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MeteoSwiss Radiosonde: current activities and future plans

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“Nothing changes like changes,
because nothing changes but
the changes. “

Gary Busey







Radiosounding in Payerne

- Started in 1941
- Continuous operation
 - 365 days radiosoundings at 00Z and 12Z
 - wind soundings at 06Z and 18Z until 2010
- SRS (Swiss RadioSound) in operation for more than 40 years at MeteoSwiss (different versions)
- GUAN, GRUAN, WMO-CIMO-Testbed



Recent changes at MeteoSwiss Payerne

- During the last two years, due to federal cost cut programs and task prioritisation:
 - reduction of 2 personal units in the operational team
 - reduction of 1 personal unit in the scientific team
 - Simultaneous increase of the other tasks
 - Number of stations of surface network 118 -> 270
 - Responsibility transfer of Aviation Meteorology network
 - Operation of 30 new ceilometers and 30 new present weather detectors
- with limited additional resources



Automatisation and reorganisation

- **2016 February:** MeteoSwiss' direction board decided to launch a automatization and reorganization project to face the problem

Requirements:

- keep the quality of the data
 - keep the innovation potential
 - keep the international commitments
- **2016 October:** MeteoSwiss' direction board decision
 - automatic soundings during night-time and week-ends
 - manual soundings during working hours (ozone, special flights)
 - **2017:** Tender procedure -> Vaisala RS41 / Autosonde AS15
 - **2018 April:** commissioning and operation of the new system





Revised plans

What does and what does not change

Previous targets

1. Weekly comparison flights (SRS C50 vs RS92/RS41 + Cobalt/SW once a month)
2. Support for remote sensing calibration
3. GRUAN certification of SRS C50
4. Special research flights (glider, radiation profiling, etc..)

New targets

1. Weekly comparison flights (RS41 vs SRS C50 + Cobalt/SW once a month)
2. Support for remote sensing calibration
3. Collaboration with ETHZ for the test of a new PCFH reference sonde for GRUAN
4. Validation of automatic soundings for GRUAN



Target 1: Weekly comparison flights

We are convinced of the value of comparing the measurements by radiosondes using different technologies

- Previous field measurements
 - More than 160 radiosoundings, SRS with RS41 since June 2014
 - More than 460 radiosoundings, SRS with RS92 since January 2005
 - More than 120 multiple flights, SRS with both RS41 and RS92, most of them performed at 00 and 12 UTC official times



GRUAN intercomparison flights in 2017

20 daytime flights

- SRS-C50 // SRS-C34 // RS92 // RS41

20 nighttime flights

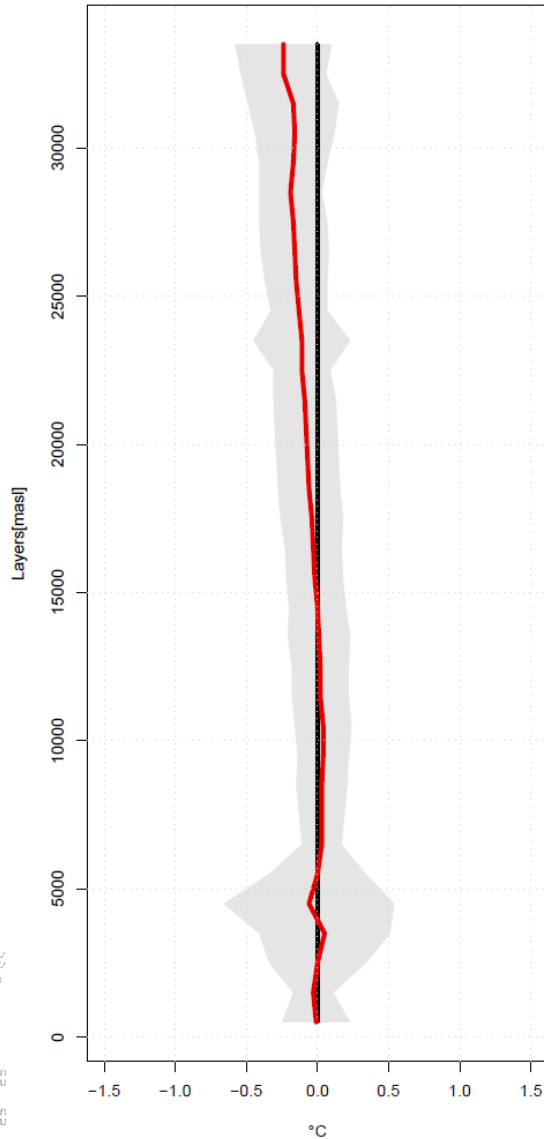
- SRS-C50 // SRS-C34 // RS92 // RS41
- + SnowWhite + COBALD 1x/month

results are in good agreement with previous years results

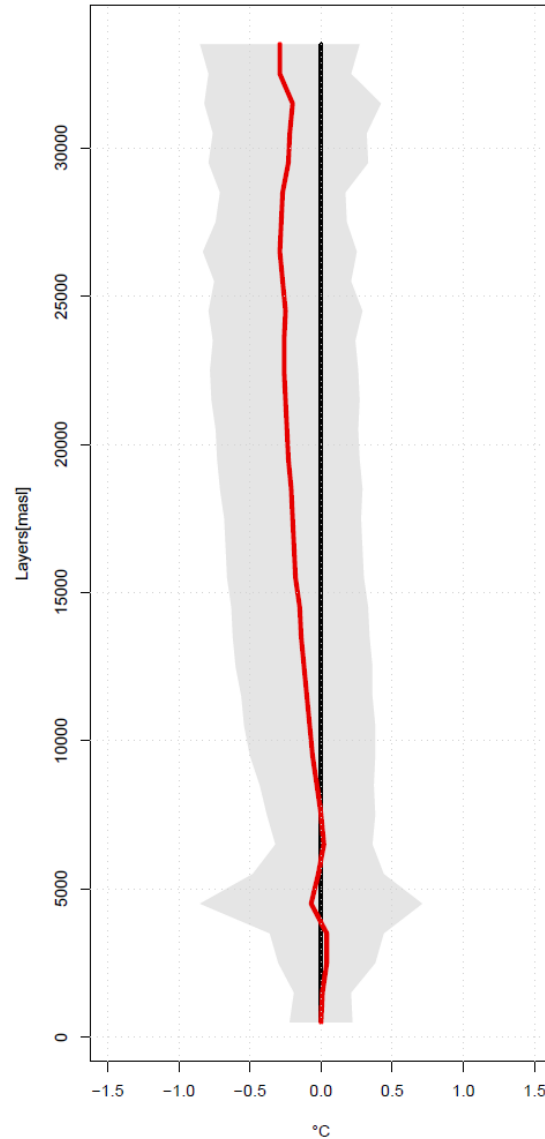


2017 nighttime temperature comparison

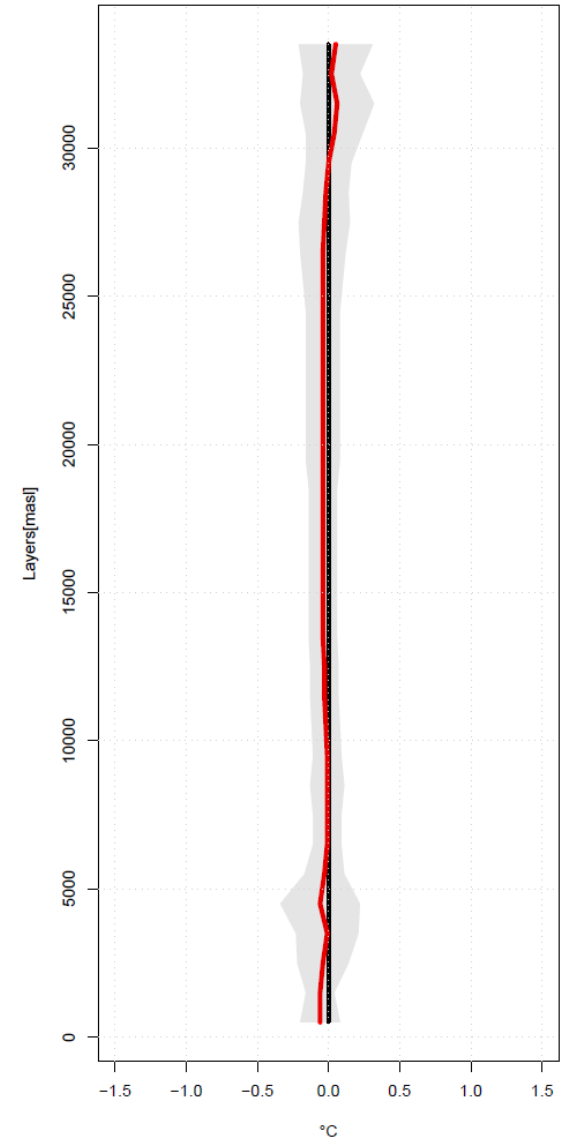
Temperature Night
C50 vs RS92



Temperature Night
C34 vs RS92



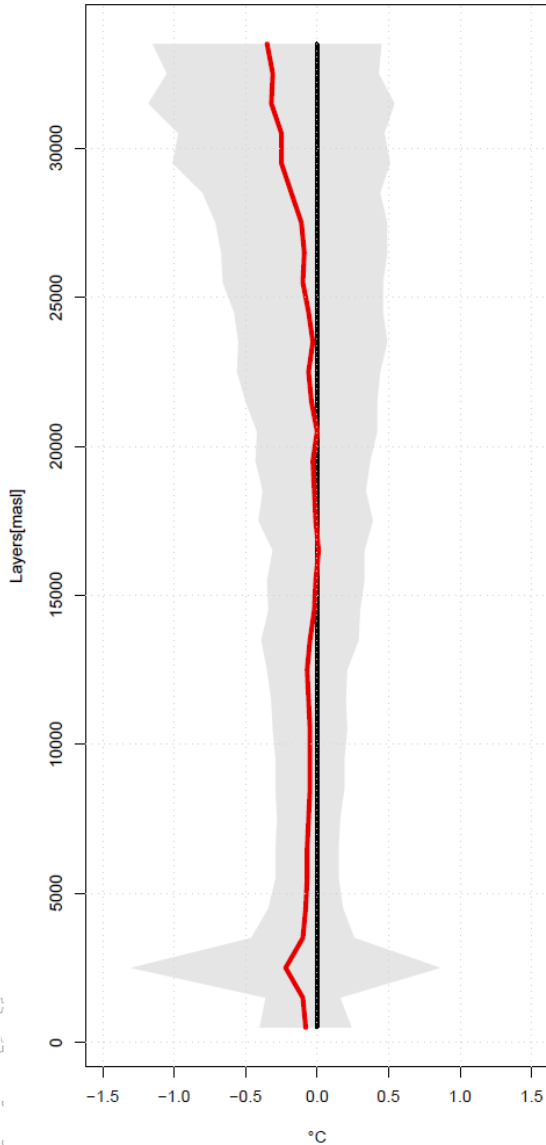
Temperature Night
RS41 vs RS92



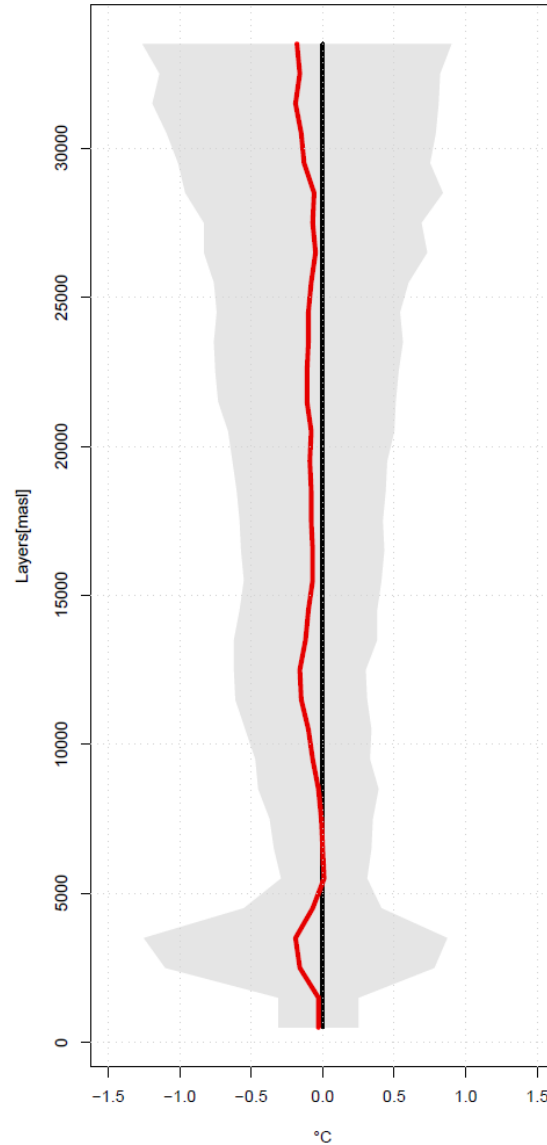


2017 daytime temperature comparison

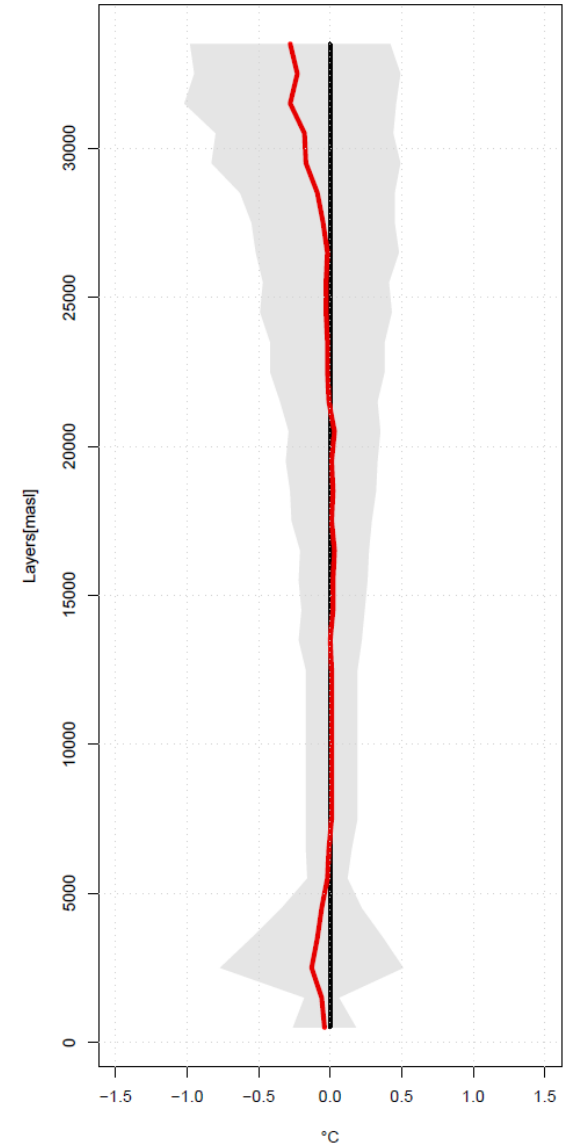
Temperature Day
C50 vs RS92



Temperature Day
C34 vs RS92



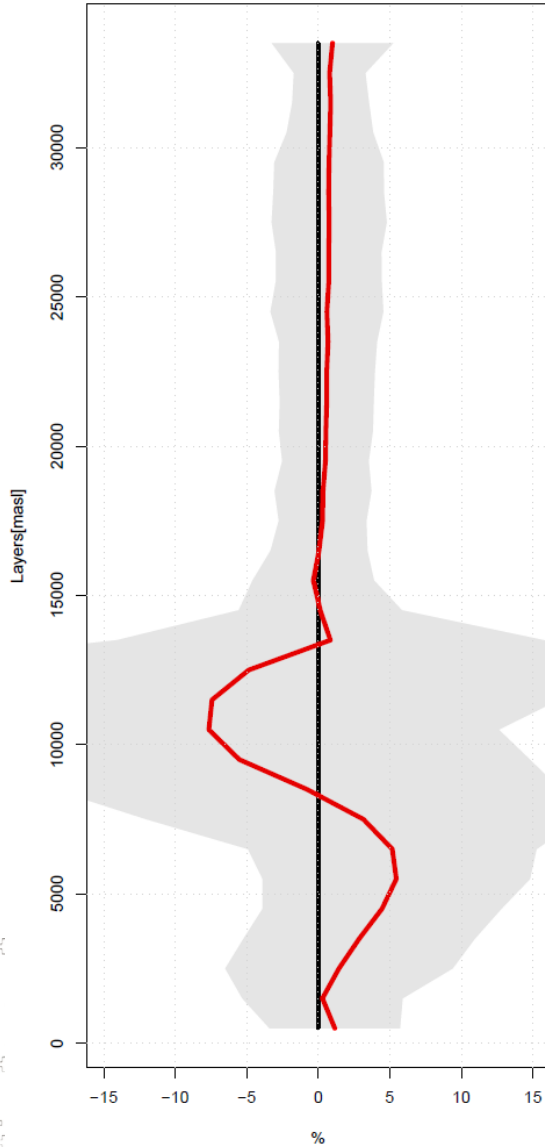
Temperature Day
RS41 vs RS92



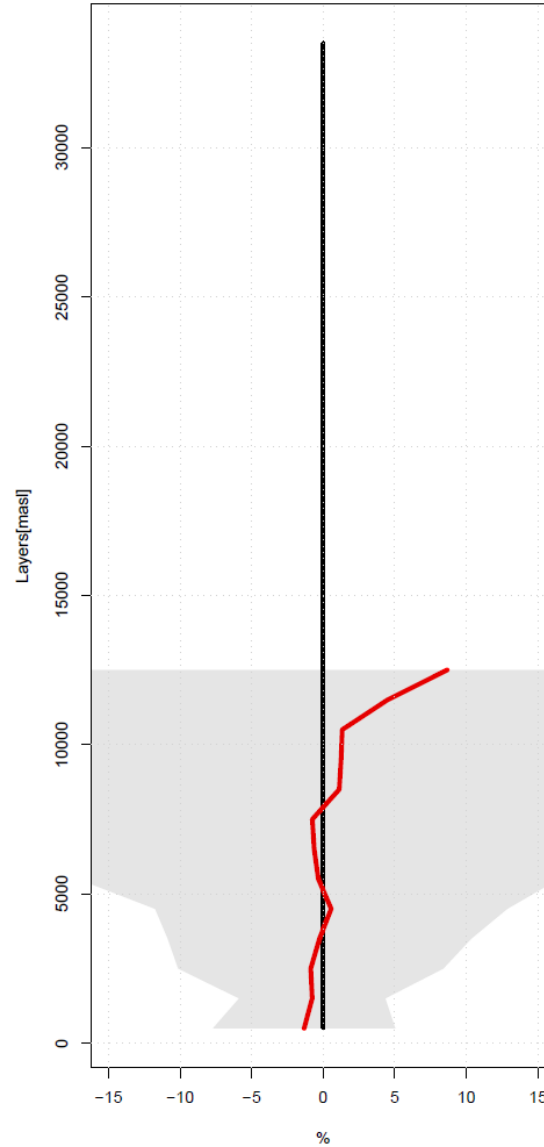


2017 humidity comparison

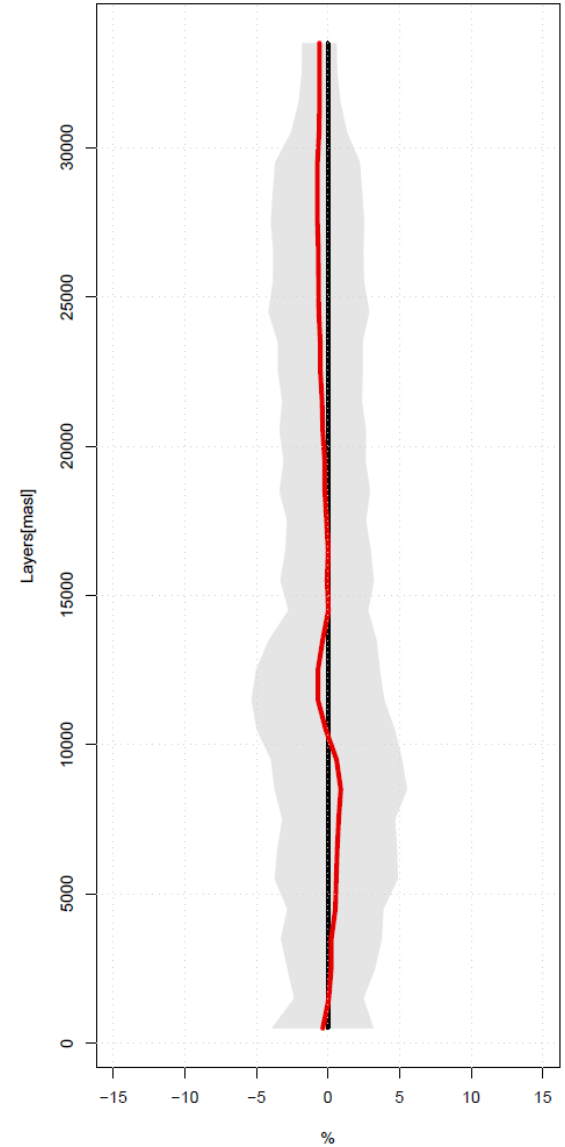
Humidity All
C50 vs RS92



Humidity All
C34 vs RS92



Humidity All
RS41 vs RS92





Target 1: Weekly comparison flights

We are still convinced of the value of comparing the measurements by radiosondes using different technologies

- Future comparison flights
 - weekly RS41 vs SRS C50, alternatively day and night
 - once a month RS41, SRS C50, SRS C34, RS92, Cobalt and SnowWhite

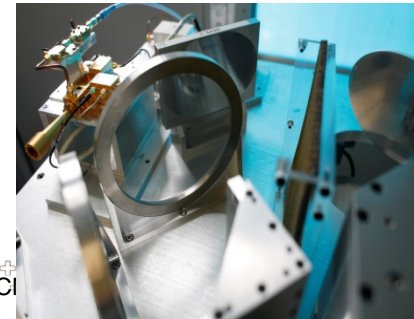
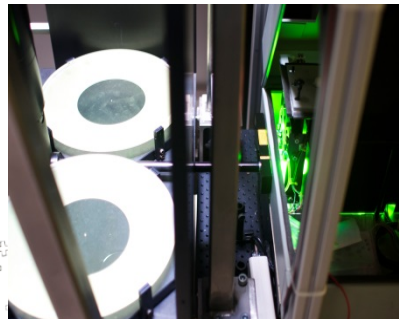


Target 2: Support for remote sensing calibration

An intense R&D activity on remote sensing instruments is ongoing in Payerne

- operational *water vapor, temperature, and aerosol* profiling with **Raman lidar**
- operational *wind, temperature and ozone* measurements with **radar wind profiler** and **microwave radiometers**
- *aerosol* profiling with **ceilometers**
- *wind* profiling with **wind lidar**

operational and special research radiosoundings are planned to provide in-situ comparison to these measurements

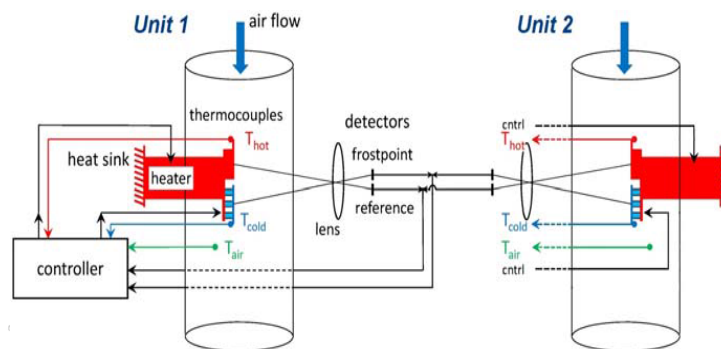




Target 3: Collaboration with ETHZ for the test of a new PCFH

We want to support our colleagues from ETH Zurich in the GAW-CH project from ETH Zurich «*Development, Validation and Implementation of a GRUAN-Worthy Plug-and-Play Balloon-Borne Hygrometer*», (2018-2021)

- Test flights (Lindenberg and Payerne)
- Validation
- ➔ GRUAN certification of PCFH



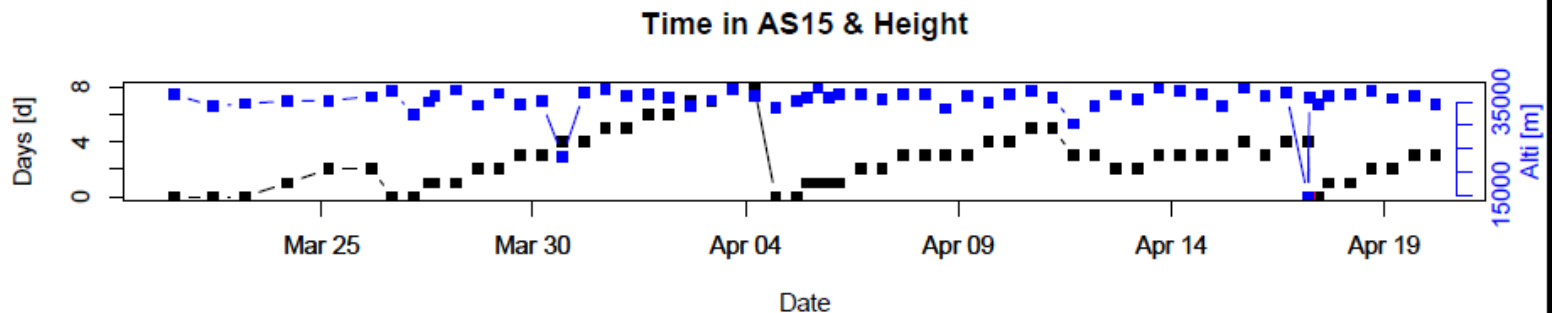
A schematic sketch of PCFH. In the depicted case, the two units are chosen to be identical. Alternatively, the instrument can be equipped with different units (for instance with differently long inlet tubes for experimental purposes, different Peltier elements or different controller schemes).



Target 4: Validation of automatic soundings for GRUAN

Investigate if and under what conditions high quality requirements of GRUAN are reachable with a fully automated launch of radiosondes.

- Reproducibility studies between manual and automatic launches
- Performance analysis in reaching consistently high altitudes



- Stability in time of pre-flight quality assessments (100% check) when the radiosondes are stored in an autosonde container for several days.



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