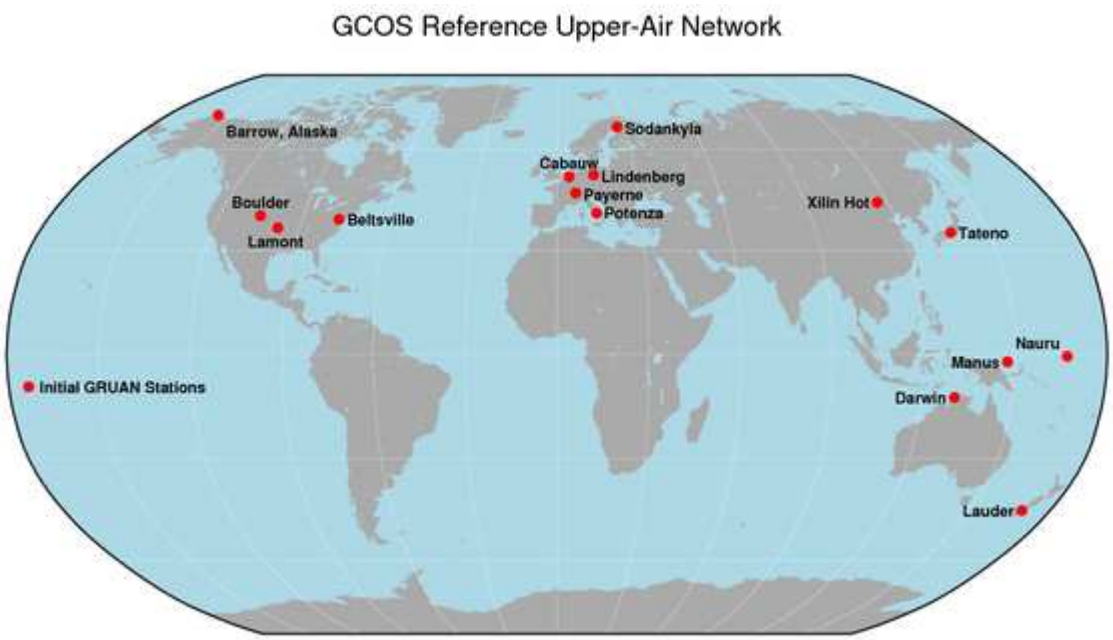
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

GRUAN site: Sodankylä, Finland

Rigel Kivi
Finnish Meteorological Institute
Arctic Research Centre

Location

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

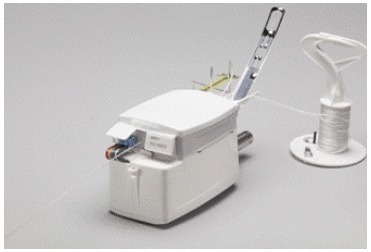
UTLS water vapor :

- 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

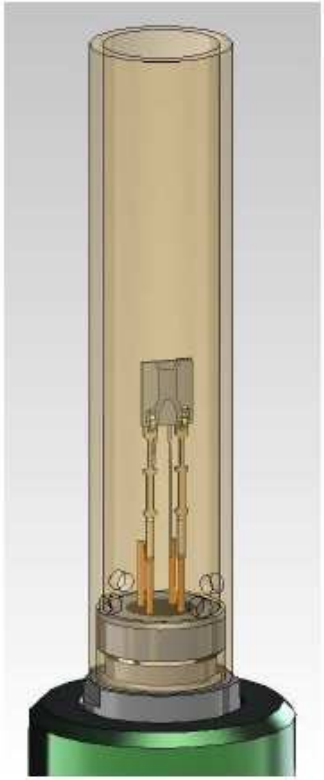
- Cloud and aerosol detection by COBALD sondes.

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 troposhere and lower stratosphere: measuring range from -30 to -90 ℃ frostpoint temperature.
- Sensor is operated at elevated temperature resulting in faster response time.
- On-flight autocalibration procedure removes drift.



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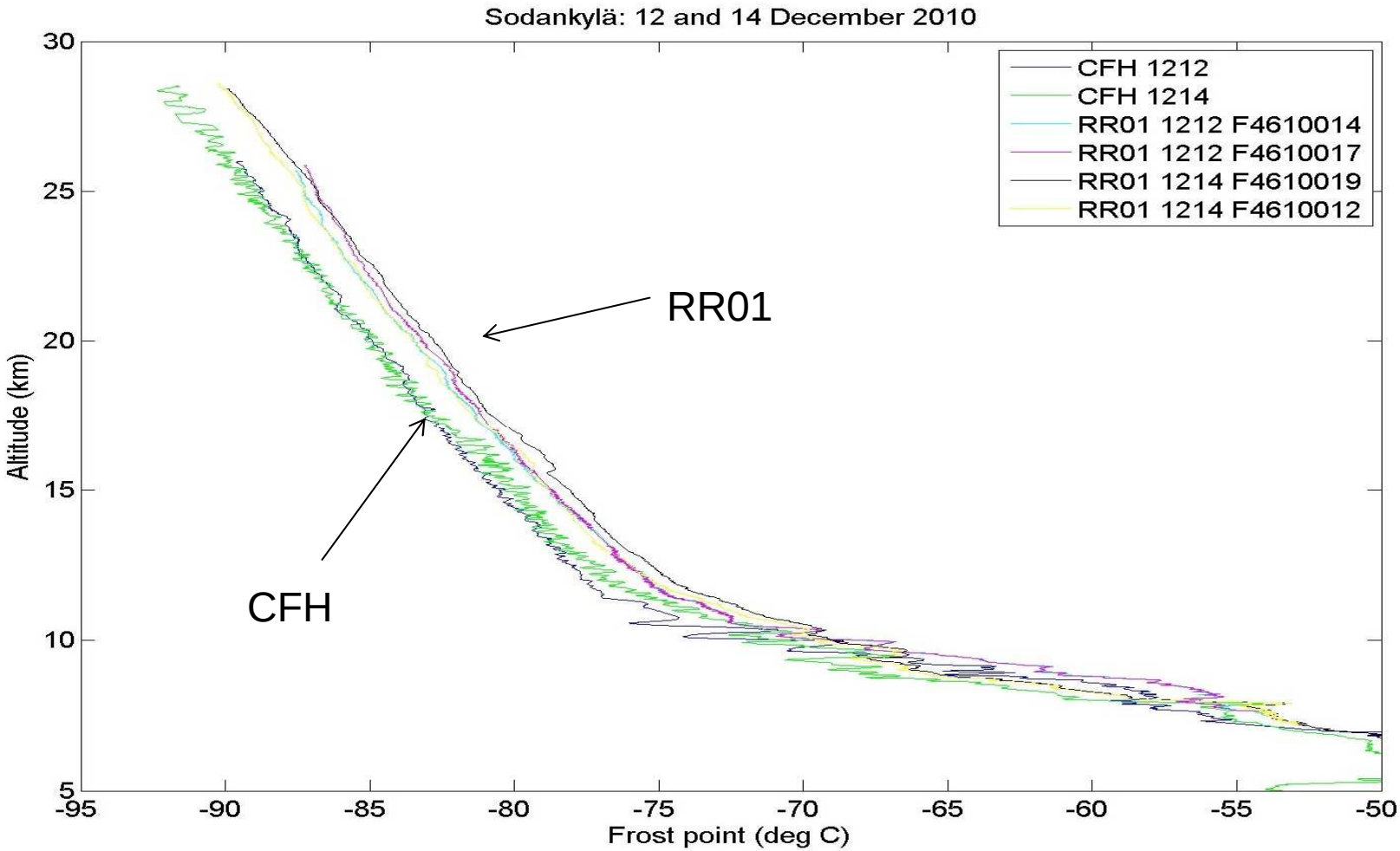
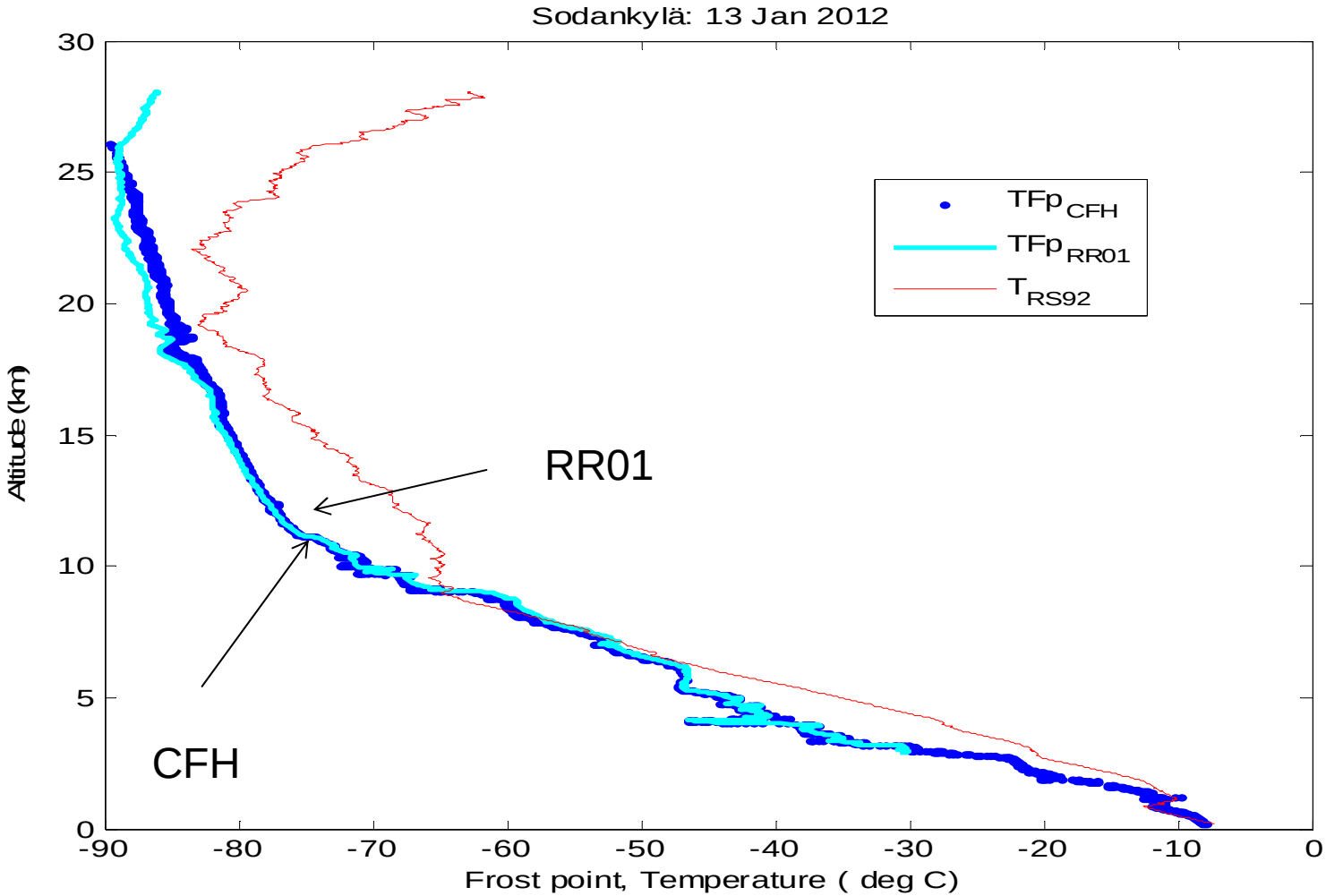
From Turtiainen et al., 2012

Water vapor soundings: CFH and RR01 in 2010 and early 2011



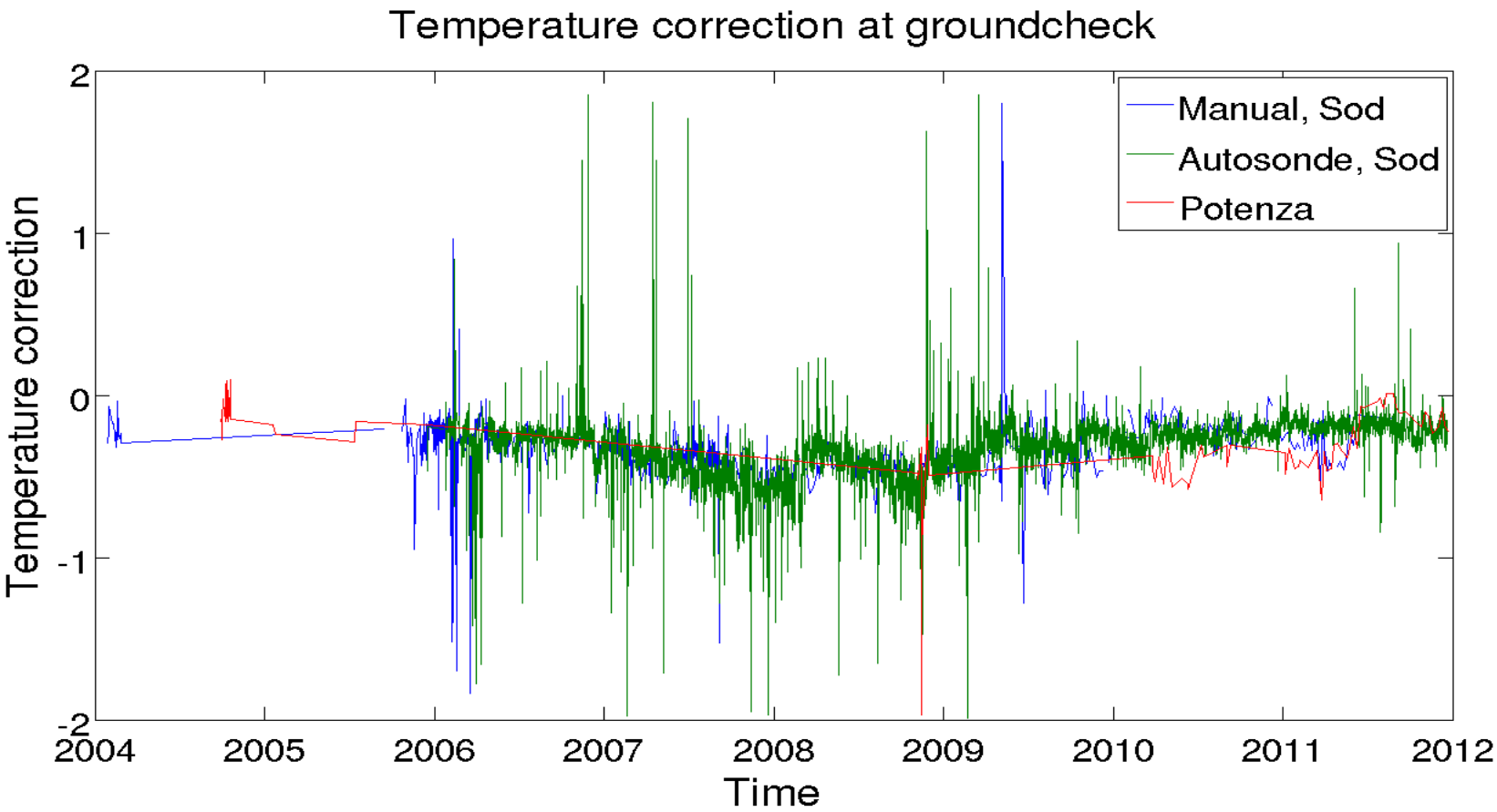
Water vapor soundings: CFH and RR01, recent situation



Autosonde vs. Manual soundings

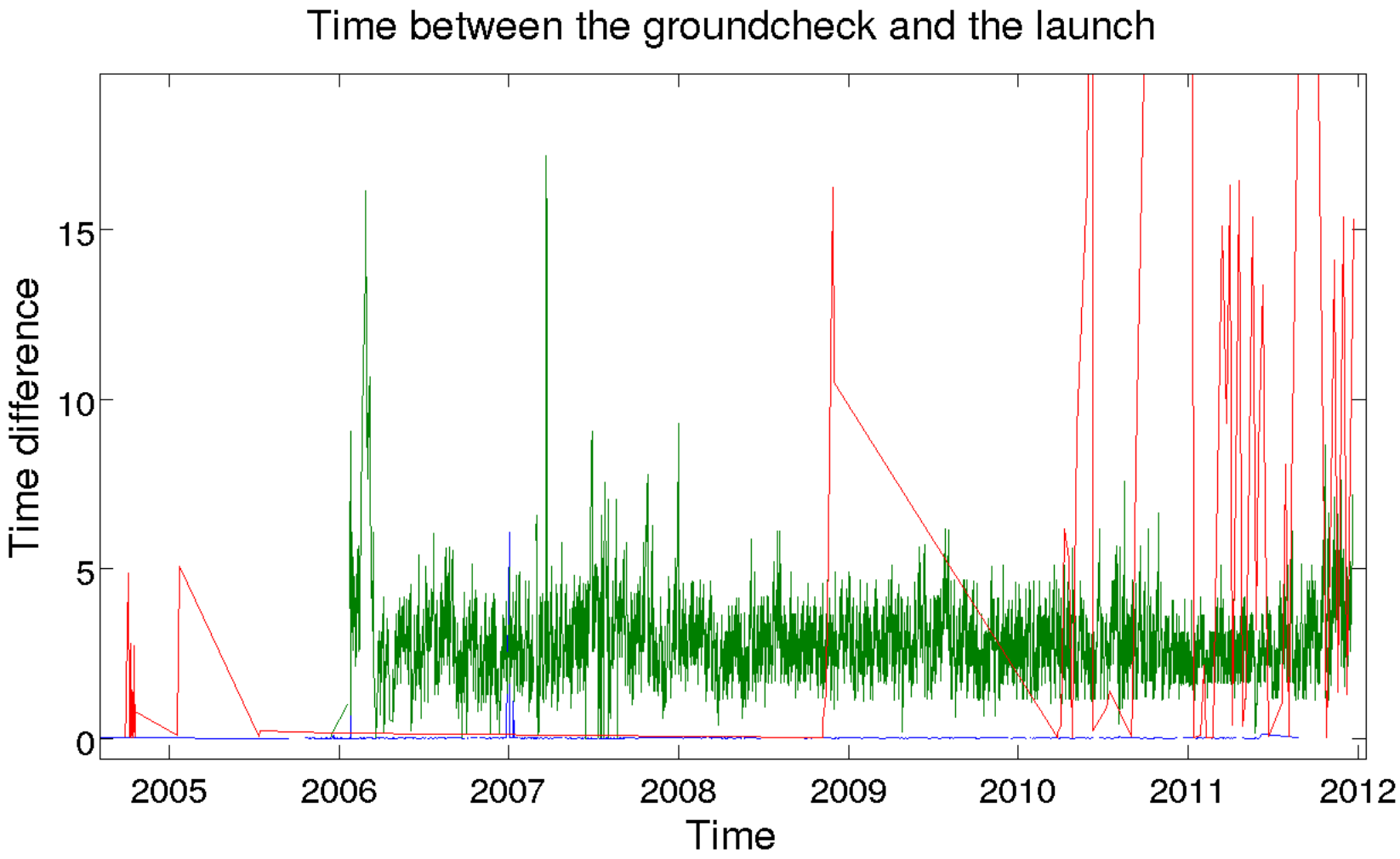
Radiosonde Task 6 (RS92 auto-launcher influence): Kivi, Karppinen (Sodankylä), Madonna (Potenza), Kizu (Tateno), Masatomo Fujiwara, Hannu Jauhiainen, Michael Sommer

Autosonde vs. Manual soundings



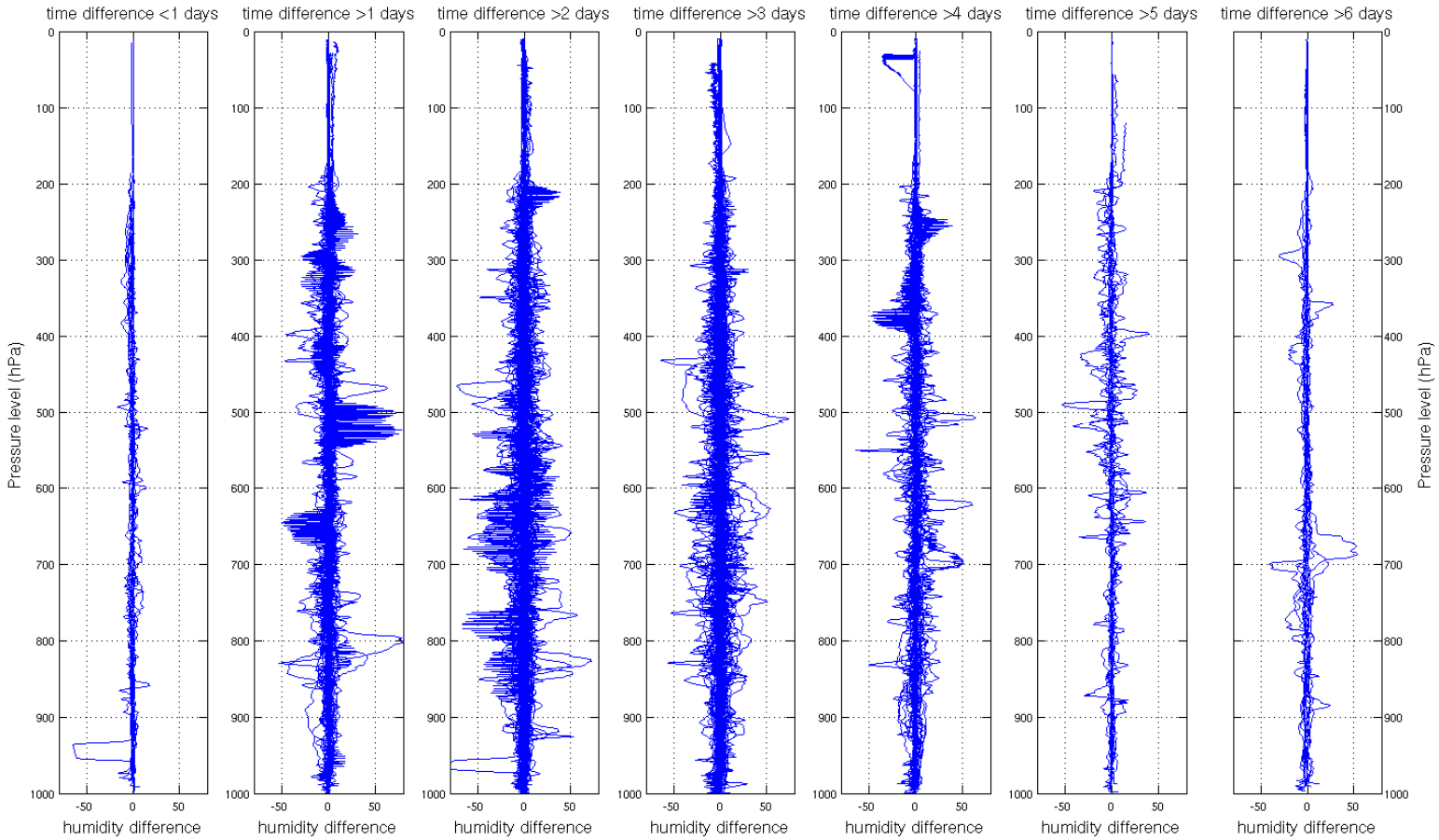
Over 4000 autosonde GC, and over 1000 manual sonde GC

Autosonde vs. Manual soundings



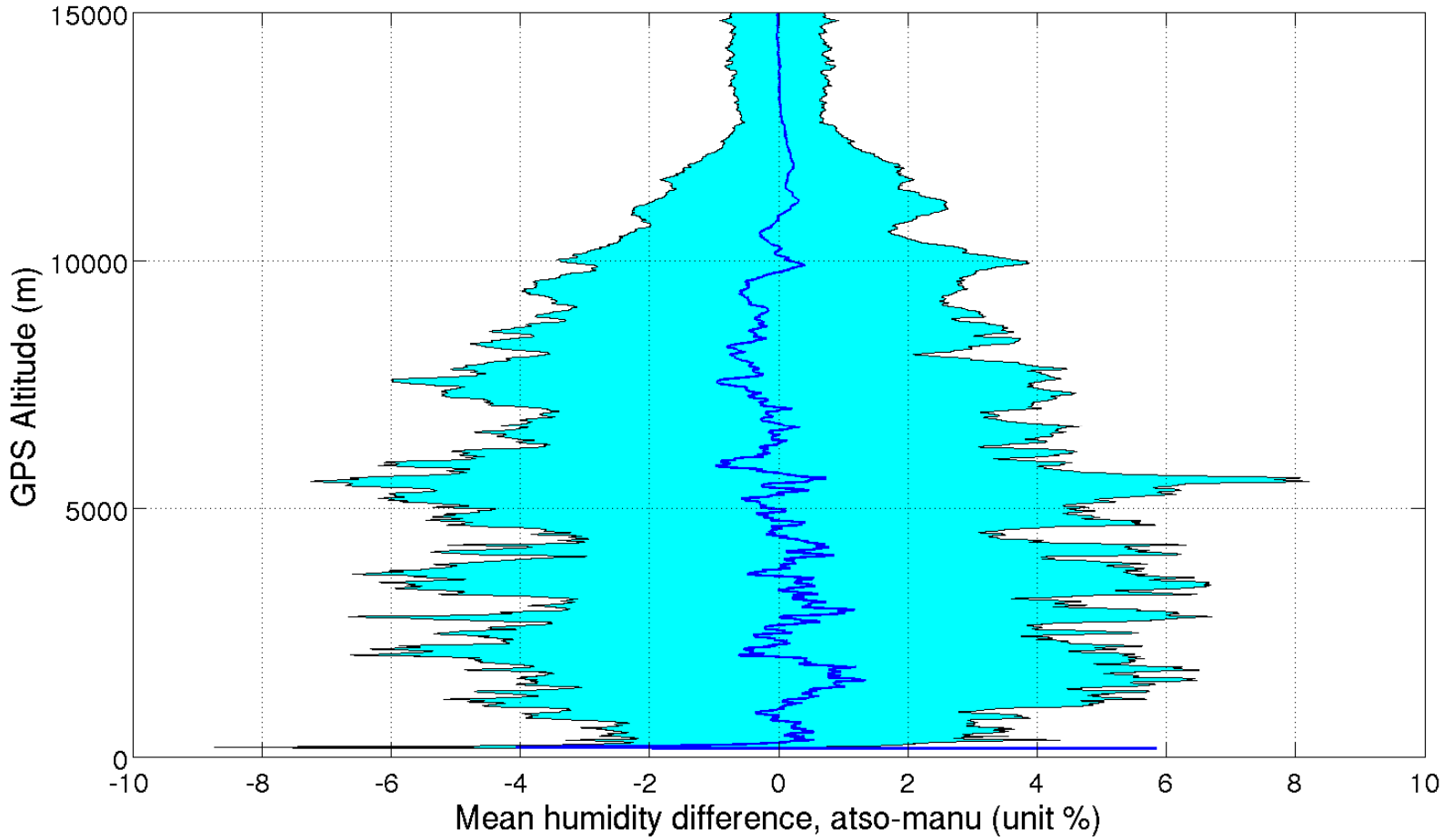
Autosonde vs. Manual soundings

<1d >1d >2d >3d >4d >5d >6d

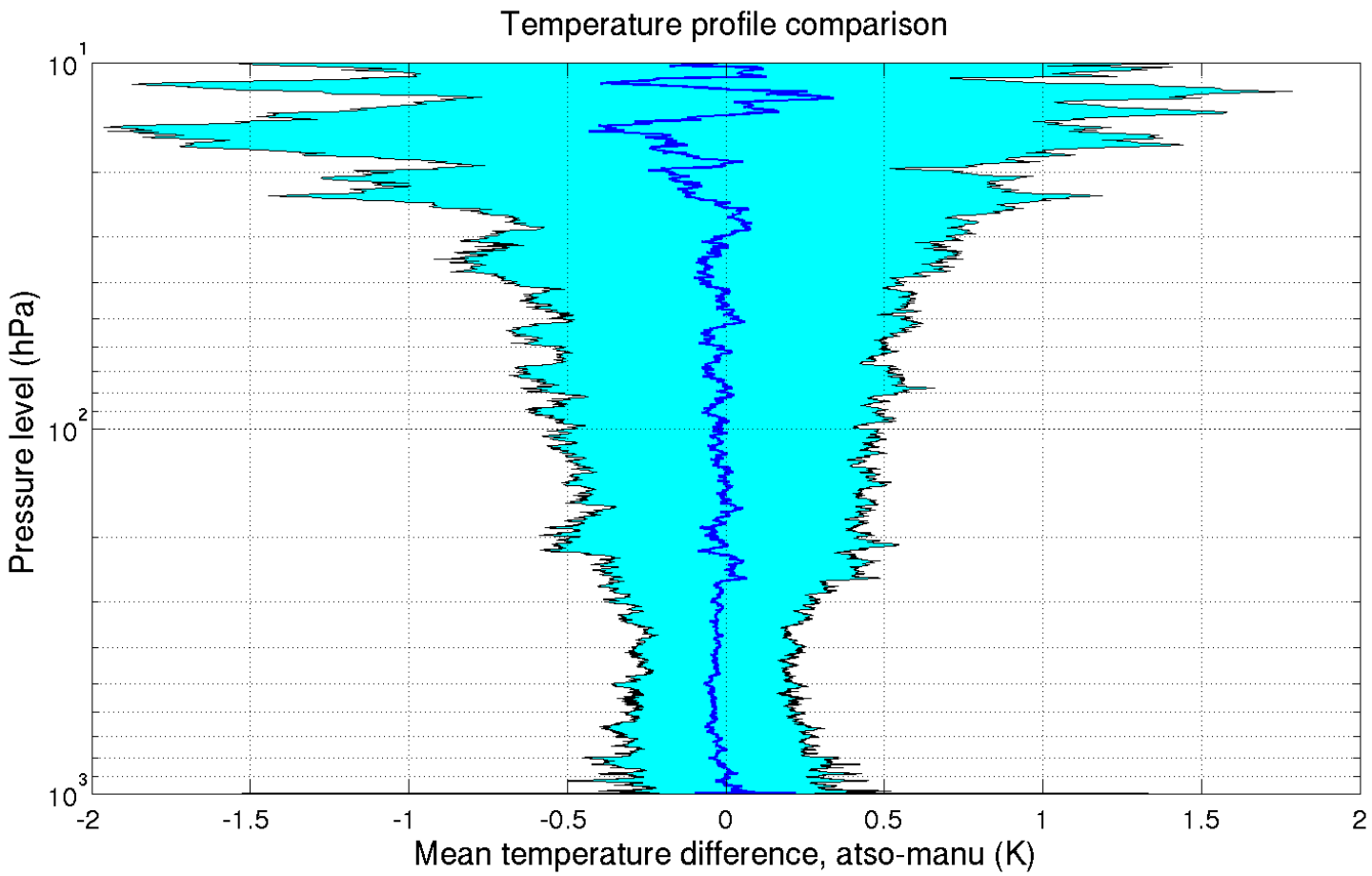


Humidity difference

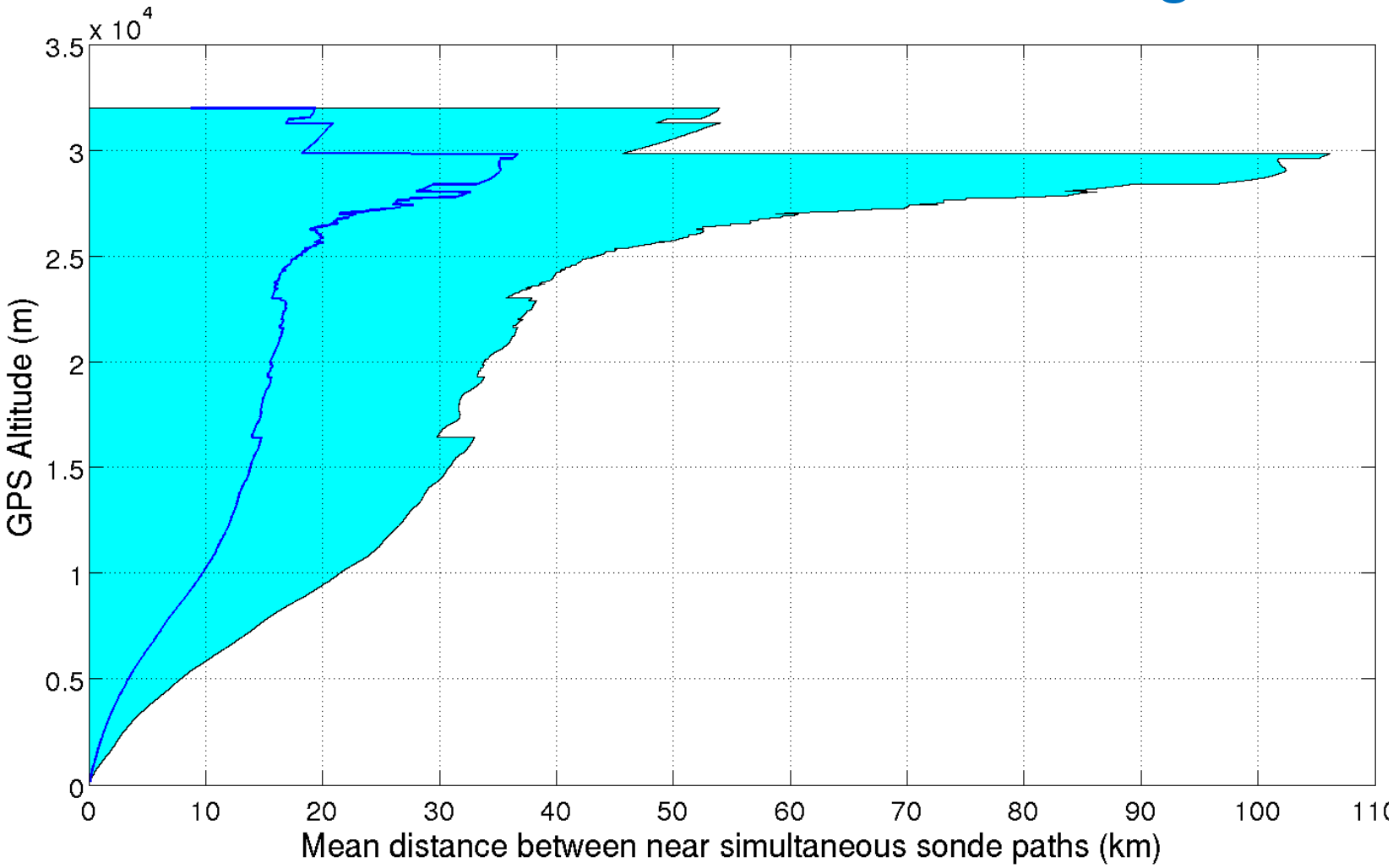
Autosonde vs. Manual soundings



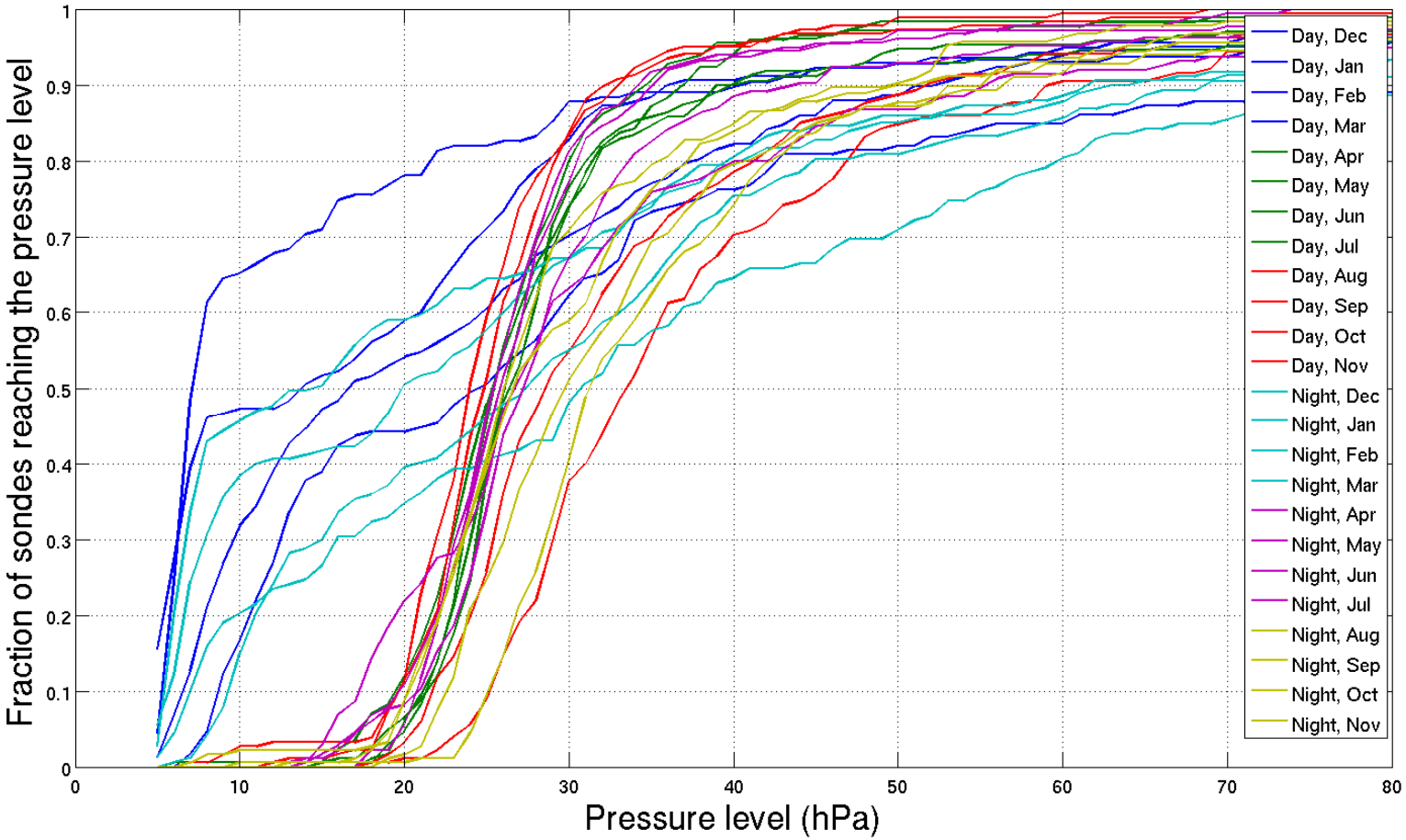
Autosonde vs. Manual soundings



Autosonde vs. Manual soundings



Autosonde


Fraction of sondes reaching the pressure level
Pressure level (hPa)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
10
20
30
40
50
60
70
80
Day, Dec
Day, Jan
Day, Feb
Day, Mar
Day, Apr
Day, May
Day, Jun
Day, Jul
Day, Aug
Day, Sep
Day, Oct
Day, Nov
Night, Dec
Night, Jan
Night, Feb
Night, Mar
Night, Apr
Night, May
Night, Jun
Night, Jul
Night, Aug
Night, Sep
Night, Oct
Night, Nov

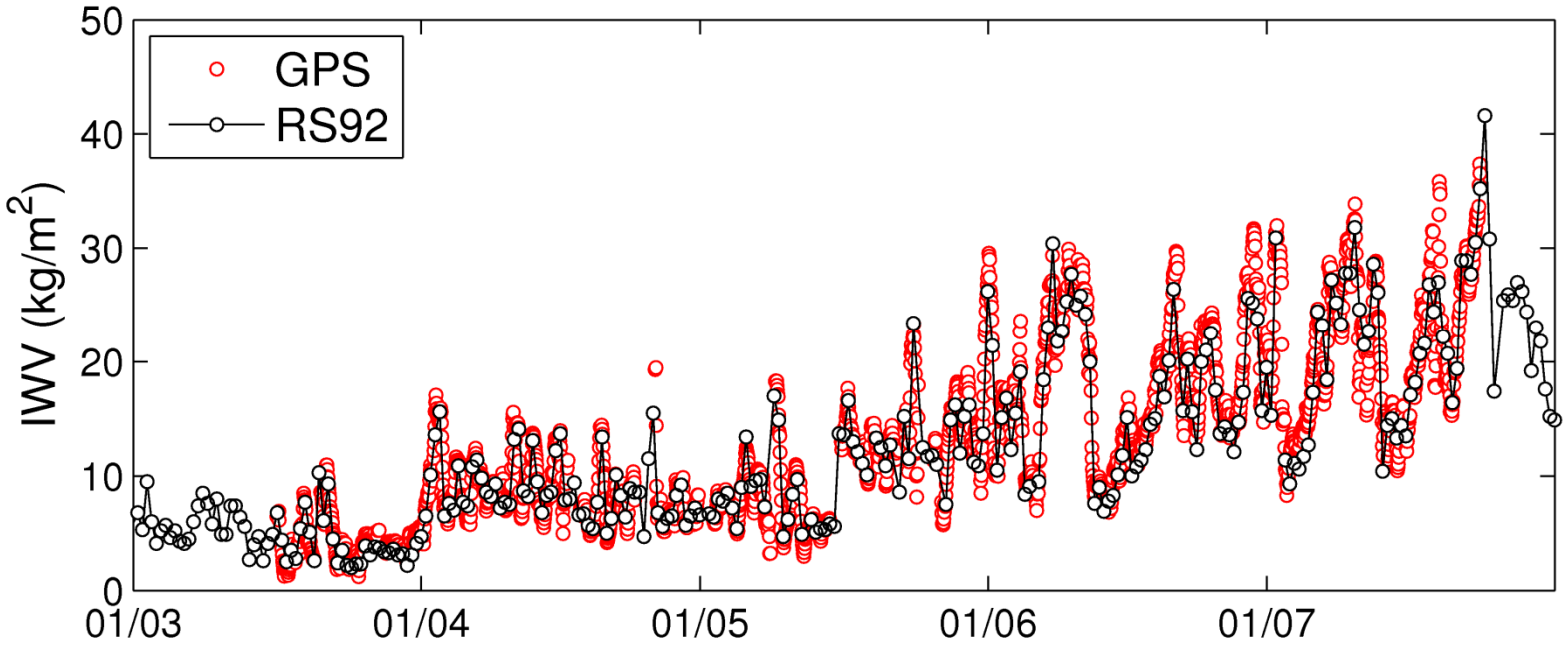
Autosonde vs. manual sonde

- 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

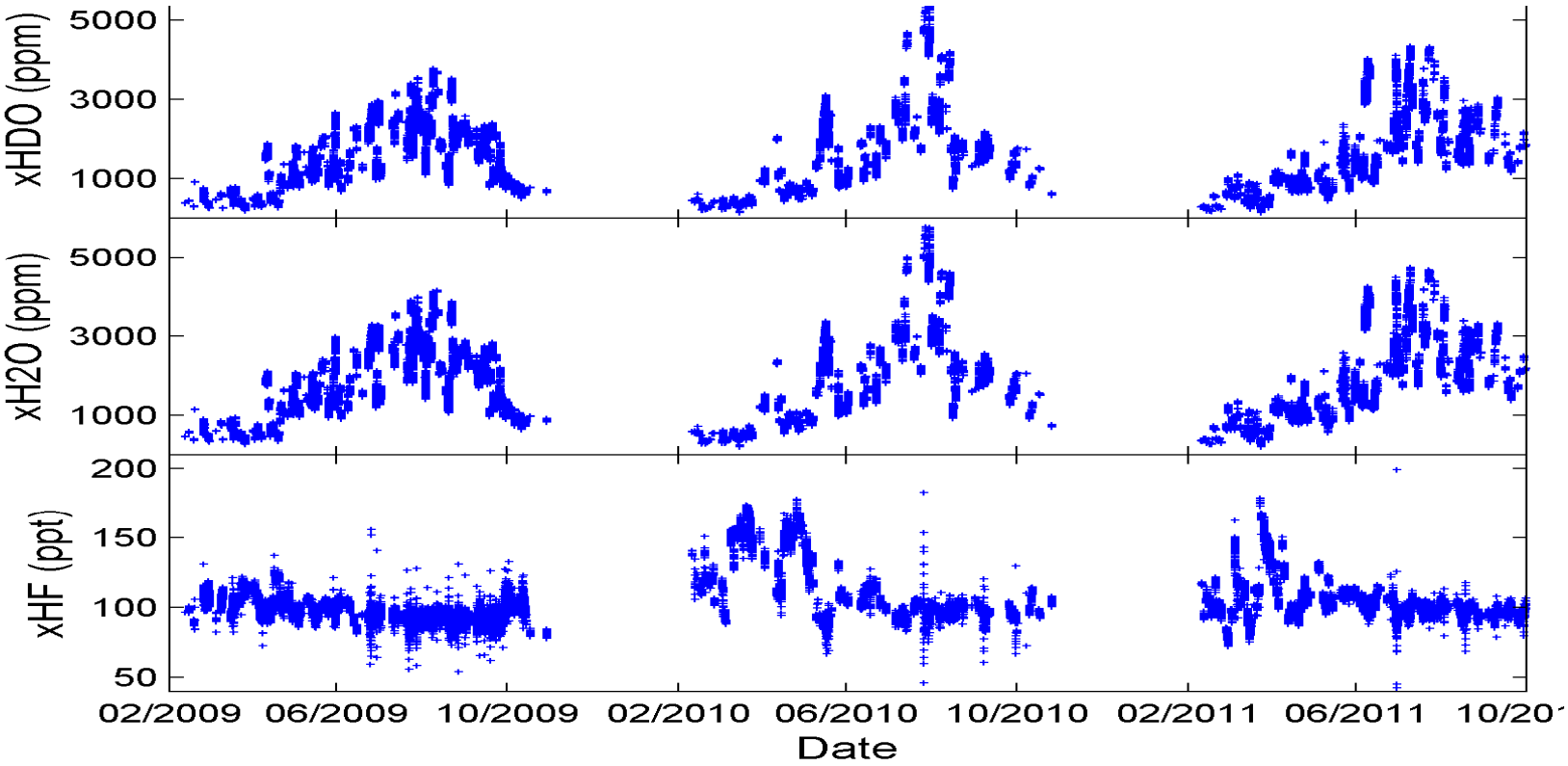
- Autosonde assessment
- CFH/RS92 flights, LAPBIAT data
- RR01 flights in Sodankylä
- CFH/COBALD flights
- IWV comparisons: GPS, MW, FTS, sondes
- Ozonesonde data
- Submissions to the GRUAN database

IWV comparison: GPS vs RS92 in 2011

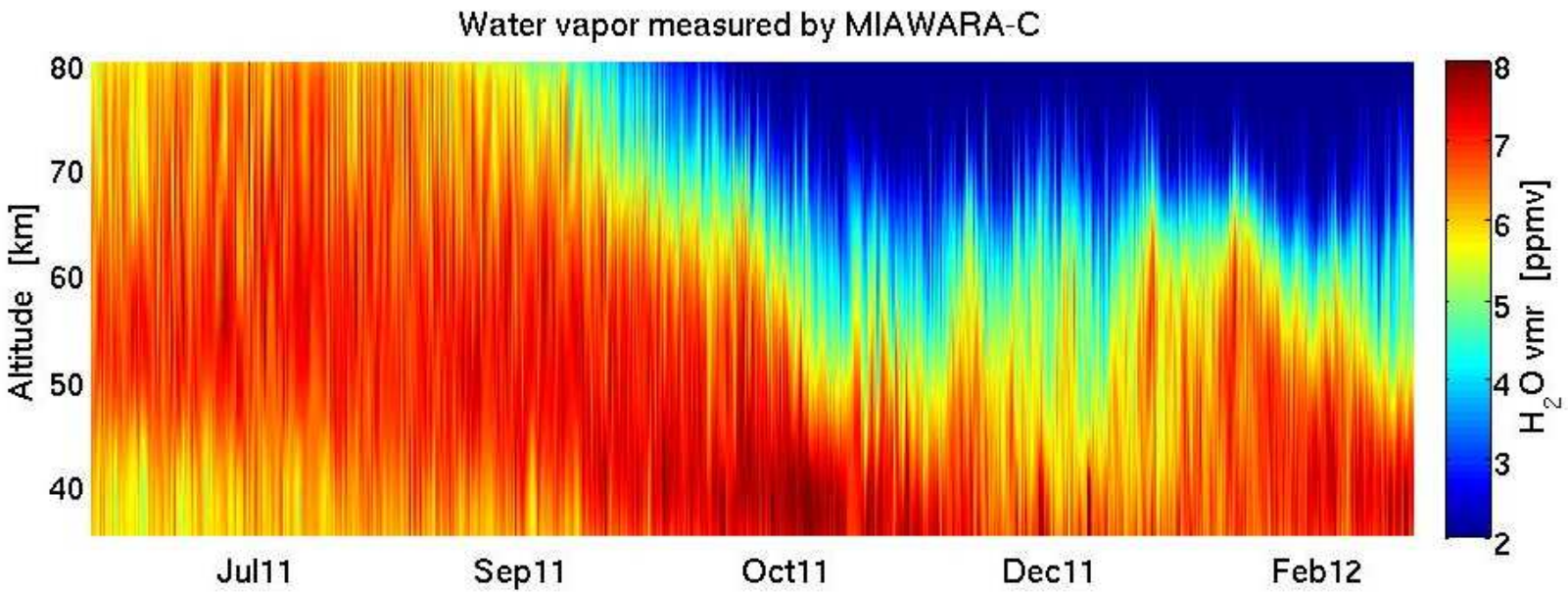


	GPS
Difference to sonde (%):	3.6
Standard deviation (%) :	12.5
Number of pairs :	225

FTIR observations 2009-201



Stratospheric water vapor by MIAWARA-C



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