Change management for the RS92 phase out

GRUAN

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Motivation

- Various GRUAN sites employ Vaisala RS92
- RS92 will phase out in the near future (~3 years)
- Need for coordinated GRUAN-wide management of this change (relevant for 13 sites)
- Several sites consider switching to Vaisala RS41
- A realistic example for change management: The RS92/RS41 transition

Status

- RS41 officially announced in 2013 (http://www.vaisala.com/en/meteorology/products/soundingsystemsandradiosondes/radiosondes/Pages/RS41.aspx)
- RS41 will replace RS92 (phase out ~3 years)
- Various RS92/RS41 intercomparison campaigns have been performed (e.g. Sodankyla, Boulder, SGP, Camborne, TMF). These data should be included in GRUAN.

➢ Define change management for RS92/RS41 within GRUAN

RS41 radiosonde

T-sensor: Pt resistor

RH sensor:

- 1 heated sensor
- capacitive polymer
- integrated T-sensor
- 0 %RH ground check over desiccant abandoned
- Easier to use (operator point of view)

Status

Requirements for new data product (presentation Holger Vömel earlier today)

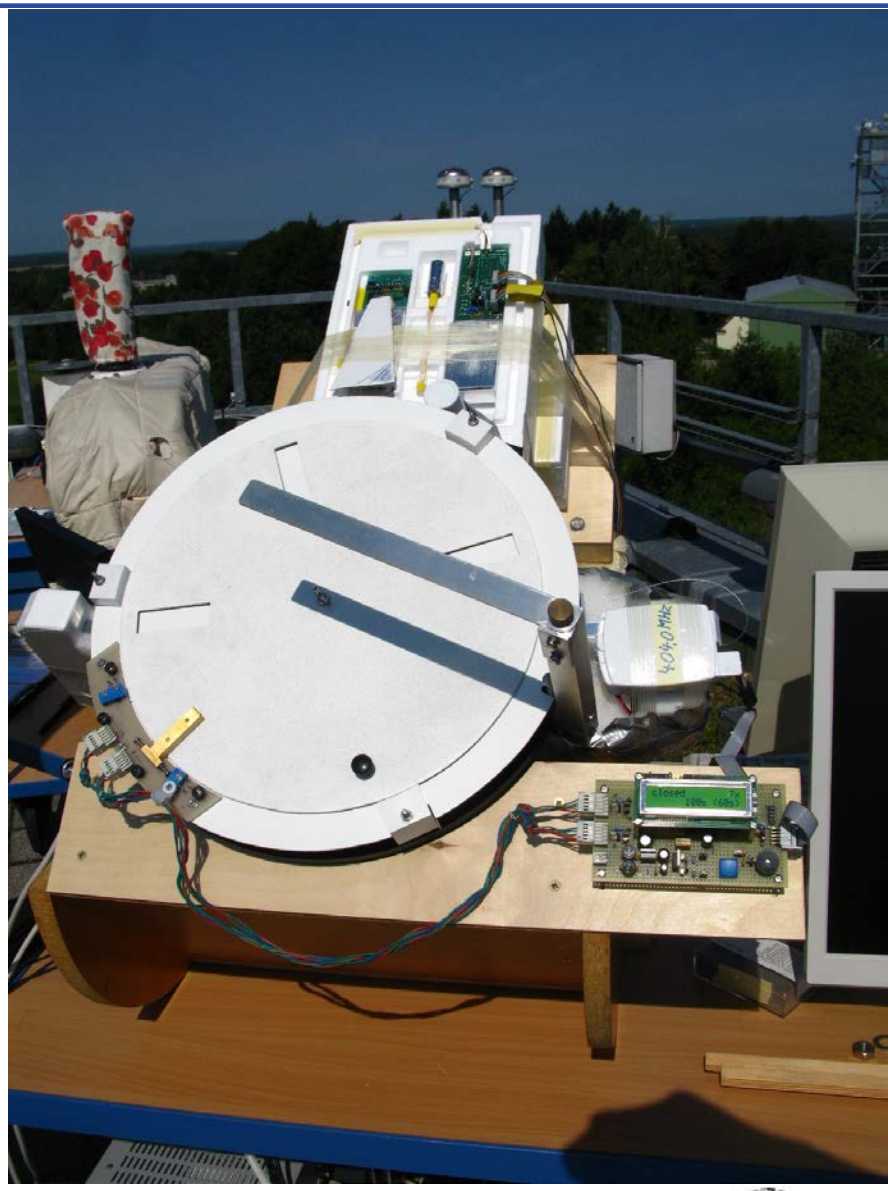
Determine uncertainties: lab studies, intercomparison

Laboratory measurements performed at Lindenberg

- Calibration (SHC with reference saline solutions)
- Time lag (climate chamber)
- Radiation (temperature sensor)

Laboratory experiments in Lindenberg

- SHC
- radiation

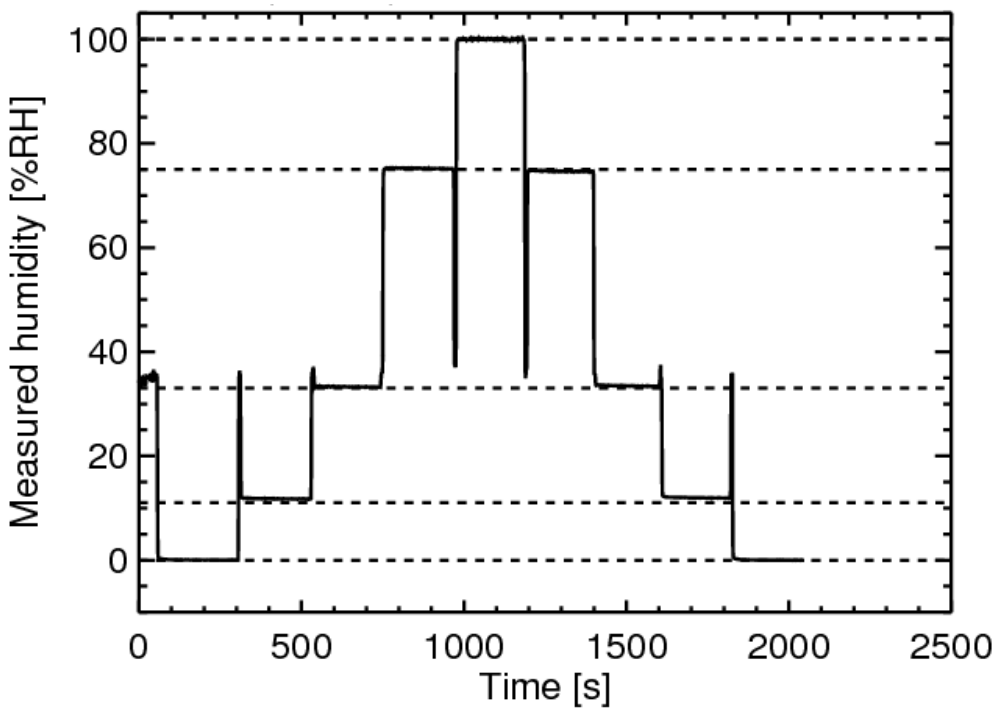


RS41 SHC experiments

Reference saline solutions 0, 11, 33, 75, 100 %RH

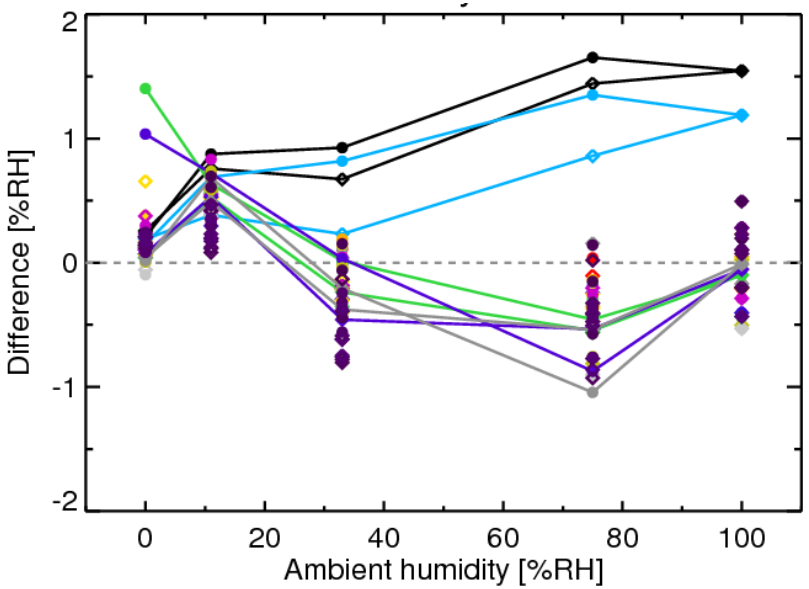
~30 sondes tested

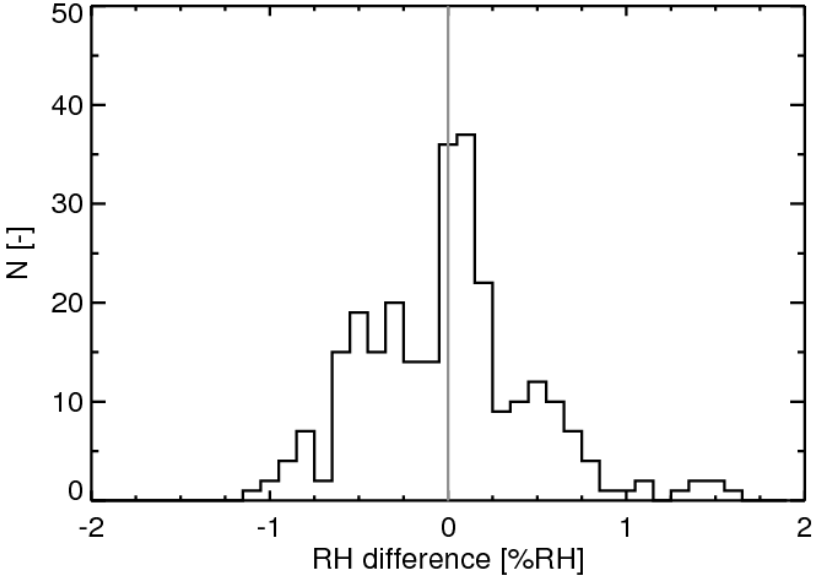
Reference temperature sensors in SHC.



SHC experiments: results

RH





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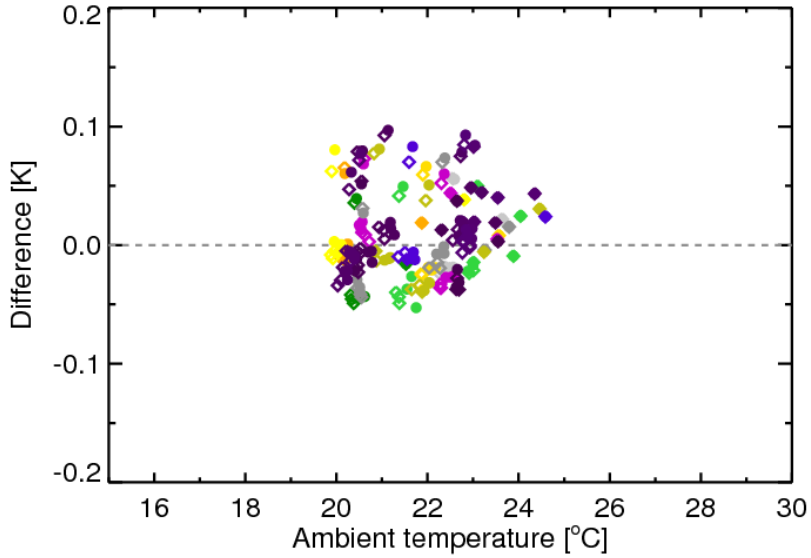
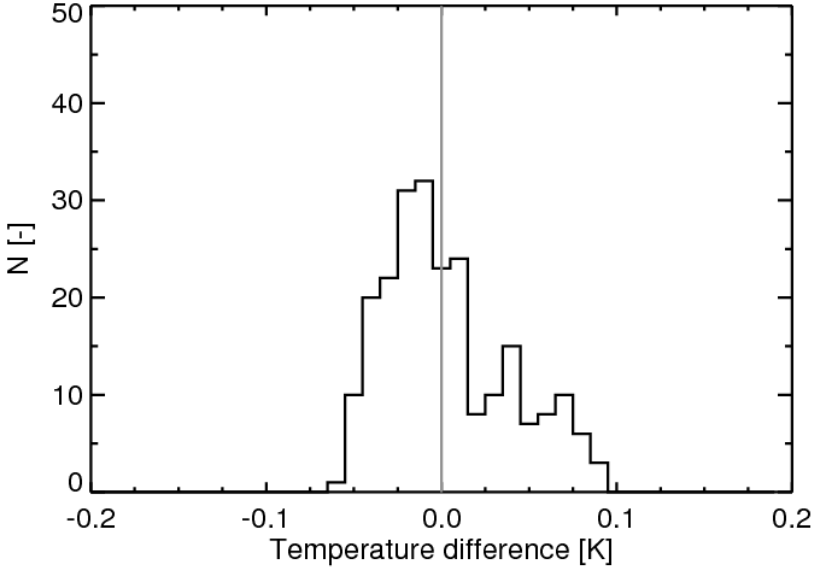
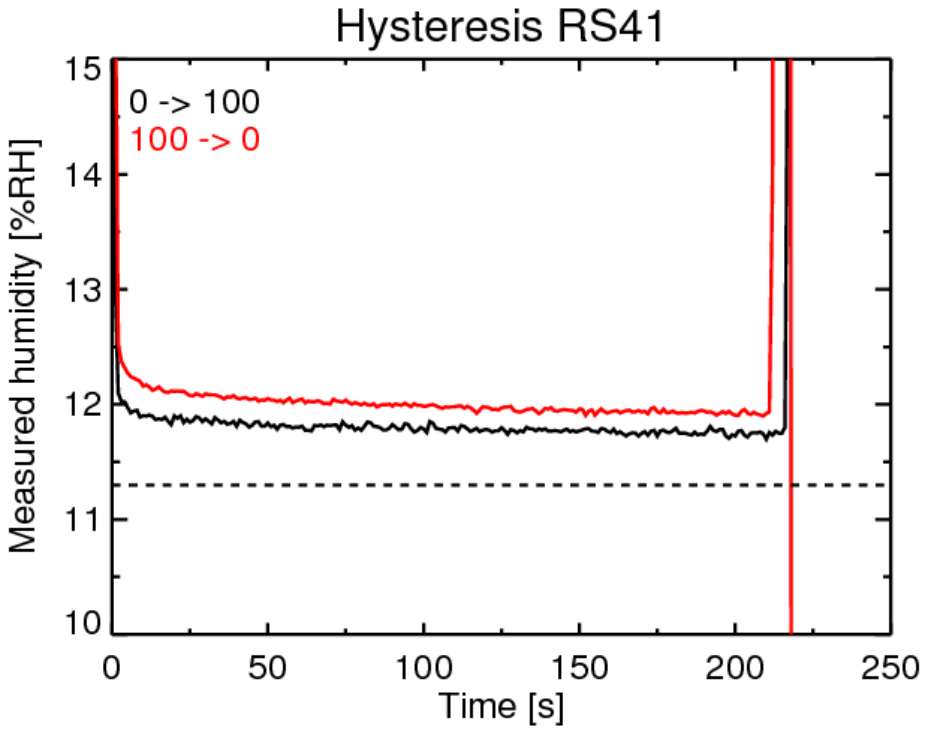
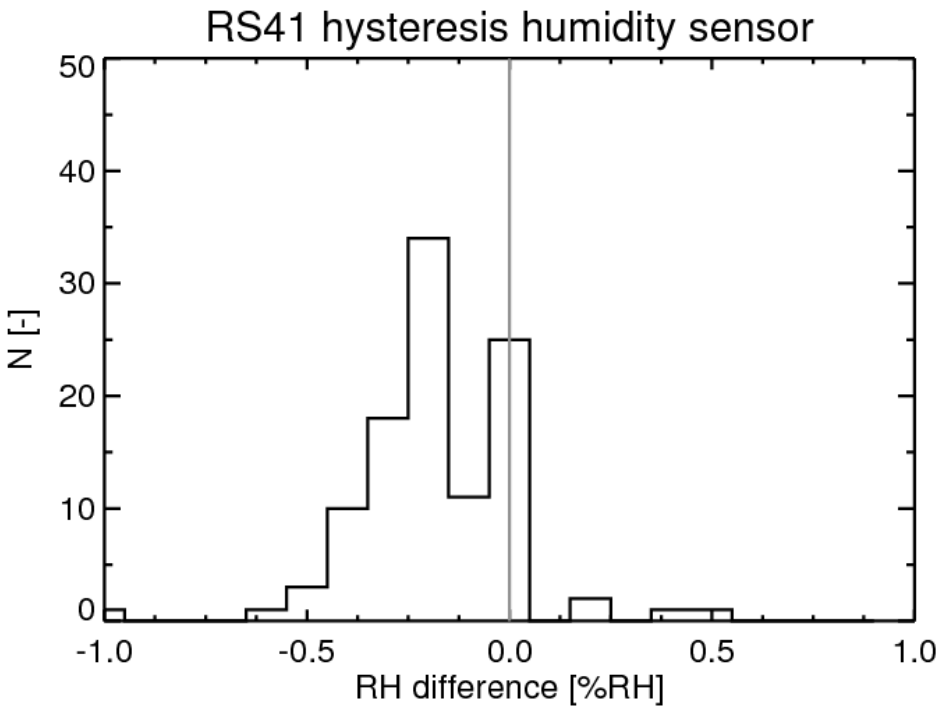




SHC experiments: hysteresis

Hysteresis < 0.5%RH

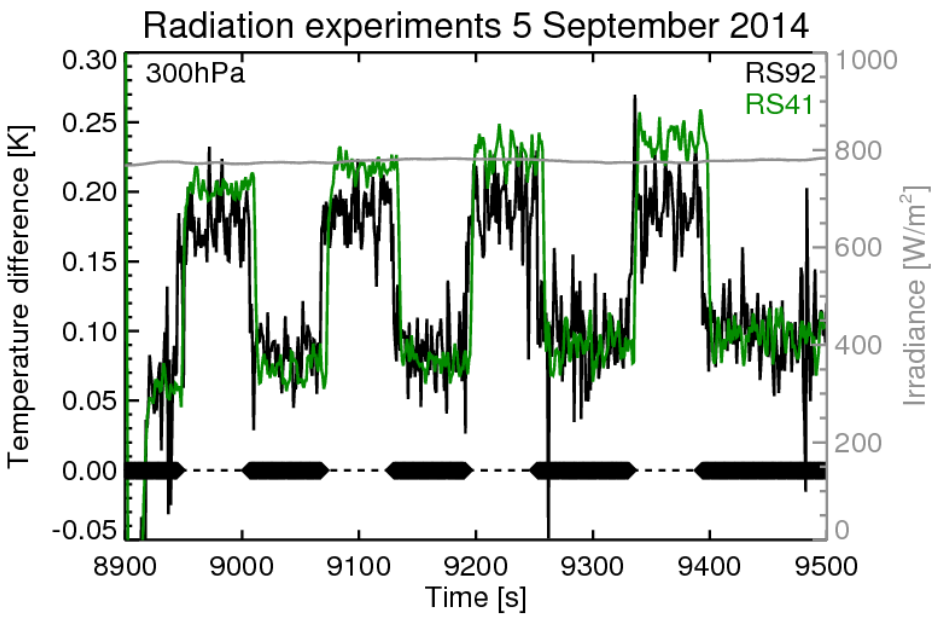


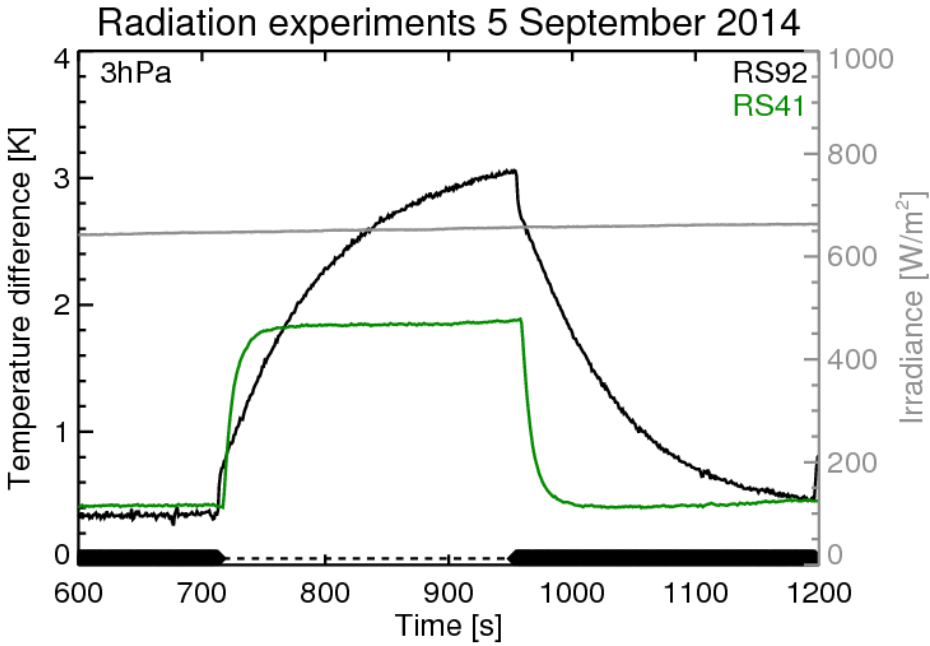


RS41 radiation experiments

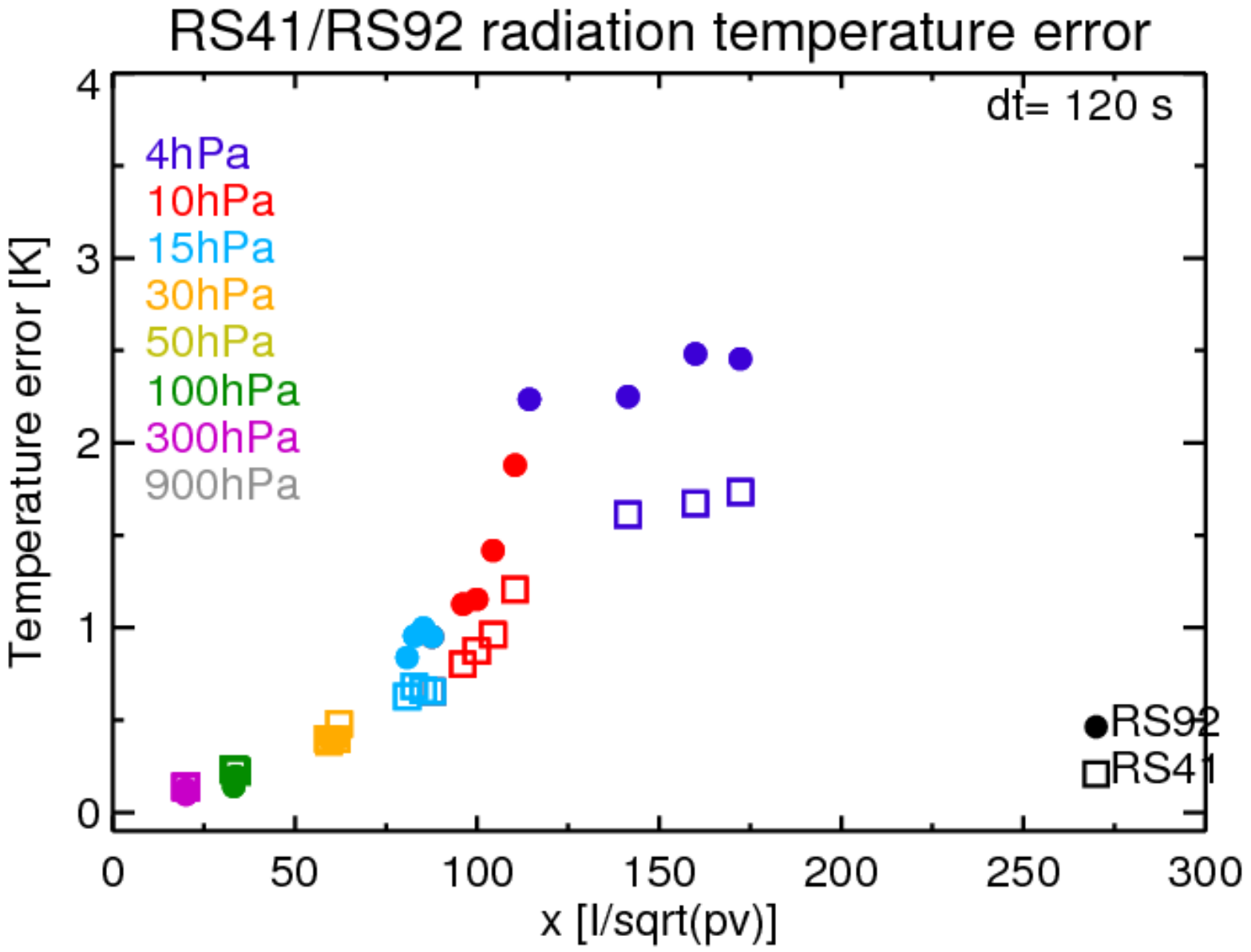
300 hPa: $\Delta T_{RS41} \approx \Delta T_{RS92}$

p < 30 hPa: $\Delta T_{RS41} < \Delta T_{RS92}$
faster equilibrium





GRUAN change management



GRUAN change management

GRUAN guide:

The length of time for which the old and new systems should be run in parallel, and the frequency with which coincident measurements should be made, will depend on the instruments used, an in-depth understanding of the measurement technique, and the main applications for the long-term measurement record.

We propose:

- Weekly parallel soundings for an extended period (seasonal change) day/night soundings 1 – 2 years

All but 2 sites fly RS92. Parallel soundings require additional sounding system (financial burden – leasing?)

- Perform twin soundings at selected sites (representative climate regions)

Possible sites for GRUAN RS92/RS41 twin sounding program

Representative climate regions:

- Ny Alesund
- Sodankyla
- Lindenberg
- SGP/TMF/Boulder?
- Lauder?
- Tropics?

Tropical sites for RS92/RS41 twin sounding

Possible locations: La Reunion, Paramaribo, Hawaii, Galapagos

Support from other GRUAN sites (e.g. offer radiosondes)

Lead Centre can provide MW41 (on loan for 1 year) + radiosondes

- MW41 software: GRUAN license, version 2.2

Intercomparison at TMF

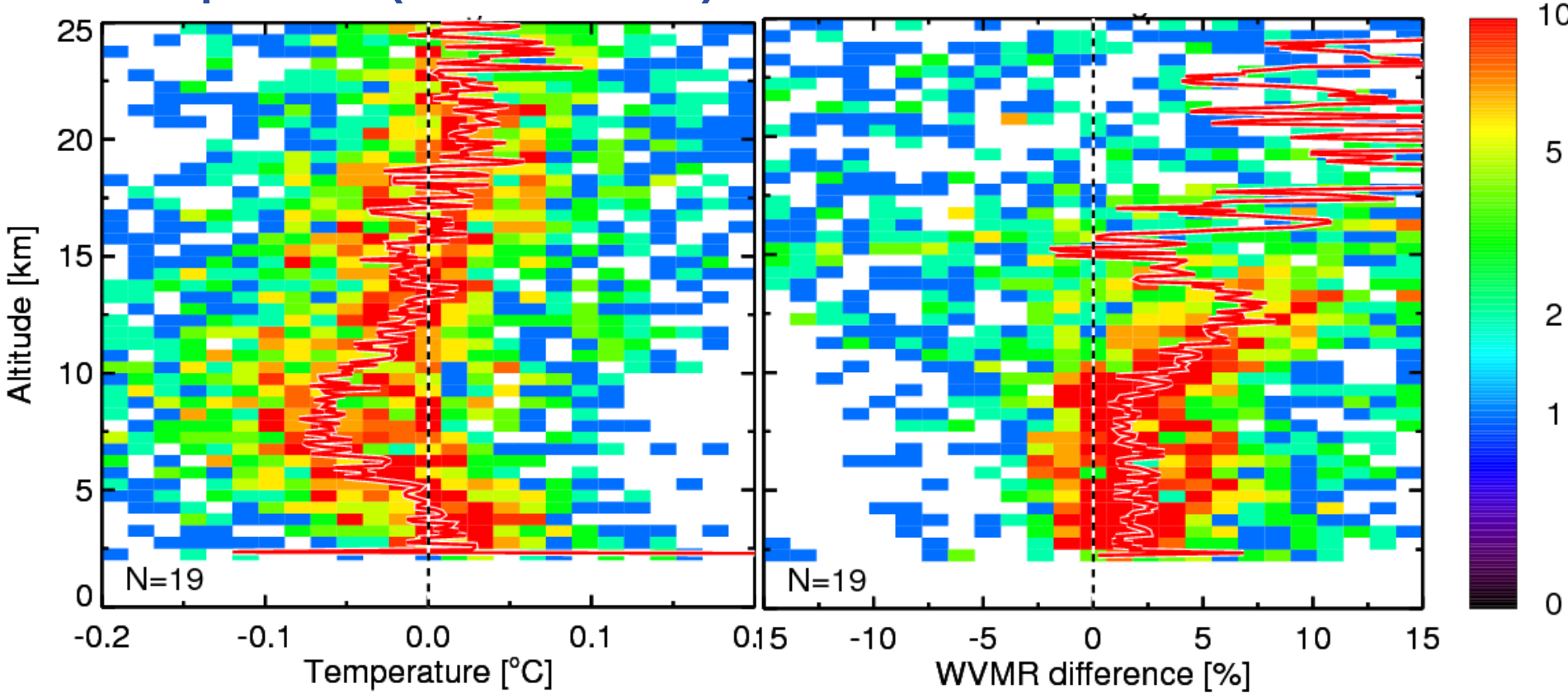
Deutscher Wetterdienst
Wetter und Klima aus einer Hand

- May – October 2014
- 19 nighttime RS92/RS41 parallel soundings

RS92 (GDP) – RS41

Temperature (abs difference)

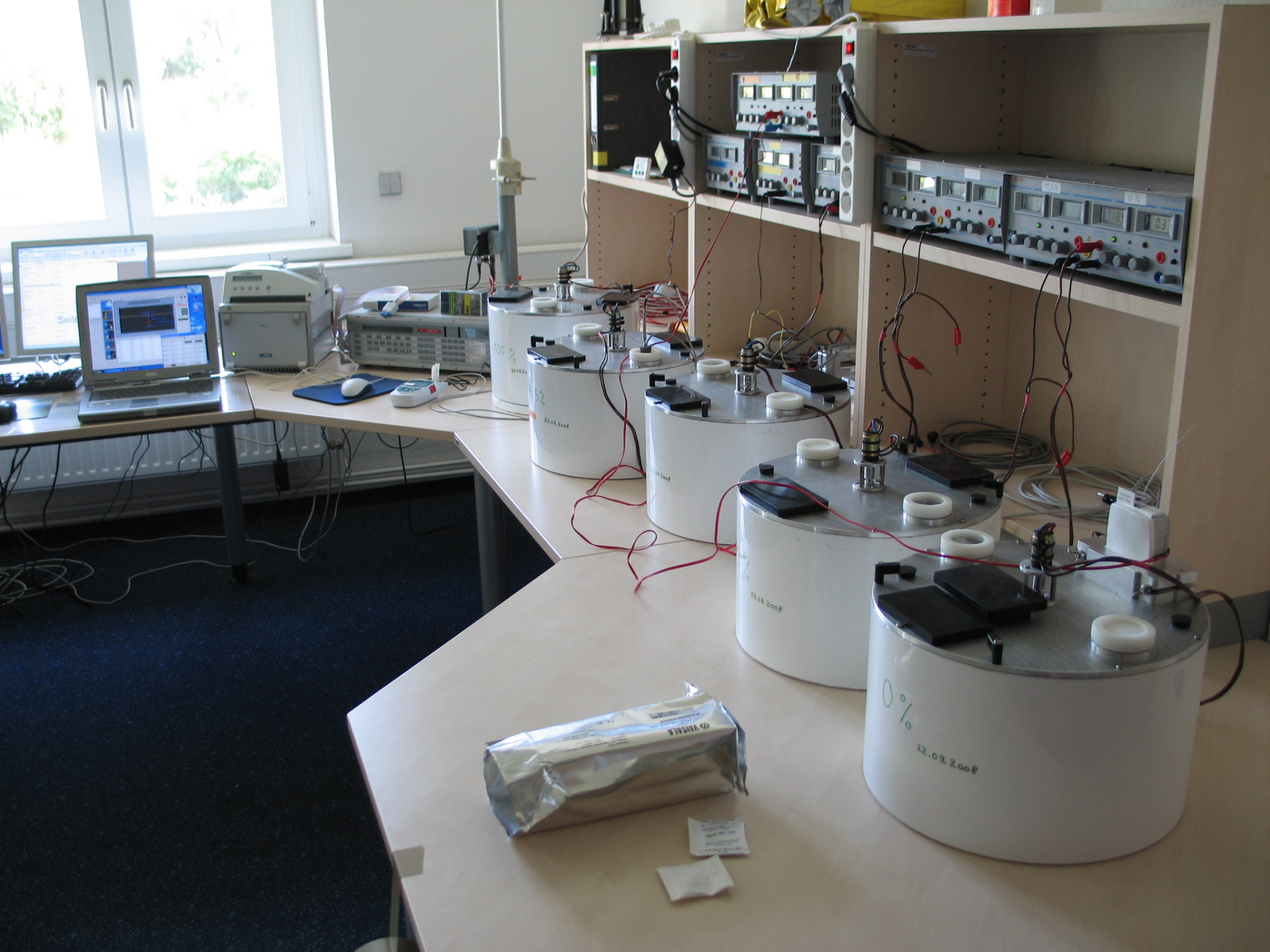
WVMR (relative difference)



Summary

- Example of upcoming change management: RS92/RS41 transition
  - Major impact on GRUAN
- Laboratory characterization of RS41 at Lindenberg (ongoing)
  - good performance of T & RH sensors
- Several dedicated (short-term) campaigns (mostly mid-lat)
- GRUAN-coordinated long-term intercomparison effort needs to be defined (selected sites)
- All intercomparison data available to GRUAN

Please share your thoughts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