Update on standard humidity chamber (SHC)

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- Dave Smyth, Richard Querel, June Wang
  - Contributions to manuscript
- Marion Fiedler-Krüger (LC)
  - Orientation experiments

Introduction

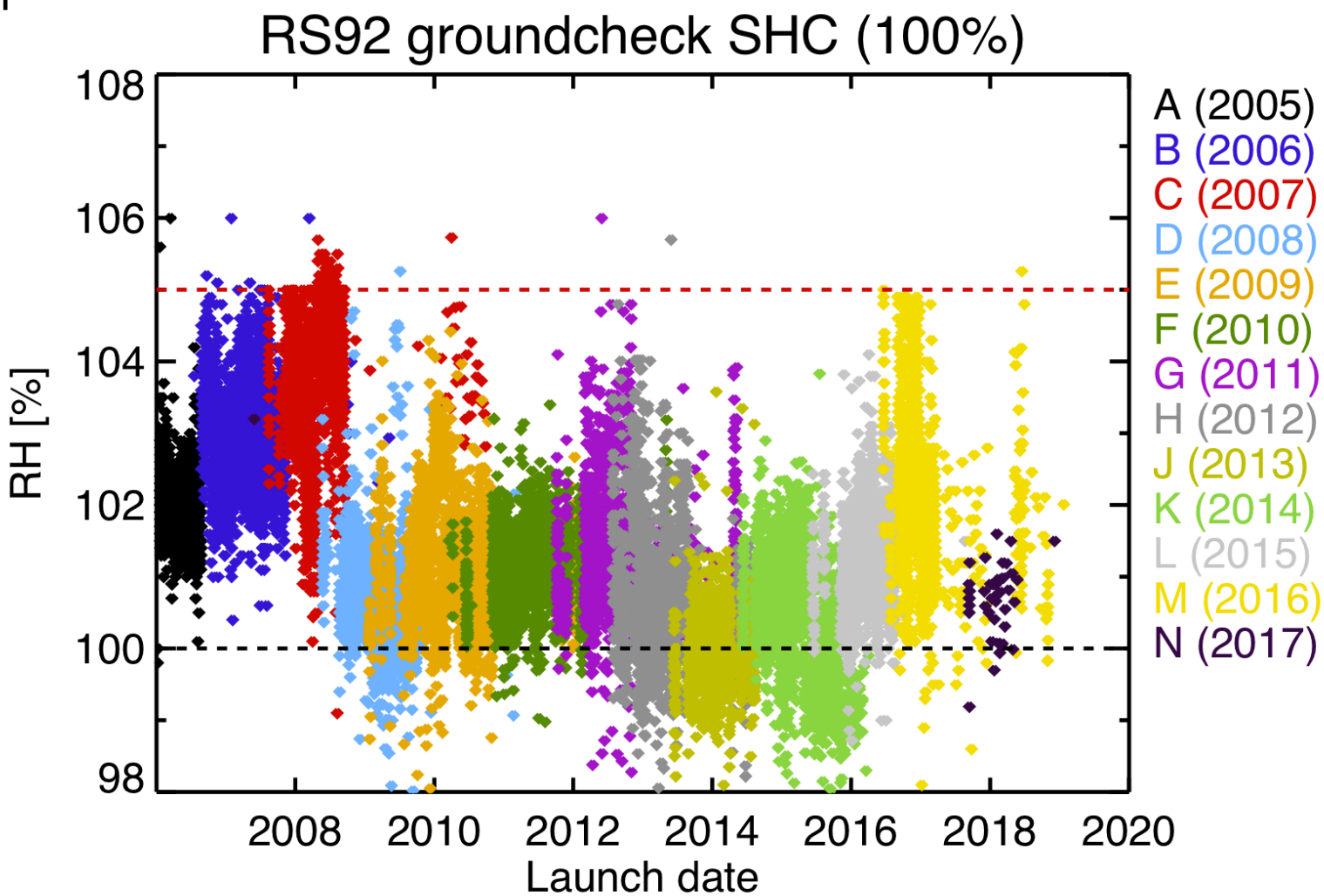
- Why: Create a stable reference environment to get pre-flight info on RH uncertainty (traceability)
- Elementary GRUAN-tool for independent ground check.
- 18 GRUAN sites employ SHC

Developed @LIN

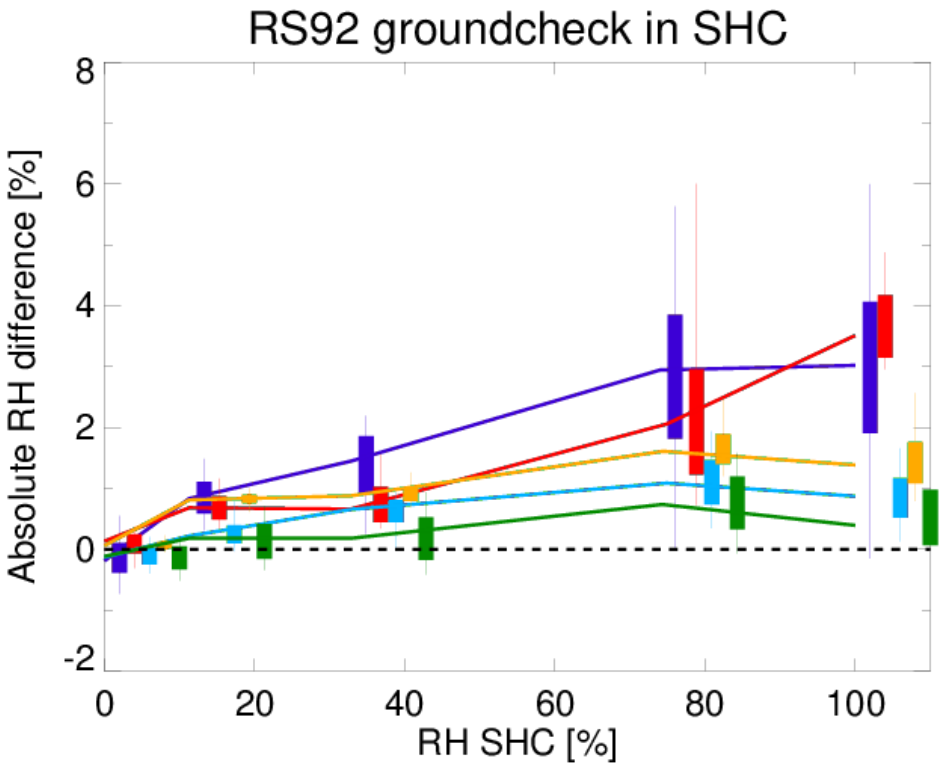
Current model

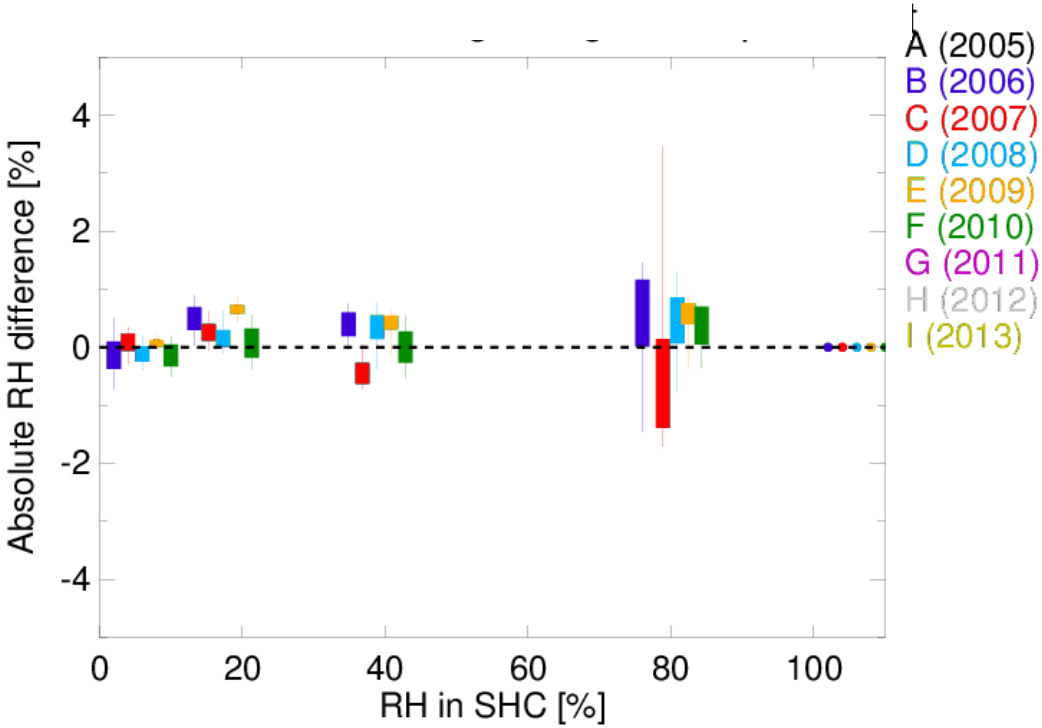
Legacy: RS92 SHC groundcheck

SHC ground checks at LIN revealed drifts in RS92 humidity calibration



Use SHC to scale RH data

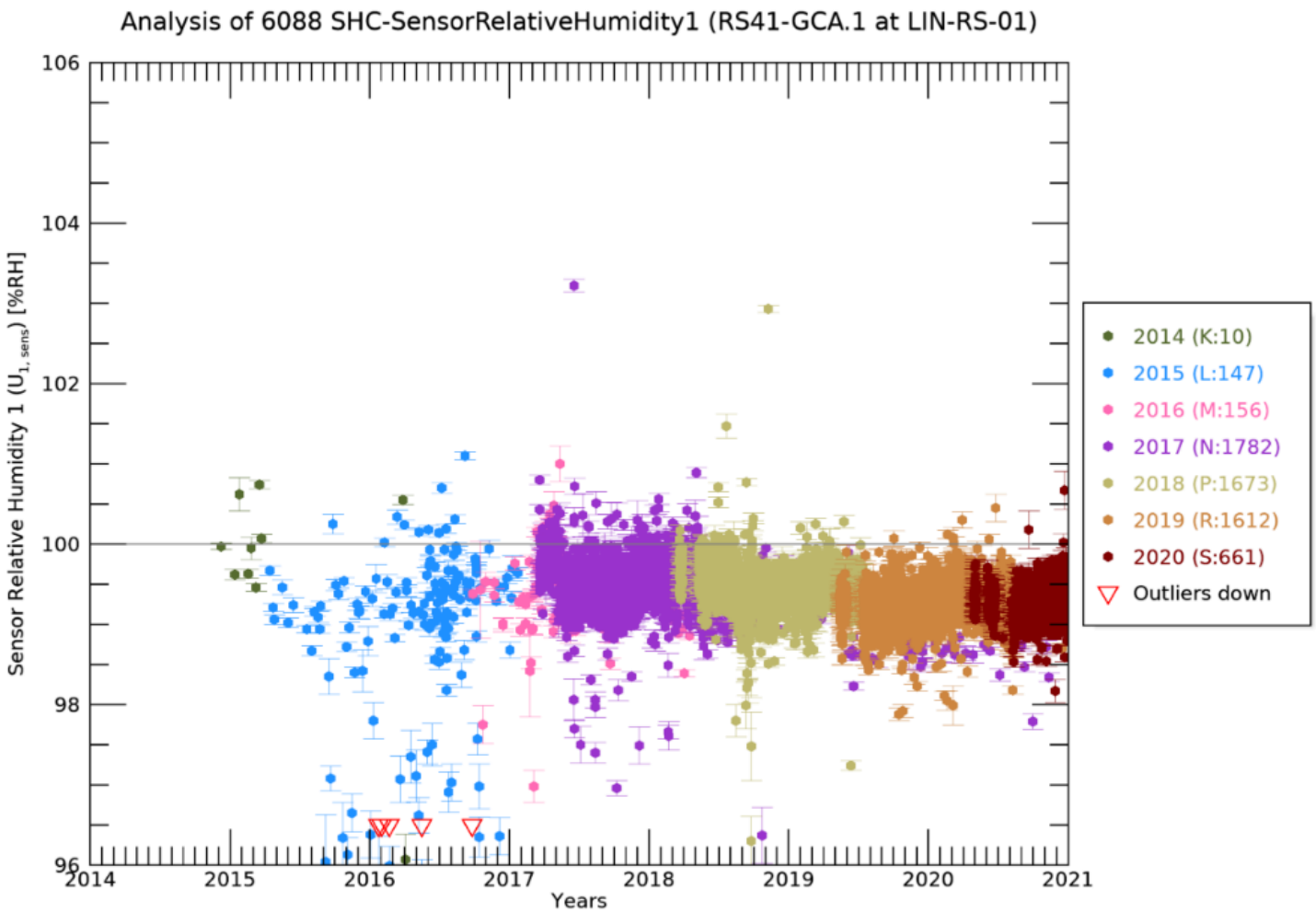




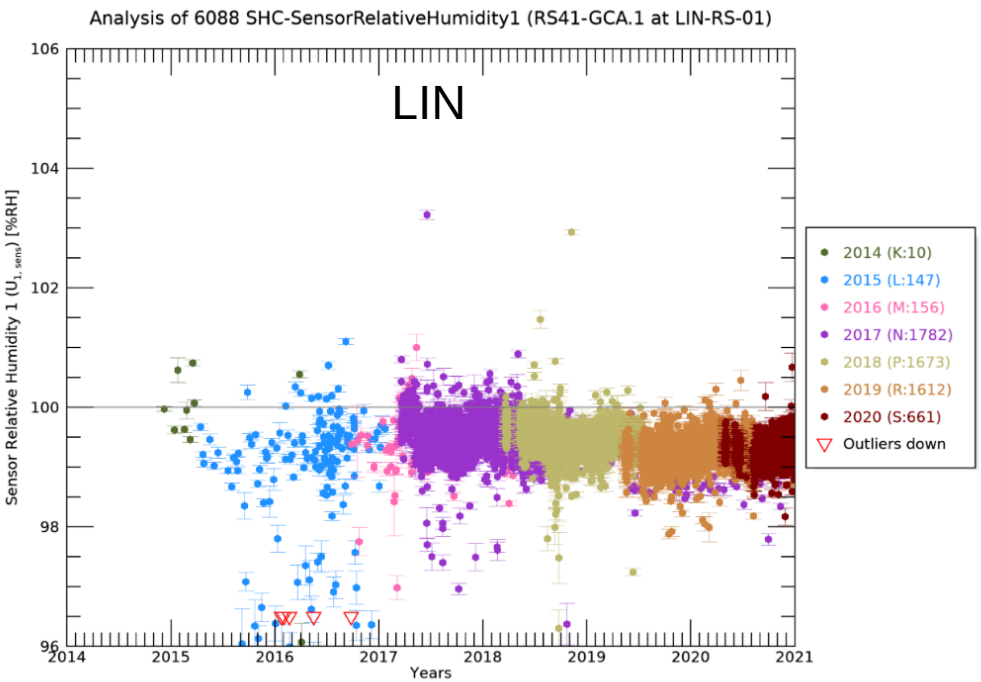
Using SHC-100% measurement as scaling factor reduces error at other RH-values

RS41 groundcheck - LIN

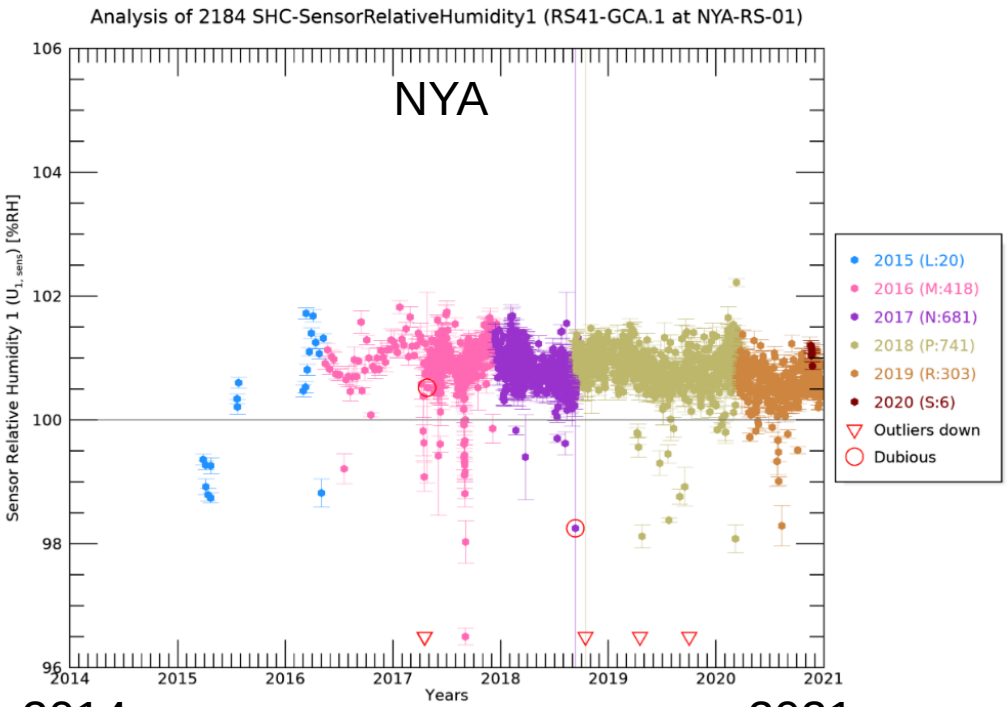
Stable RS41
humidity calibration



RS41 - Inconsistency among sites



2014 2021

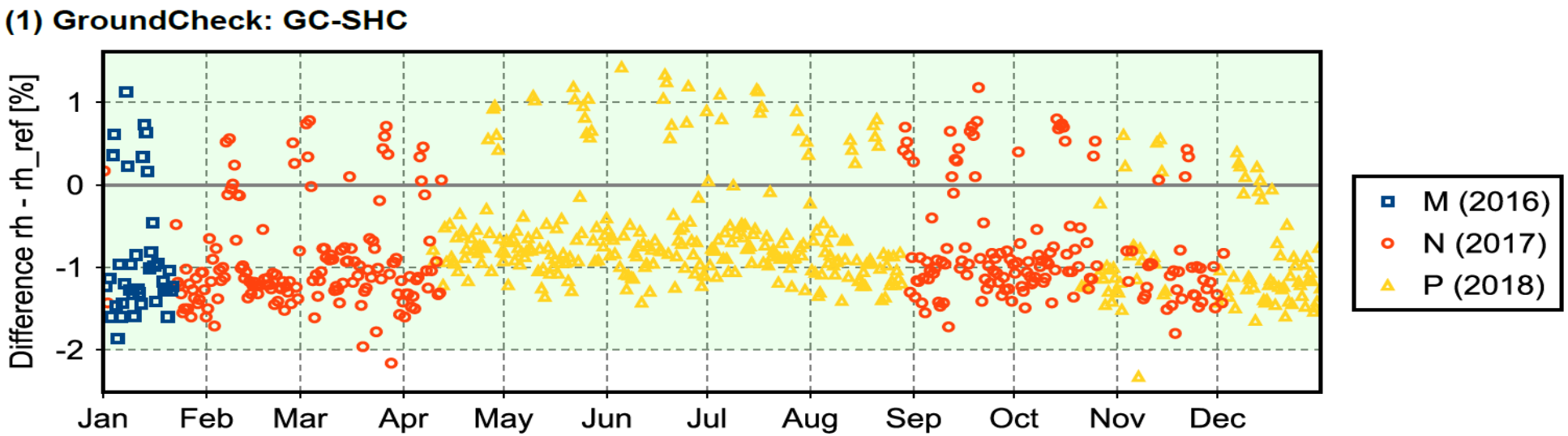


2014 2021

Offset LIN – NYA for ‘identical‘ radiosondes

@LIN ventilator rotation direction CCW
@NYA ventilator rotation direction CW

Orientation?

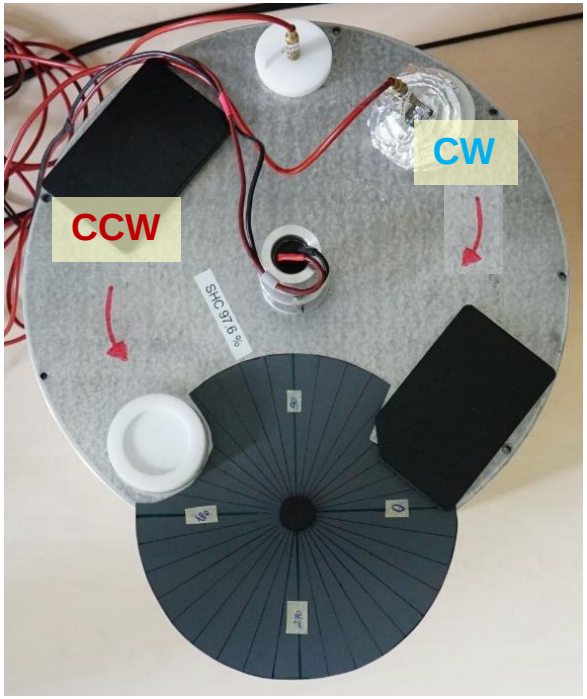


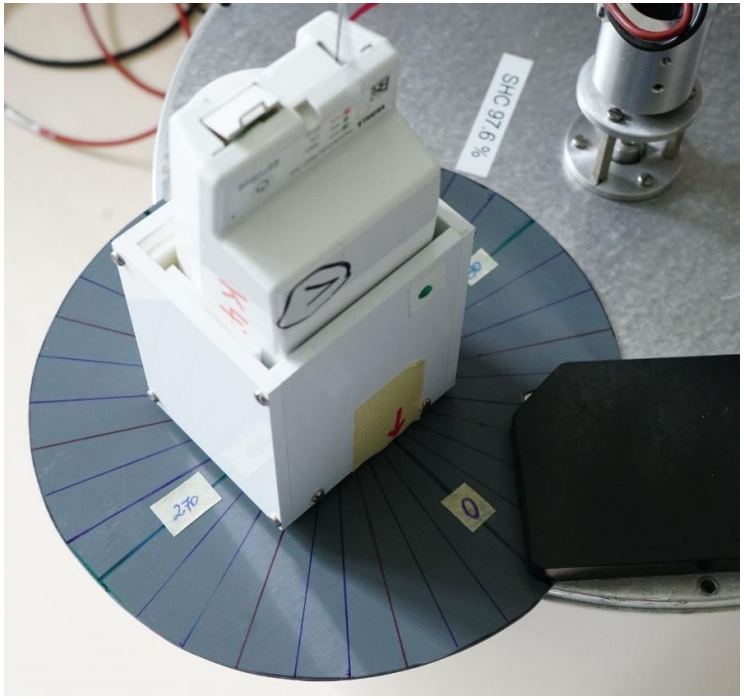
LAU: no fixed position for radiosonde during ground check

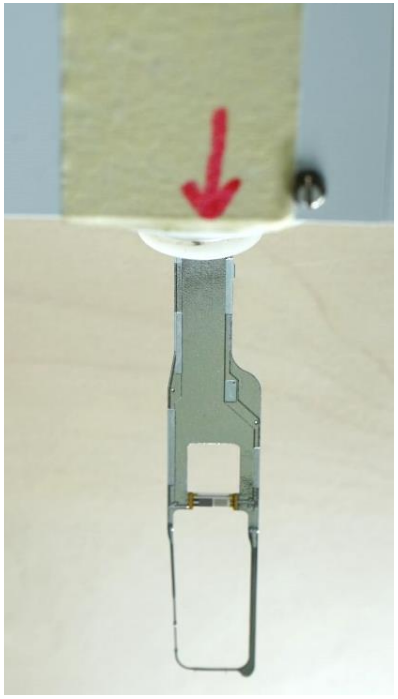
SRC-10 %

SRC-10 %

Investigation at LC



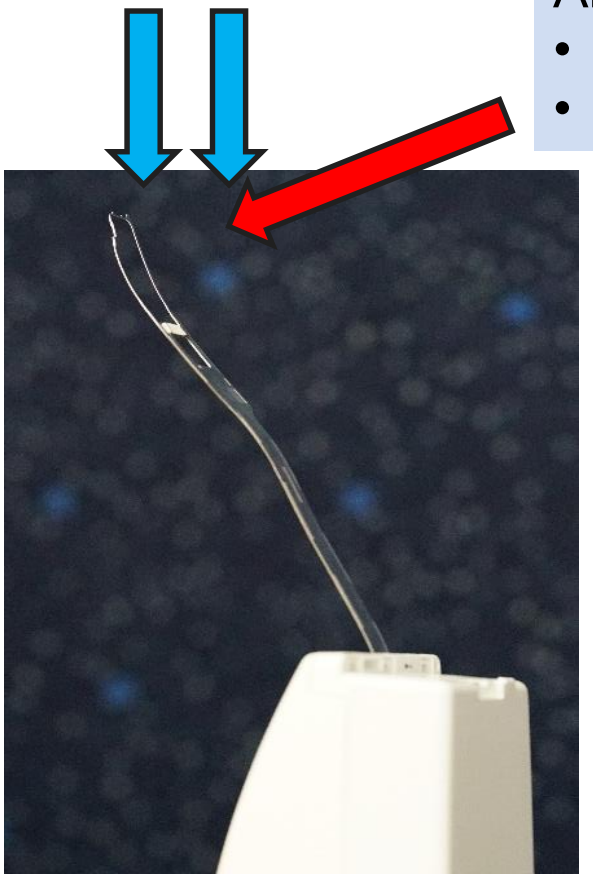




Goal:
(try to) Understand cause of effect
Define optimal orientation

Parameters
- Orientation of sensor boom
- Ventilation speed
- Ventilation direction

Air flow at sensor during ascent



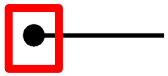
Air flow in SHC
- Position 0°
- flow direction CCW

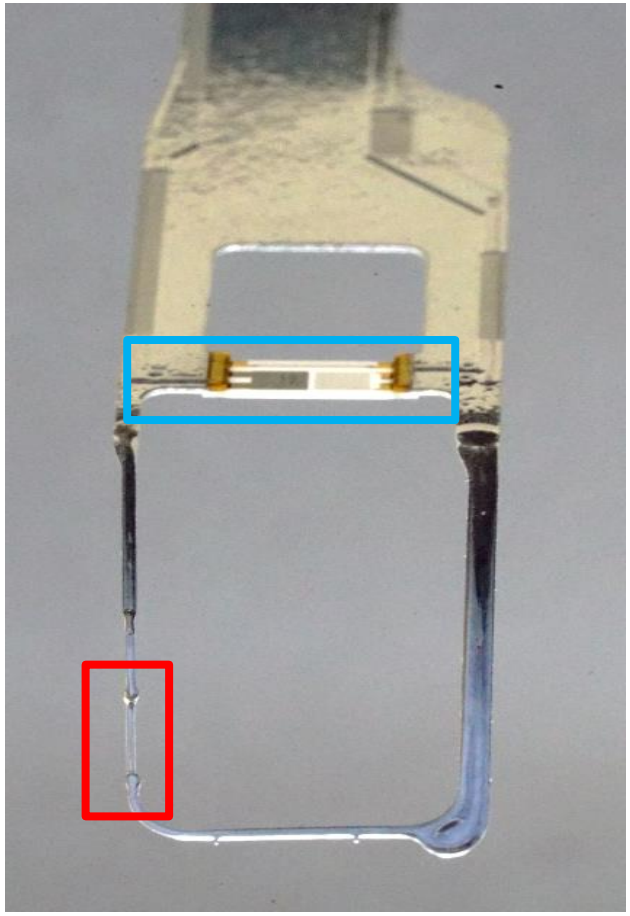
Some definitions

Orientation of RS41 sensor boom in SHC

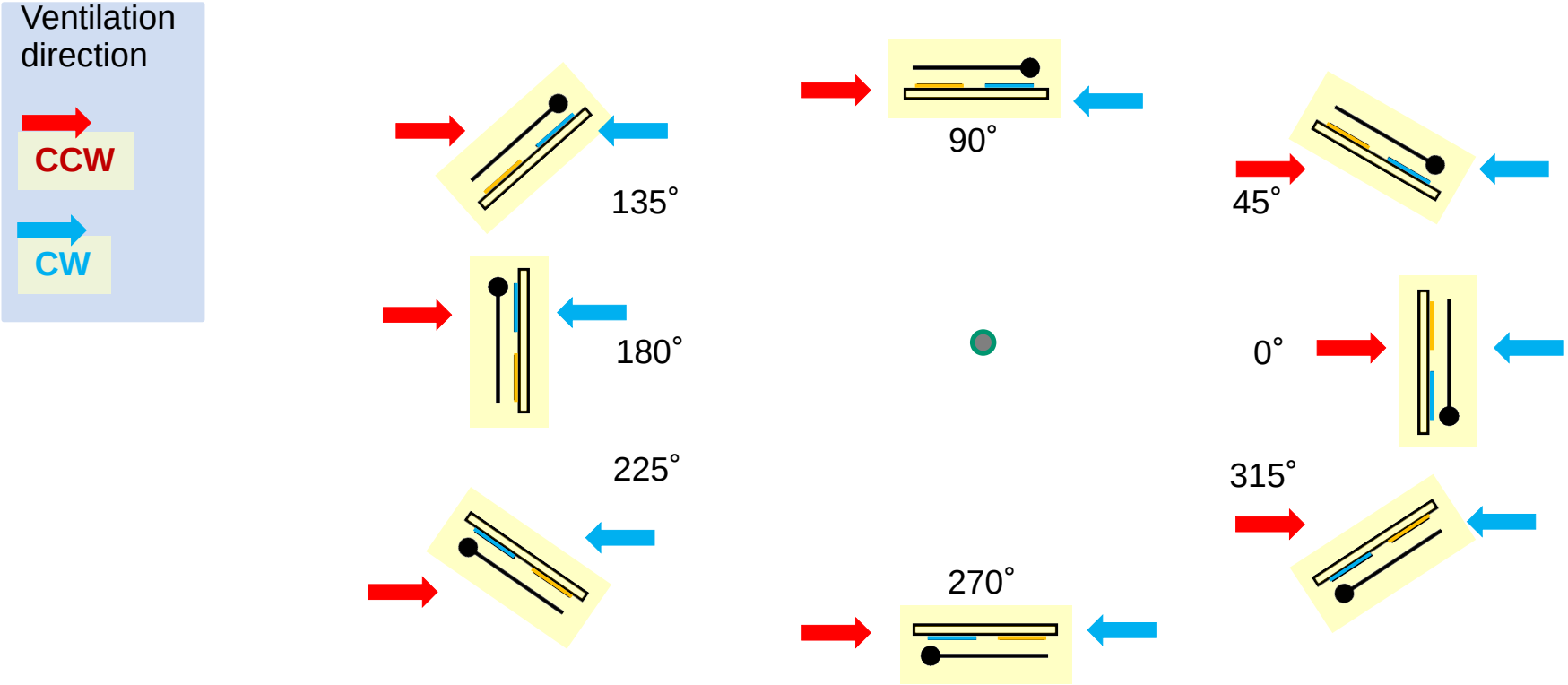
symbol for humidity sensor unit:

symbol for air temperatur sensor:

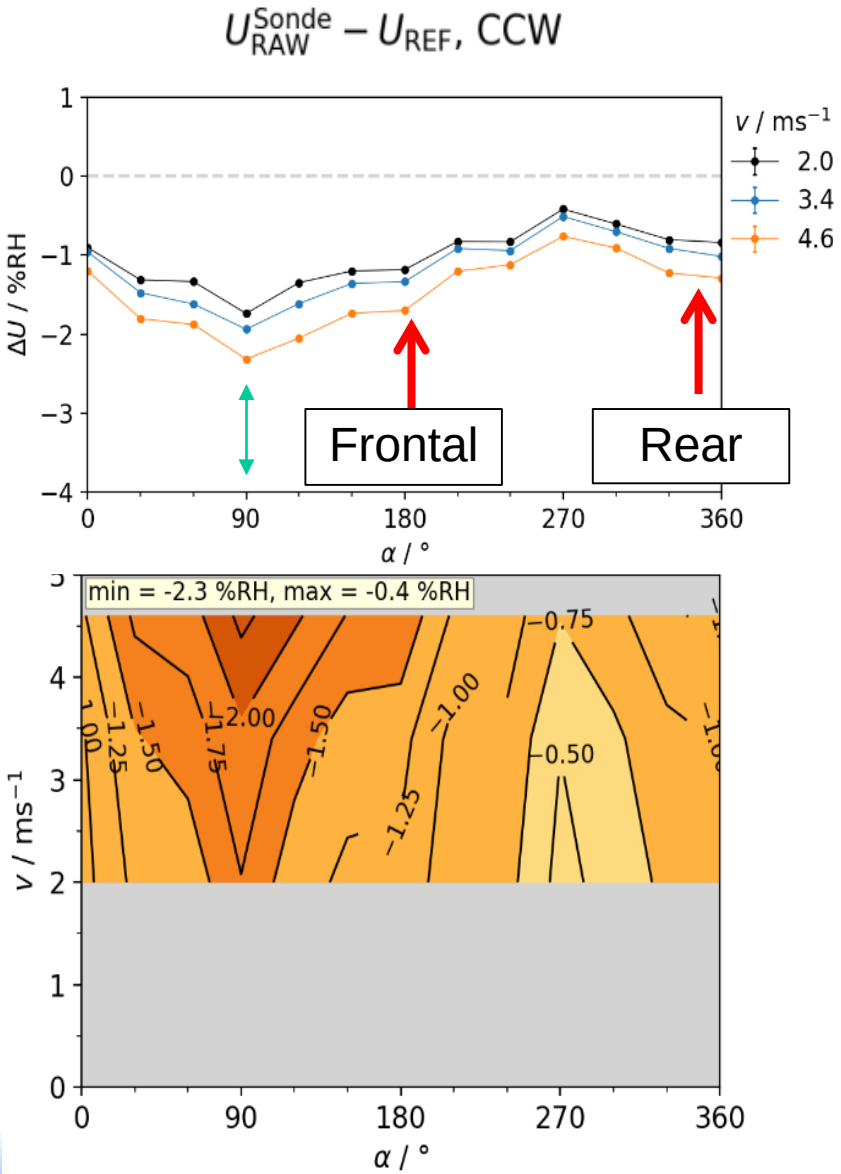


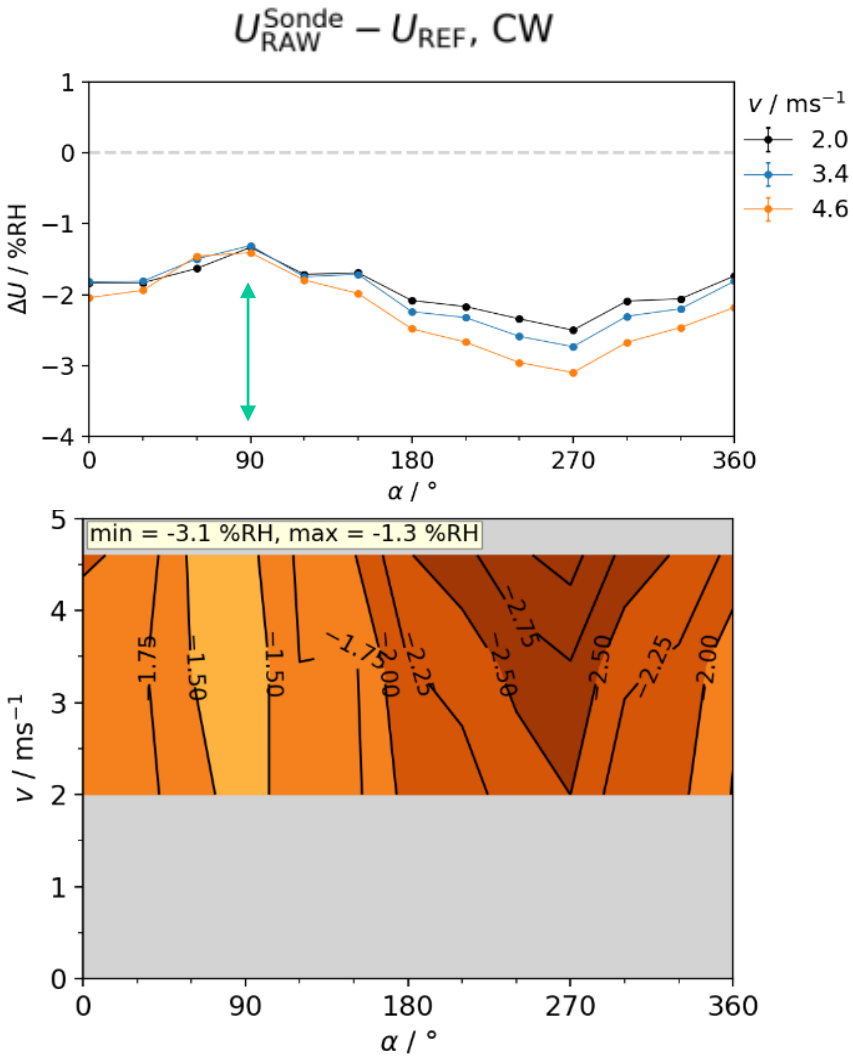


Test configurations



Results - 1


$U_{RAW}^{Sonde} - U_{REF}$, CCW
v / ms^{-1}
2.0
3.4
4.6
ΔU / %RH
α / °
Frontal
Rear
min = -2.3 %RH, max = -0.4 %RH
v / ms^{-1}


$U_{RAW}^{Sonde} - U_{REF}$, CW
v / ms^{-1}
2.0
3.4
4.6
ΔU / %RH
α / °
min = -3.1 %RH, max = -1.3 %RH
v / ms^{-1}

Results – 2

- Largest deviations for orientation parallel to wall (90° /270°)
  - Consistent with differenes in SHC groundchecks at sites
- Optimal position: frontal or rear side (0° /180°), similar to in flight condition
- Adjustment of current procedure for RS41
- Schulz & partner continue manufacturing of SHC

Further steps

- Write paper
- Write TN