

# Site update: Lindenberg



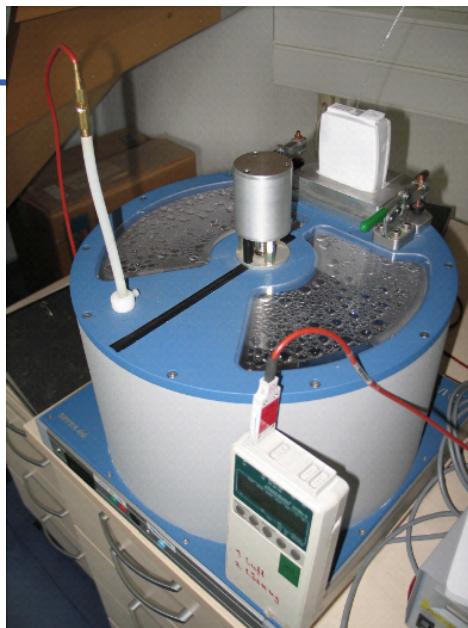
**Ruud Dirksen**  
*GRUAN Lead Centre, DWD*

5<sup>th</sup> GRUAN Implementation and Coordination Meeting (ICM-5)  
De Bilt, The Netherlands  
27 February 2013

# Outline

- Ground-check of RS92
- RS92-CFH comparison
- 2012: one year of RS92-GRAW comparison
- Radiation experiments
- RS92 vs GNSS (change management)

# Additional ground check

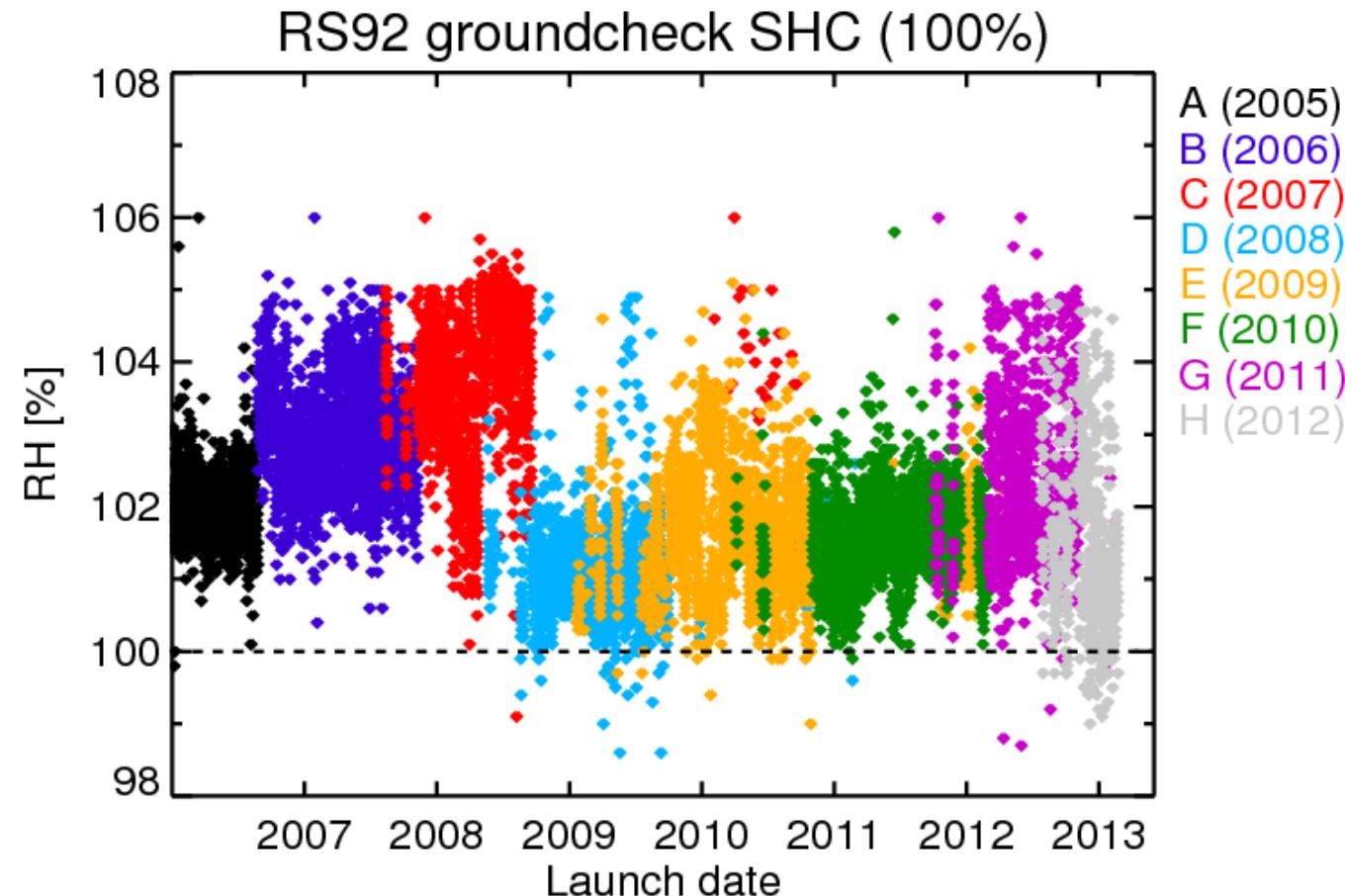


Additional quality  
check in SHC (100%)

Reject sondes >105%

Input for uncertainty  
budget

Scale profiles in GDP

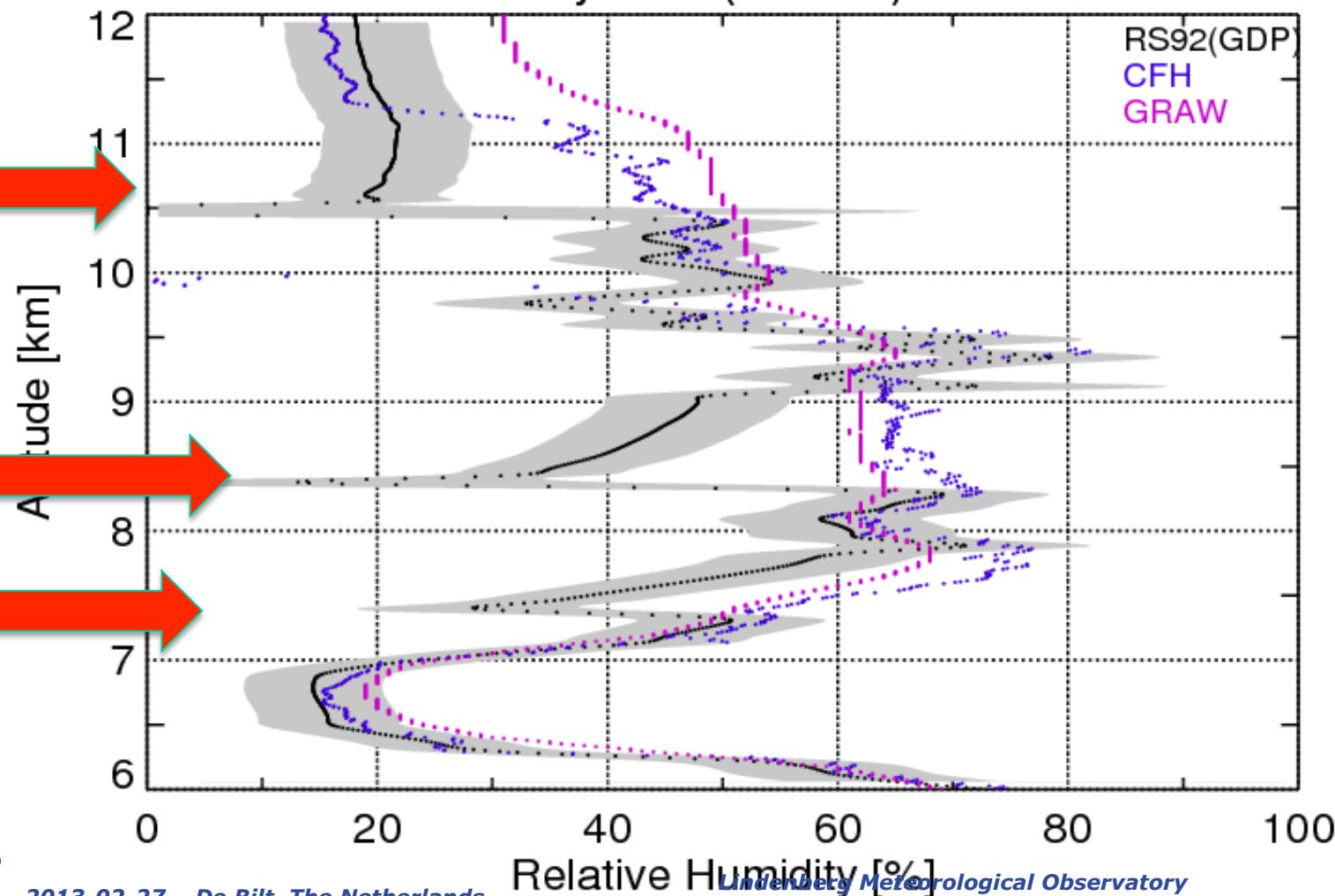


# Example: value of 100% check

	GC25 (0%)	SHC (100%)
U1	0.33	106.00 (clipped)
U2	0.36	100.98

30 May 2012 (0h UTC)

U1 switched on



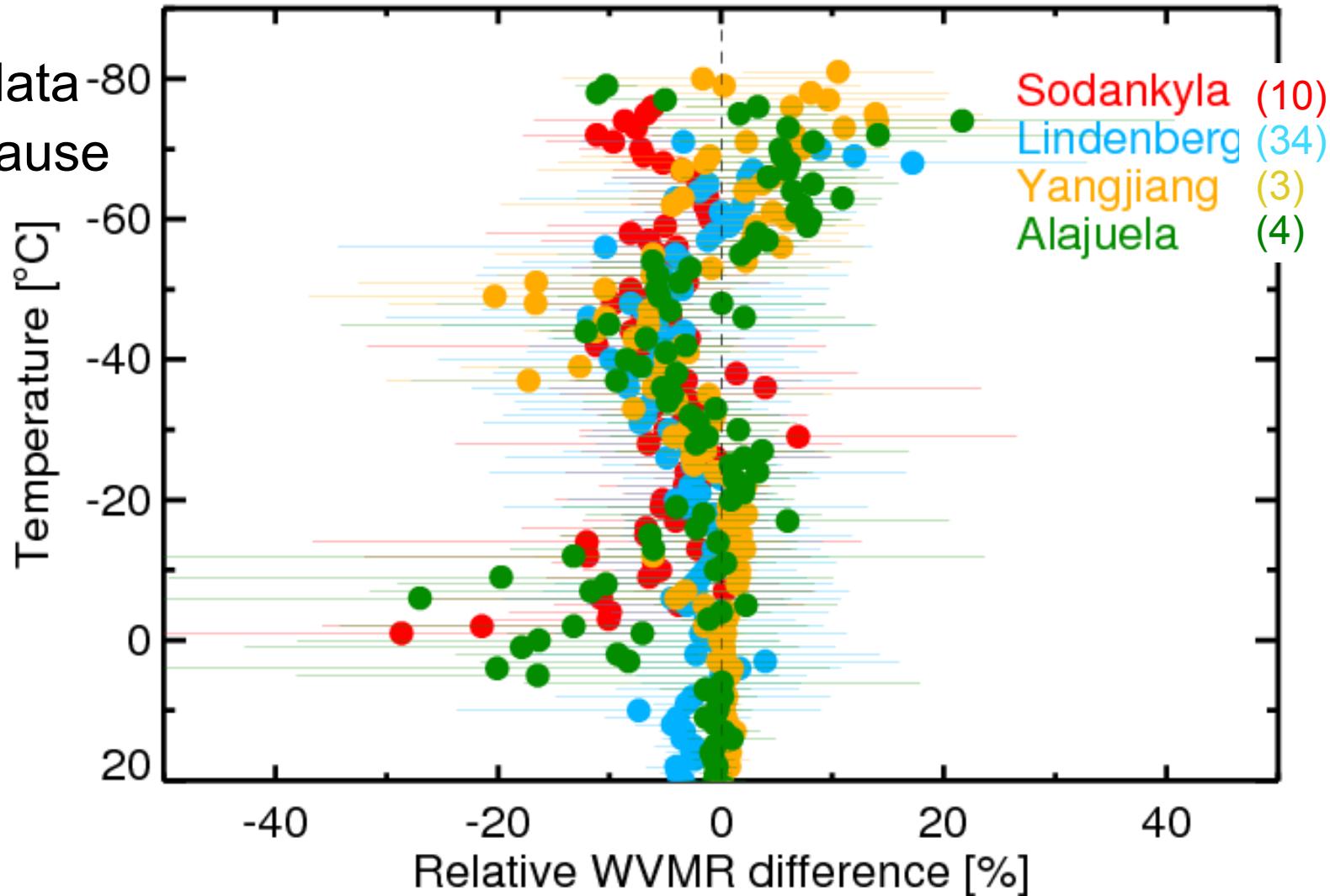
# RS92-CFH comparison: night

Deutscher Wetterdienst  
Wetter und Klima aus einer Hand



RS92-CFH (night)

- RS92 GPDv2 data
- Surface-tropopause
- 1°C bins

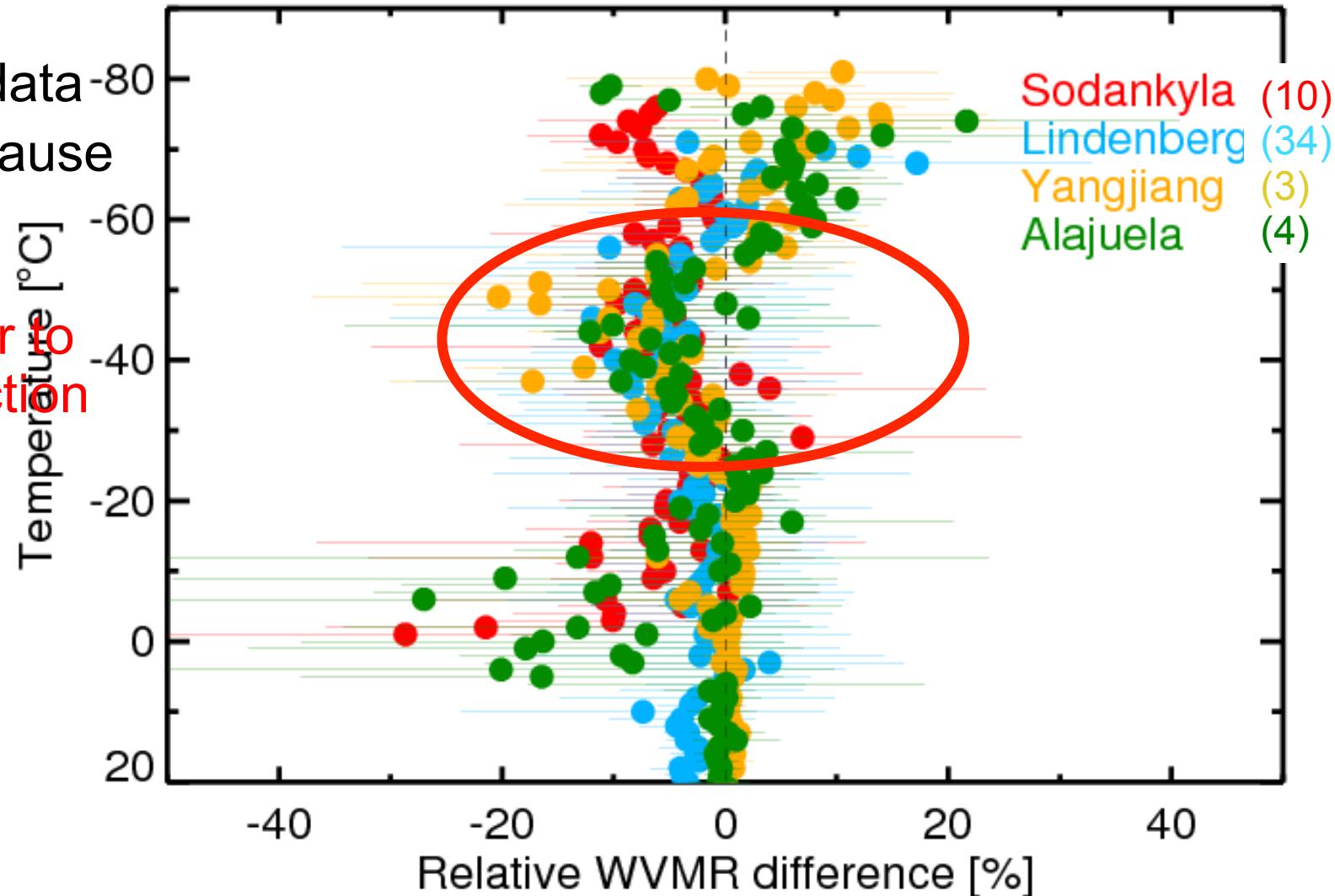


# RS92-CFH comparison: night

RS92-CFH (night)

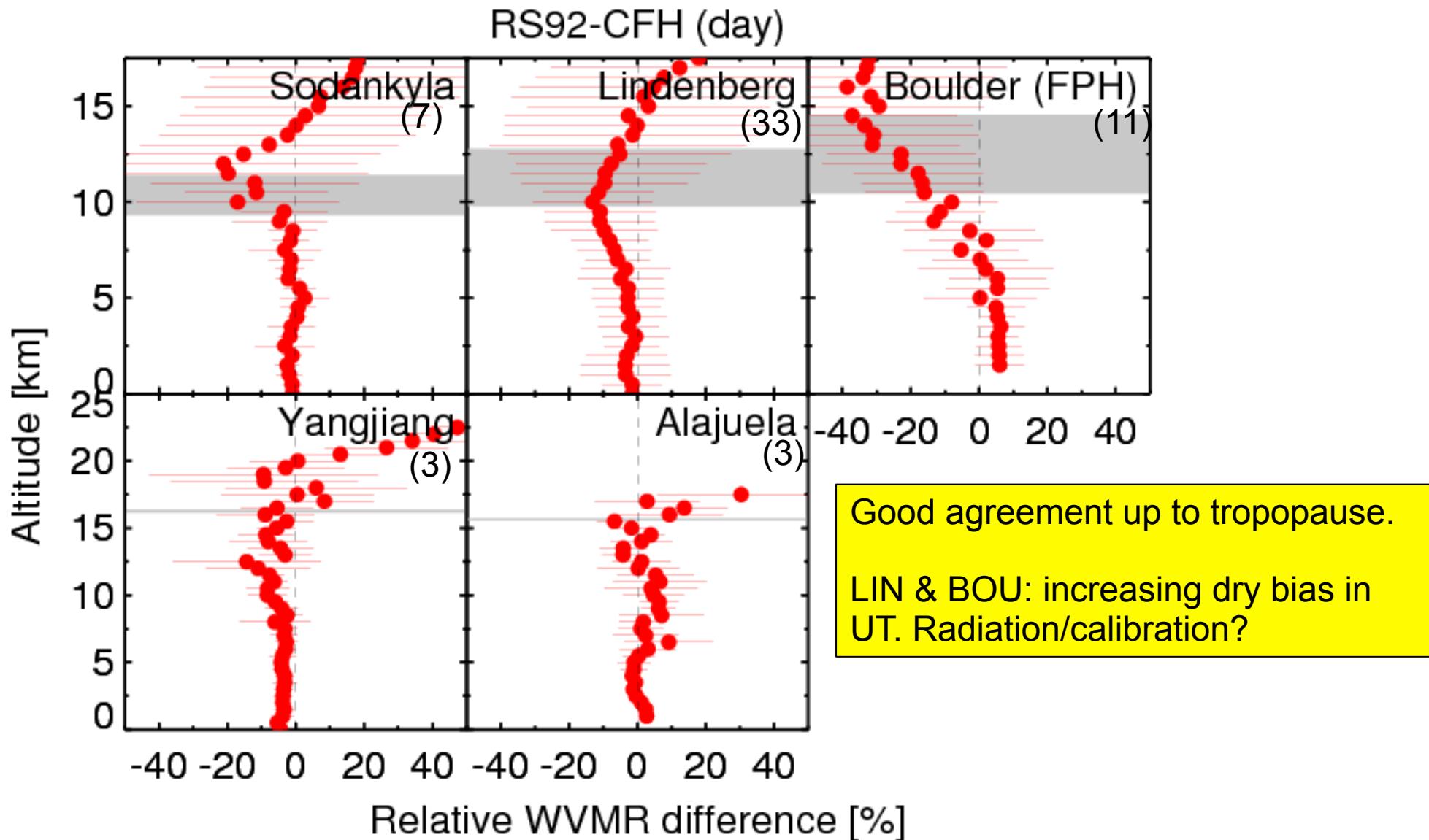
- RS92 GPDv2 data
- Surface-tropopause
- 1°C bins

Deviations similar to calibration correction



# RS92-CFH comparison: day

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# RS92-GRAW comparison

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Wetter und Klima aus einer Hand



Weekly: RS92-GRAW dual sounding

Bi-weekly: extended payload  
(CFH, O<sub>3</sub>, COBALD, ...)

GRAW:

- Single unheated RH sensor
- Radiation cap
- Time lag
- Sensor icing
- **RH limited to troposphere**



DFM-09



# RS92-GRAW comparison

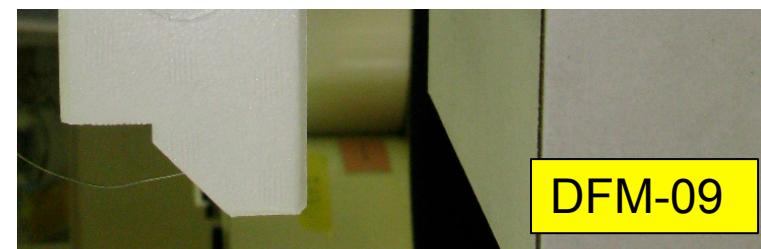
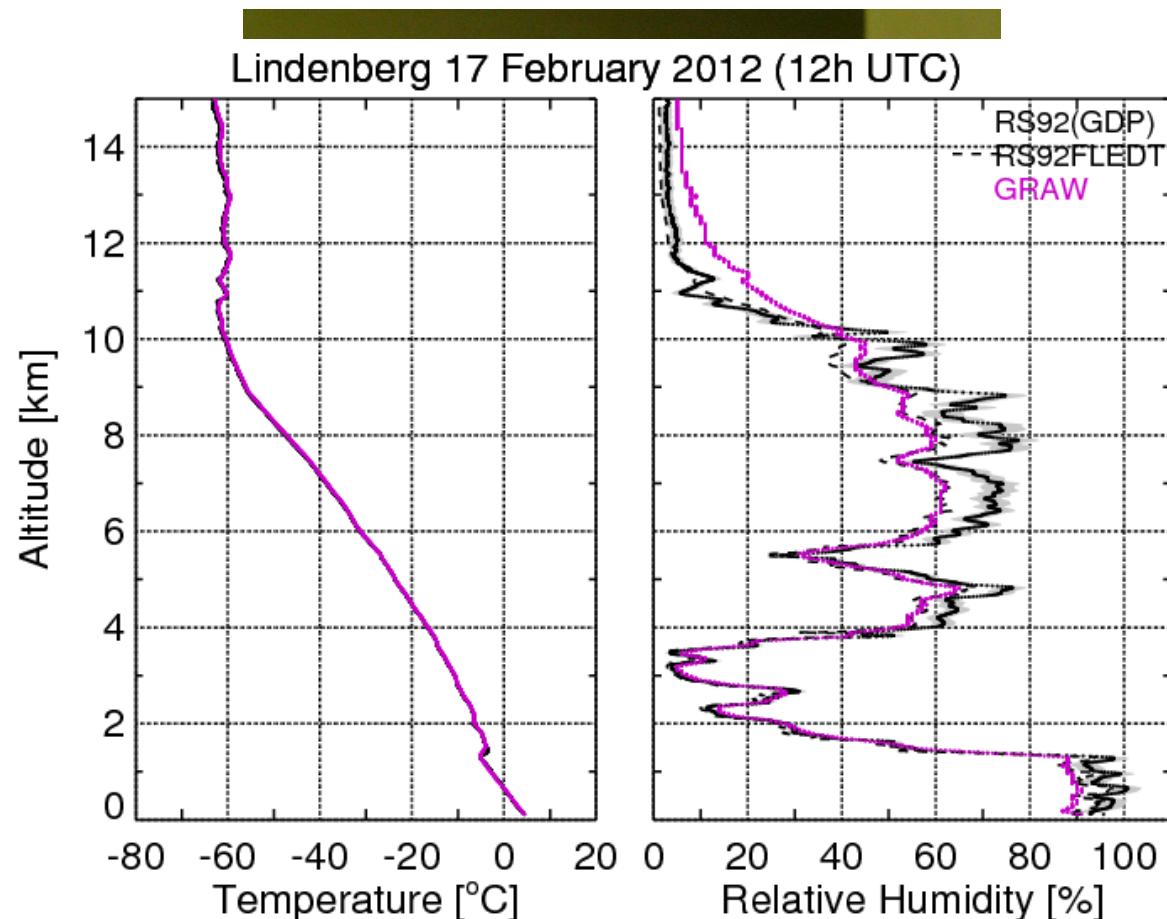
Deutscher Wetterdienst  
Wetter und Klima aus einer Hand



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GRAW:

- Single unheated RH sensor
- Radiation cap
- Time lag
- Sensor icing
- **RH limited to troposphere**

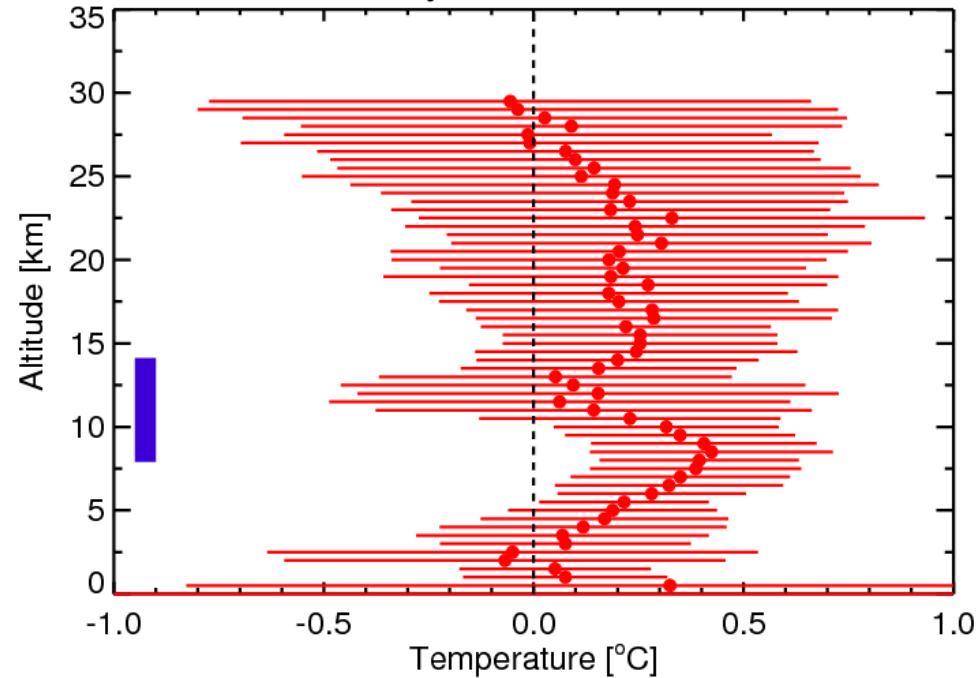


# GRAW-RS92 comparison: T

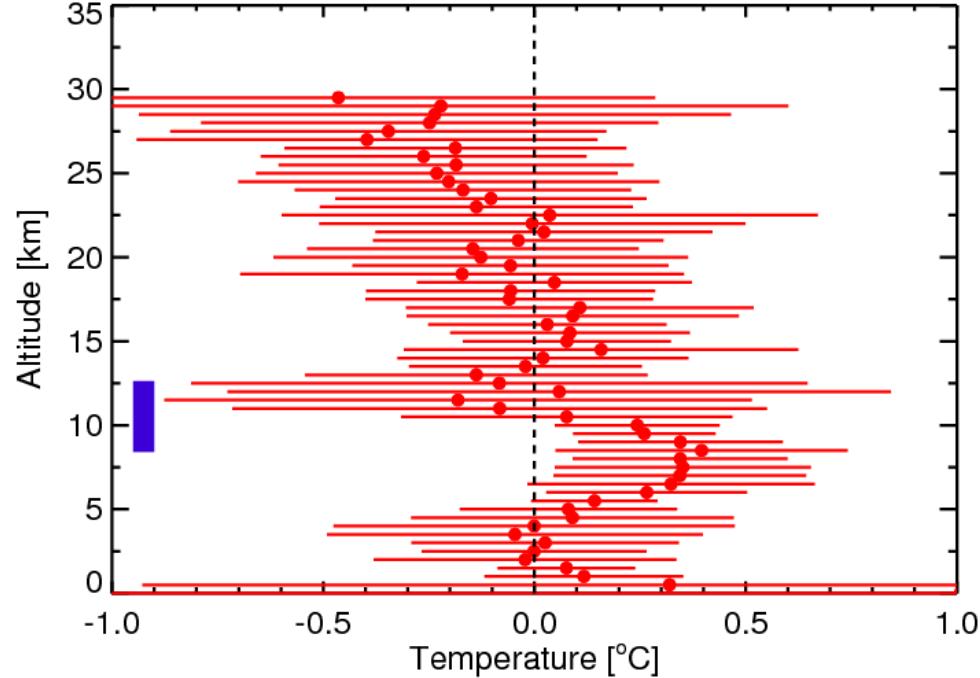
Deutscher Wetterdienst  
Wetter und Klima aus einer Hand



N=49  
daytime launches



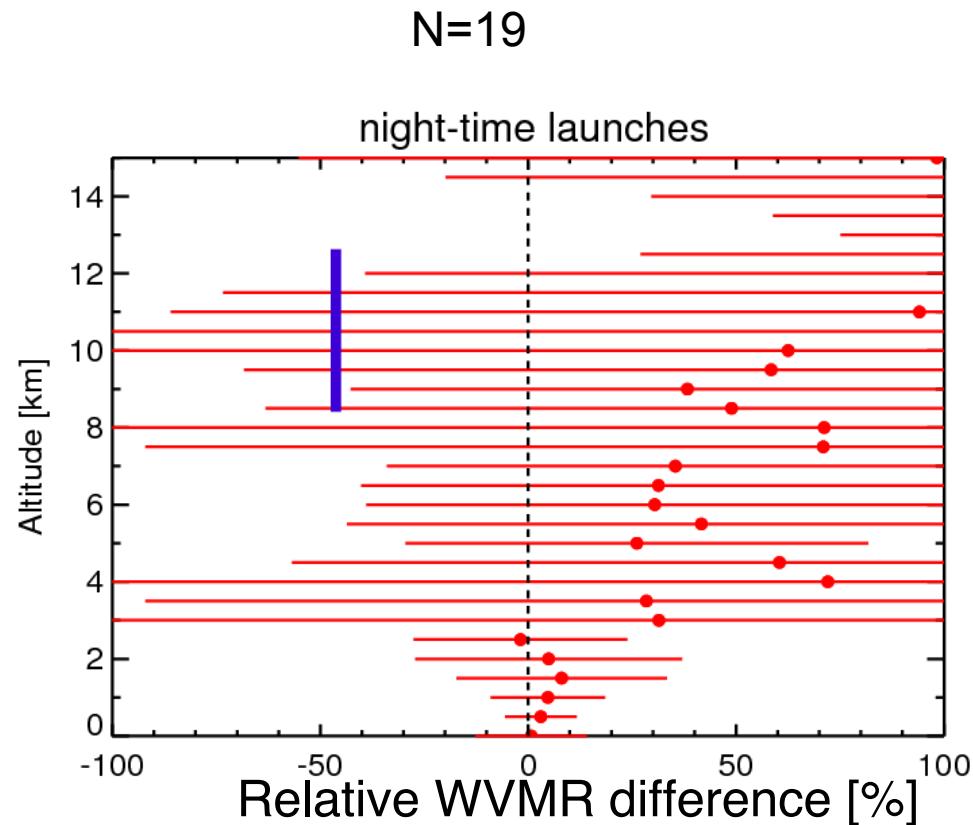
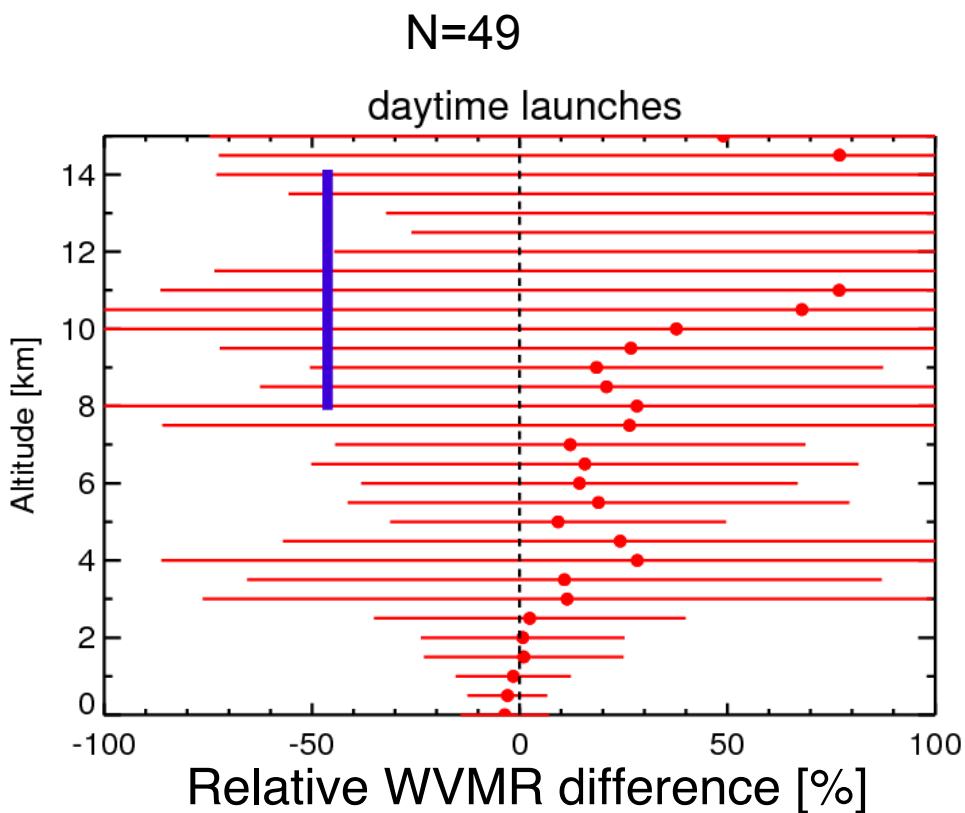
N=19  
night-time launches



Compared to RS92(GDP):  
GRAW has warm bias during day  
Cold bias in stratosphere at night  
Mean  $\Delta T < 0.5K$



# GRAW-RS92 comparison: RH



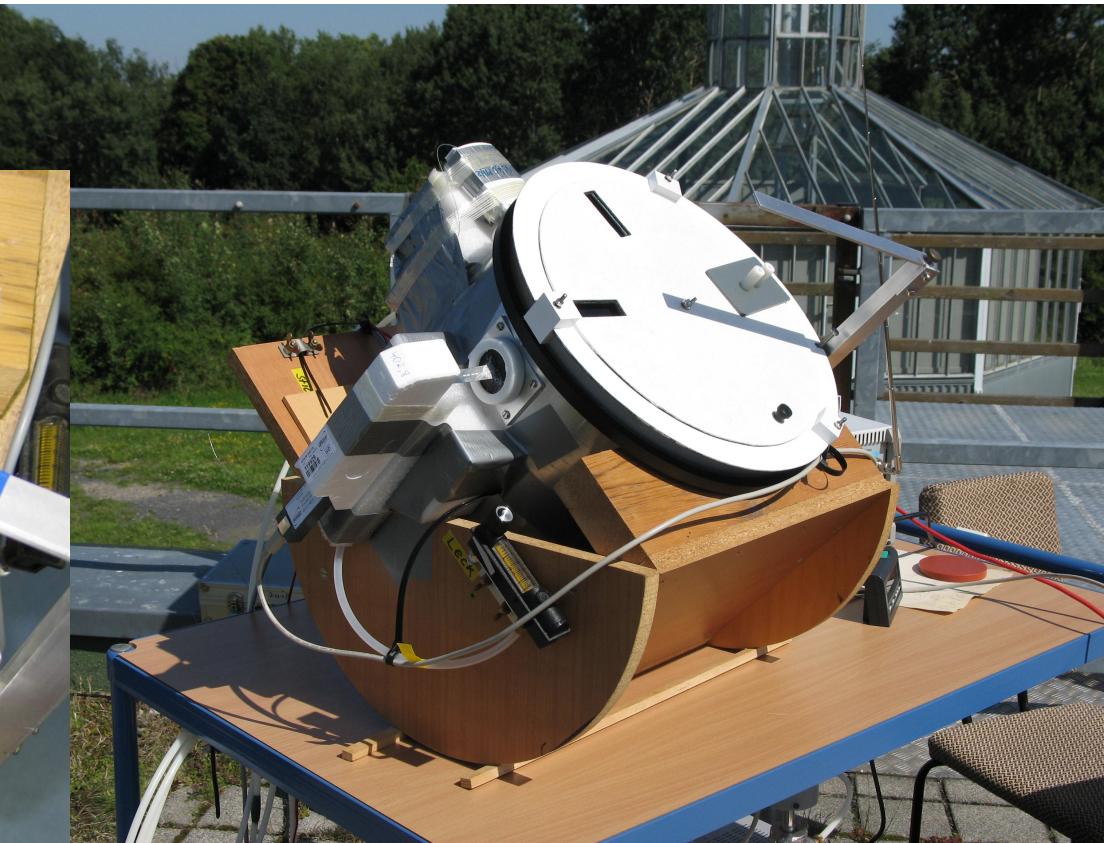
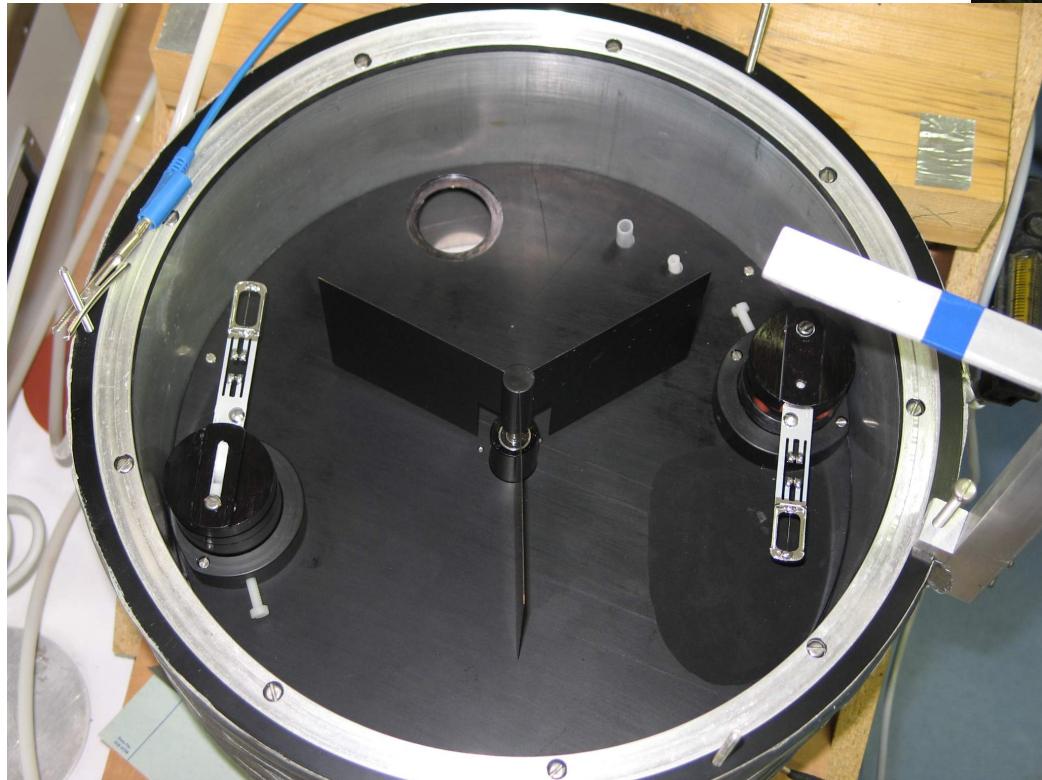
On average wet bias  
Considerable spread, low  
bias at high RH, high bias at  
low RH

Plan: apply GRUAN  
algorithms to GRAW profile



# Radiation experiments RS92

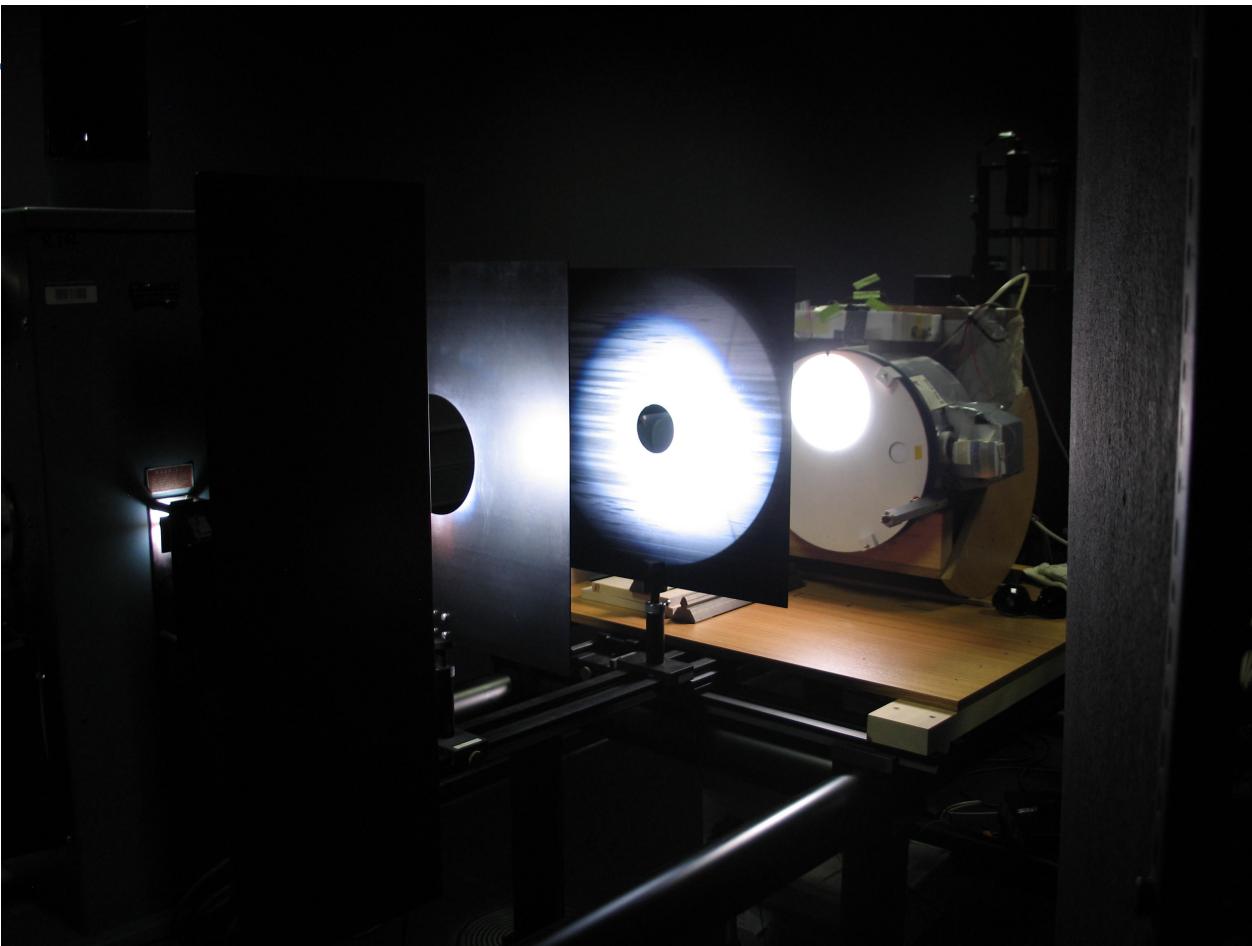
Deutscher Wetterdienst  
*Wetter und Klima aus einer Hand*



Flight representative conditions  
Pressure range: 4-1000 hPa  
Ventilation speed 0-10m/s  
Irradiance ~850W/m<sup>2</sup>



# Radiation experiments, lab facility



Deutscher Wetterdienst  
*Wetter und Klima aus einer Hand*



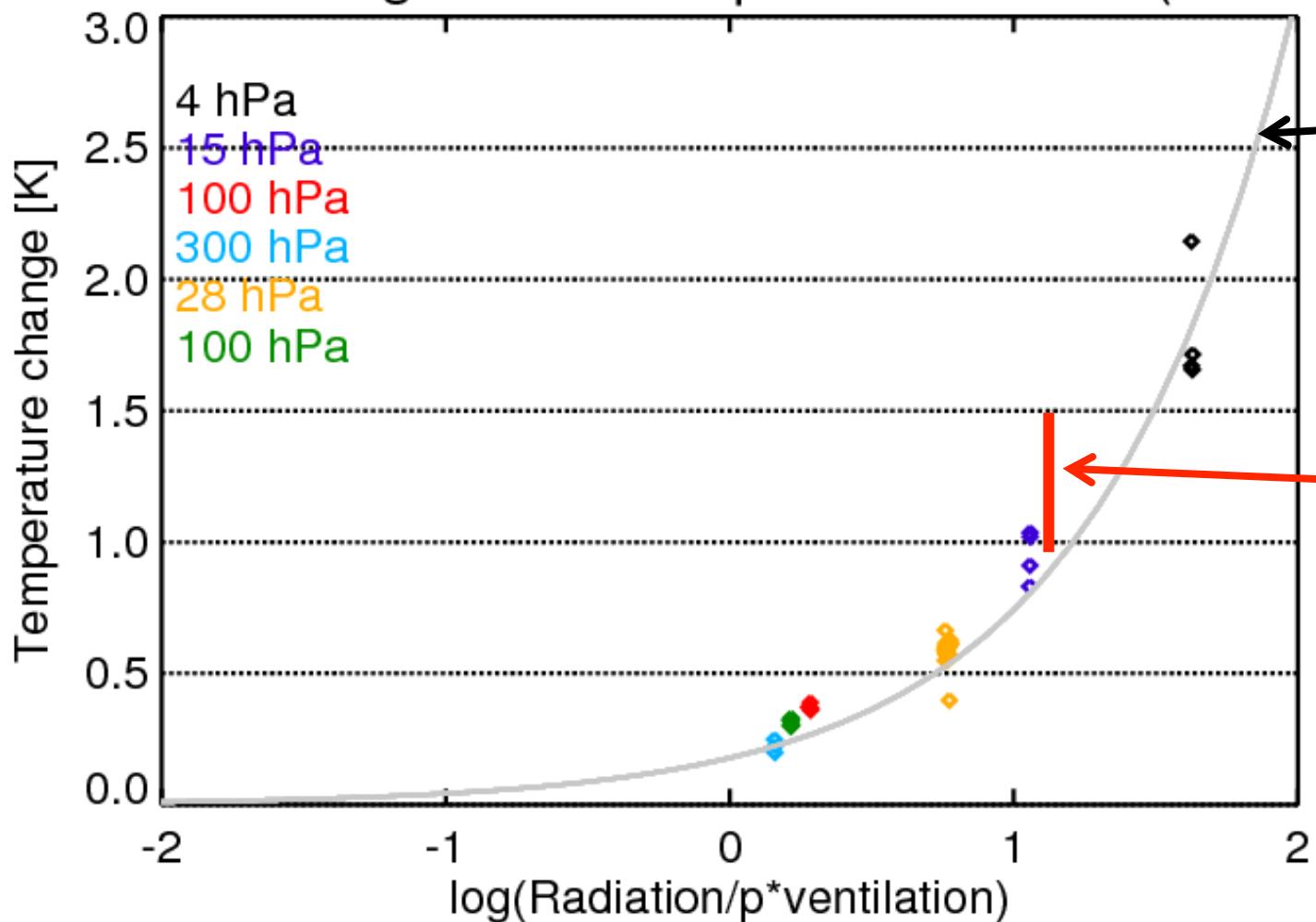
2500W Xe arc lamp (color temperature ~6000K )  
Irradiance at 1.5m ~1650W/m<sup>2</sup>

# Radiation experiments RS92

Deutscher Wetterdienst  
Wetter und Klima aus einer Hand



Lindenberg radiation experiments 2012 (RS92)



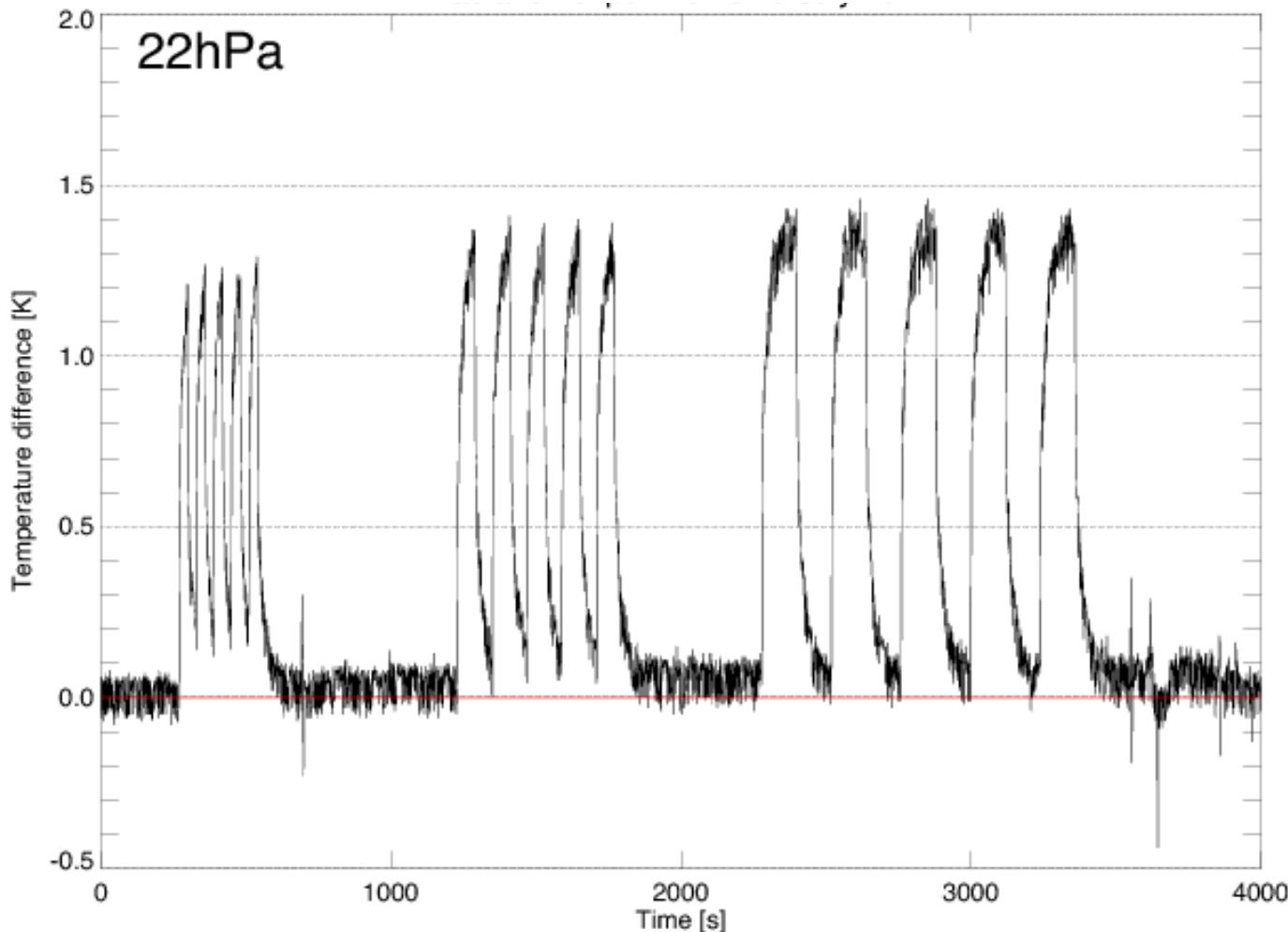
Franz Immel's fit. Used in GRUAN data processing

Laboratory experiment



# Radiation experiment

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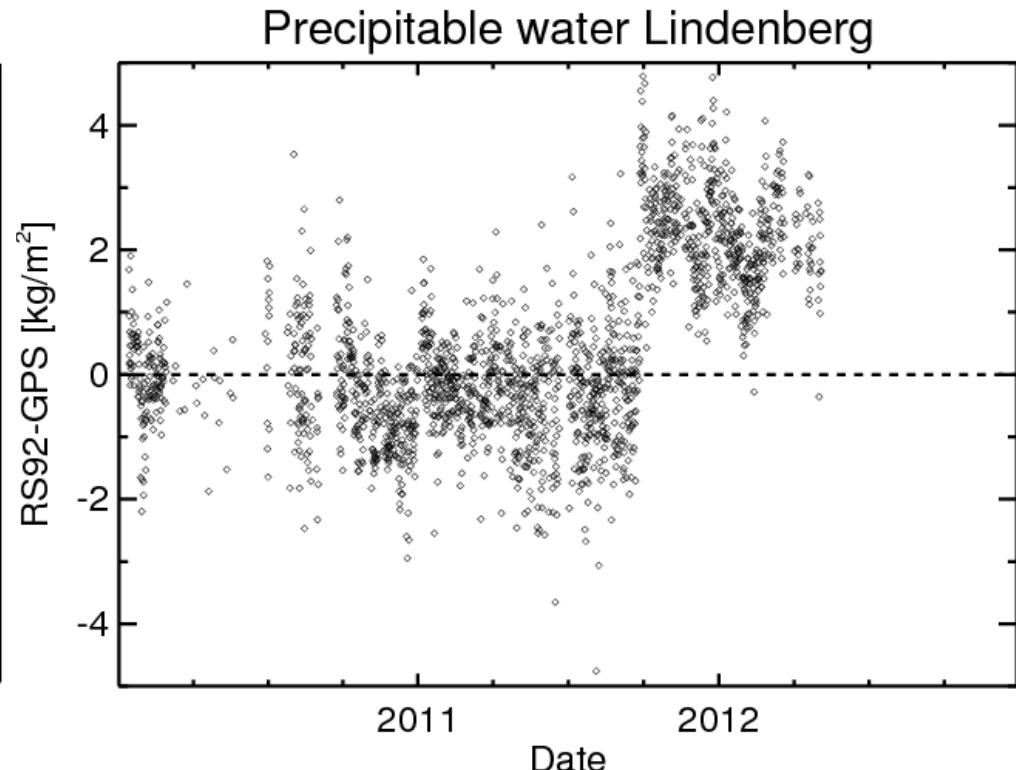
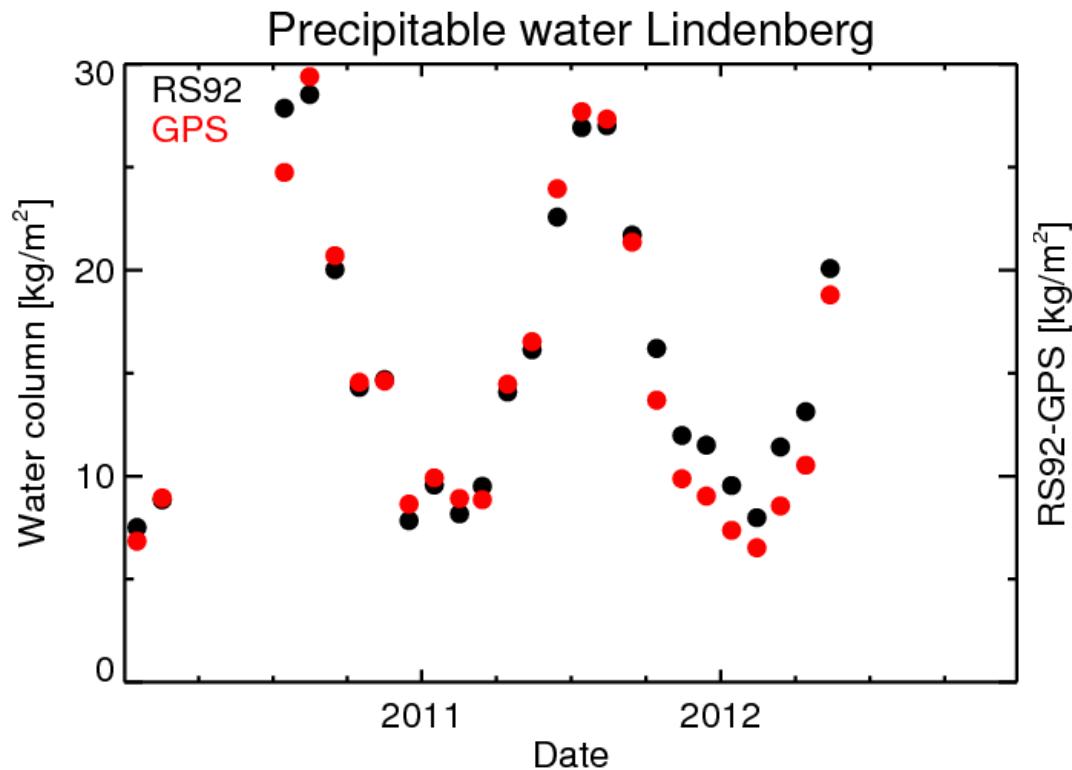


Influence of length of measurement intervals



# RS92-GNSS comparison

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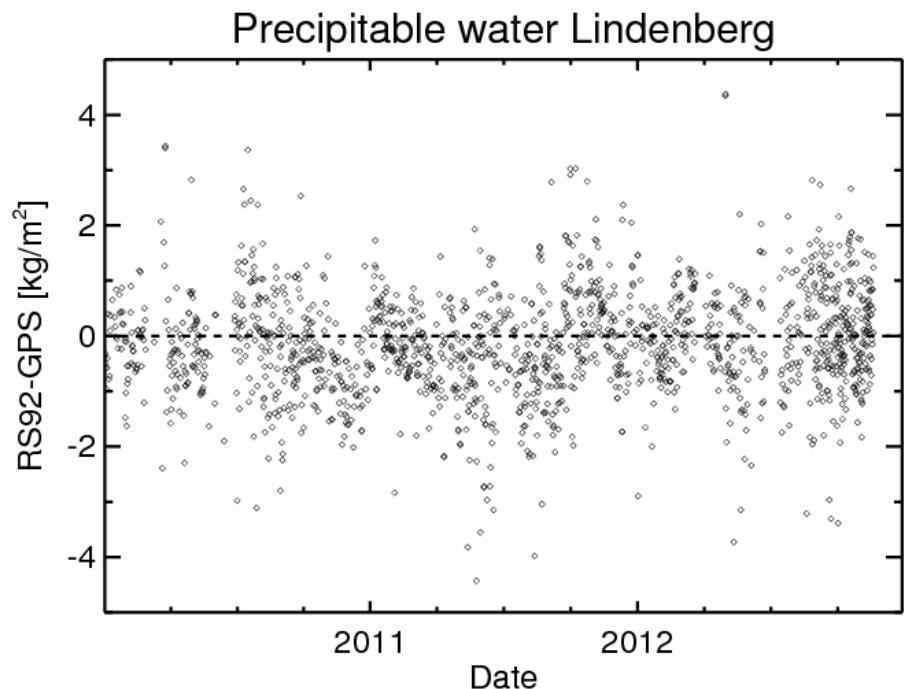
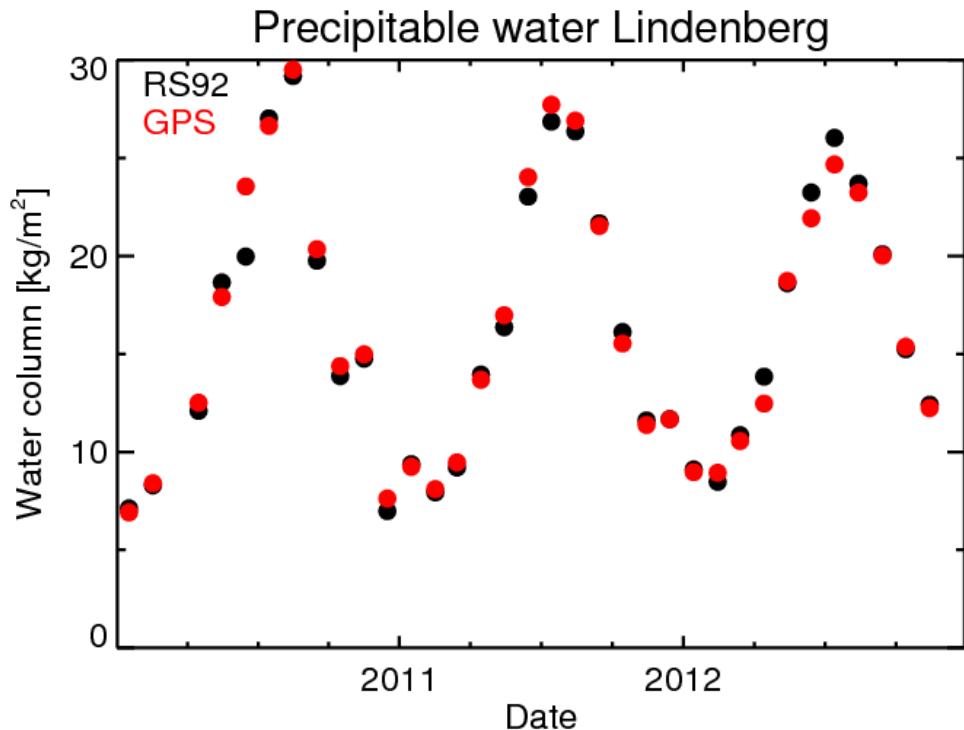


Reason: undocumented antenna change  
→ Change management!



# RS92-GNSS comparison

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Antenna change taken into account  
→ Change management!



# Summary

Deutscher Wetterdienst  
*Wetter und Klima aus einer Hand*



- Importance of 100% check
- Good agreement RS92 (GDP) – CFH
- Comparison GRAW vs RS92 ongoing
- Radiation experiments ongoing
- Plan:
  - Continue radiation experiments (other sondes)
  - Time lag experiments in climate chamber facility at KIT
  - Paper

