MeteoSwiss Radiosonde: current activities and future plans

Christian Félix, Gonzague Romanens
“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 or station 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
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.