GRUAN site: Sodankylä, Finland

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Sodankylä site is operated by the Finnish Meteorological Institute Arctic Research Centre (FMI-ARC). Location of the site is 67.4 °N, 26.6 °E, 179 m above mean sea level; WMO station’s number is 02836
Outline

• Status of the observations
• RR01 vs. CFH test flights
• Progress with Autosonde assessment
• Plans and perspectives
Sonde observations at Sodankylä

- Twice daily 00/12 UT: **RS92 radiosondes** launched on regular basis, software v. 3.64.1 in operational and research soundings. Operational soundings are made using the Vaisala autosonde system. Near simultaneous manual and autosonde soundings have been performed.

- **ECC ozonesondes** are launched on regular basis once per week and additional ozonesondes have been included in other soundings, for example CFH soundings. Ozone soundings have been submitted to GRUAN database using the GRUAN RS Launch client software.
Sonde observations at Sodankylä

**UTLS water vapor:**
- Cryogenic Frostpoint Hygrometer, CFH
- Fluorescent Advanced Stratospheric Hygrometer (FLASH), including experimental versions of the instrument
- Tests of the new Vaisala climate research sonde RR01, which is currently in the development phase. This activity has been ongoing in 2011 and 2012.

**Aerosol sondes**
- Cloud and aerosol detection by COBALD sondes.
Water vapor soundings: CFH and RR01

Extremely sensitive DRYCAP® humidity sensor

- Advanced capacitive sensor based on Vaisala DRYCAP® technology, originally developed for measuring ultra-dry gases in industrial applications.
- Measures water vapour pressure (Pw), which is then converted to frostpoint temperature.
- Highly sensitive sensor enables humidity measurements in upper troposphere and lower stratosphere: measuring range from -30 to -90 °C frostpoint temperature.
- Sensor is operated at elevated temperature resulting in faster response time.
- On-flight autocalibration procedure removes drift.

From Turtiainen et al., 2012
Water vapor soundings: CFH and RR01 in 2010 and early 2011
Water vapor soundings: CFH and RR01, recent situation

Sodankylä: 13 Jan 2012

Altitude (km)

Frost point, Temperature (deg C)

CFH

RR01
Autosonde vs. Manual soundings

Radiosonde Task 6 (RS92 auto-launcher influence): Kivi, Karppinen (Sodankylä), Madonna (Potenza), Kizu (Tateno), Masatomo Fujiwara, Hannu Jauhiainen, Michael Sommer
Autosonde vs. Manual soundings

Temperature correction at groundcheck

Over 4000 autosonde GC, and over 1000 manual sonde GC
Autosonde vs. Manual soundings

Time between the groundcheck and the launch
Autosonde vs. Manual soundings

Humidity difference
Autosonde vs. Manual soundings

![Graph showing mean humidity difference between autosonde and manual soundings](image-url)
Autosonde vs. Manual soundings

Temperature profile comparison

Pressure level (hPa)

Mean temperature difference, atso-manu (K)

10^1

10^2

10^3

-2 -1.5 -1 -0.5 0 0.5 1 1.5 2

22.3.2012

Ilmatieteen laitos
Autosonde vs. Manual soundings

Mean distance between near simultaneous sonde paths (km) vs. GPS Altitude (m)
Autosonde

Fraction of sondes reaching the pressure level
Pressure level (hPa)
Autosonde vs. manual sonde

- Parallel soundings suggest no significant biases in temperature and humidity.
- Variations of time period between ground check and launch did not influence the comparison results.
Plans and perspectives

• Autosonde assessment
• CFH/RS92 flights, LAPBIAT data
• RR01 flights in Sodankylä
• CFH/COBALD flights
• IWV comparisons: GPS, MW, FTS, sondes
• Ozonesonde data
• Submissions to the GRUAN database
IWV comparison: GPS vs RS92 in 2011

GPS

Difference to sonde (%): 3.6
Standard deviation (%) : 12.5
Number of pairs : 225
FTIR observations 2009-201
Stratospheric water vapor by MIAWARA-C

Water vapor measured by MIAWARA-C

Data processed by Brigitte Tschanz and Corinne Straub, Institute of Applied Physics, University of Bern