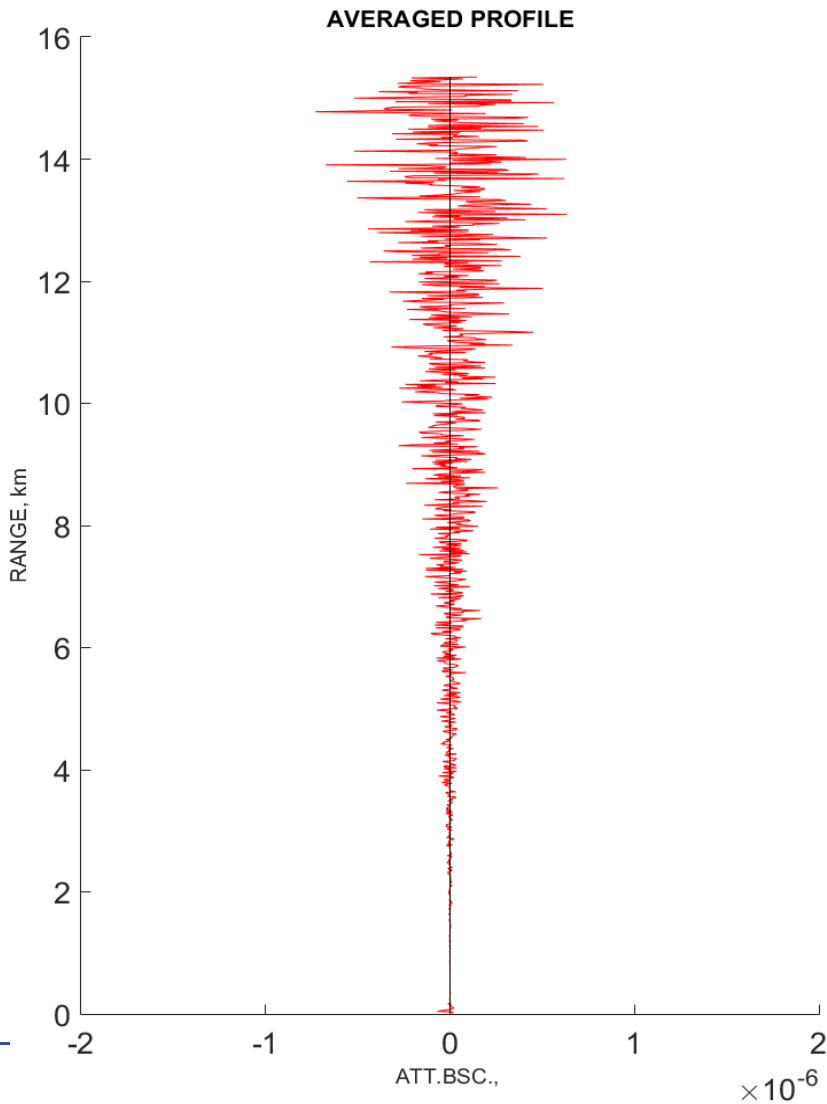
20150708 CL31 RAO

20150708 CL31 RUB



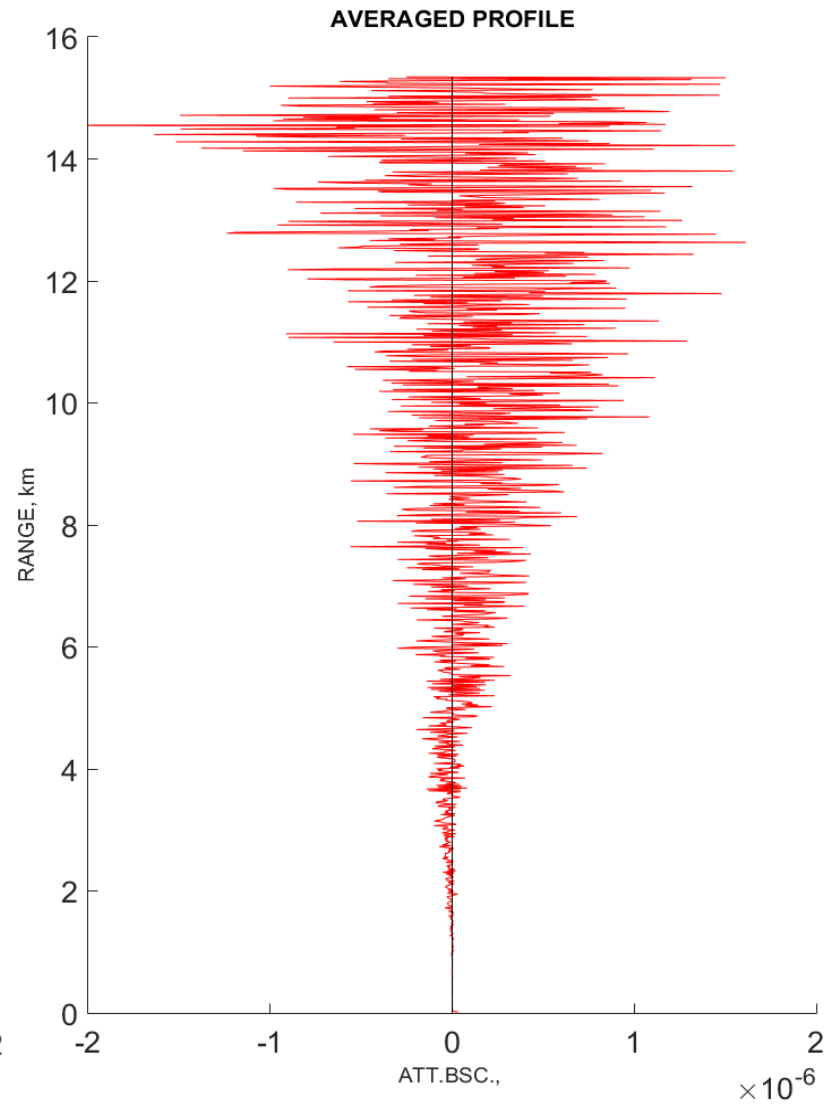
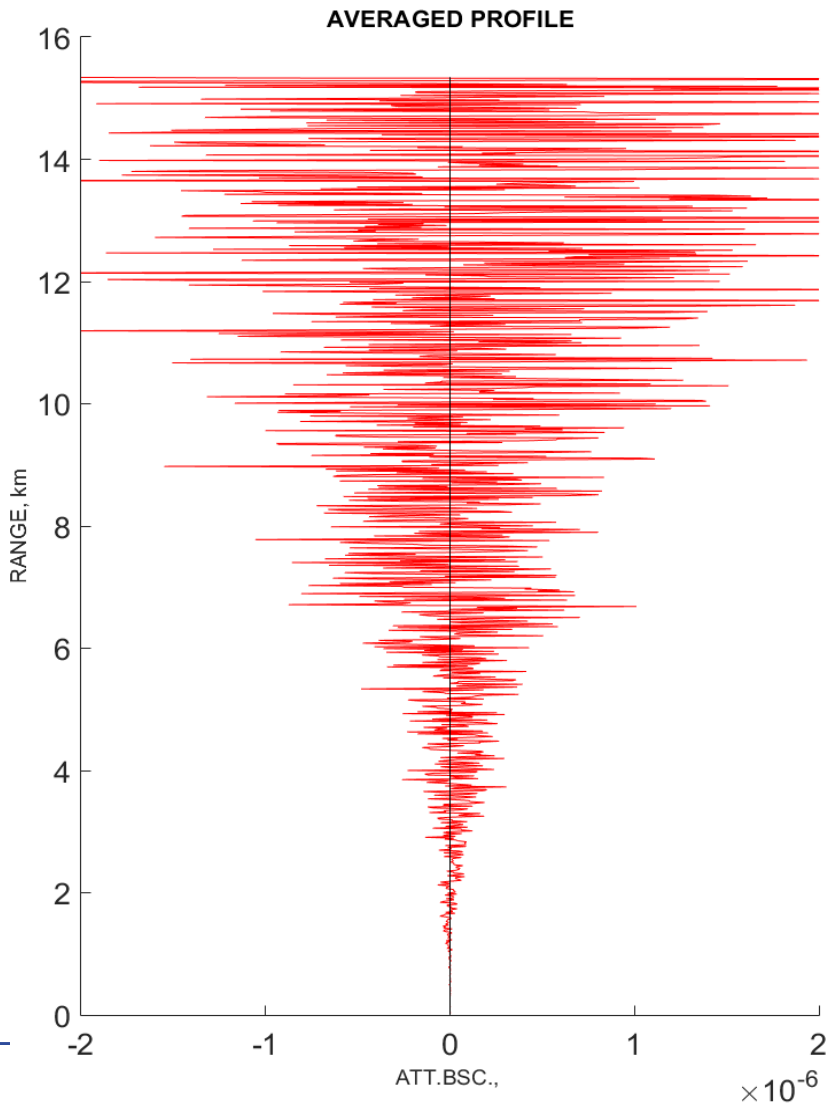
20150731 CHM100110

20150731 CHM140101



20150731 CHX080082

20150731 CHX LMU



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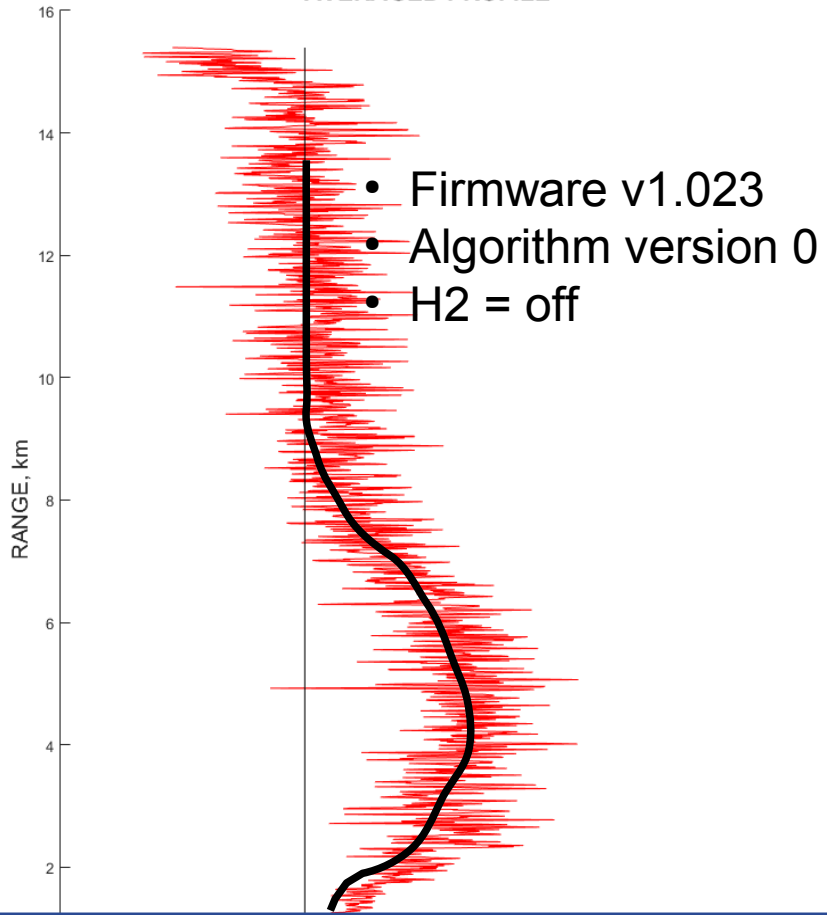
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 - From the residuals
 - Possible in CEILINEX because reference instrument shows that there are no aerosols in the corresponding altitude region
 - From dark current measurements
 - Can be applied also to stand-alone instruments
 - Tools provided by manufacturers?
 - Temporal stability?
- Correction for the effect?
 - Implemented in Vaisala TOPROF firmware





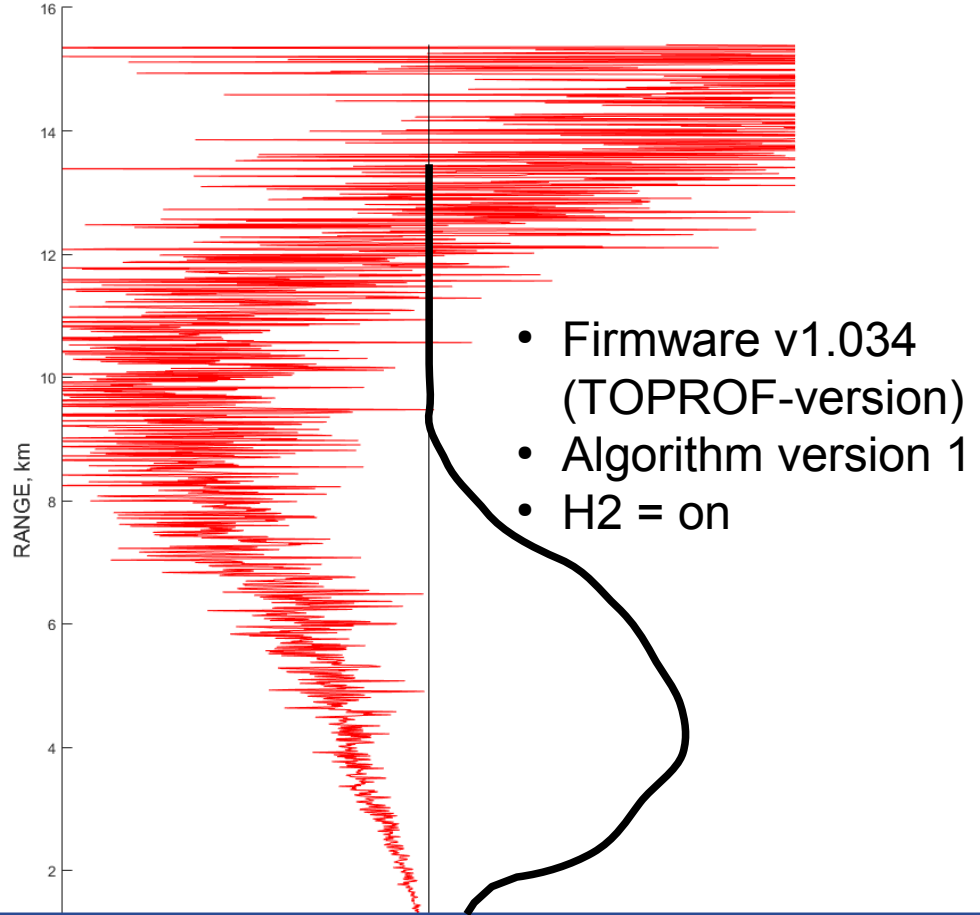
20150708 CL51RAO

AVERAGED PROFILE



20150717 CL51RAO

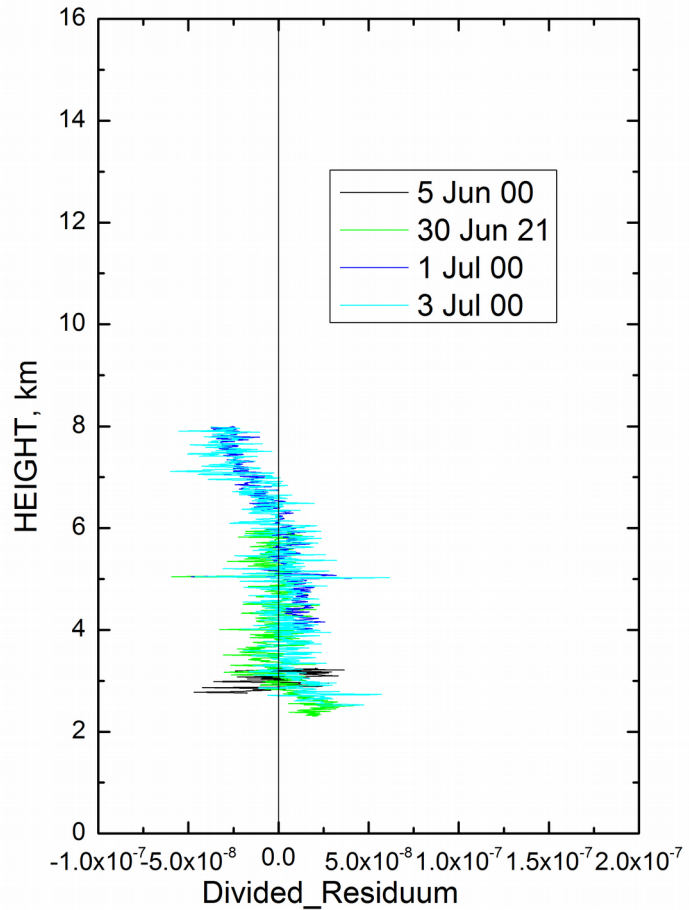
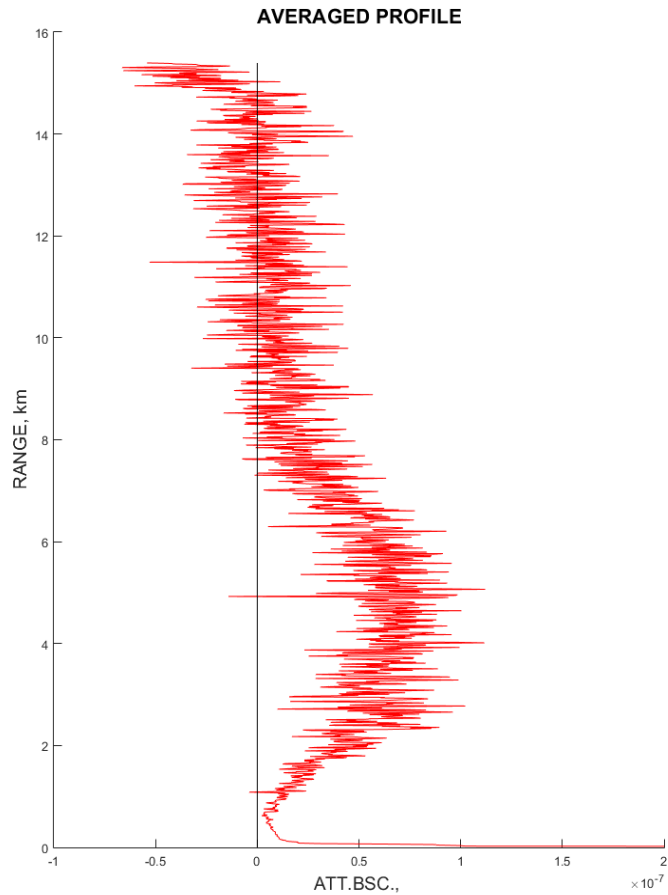
AVERAGED PROFILE



Ch. Munkel: „Later CL51 firmware versions (CL51CG since delivery, CL51RAO since 16.07.) involve an improved compensation of signal impurities caused by high temperatures. This will probably reduce the observed CL51RAO belly“

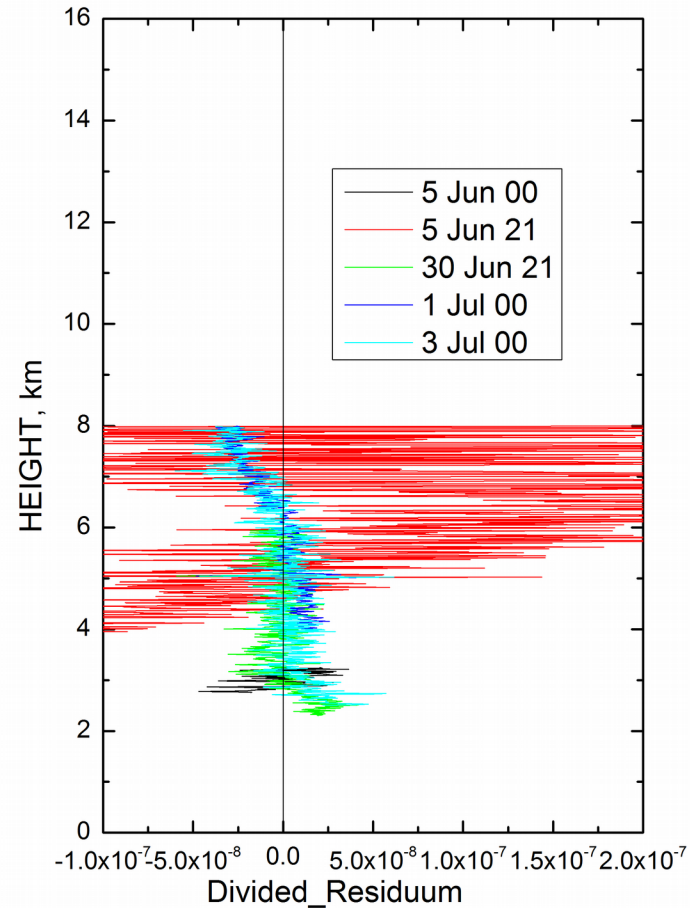
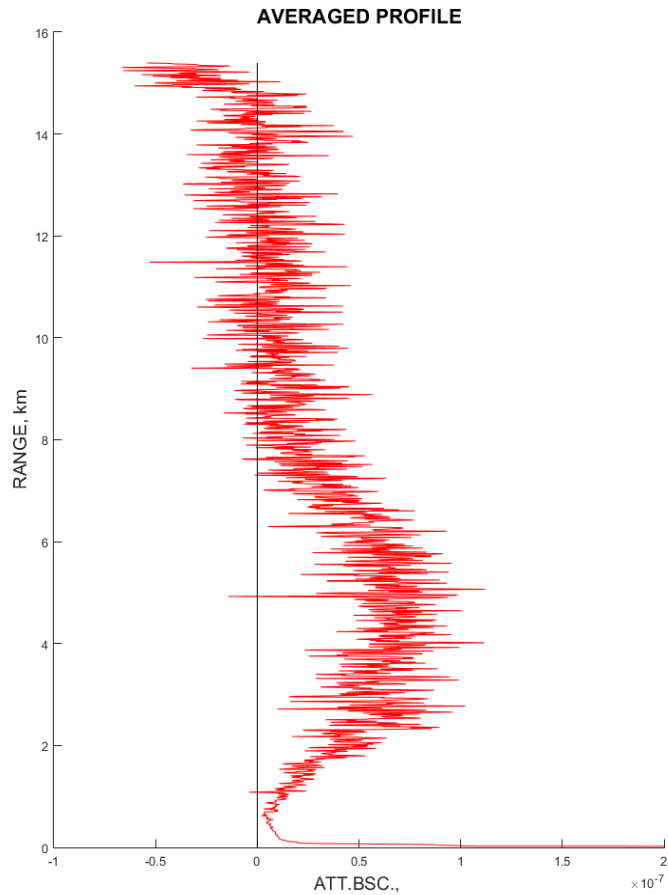
Dark-current vs. Rayleigh residual

20150708 CL51RAO



There seems to be promising similarities between Rayleigh residual and dark current

20150708 CL51RAO



There seems to be promising similarities between Rayleigh residual and dark current

-but not always

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 - From dark current measurements
 - Can be applied also to stand-alone instruments
 - Tools provided by manufacturers?
 - Temporal stability?
- Correction for the effect?
 - Implemented in Vaisala TOPROF firmware
- Improvement of Rayleigh fit?
 - Not yet analyzed
- Quantification of systematic errors of bsc profile
 - Not yet finished

