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GLOBAL CLIMATE OBSERVING
SYSTEM (GCOS)

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**4rd GRUAN Implementation-
Coordination Meeting (ICM-4)**

Tokyo, Japan
5 March – 9 March 2012

Session 5

The GRUAN Observing Station Payerne - Switzerland

*(Submitted by Rolf Philipona, Gilbert Levrat, Gonzague Romanens, Pierre Jeannet,
Emmanuel Brocard, Andreas Kräuchi)*

Summary and Purpose of Document

This document contains GRUAN Activities in 2011 and a presentation of the Swiss digital radiosonde SRS-C34.



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Home Affairs FDHA
Federal Office of Meteorology and Climatology MeteoSwiss

The GRUAN Observing Station Payerne - Switzerland

Rolf Philipona, Gilbert Levrat, Gonzague Romanens,
Pierre Jeannet, Emmanuel Brocard, Andreas Kräuchi



GRUAN activities

- New digital radiosonde SRS-C34 since January 2011
- GRUAN - reference and test soundings since May 2011
- Humidity intercomparison SRS-C34, RS92, SnowWhite
- Temperature intercomparison and radiation error
- Temperature intercomparison SRS-C34, RS92
- Temperature uncertainty triple sounding SRS-C34



Swiss digital Radiosonde SRS-C34

Operational 2011 –

daily UT 00/12

Swiss digital radiosonde SRS-C34 developed by
MeteoLabor using GPS for pressure and wind

Temperature:	Thermocouple
Humidity:	ROTRONIC HC2 capacitive sensor
Altitude/Pressure:	GPS
Wind Speed/Dir.:	GPS



Swiss digital Radiosonde SRS-C34

Temperature - Humidity - Pressure sensors

Rotronic HC2
capacitive sensor

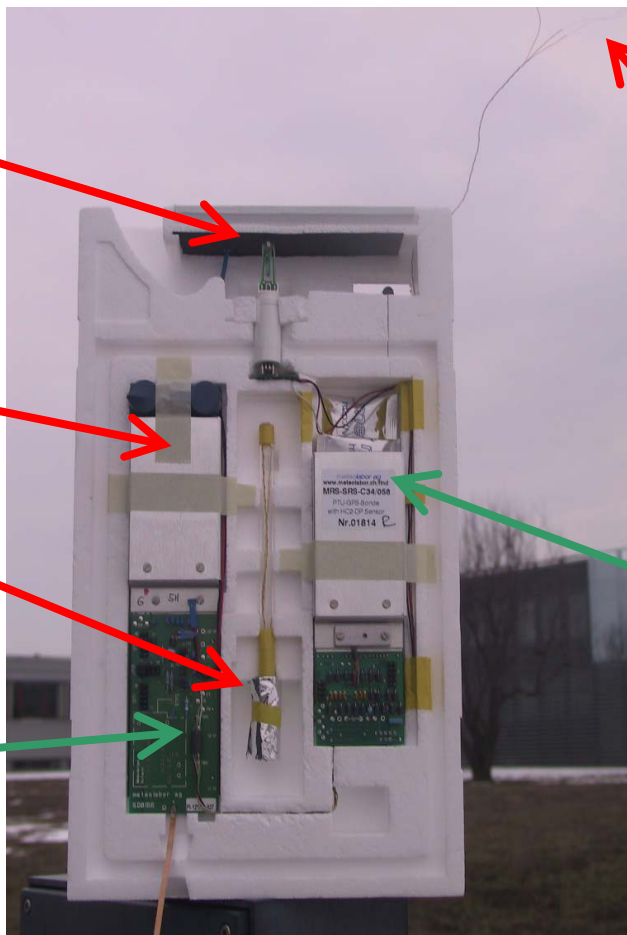
GPS

Water
Hypsometer

Transmitter
400 Mhz

Thermocouple
(Copper - Constantan)
(wire Ø 0.05 mm)

Electronique
Interface
Telemetry



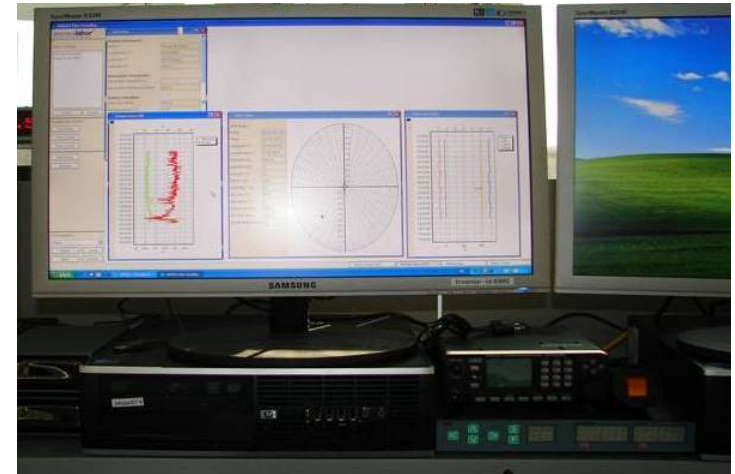
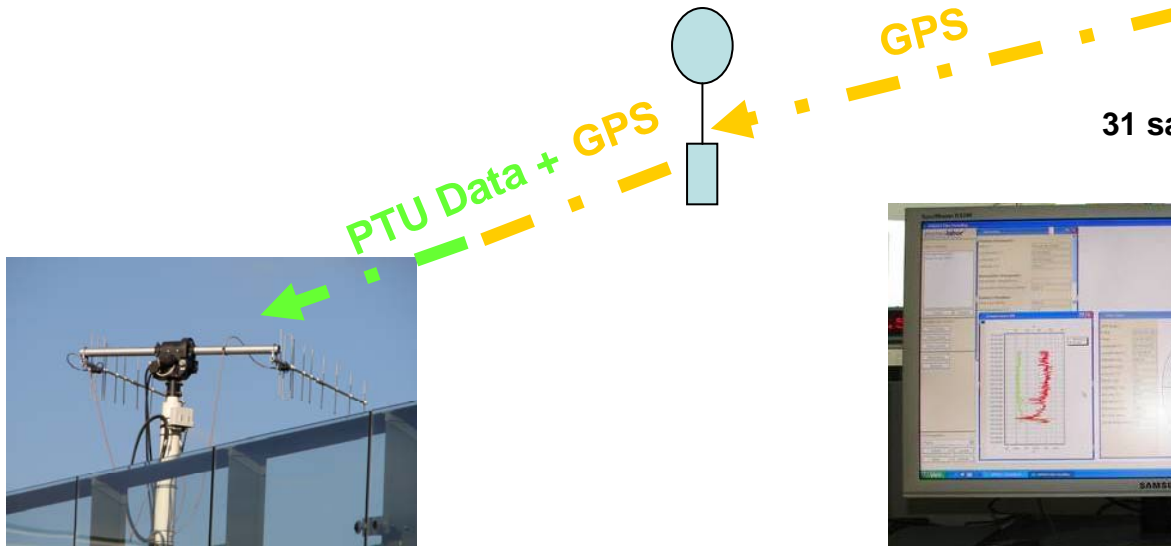


Swiss digital Radiosonde SRS-C34

ARGUS 37 control system for SRS-C34



31 satellites orbiting at 20'200 km





Swiss digital Radiosonde SRS-C34

Versatility of SRS-C34

SRS-C34 + Ozone sonde

Oxidation of potassium iodide by ozone in an aqueous solution



SRS-C34 + SnowWhite (dew/frost point hygrometer)

Detection of dew or frost on gold mirror by diode light beam



SRS-C34 + FLASH (Fluorescent Advanced Stratospheric Hygrometer)

Photodissociation of H_2O molecules with Lyman Alpha light source and detection of the fluorescence of excited OH radicals

SRS-C34 + COBALD (backscatter sonde)

Light flash from Xenon lamp at 490 and 940 nm and measurement of backscattered light from ice crystals or aerosols

SRS-C34 + CNR4 Net Radiometer

Shortwave and longwave upward and downward



GRUAN - reference multi-soundings since May 2011

Biweekly daytime UT 12:00 (Tuesday or Thursday)

Double sounding:

- Meteolabor SRS-C34
- Vaisala RS92 (DigiCORA MW31) **submitted to GRUAN lead center**

Biweekly nighttime UT 00:00 (Wednesday or Friday)

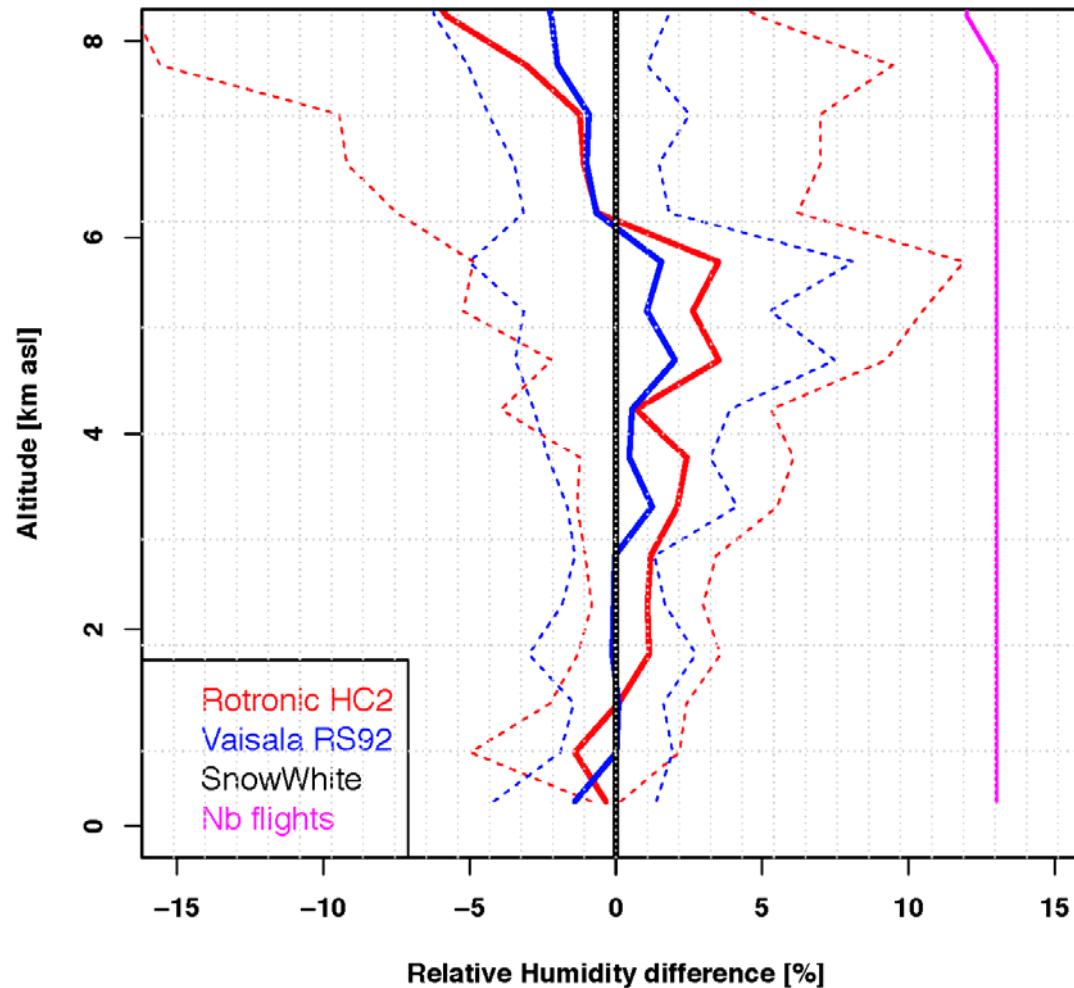
Triple sounding:

- Meteolabor SRS-C34
- Vaisala RS92 (DigiCORA MW31) **submitted to GRUAN lead center**
- Meteolabor SnowWhite dew/frost point hygrometer



Humidity intercomparison

SnowWhite, SRS-C34, RS92 (nighttime)

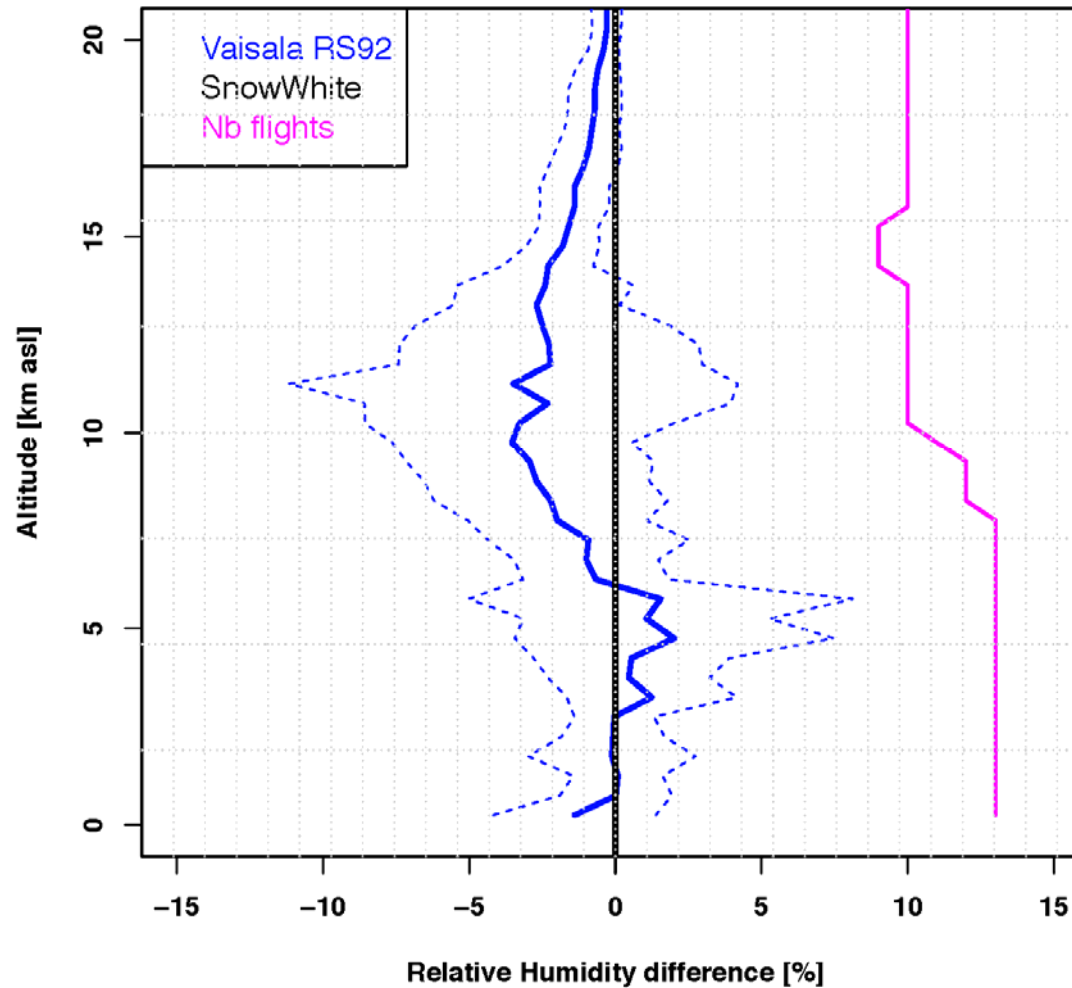




Humidity intercomparison

SnowWhite, RS92

(nighttime)

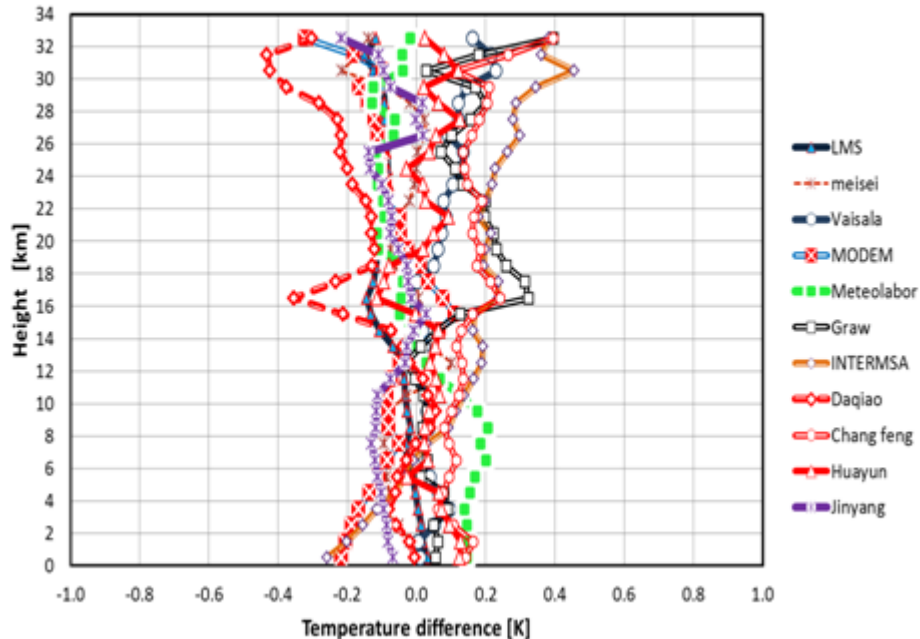




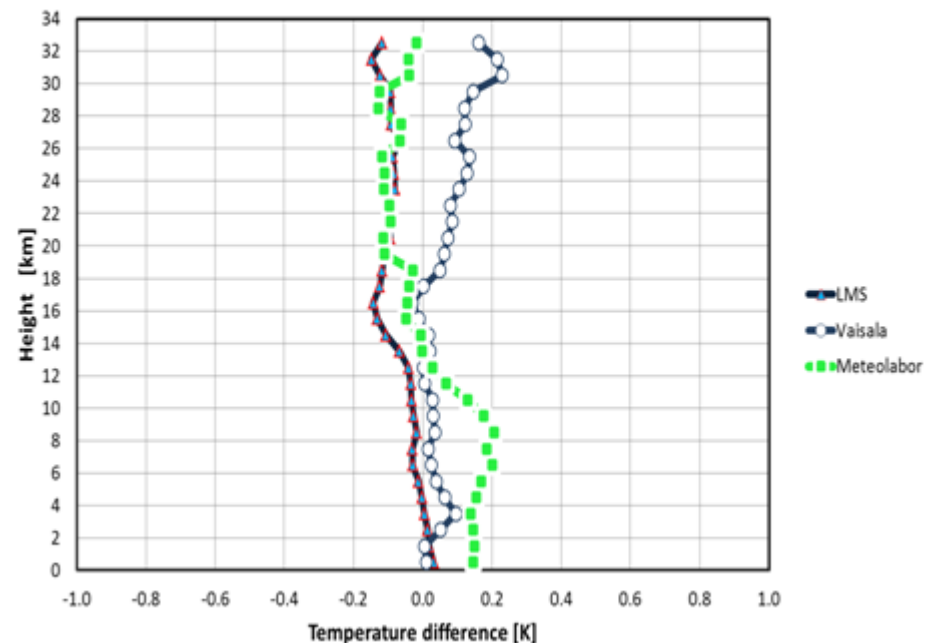
Temperature intercomparison

SRS-C34 during CHINA intercomparison (nighttime)

Simultaneous Temperature differences at night,
8th WMO Radiosonde Comparison, Yangjiang, China



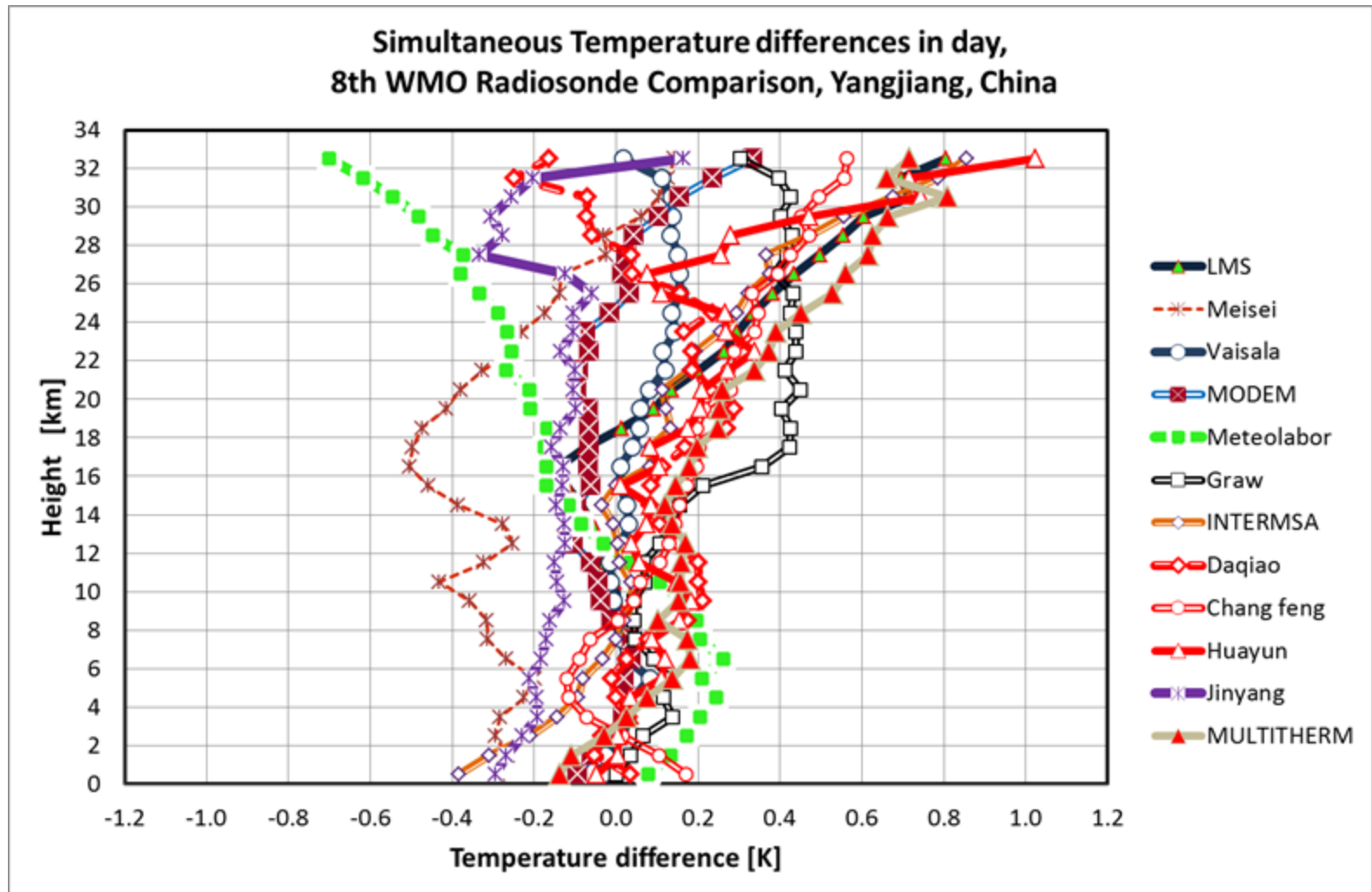
Simultaneous Temperature differences at night,
8th WMO Radiosonde Comparison, Yangjiang, China





Temperature intercomparison

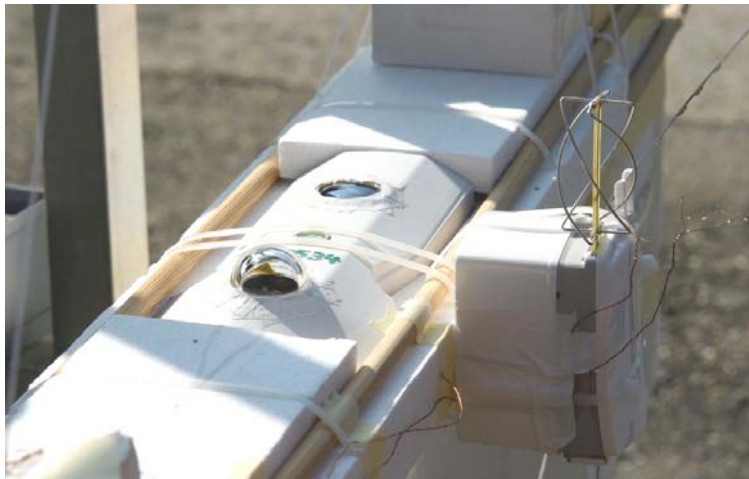
SRS-C34 during CHINA intercomparison (daytime)





Radiation Error on SRS-C34

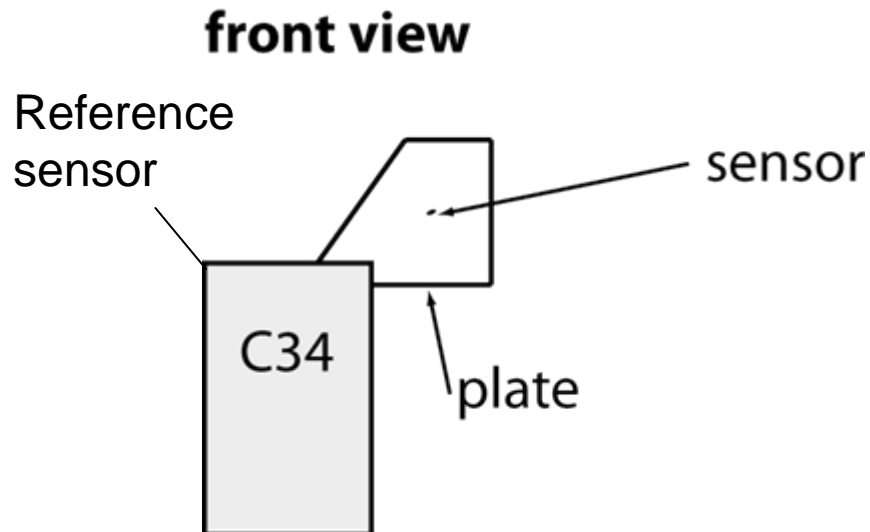
Temperature sensor





Method to shade and unshade Temperature sensor

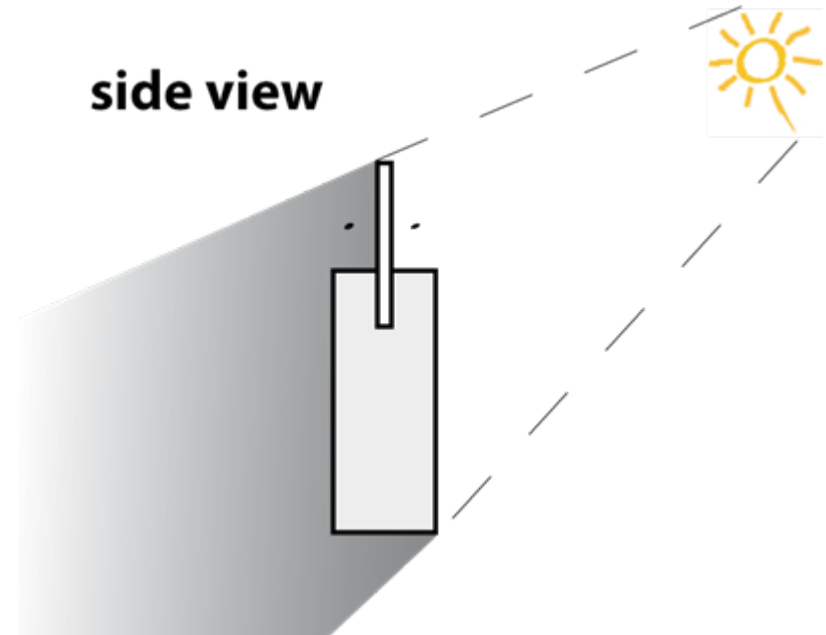
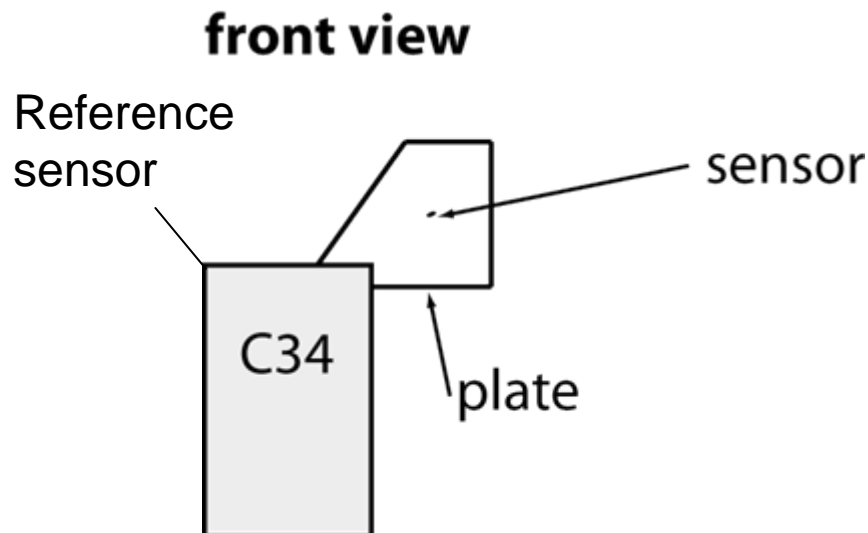
- Aluminium plate (brilliant / black) attached to SRS-C34
- Temperature sensors on both sides (5cm distance)
- Alternately one sensor is exposed to the sun





Method to shade and unshade Temperature sensor

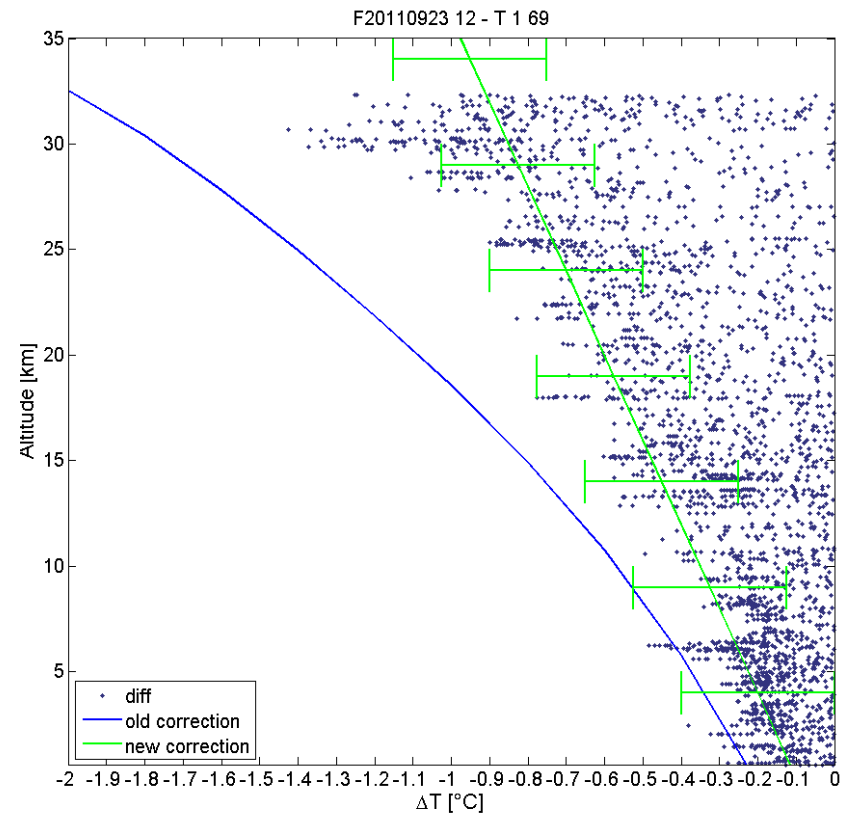
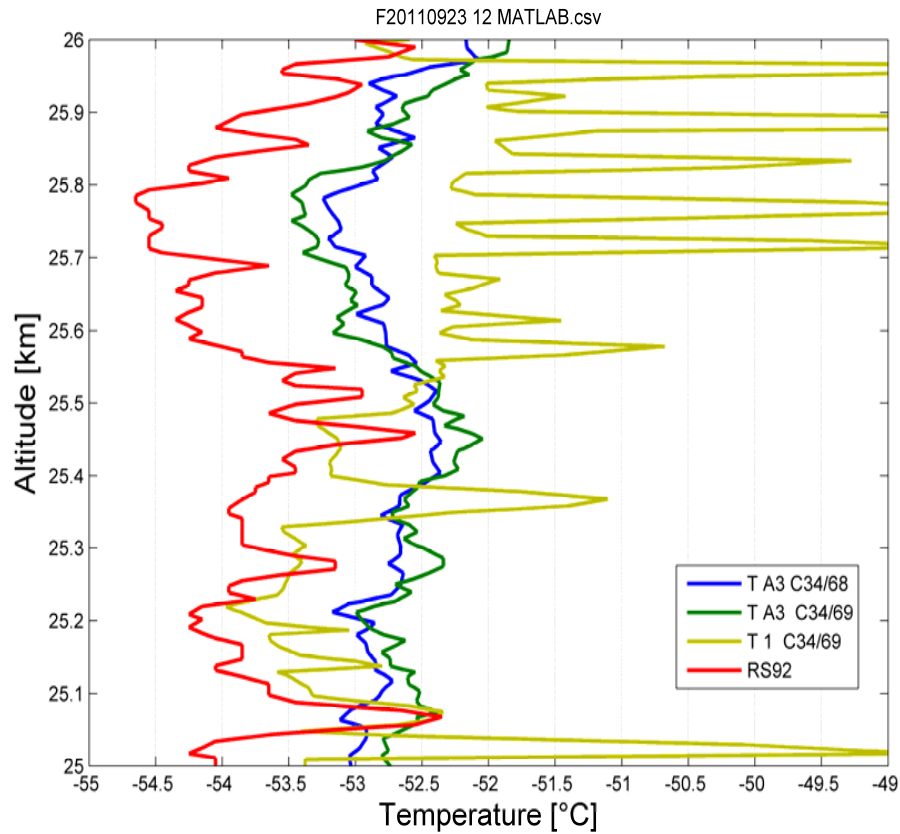
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Radiation Error on Temperature

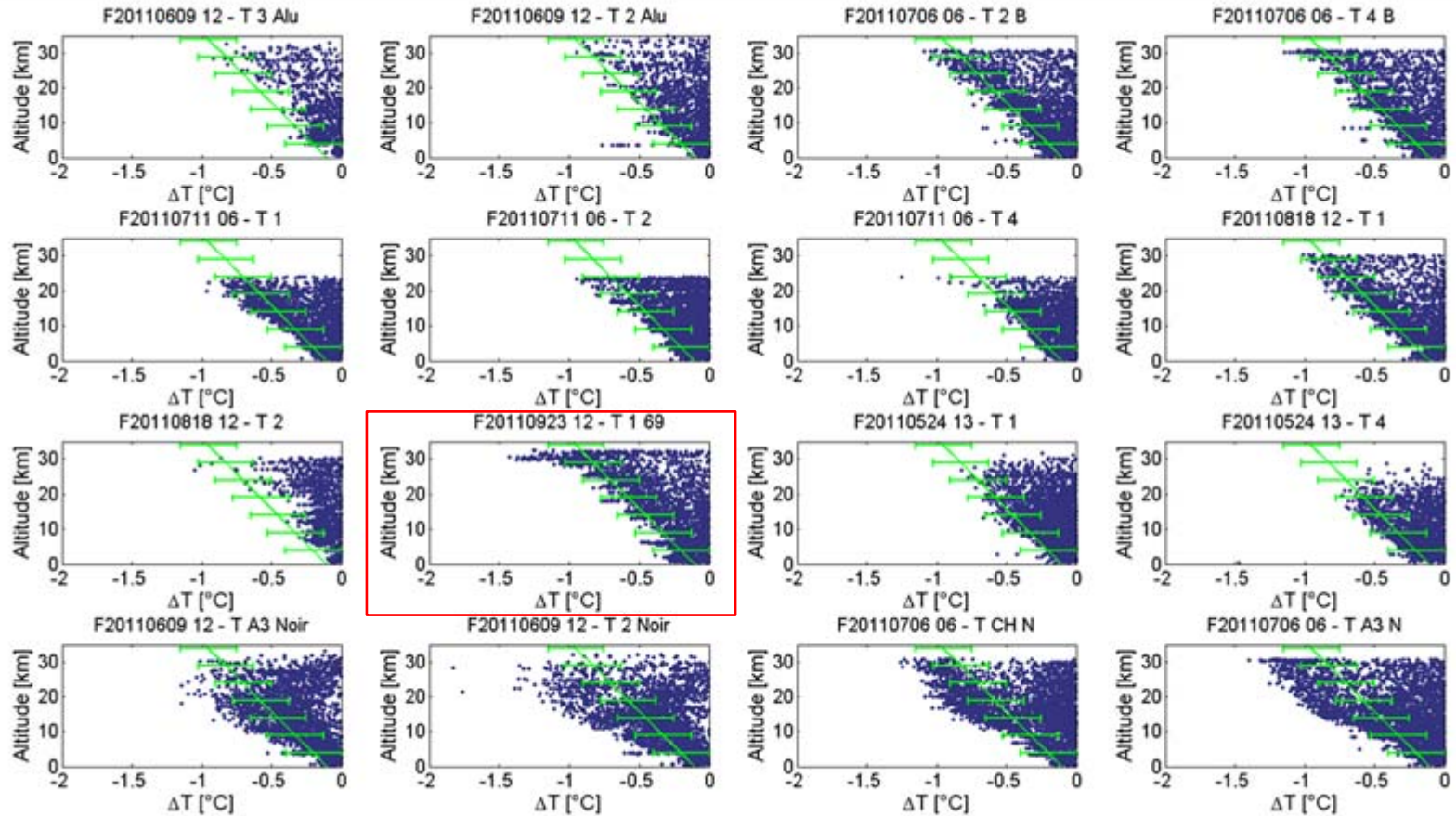
SRS-C34 Radiosonde





Radiation Error on Temperature

SRS-C34 Radiosonde

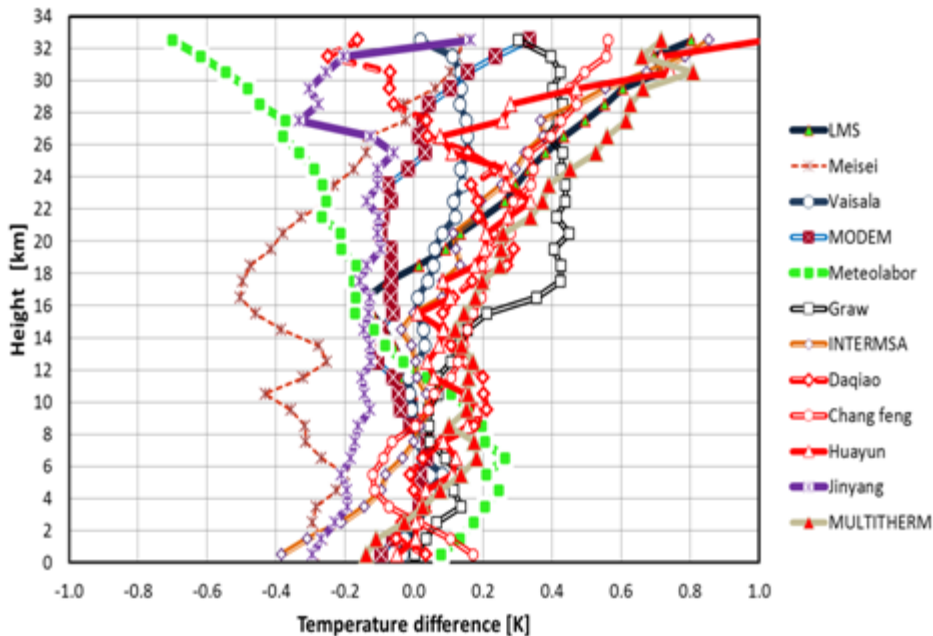




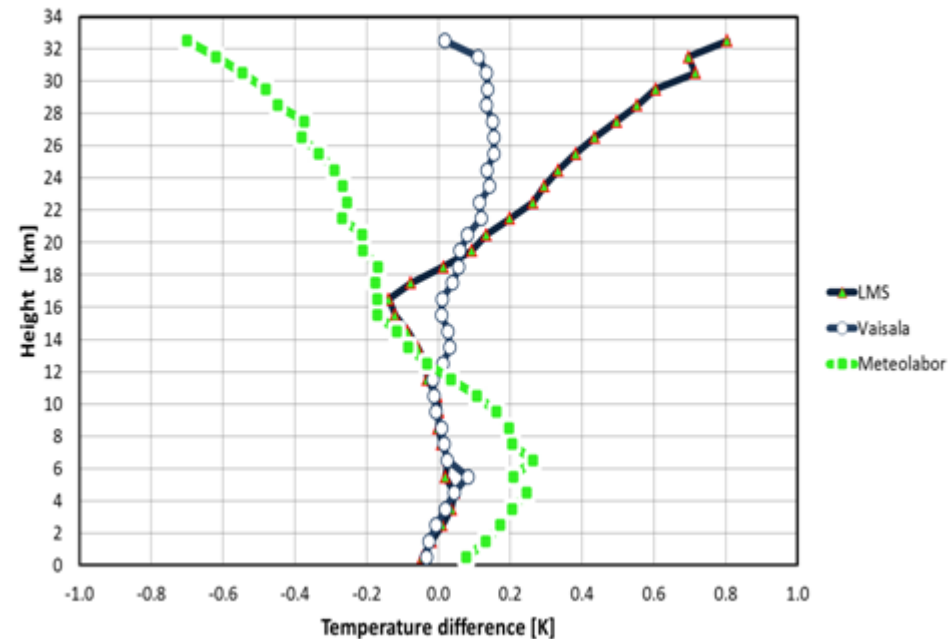
Old - Radiation Error Correction

SRS-C34 Radiosonde

Simultaneous Temperature differences in day,
8th WMO Radiosonde Comparison, Yangjiang, China



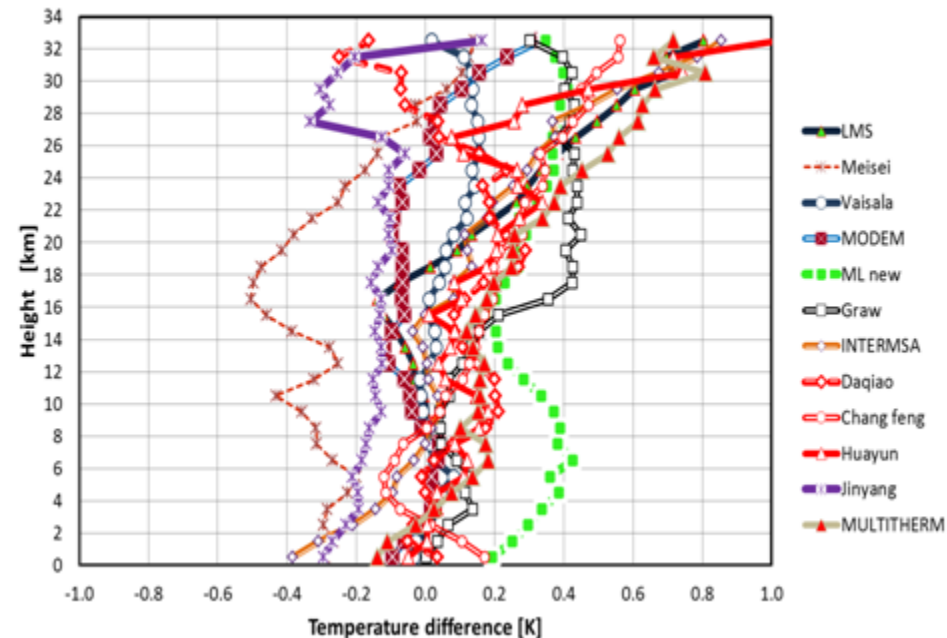
Simultaneous Temperature differences in day,
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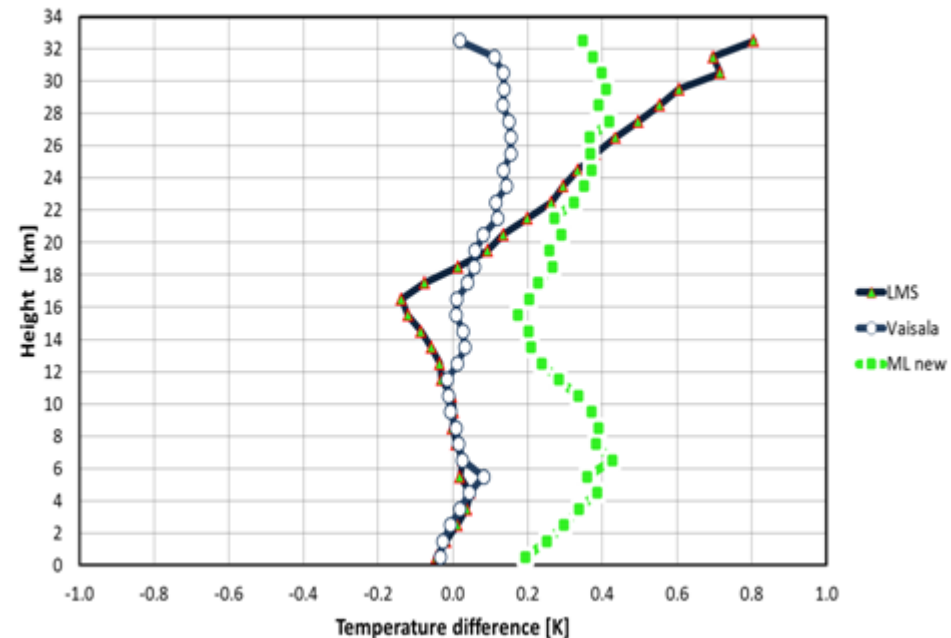


New - Radiation Error Correction SRS-C34 Radiosonde

Simultaneous Temperature differences in day,
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Simultaneous Temperature differences in day,
8th WMO Radiosonde Comparison, Yangjiang, China

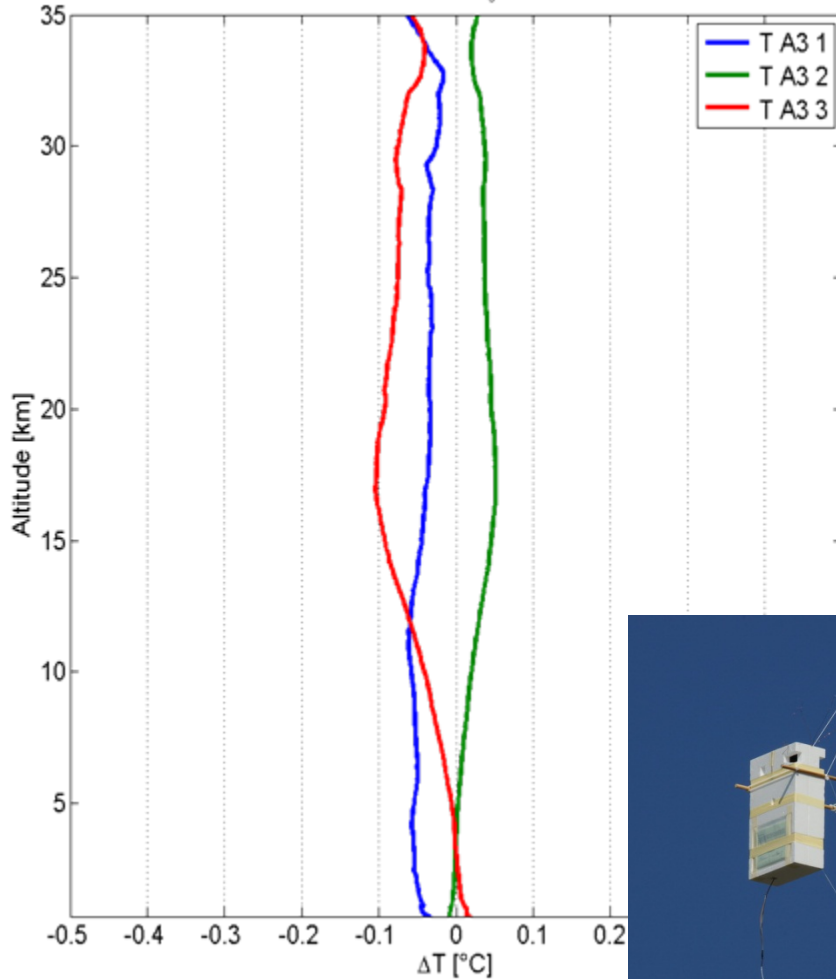




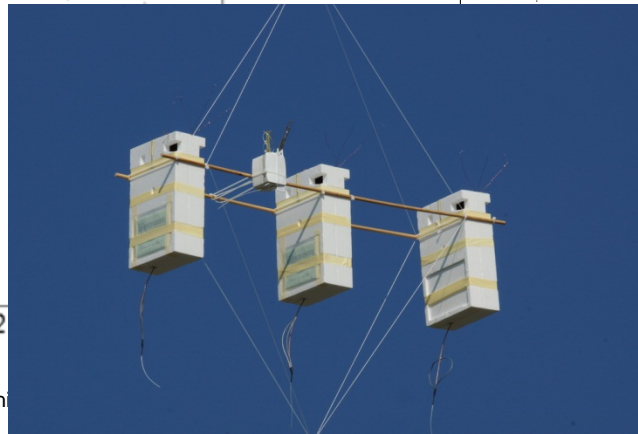
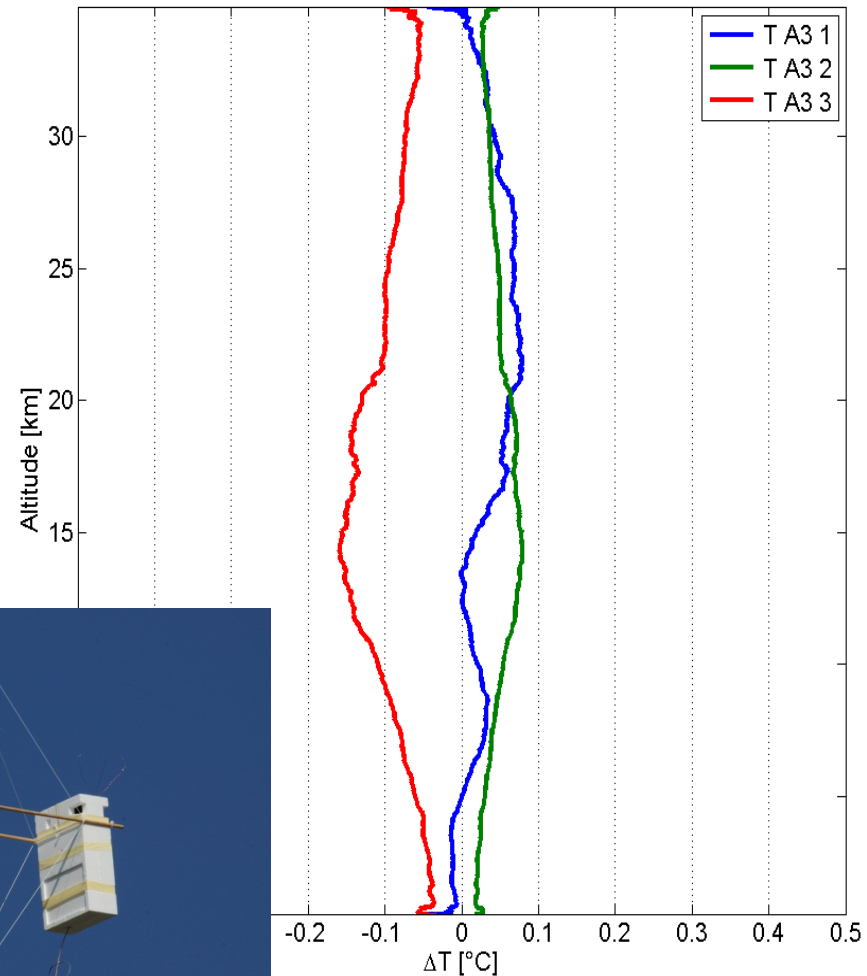
Temperature uncertainty

Triple sounding SRS-C34

Night flight (± 0.1 K)



Day flight (± 0.2 K)





Summary

GRUAN reference multi-sounding
biweekly with
SRS-C34, RS92 and SnowWhite

Humidity comparisons between
SRS-C34, RS92 and SnowWhite

Investigations on radiation error on temperature measurements

Temperature uncertainty with triple sounding SRS-C34