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Confederazione Svizzera
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Swiss Confederation

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

The GRUAN Observing Station Payerne - Switzerland

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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 experiments
- 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

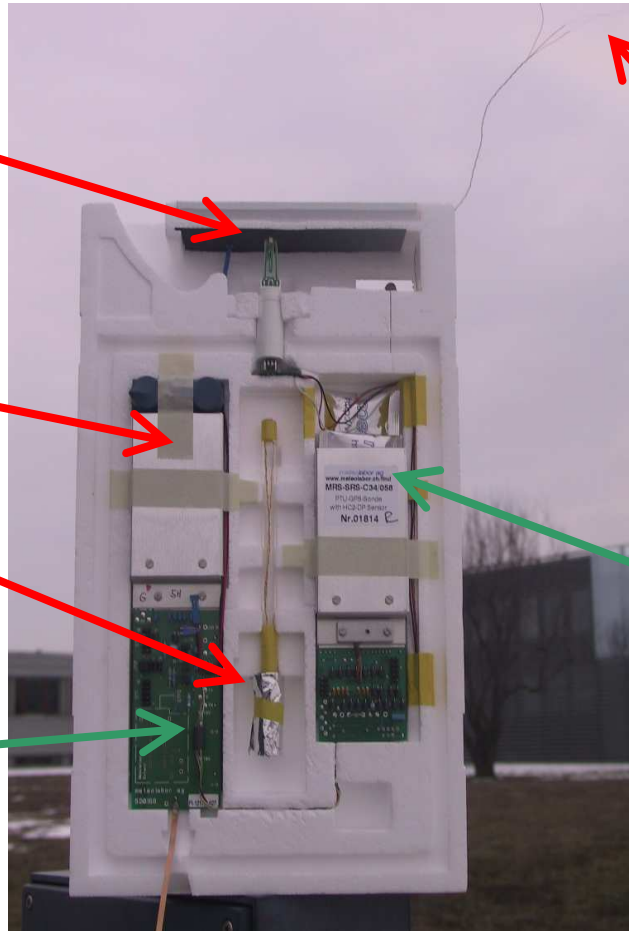
GPS

Water
Hypsometer

Transmitter
400 Mhz

Thermocouple
(Copper - Constantan)
(wire \varnothing 0.05 mm)

Electronique
Interface
Telemetry



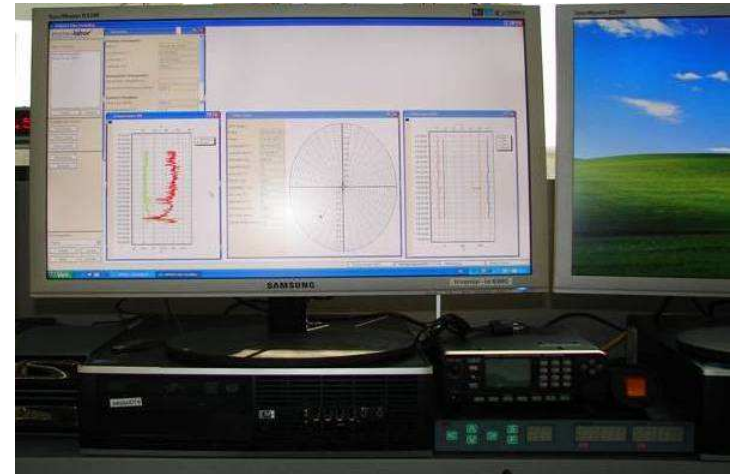
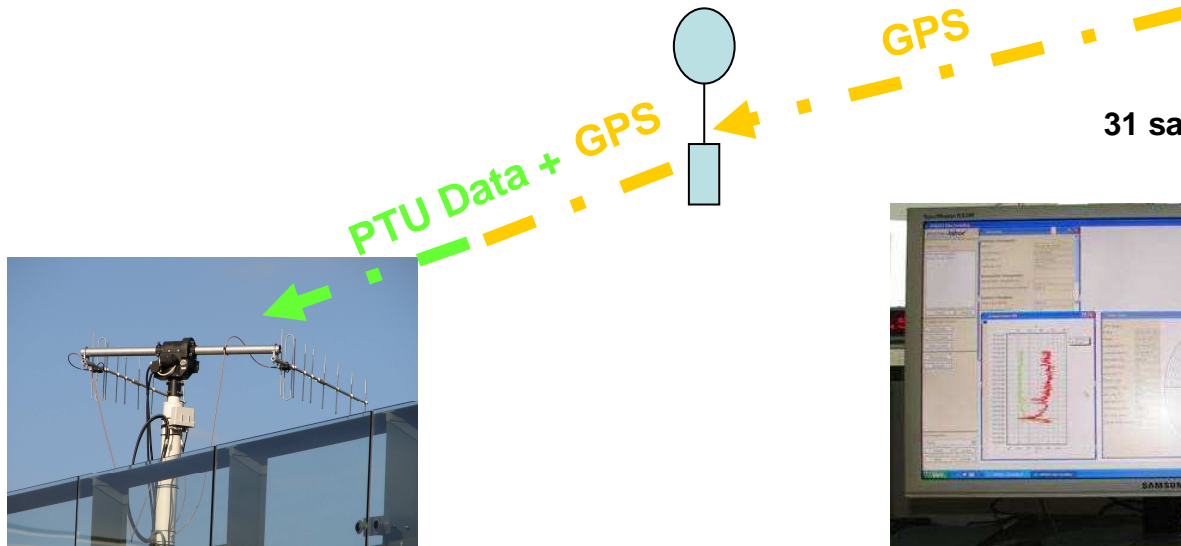


Swiss digital Radiosonde SRS-C34

ARGUS 37 control system for SRS-C34



31 satellites orbiting at 20'200 km



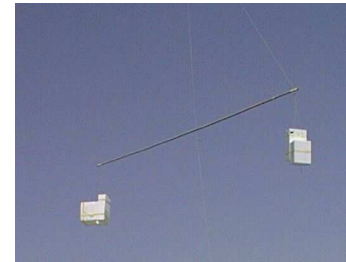


Swiss digital Radiosonde SRS-C34

Versatility of SRS-C34

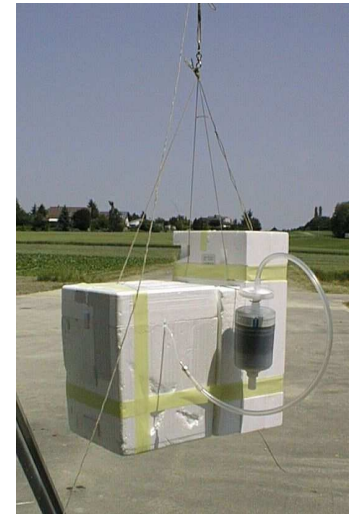
SRS-C34 + Ozone sonde

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)

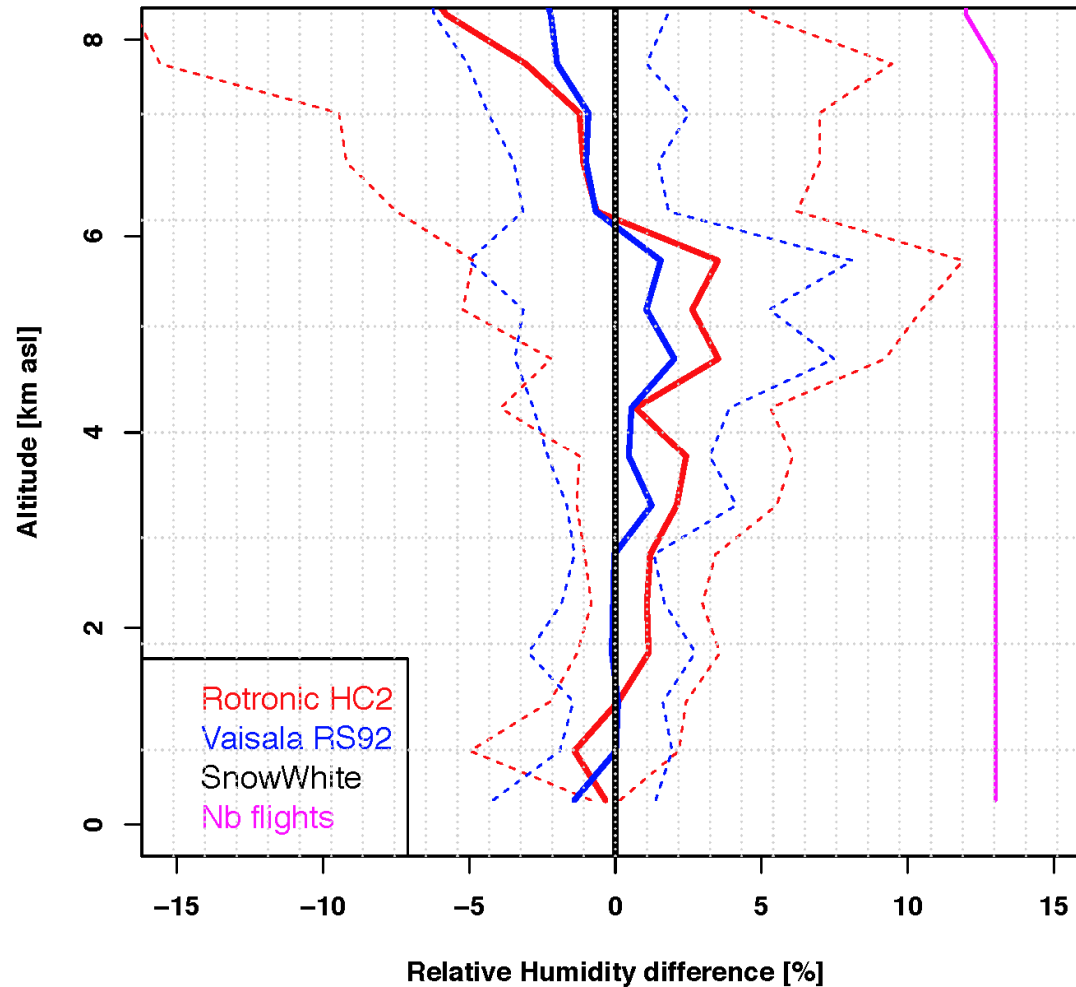
Triple sounding:

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



Humidity intercomparison

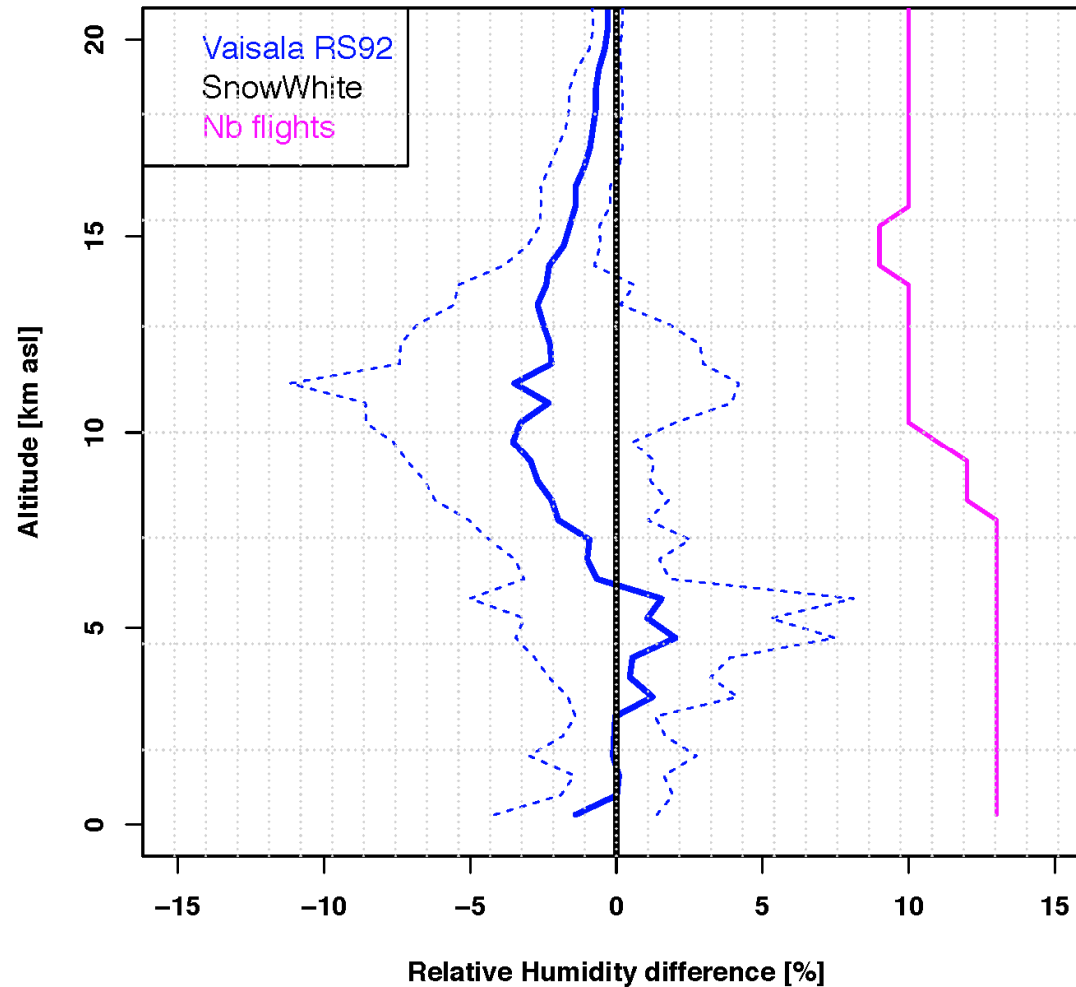
SnowWhite, SRS-C34, RS92 (nighttime)





Humidity intercomparison

SnowWhite, RS92 (nighttime)

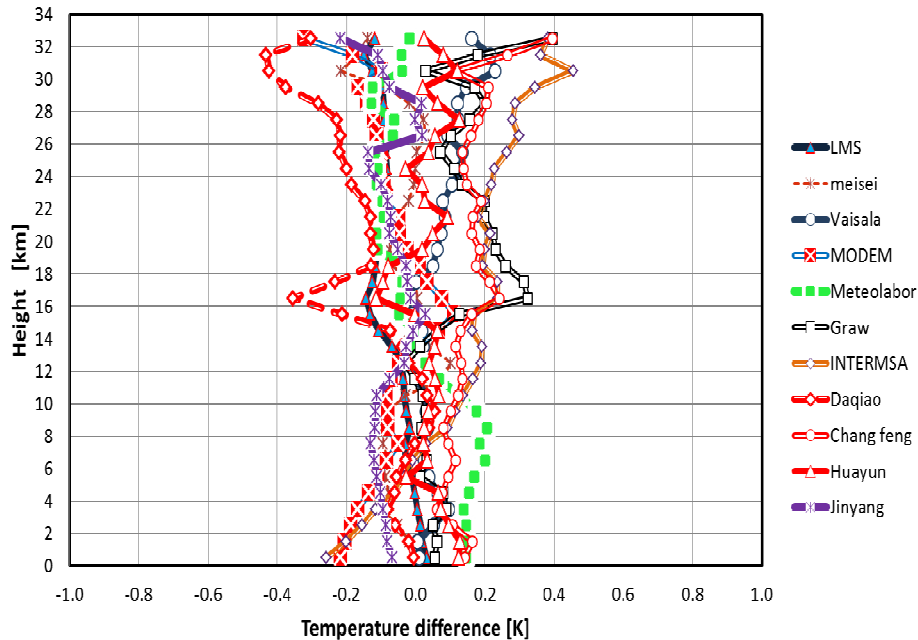




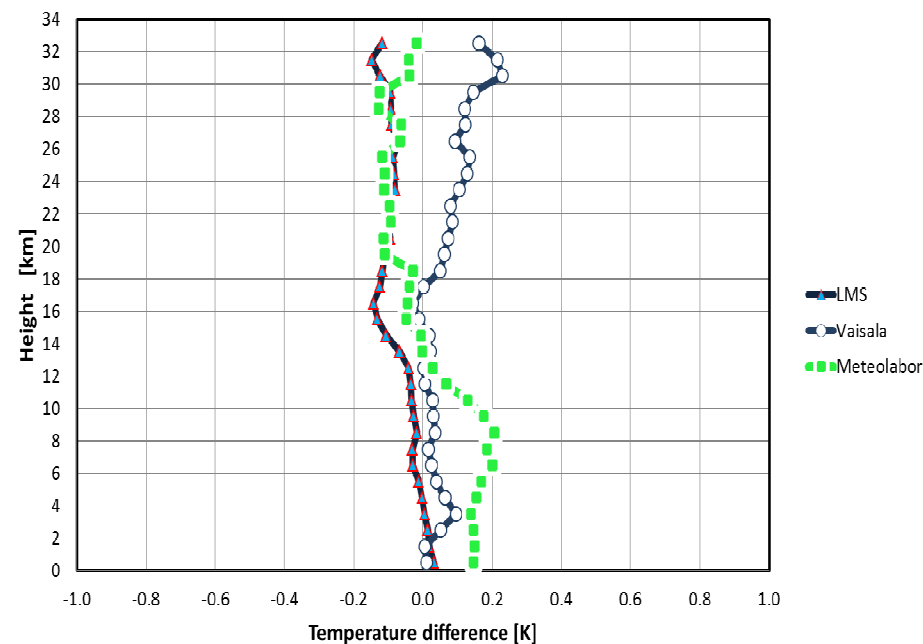
Temperature intercomparison

SRS-C34 during CHINA intercomparison (nighttime)

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



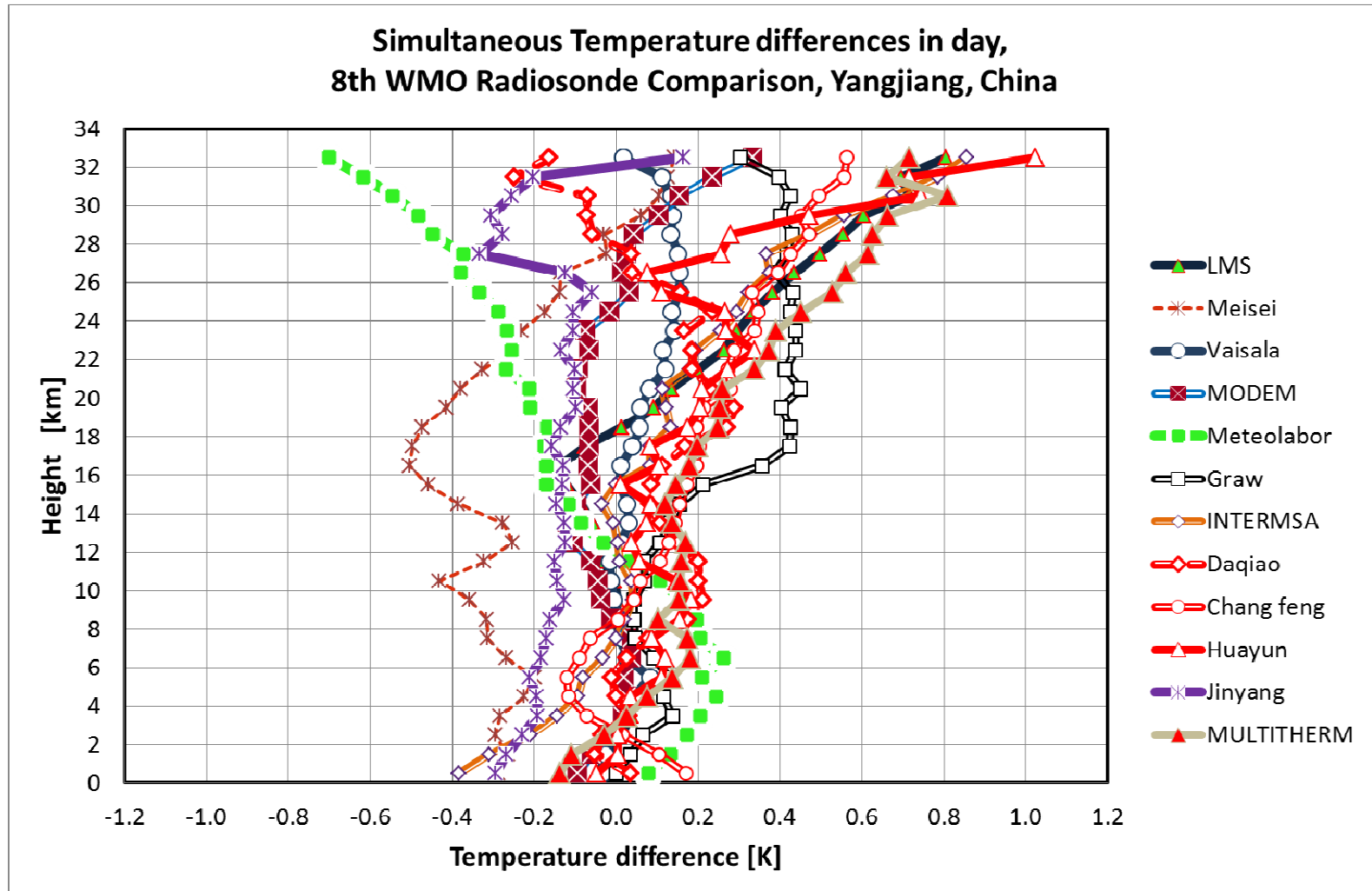
Simultaneous Temperature differences at night,
8th WMO Radiosonde Comparison, Yangjiang, China





Temperature intercomparison

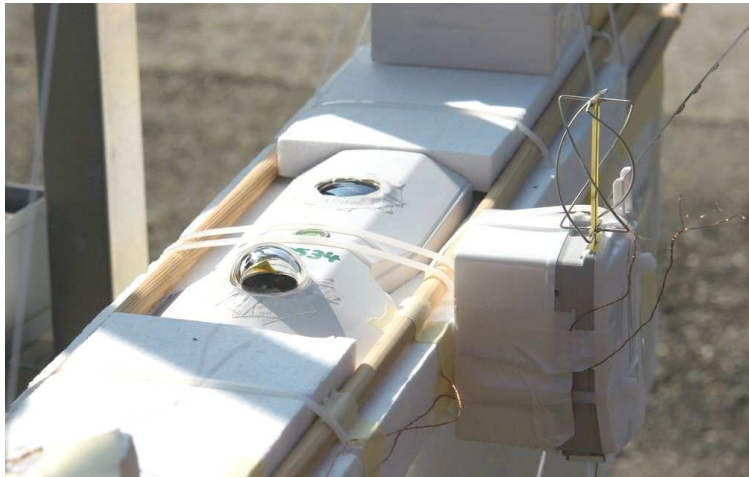
SRS-C34 during CHINA intercomparison (daytime)





Radiation Error on SRS-C34

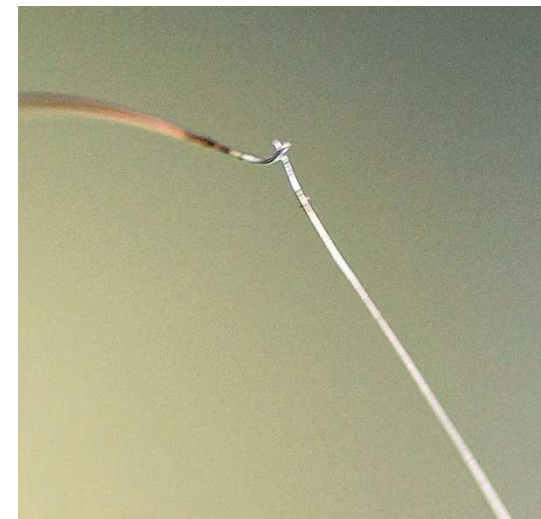
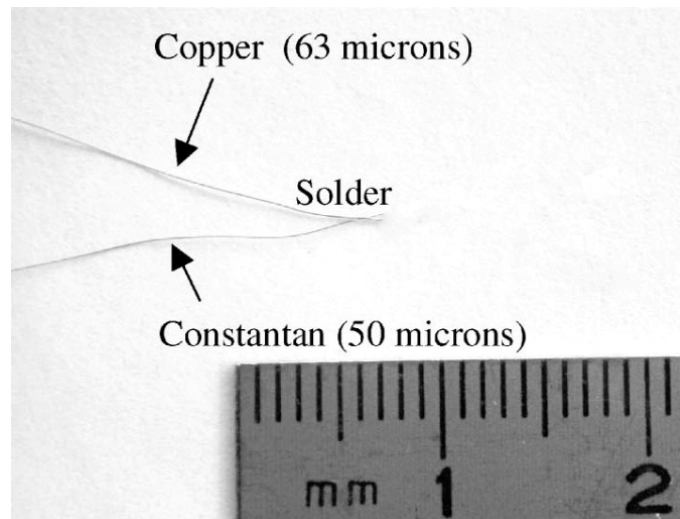
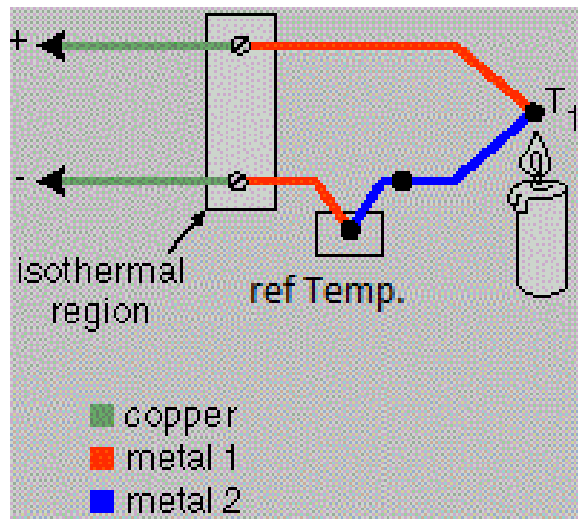
Temperature sensor





Temperature sensor on SRS-C34

Copper-Constantan Thermocouple

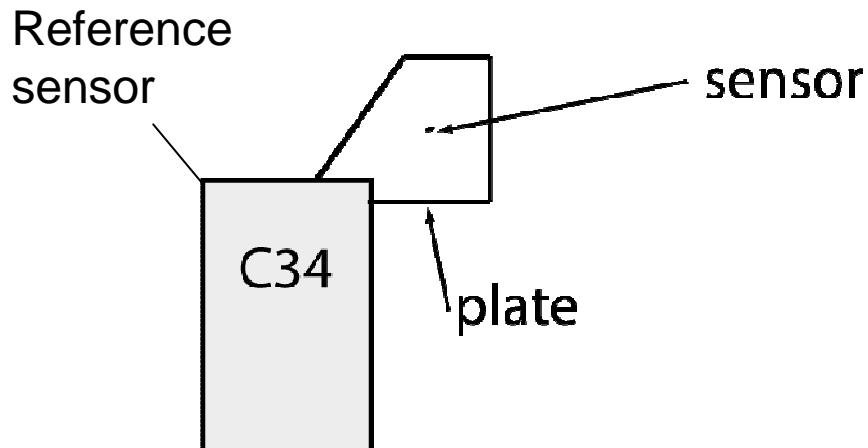




Method to shade and unshade Temperature sensor

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

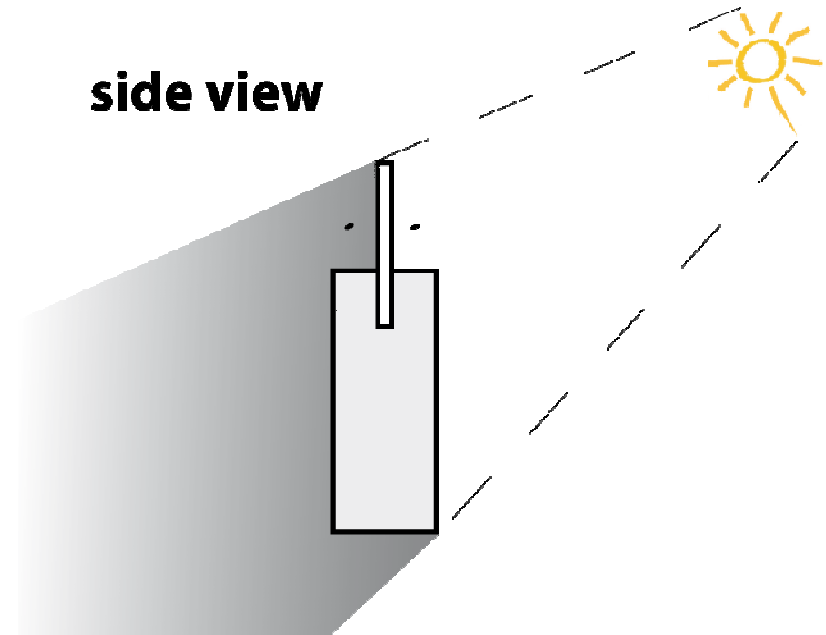
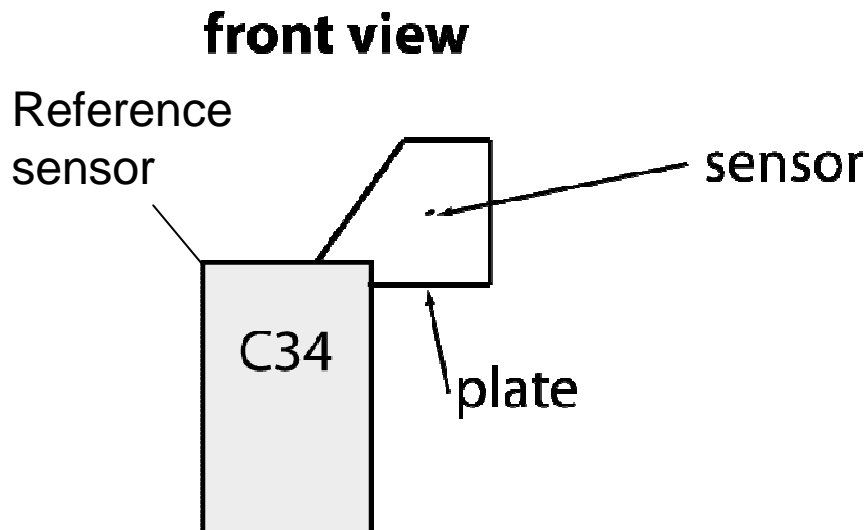
front view





Method to shade and unshade Temperature sensor

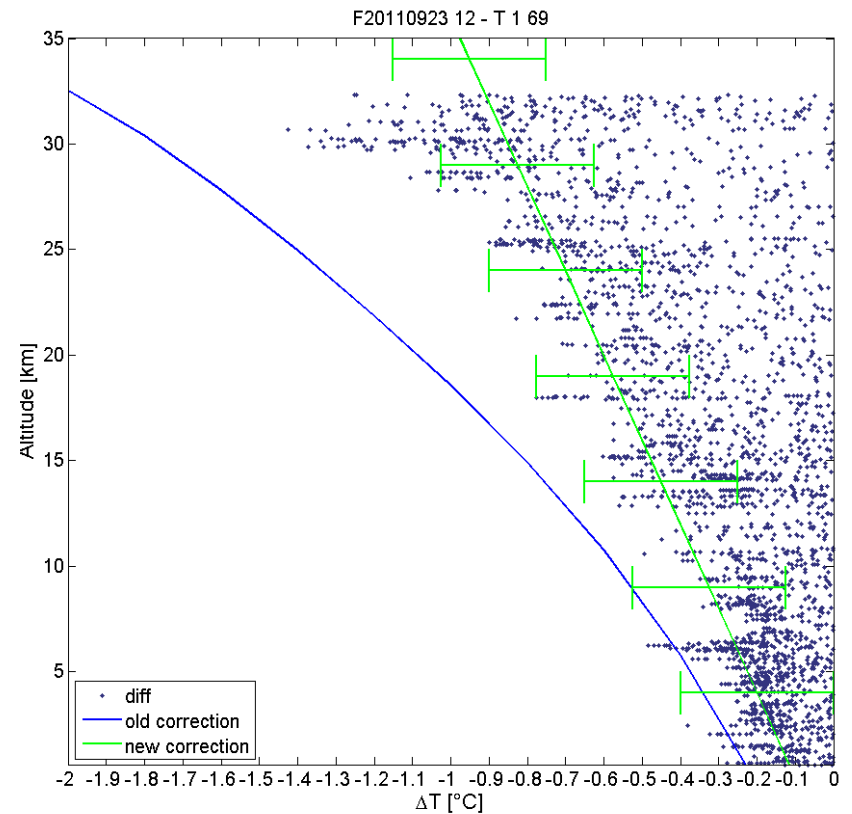
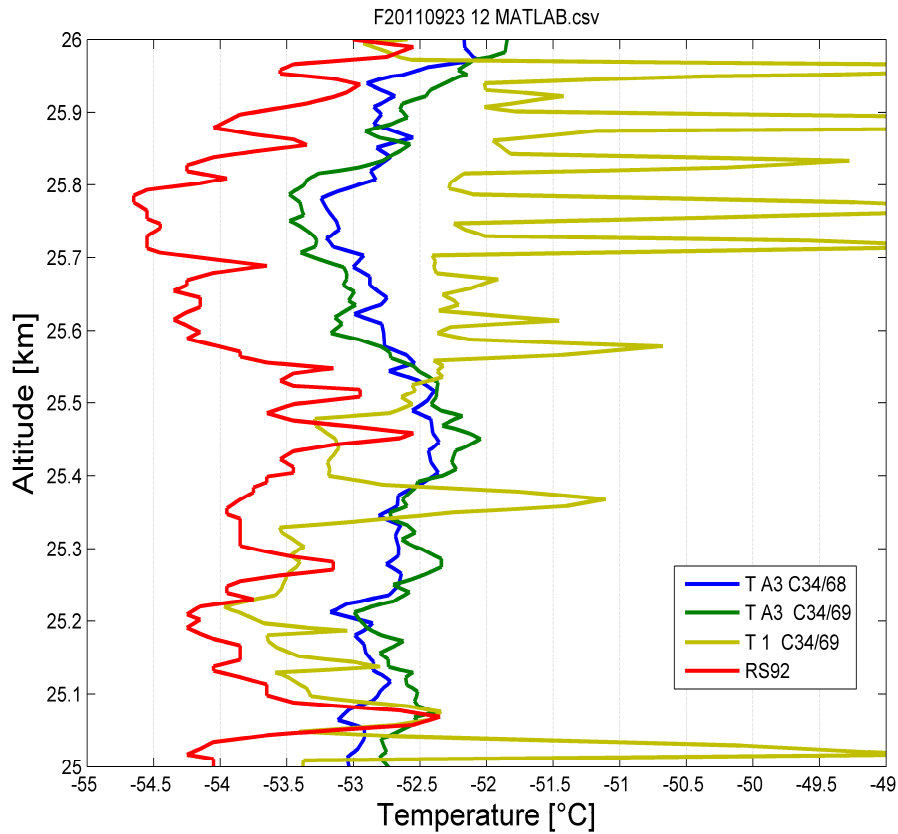
- Aluminium plate (brilliant / black) attached to SRS-C34
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- Alternately one sensor is exposed to the sun





Radiation Error on Temperature

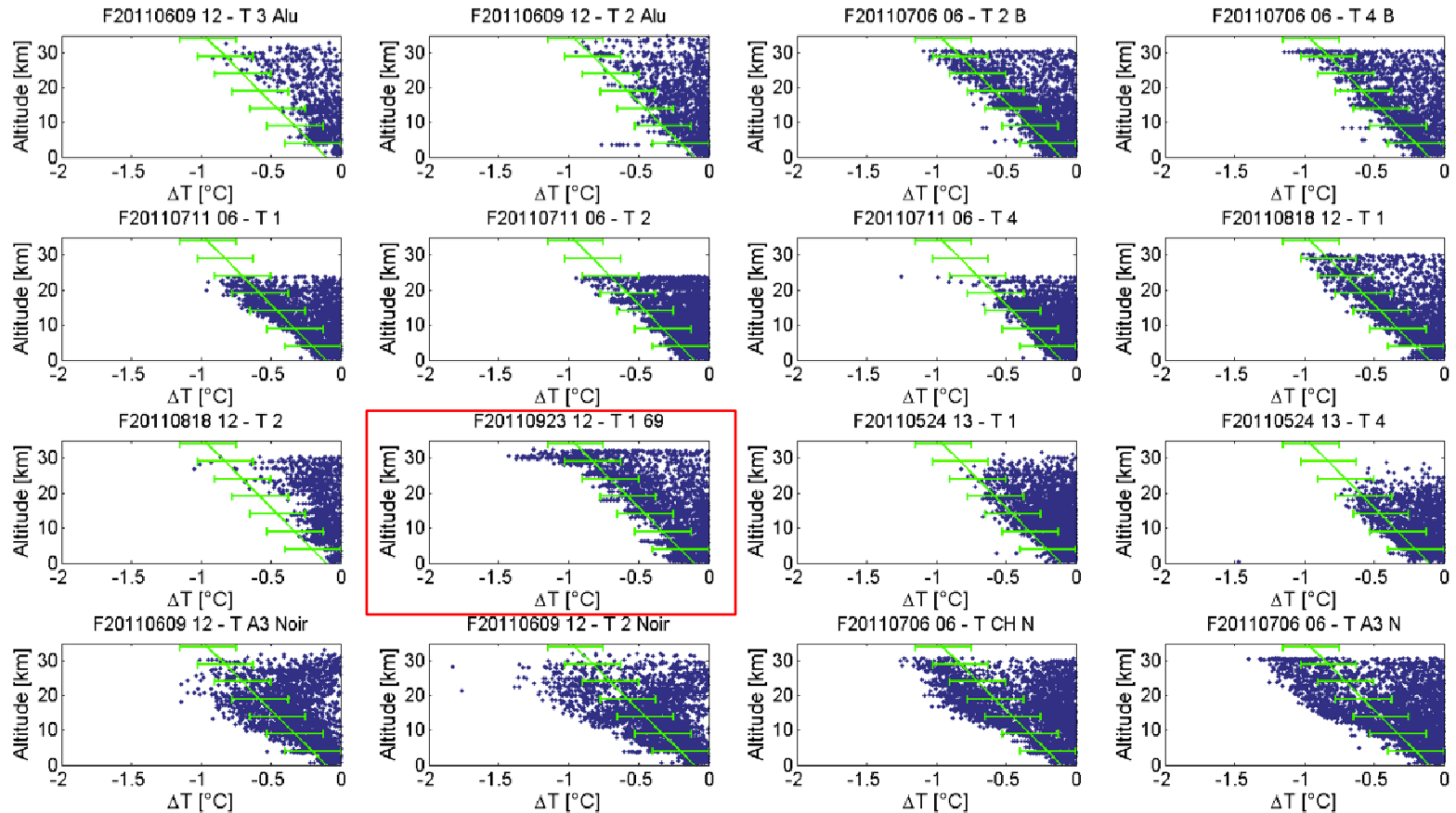
SRS-C34 Radiosonde





Radiation Error on Temperature

SRS-C34 Radiosonde

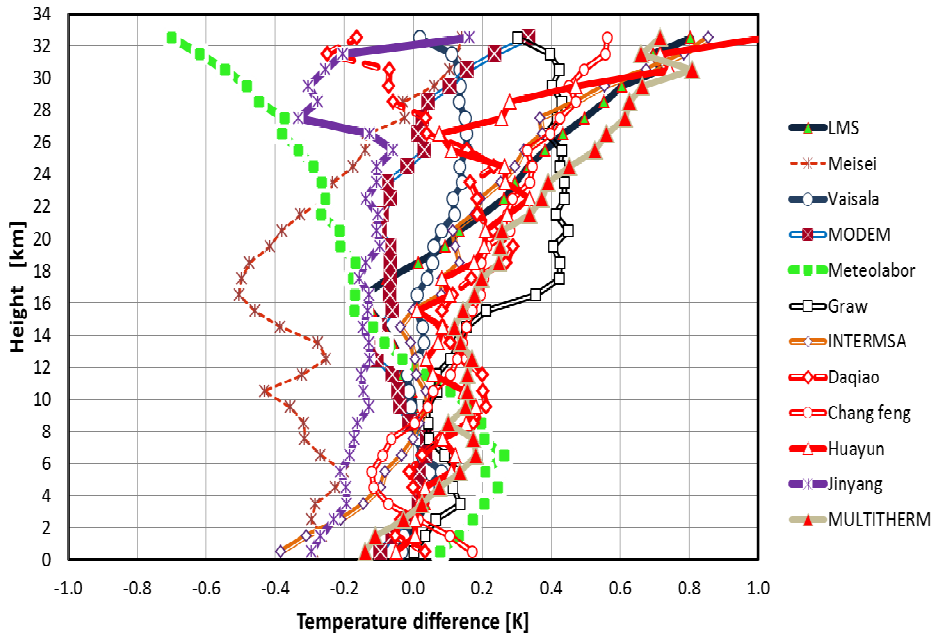




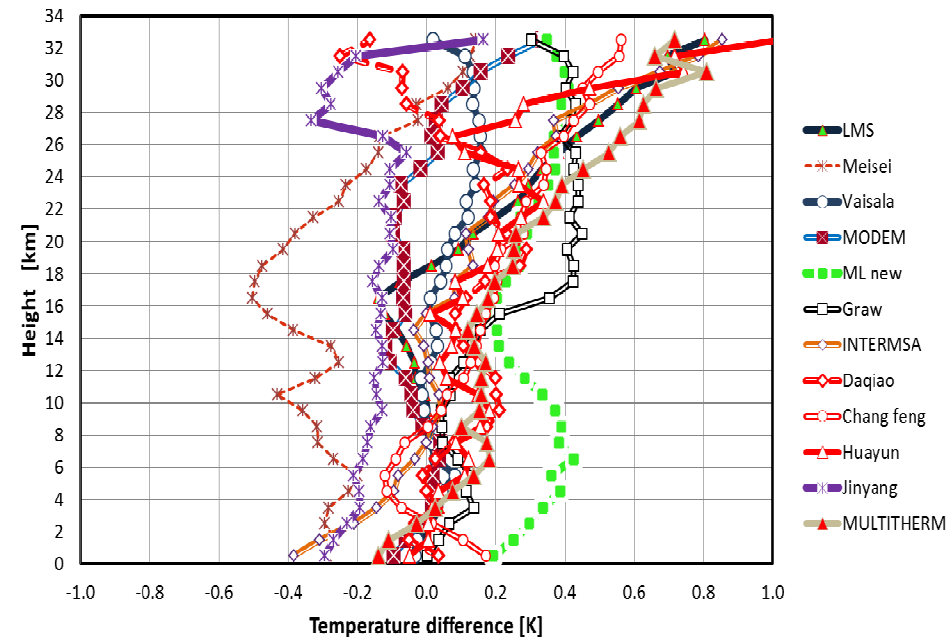
Old - Radiation Error Correction

SRS-C34 Radiosonde

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



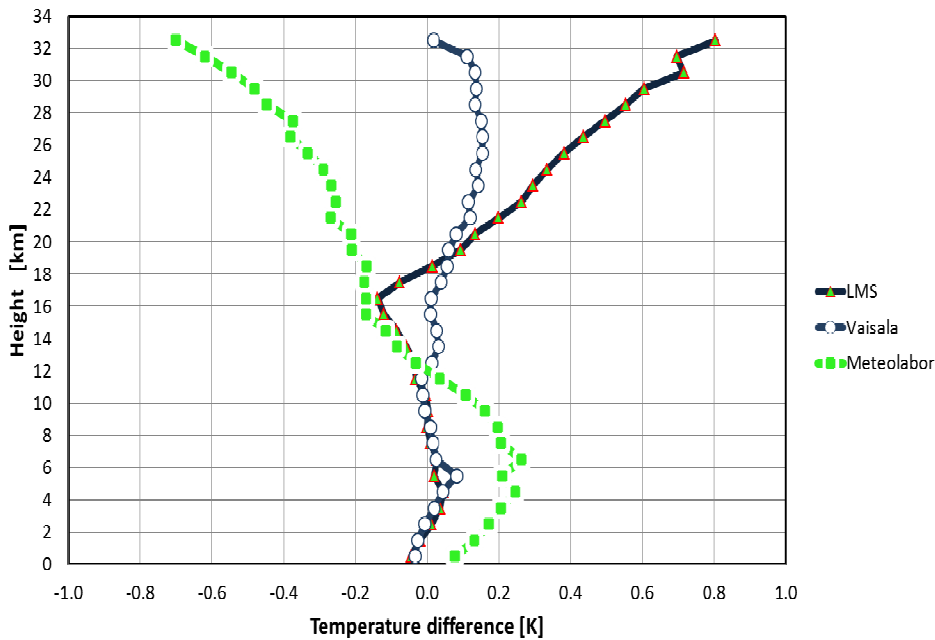
Simultaneous Temperature differences in day,
8th WMO Radiosonde Comparison, Yangjiang, China



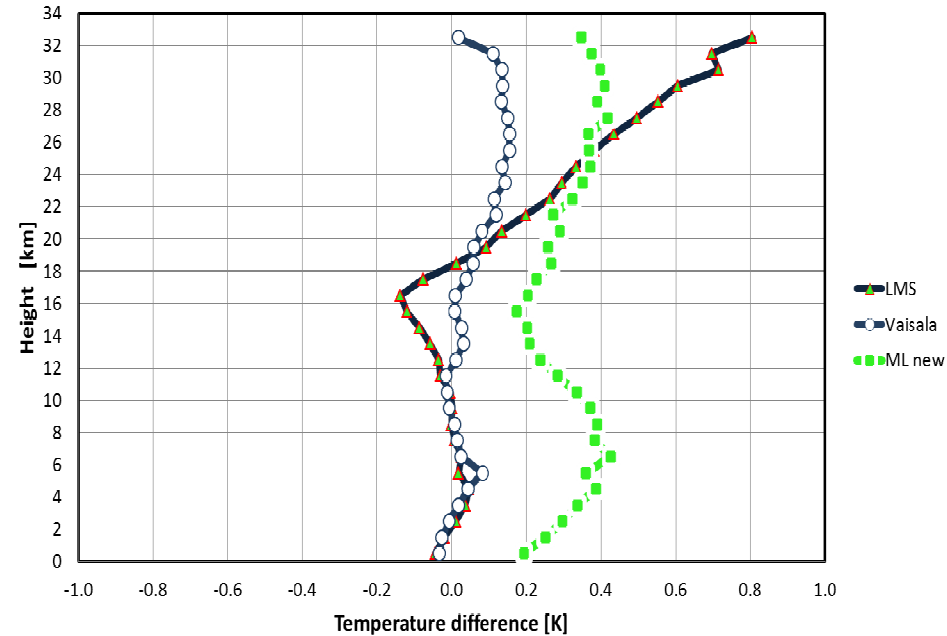


New - Radiation Error Correction SRS-C34 Radiosonde

Simultaneous Temperature differences in day,
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Simultaneous Temperature differences in day,
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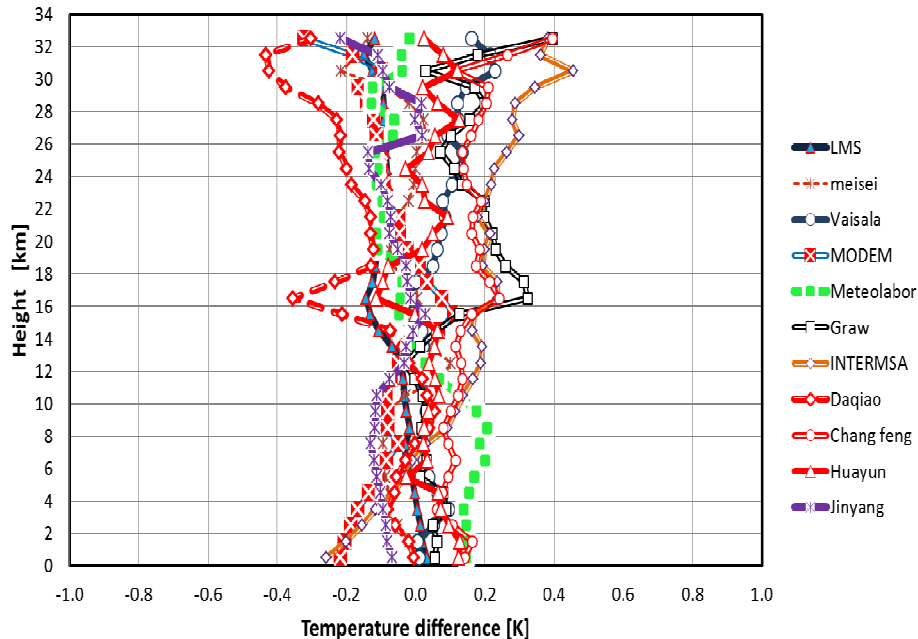




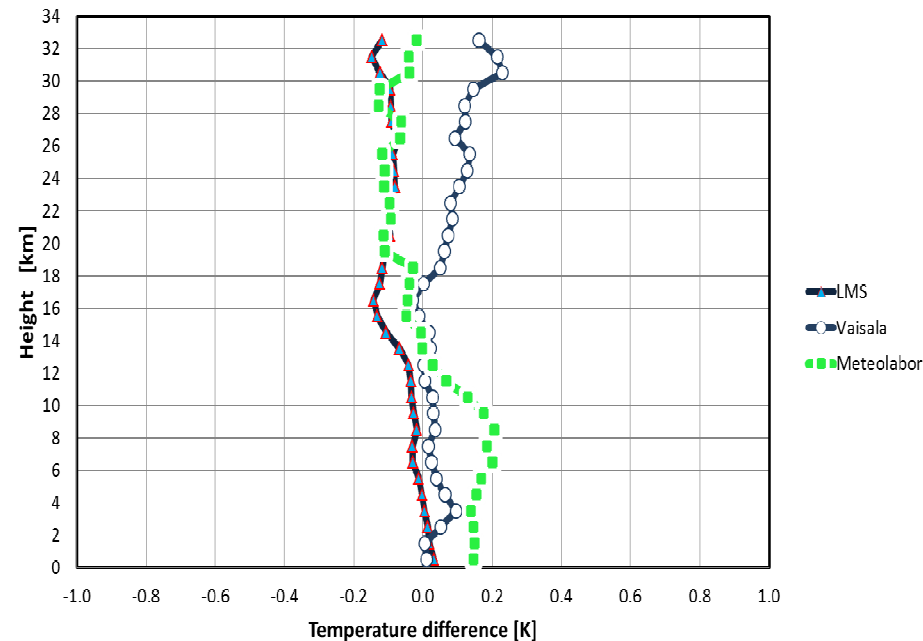
Temperature intercomparison

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

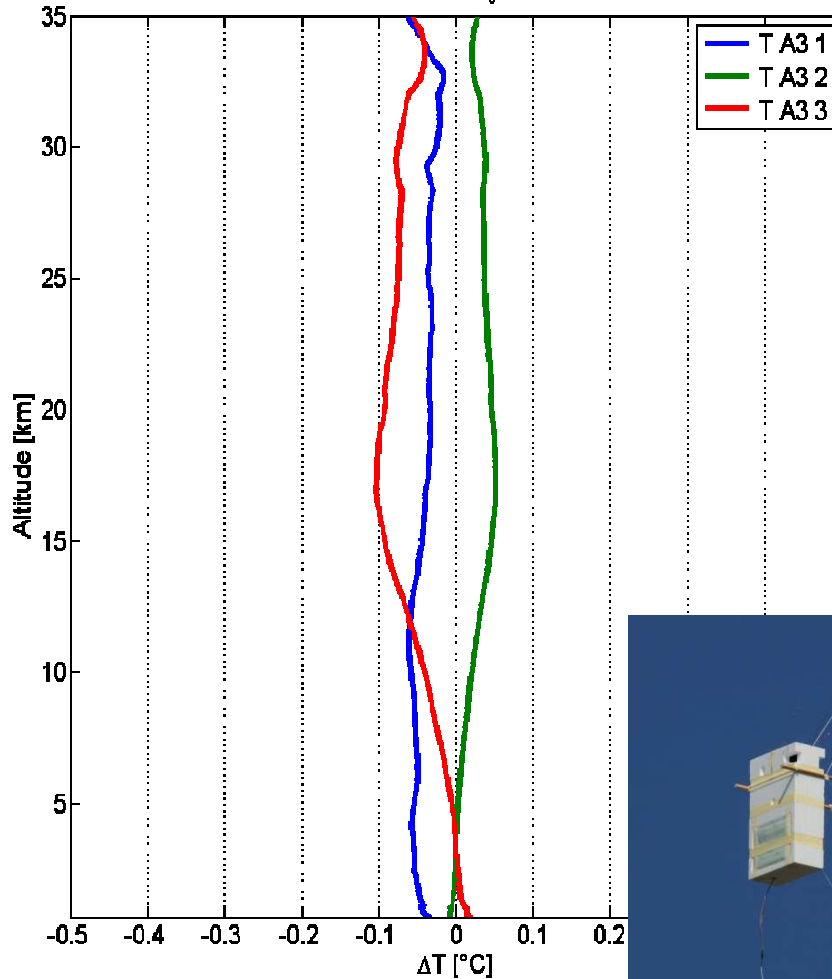




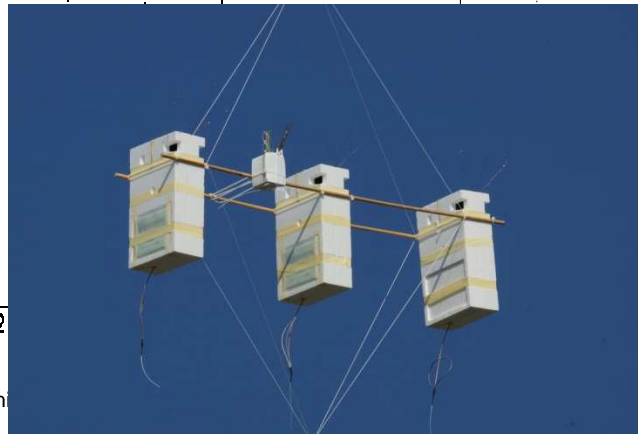
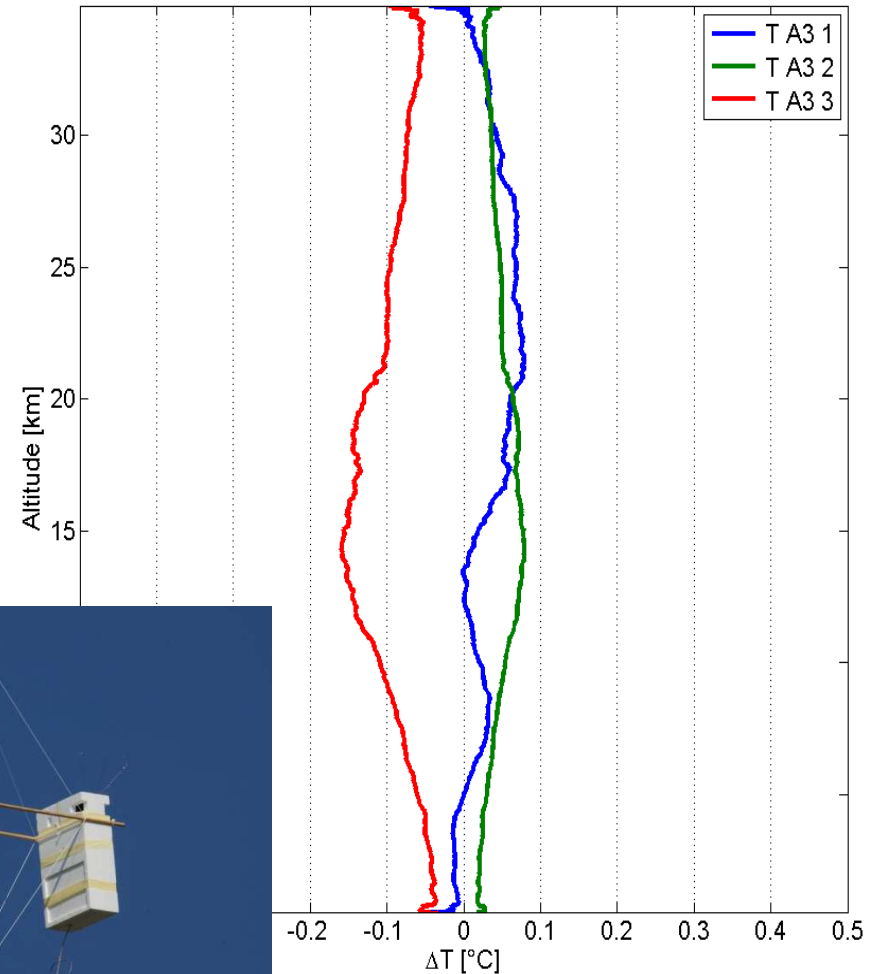
Temperature uncertainty

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

Intercomparison of Temperature and Humidity

Humidity comparisons between
SRS-C34, RS92 and SnowWhite

Agreement between 2 – 4%

Investigations on radiation error on temperature measurements
Temperature uncertainty with triple sounding SRS-C34

Results to appear soon