Deutscher Wetterdienst
Wetter und Klima aus einer Hand

INSTRUMENTAL EFFECTS

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Deutscher Wetterdienst
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Detector Saturation and Ringing, signal induced noise

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How to detect?

Both effects can be detected through the presence of negative values above the cloud which are different from noise.

Necessary condition: background is correctly determined

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CL31 @Sirta

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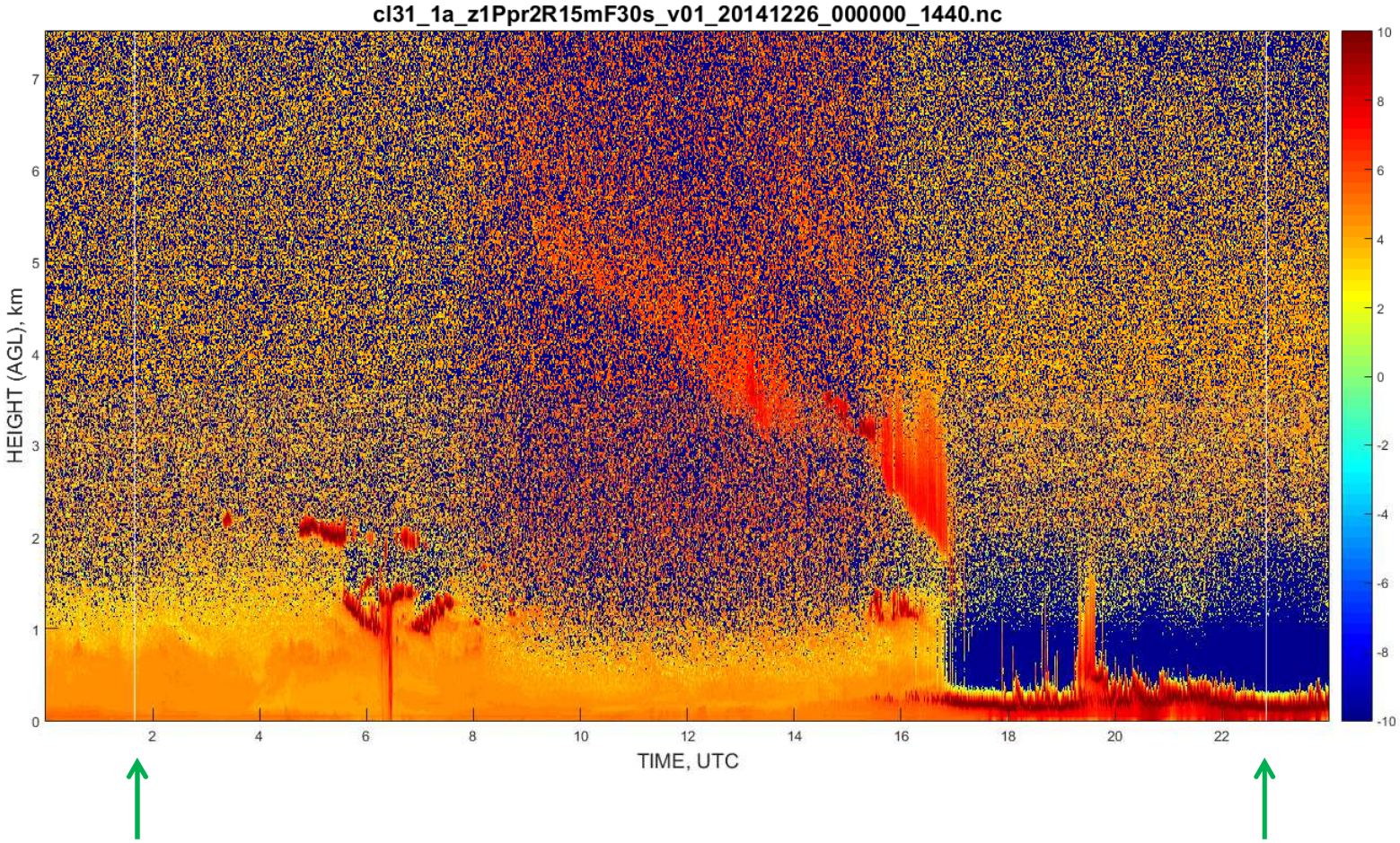

Profile without Clouds

Profile with Clouds

Example CL31

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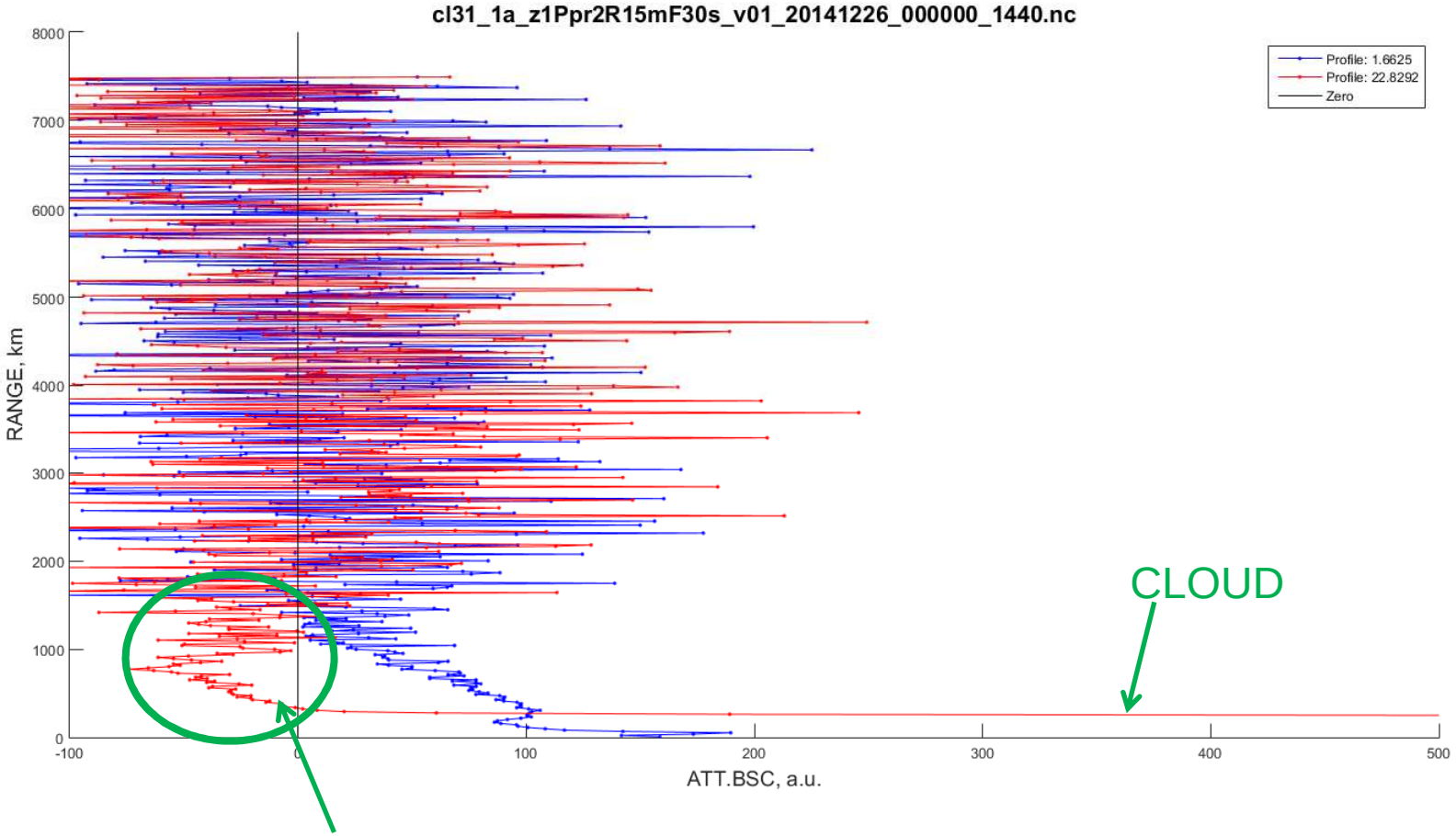

Negative values above the cloud

CHM @Lindenberg

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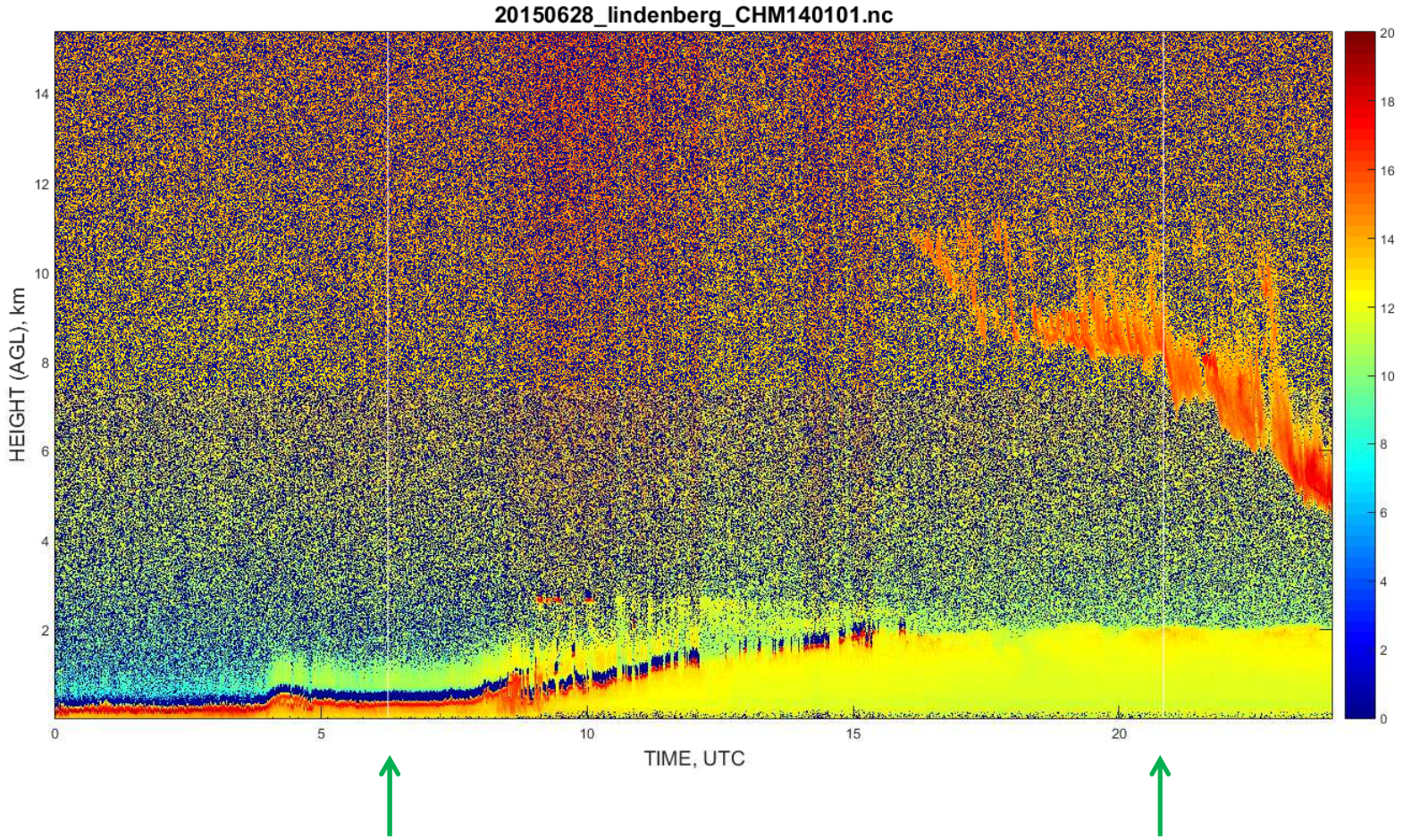

Profile with Clouds

Profile without low Clouds

CHM @Lindenberg

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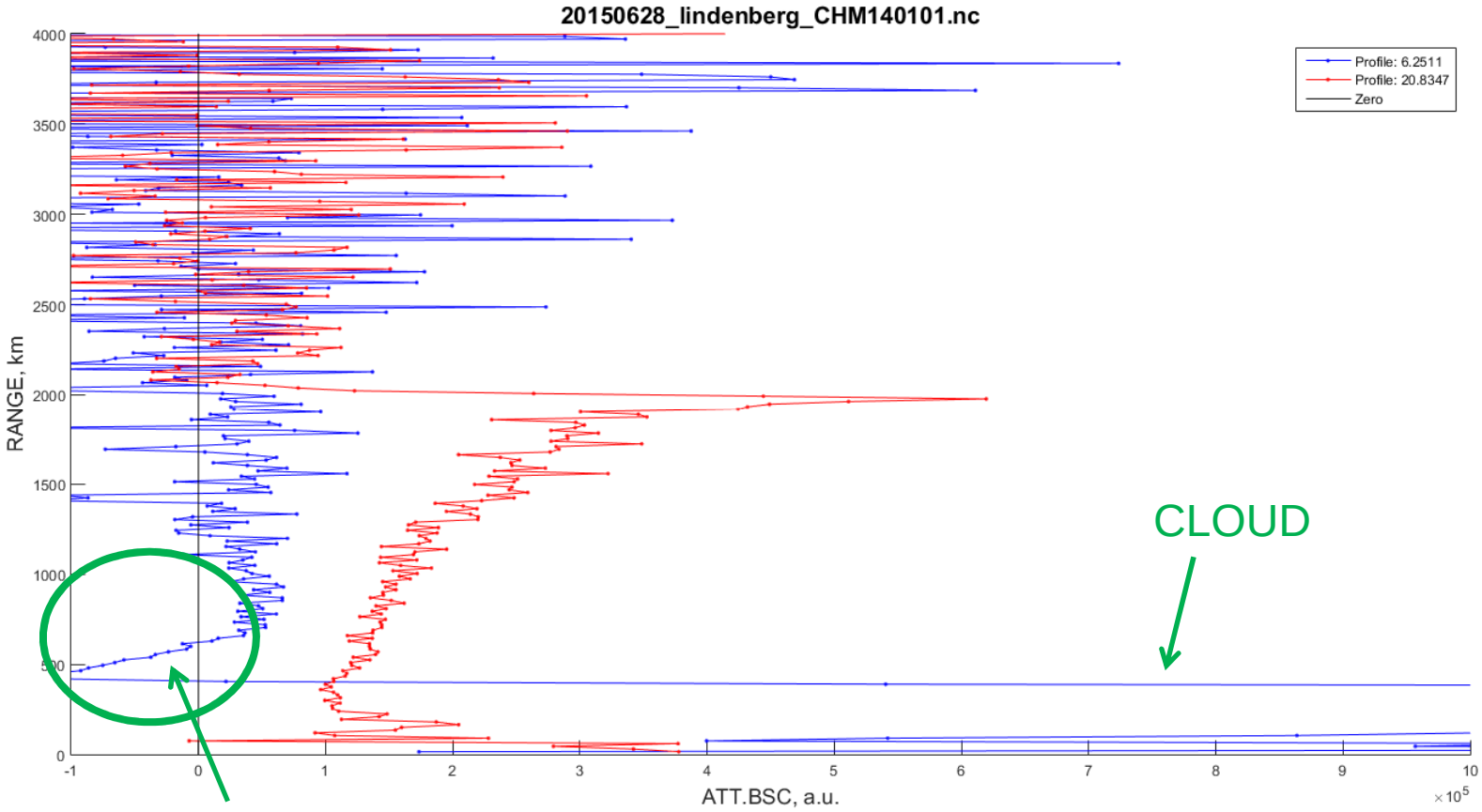

Negative values above the cloud

CI51 @Lindenberg

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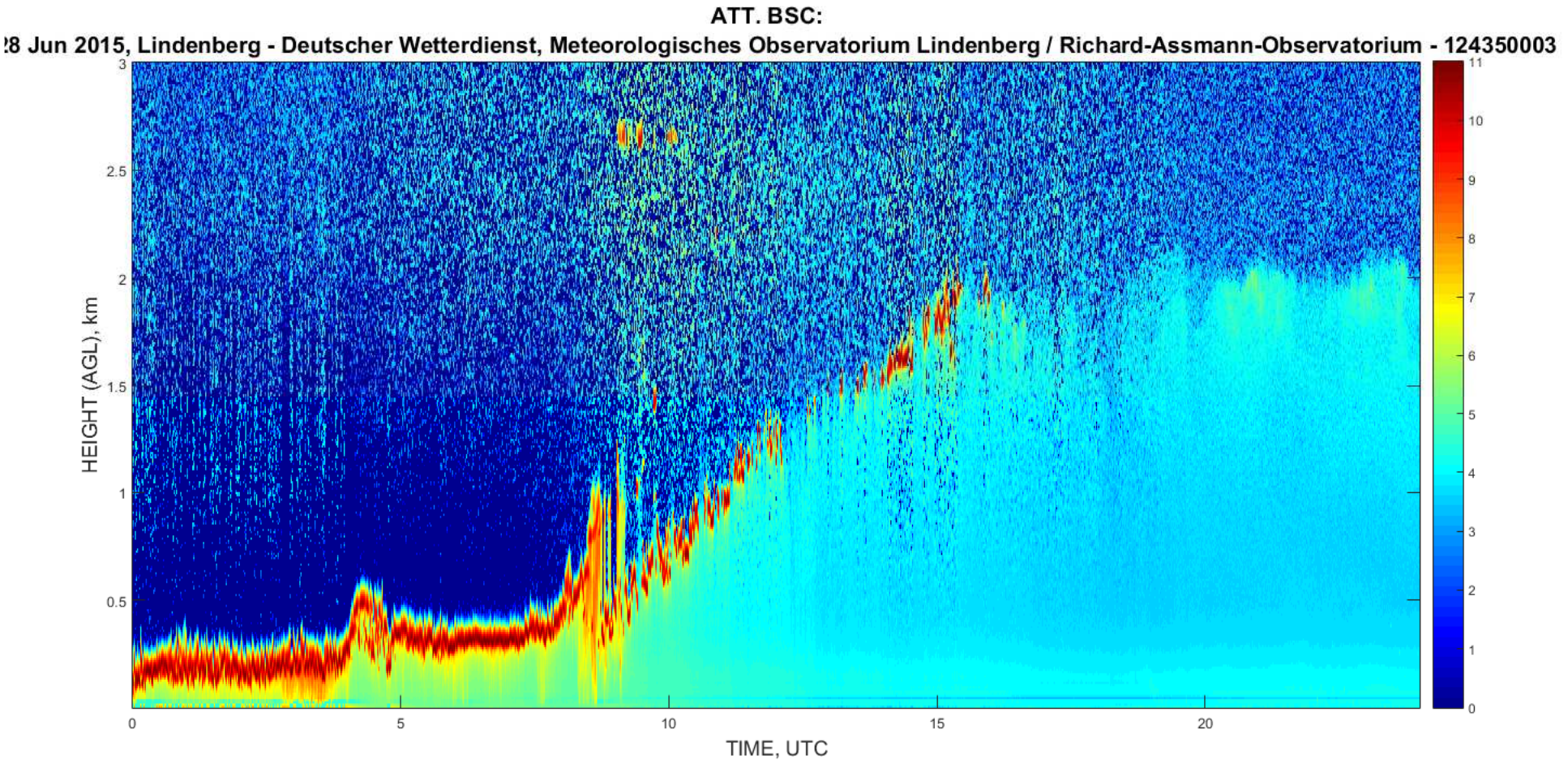

CS135 @Lindenberg

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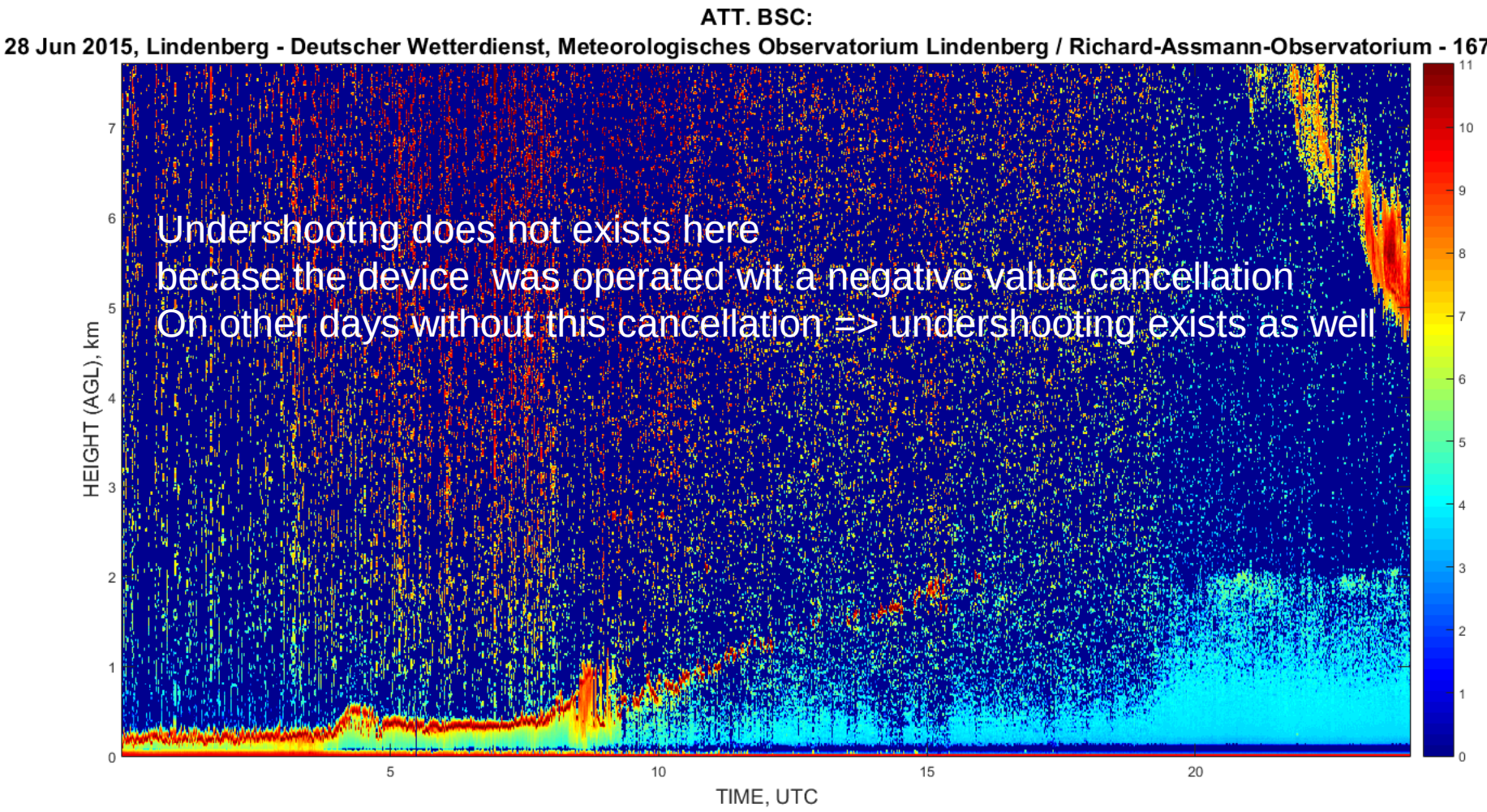

Conclusion

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Detection is possible in case the effect is large enough
(suffiently large range with negative values)

Correction?
Lufft wanted to investigate the effect in September
and hopefully provide first (not final) info
during SWG Ceilinex at Munich in October
key: determination of dead time
Vaisala wanted to investigate this effect
we will see what will be the outcome
Campell has undershooting, too
be careful with device settings!

Small effects?
good question

Cloud calibration method
excludes clouds which produces such negative values

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CLOUD BASE HEIGHT

-> Presentation by Uli Goersdorf

CBH and Detector Saturation 1

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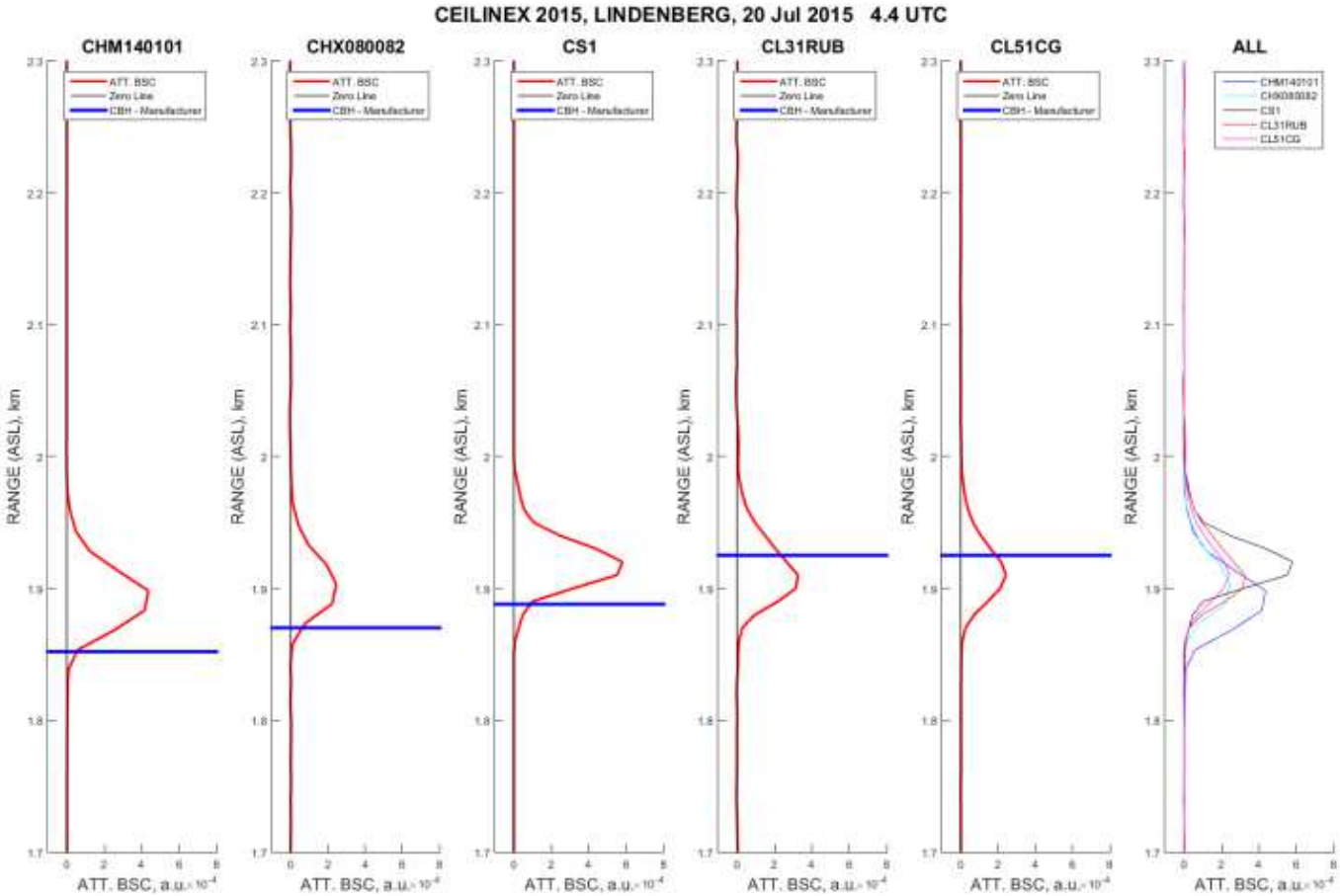
Not so low clouds, CBH ~ 1.9 km



CBH and Detector Saturation 2

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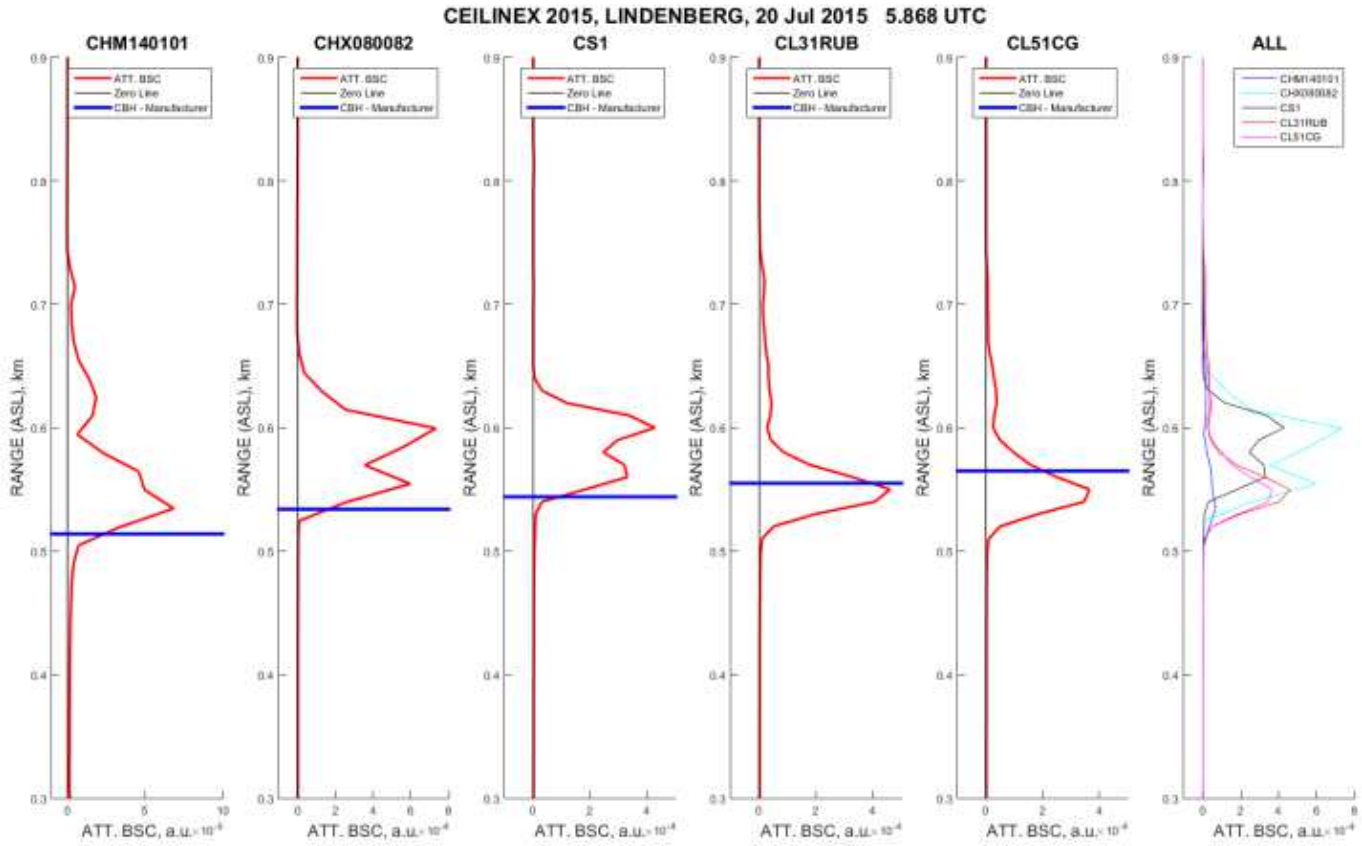
low clouds, CBH ~ 0.5 km



NEW CBH SCHEME (1)

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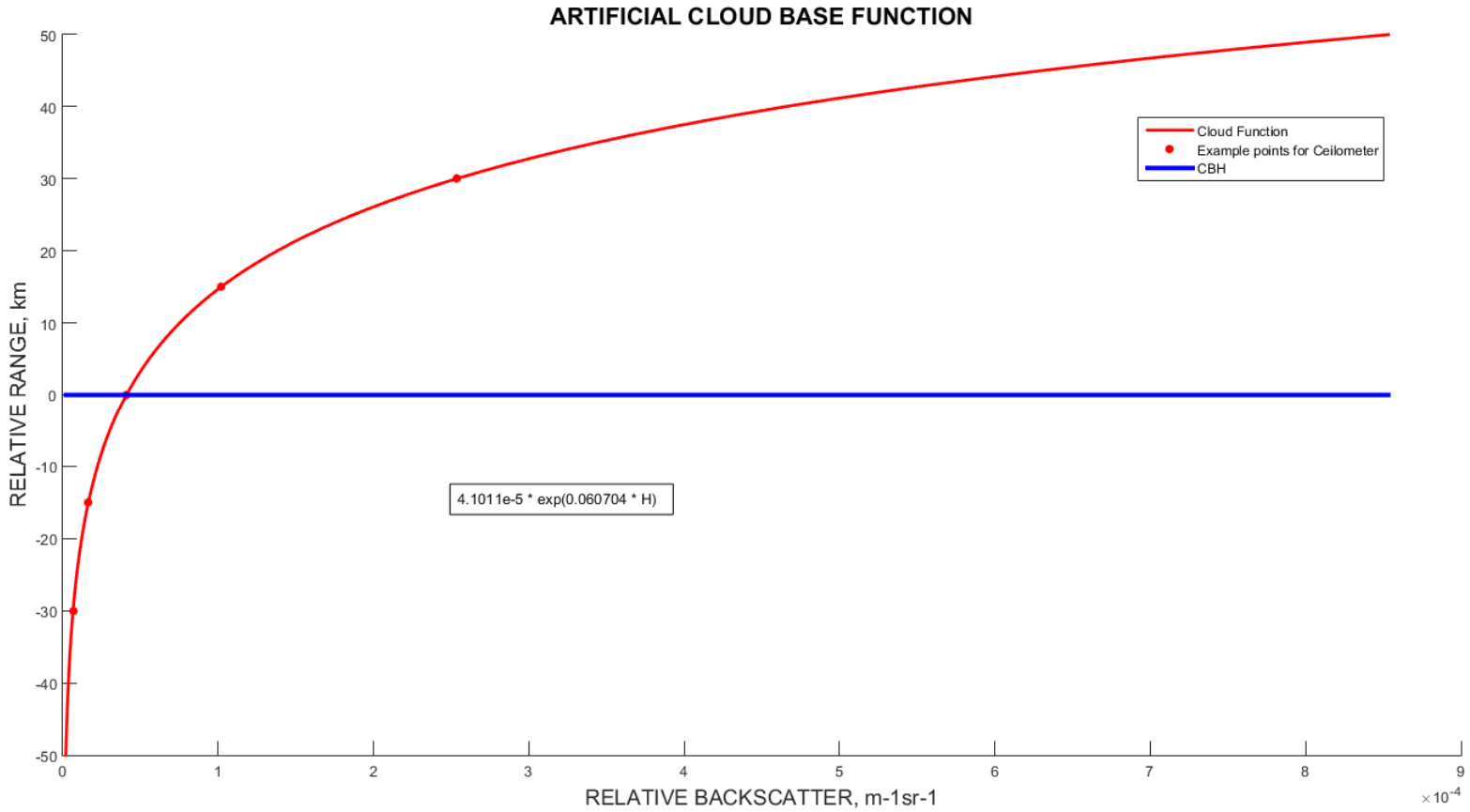

NEW CBH SCHEME (2)

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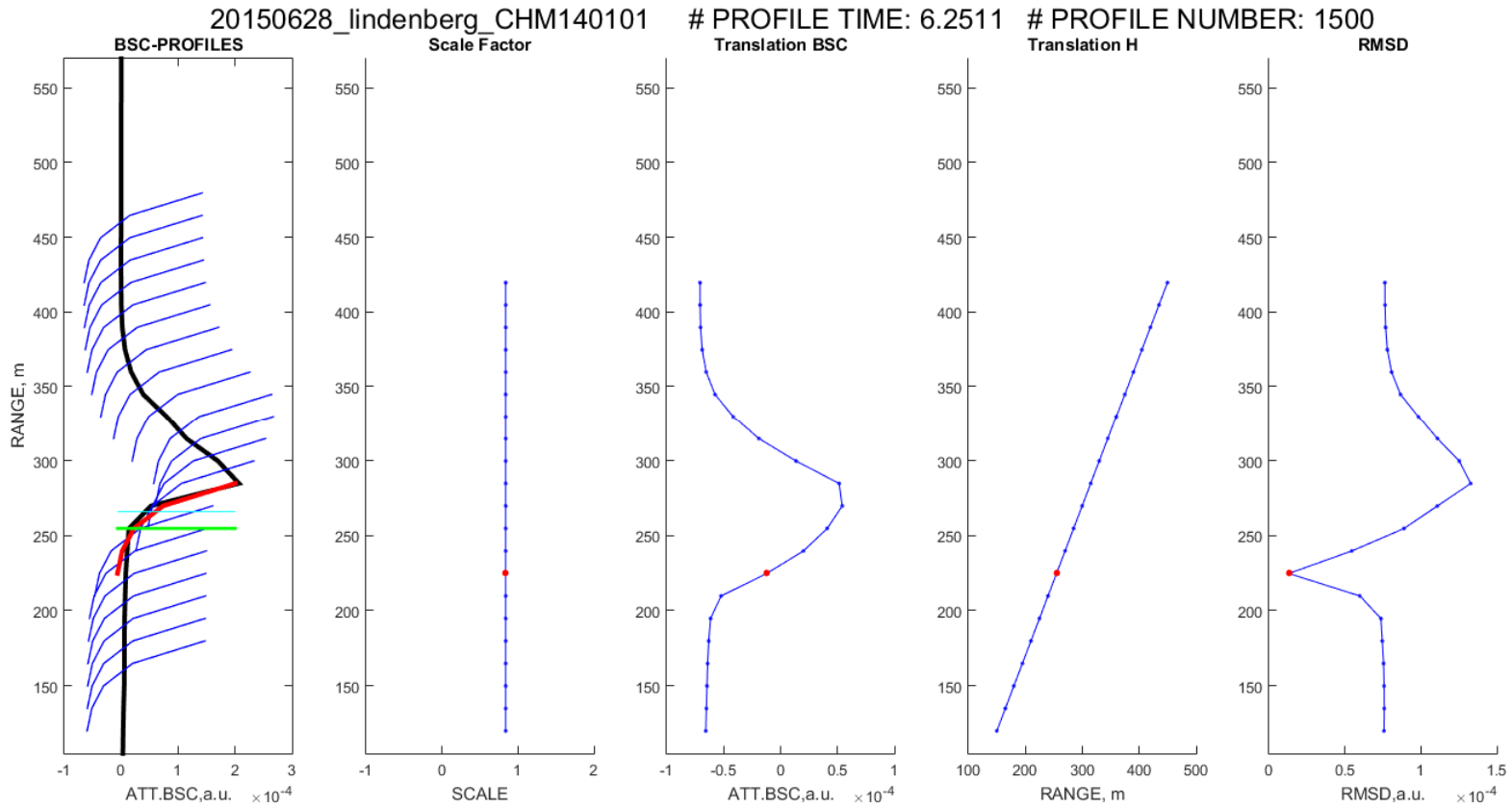

Left: measured BSC profile together with all fit-tests of the artificial cloud shape
Right: corresponding RMSD (the red dot corresponds to the beginning of the artificial cloud shape profile

Rain

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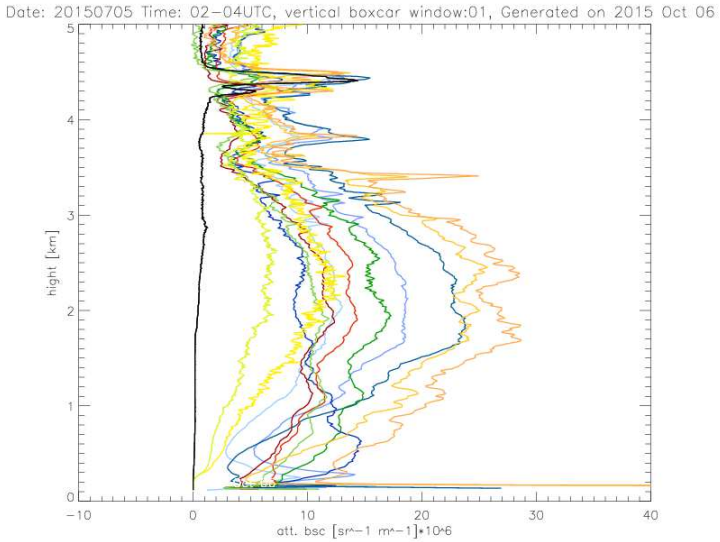
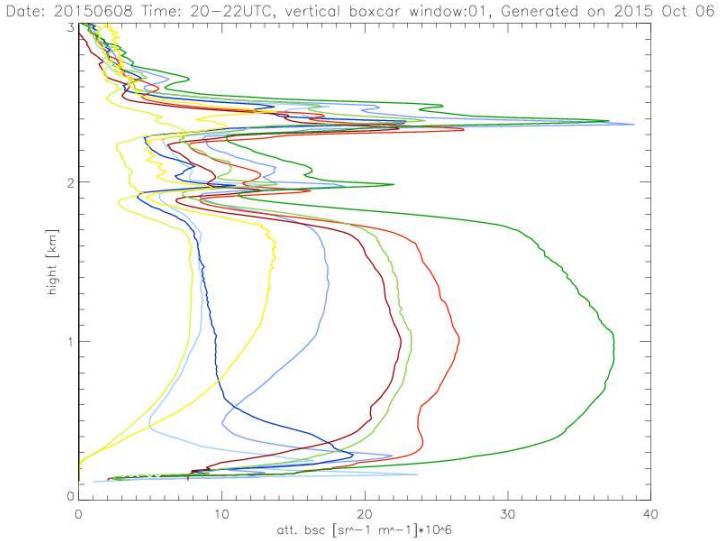
Figures kindly provided by Margit





First few bins - vaisala

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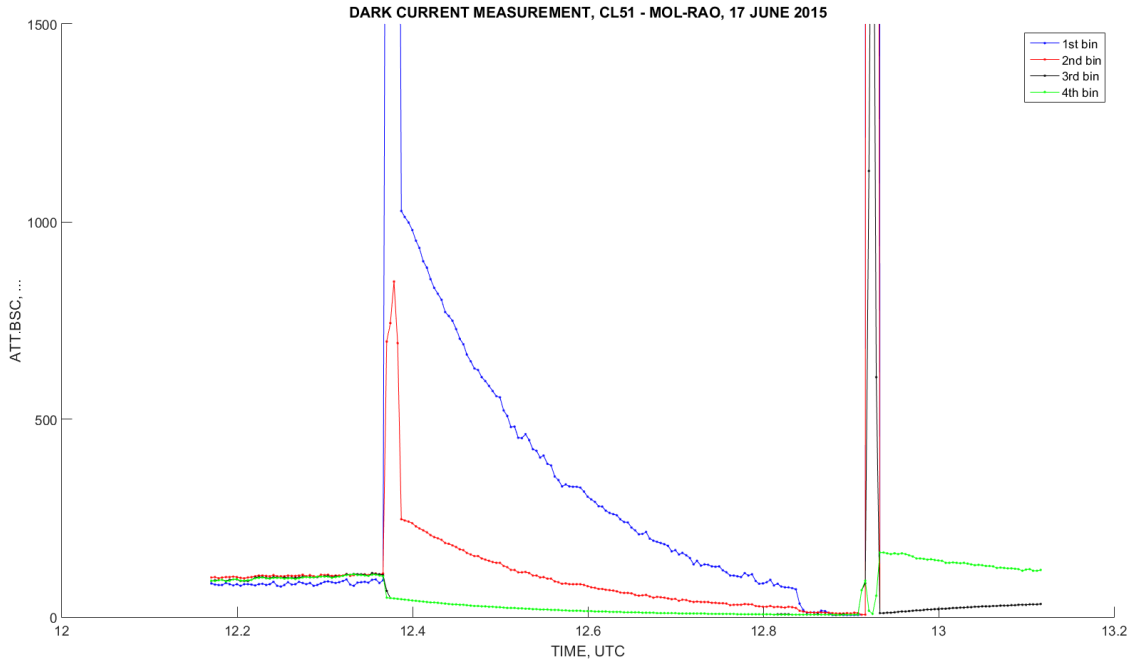
The first 2 or 3 or 4 bins cannot be used by any instrument,
Neither Lufft ceilometer, neither Vaisala, neither Campbell

Example for Vaisala CL51 after start of dark current measurements



First few bins - Campbell

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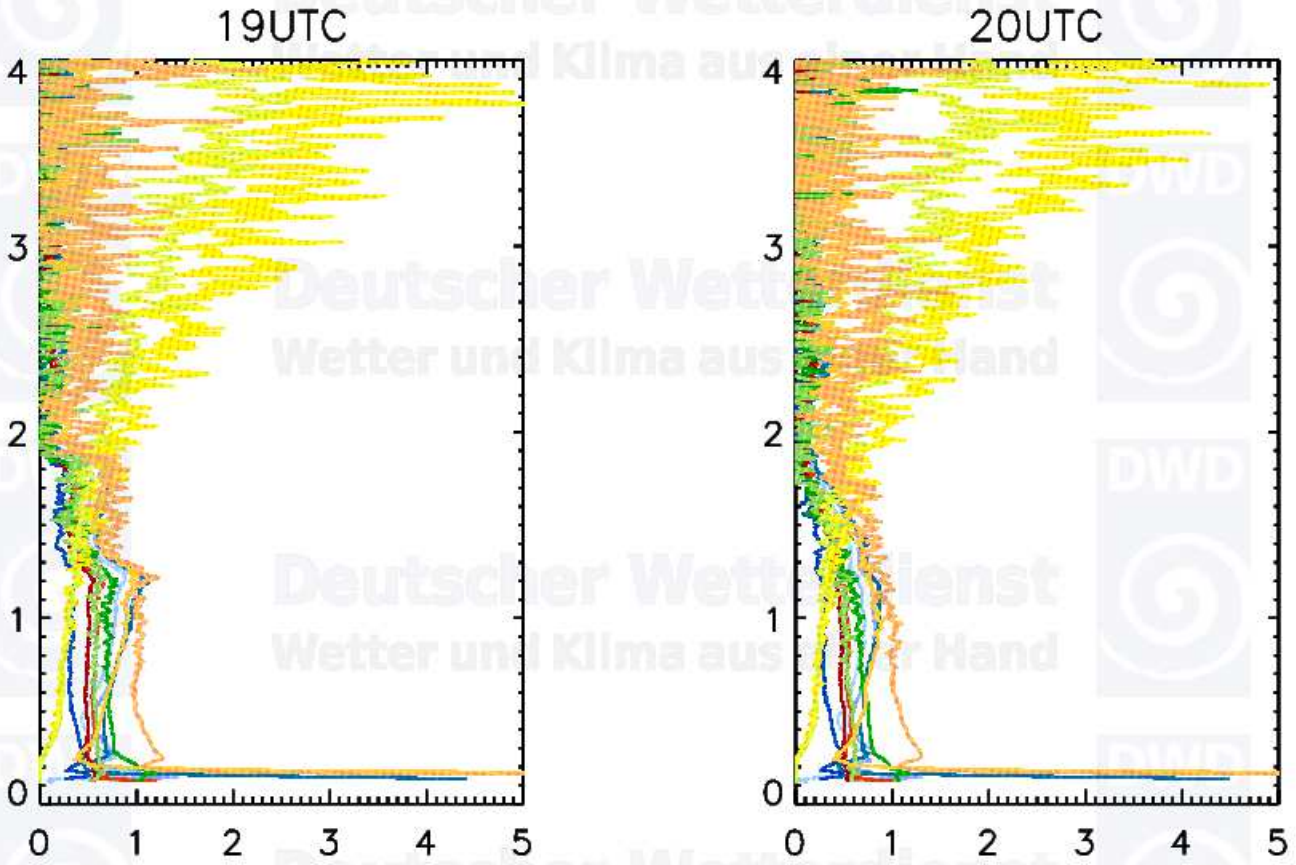
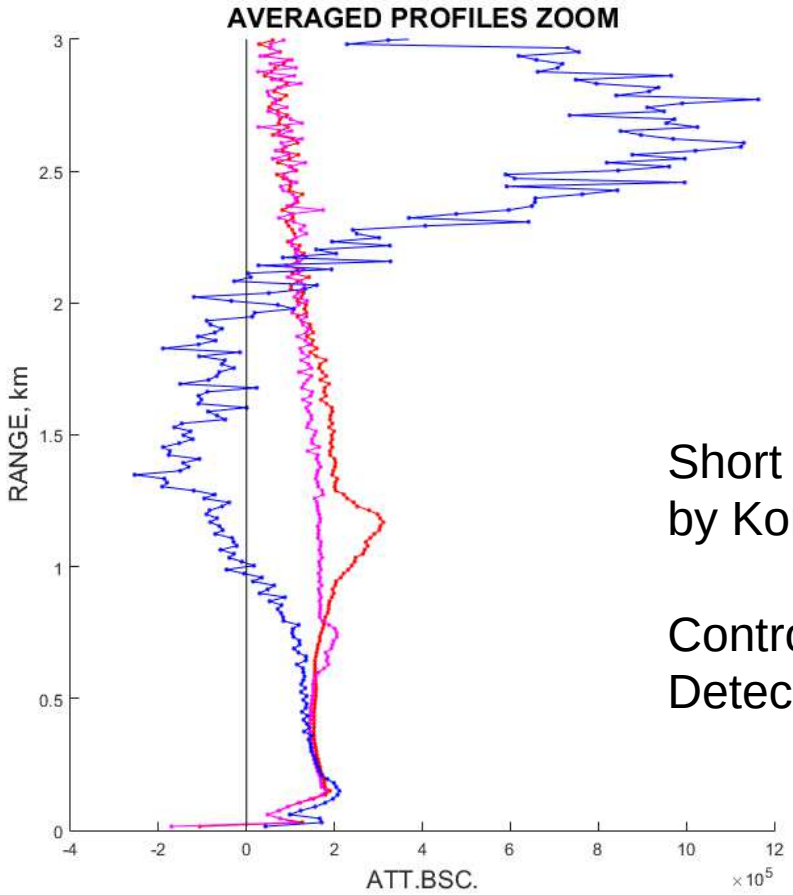
Example: 12 Sep 2015



Problematic Lufft CHX-RAO device



Red: CHX-LMU
Blue: CHX-RAO

Short explanation
by Konny Poenitz (Lufft)

Control of voltage was not “perfect”
Detector was run with too high voltage

Other Effects – tackled in other presentations

Dark current Measurements
belly in free troposphere

Effect of Firmware changes

Effect of Parameter Settings for Vaisala and Campbell devices

- overlap (Vaisala)
- noise (Vaisala, Campbell)
- resolution (Campbell)

Overlap issue

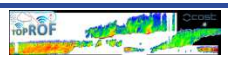
CONCLUSIONS

Combined Effort of all is needed
Close collaboration with manufacturers

For those who want to evaluate signals

- read the logbook
- have in mind all instrumental effects
- don’t waste your time with tricky data

=> choose good data in the first place



THANK YOU

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Image taken in Berlin (close to Lindenberg)