



# **The GRUAN Observing Station Payerne, Switzerland**

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# Payerne Observing Station







# Surface Meteorological Station

Standard SwissMetNet Station Payerne





# Surface Radiation Station

## Baseline Surface Radiation Network BSRN



- Direct solar radiation broadband and spectral
- Diffuse sky radiation broadband and UV
- Global and reflected radiation broadband and UV
- Longwave radiation downward and upward
- Shortwave and longwave upward 10 m and 30 m tower



# Payerne Profiling Systems

Operational Radiosonde Station

Operational Low Tropospheric Windprofiler

Operational Microwave Temperature and WV Radiometer

Operational Water Vapor Raman Lidar

Operational Ceilometer

Operational Ozone Microwave Radiometer

Operational GPS Antenna





# Radiosonde System





# Radiosonde System

Swiss system BASORA and sonde SRS 400 developed end of 1980s by Meteolabor AG with MeteoSwiss and Swiss Army

SRS400 analog version in operation since 1990, thermocouples, hypsometer and VIZ/SIPPICAN hygristor

Meteolabor developed digital version C34 with SnowWhite dew/frost point hygrometer

Presently investigating a ROTRONIC capacitive hygristor for SRS400 analog



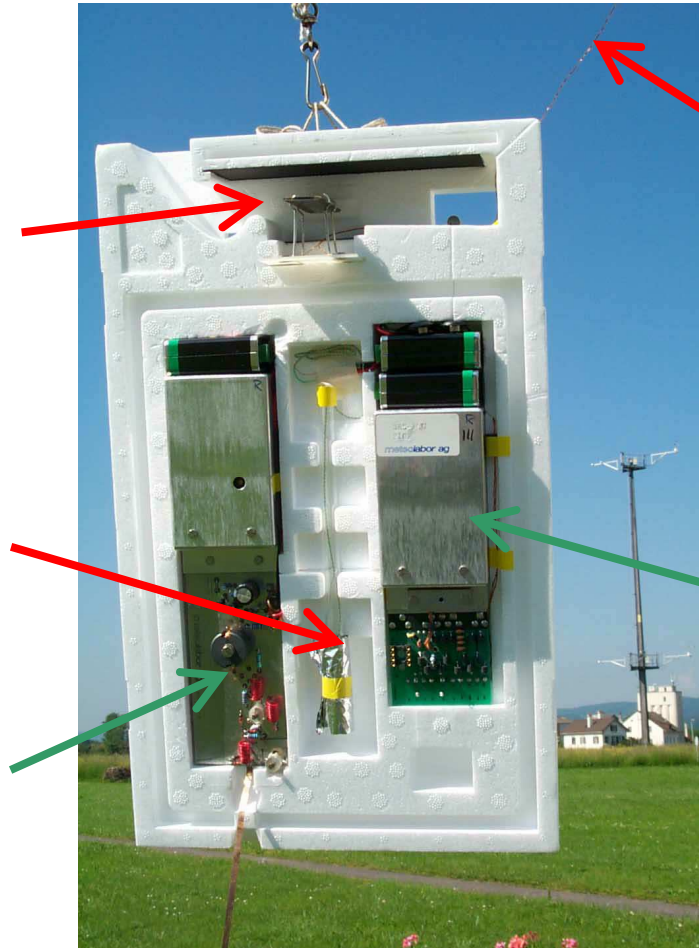
# RadioSonde System

**Swiss RadioSonde SRS 400** (operational since April 1990)

VIZ/Sippican B2  
resistive carbon  
hygristor

Water  
Hypsometer

Transmitter  
400 Mhz



Thermocouple  
(Copper - Constantan)  
(junction 70 - 100  $\mu\text{m}$ )

Electronique  
Interface  
with HF filtre

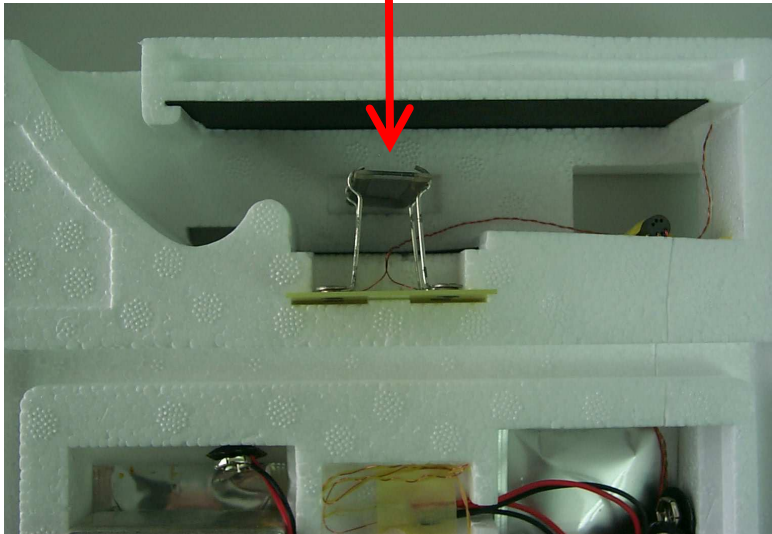




# Radiosonde System

## Replacement of VIZ/SIPPICAN by ROTRONIC HC2 hygristor

Resistive VIZ/SIPPICAN hygristor  
in ventilation channel



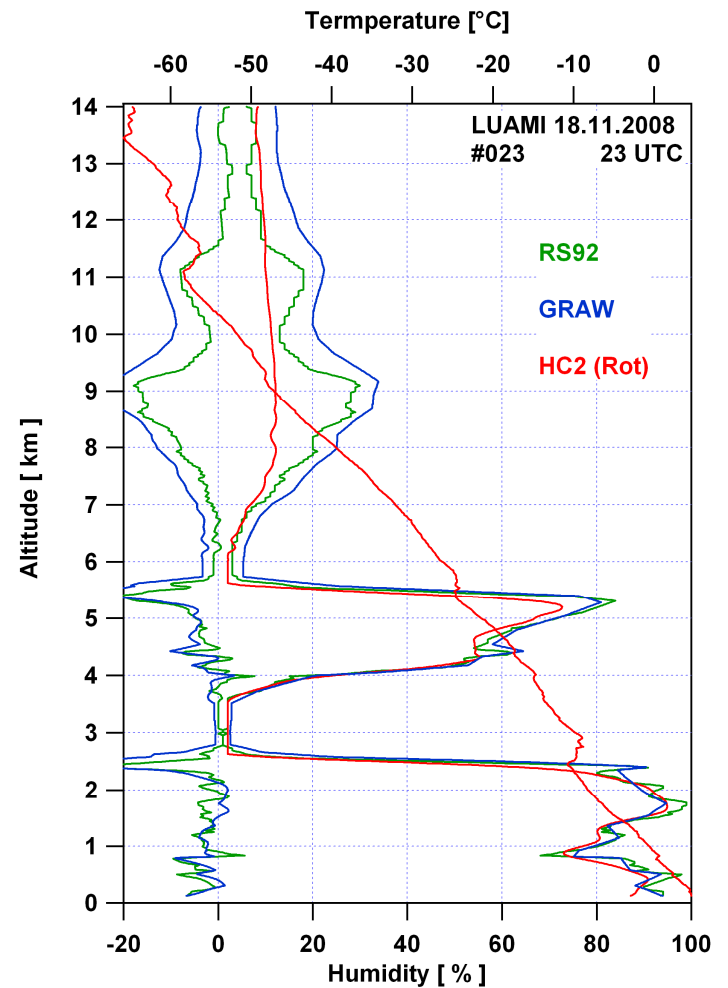
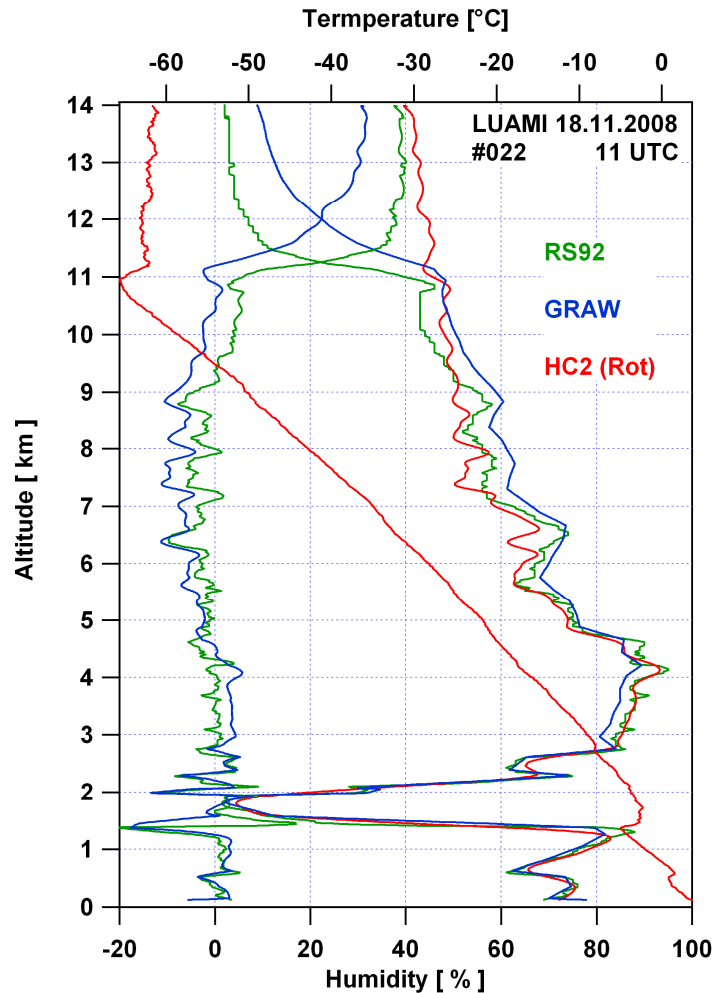
Capacitive ROTRONIC HC2 hygristor  
in ventilation channel





# Radiosonde System

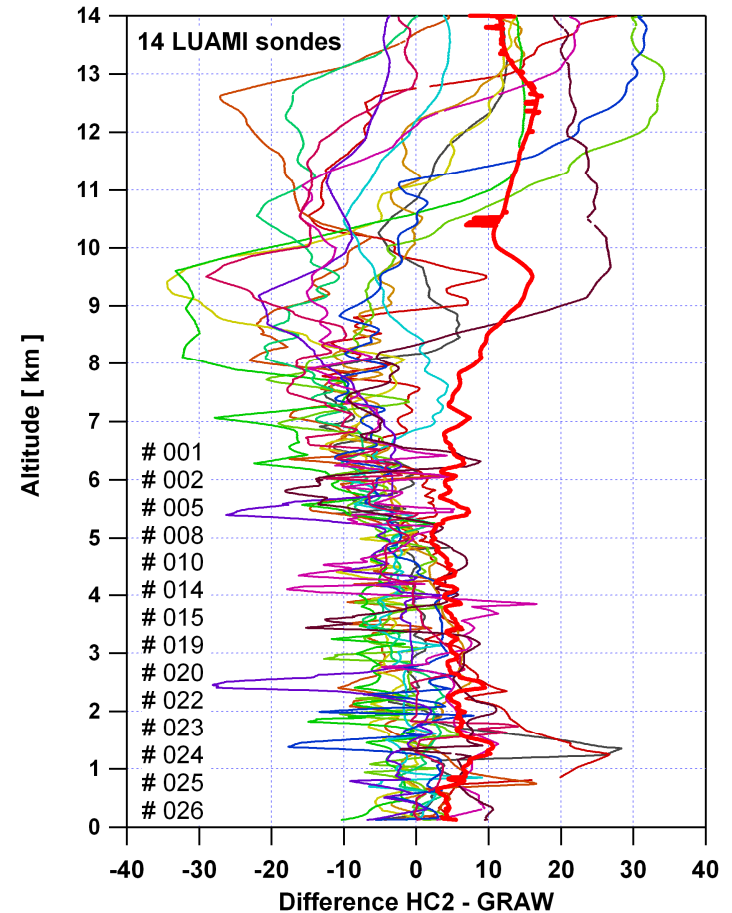
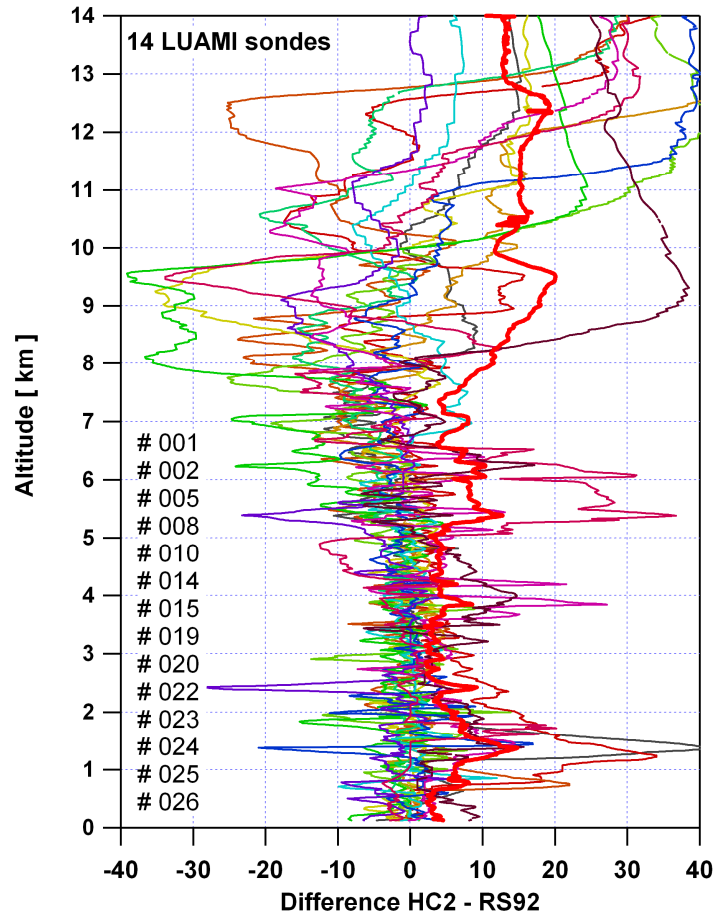
## ROTRONIC HC2 hygristor test results during LUAMI (Nov 2008)





# Radiosonde System

## 14 HC2 sondes compared to RS92 and GRAW during LUAMI







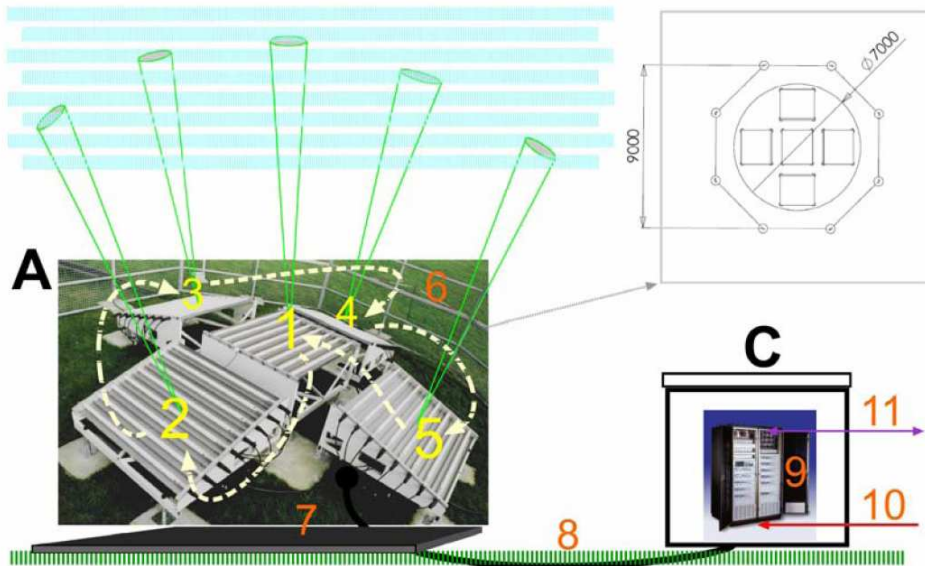
# Remote Sensing Systems





# Low Tropospheric Wind Profiler

Low-tropospheric 1290 MHz wind profiler Degreane



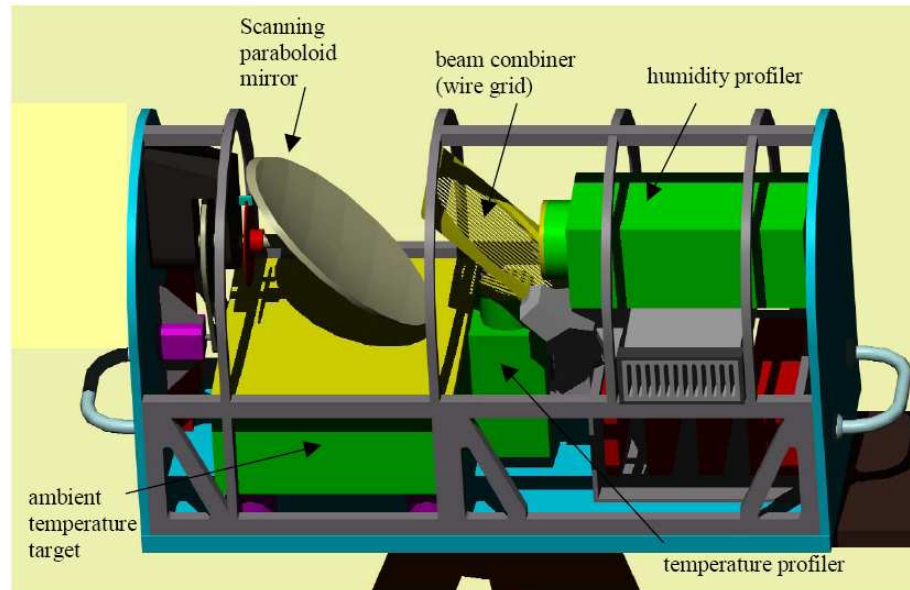
- Fully automatic and in operation since 1998 (Degreane 2007)
- Part of the European wind profiler network (CWINDE)
- Operationally assimilated in several NWP models
- Part of CN-MET network for nuclear power plant surveillance in Switzerland





# Microwave Radiometer RPG-HATPRO

Radiometer for temperature and water vapor profiling



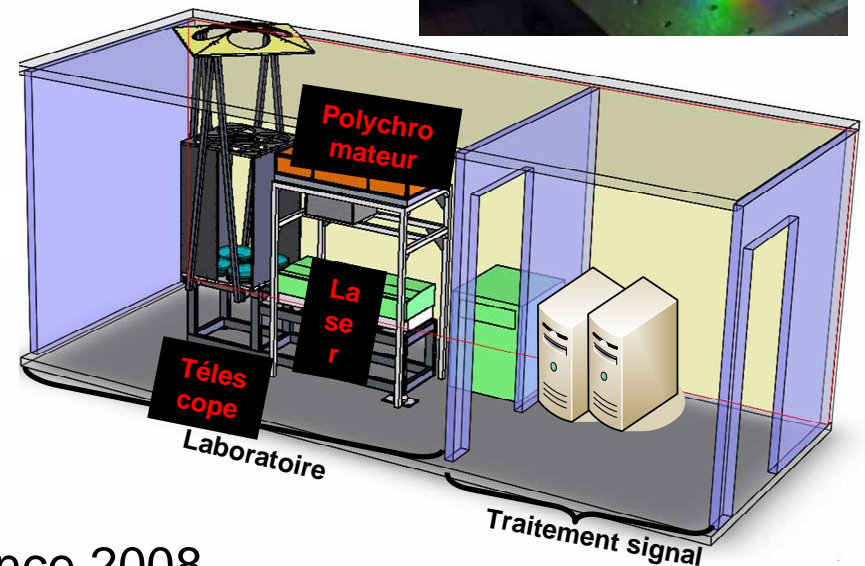
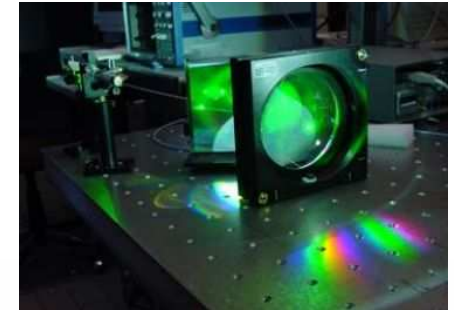
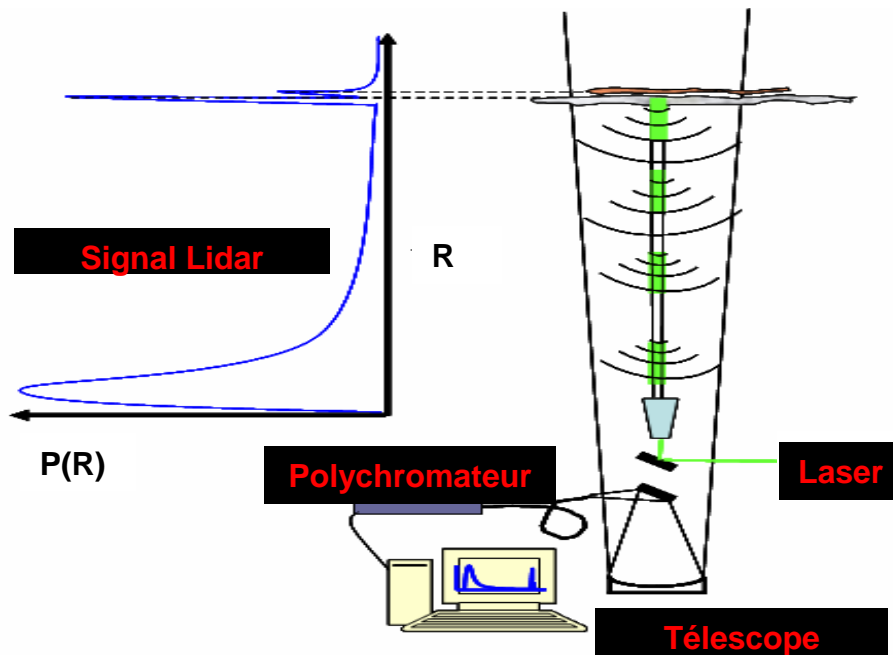
- Fully automatic and in operation since 2007
- Part of CN-MET network for nuclear power plant surveillance in Switzerland





# Water Vapor Raman Lidar RALMO

Raman Lidar RALMO for water vapor profiling



- Fully automatic and in operation since 2008
- Validation in progress



# Ceilometer

## Ceilometer Eliasson CBME80



- Range: 0 – 25 000 feet  
(0 – 7500 m)
- Resolution: 30 feet
- Accuracy: 30 feet  $\pm$  2%
- Interval: 30 / 60 s
- Pulse power: 50W
- Pulse length: 100 ns
- Puls freq.: 400 – 1000 Hz
- Wavelength: 905  $\pm$  5 nm
- Divergence: 2.8 mrad



# Ozone Microwave Radiometer SOMORA

142.17 GHz microwave radiometer for ozone profiling



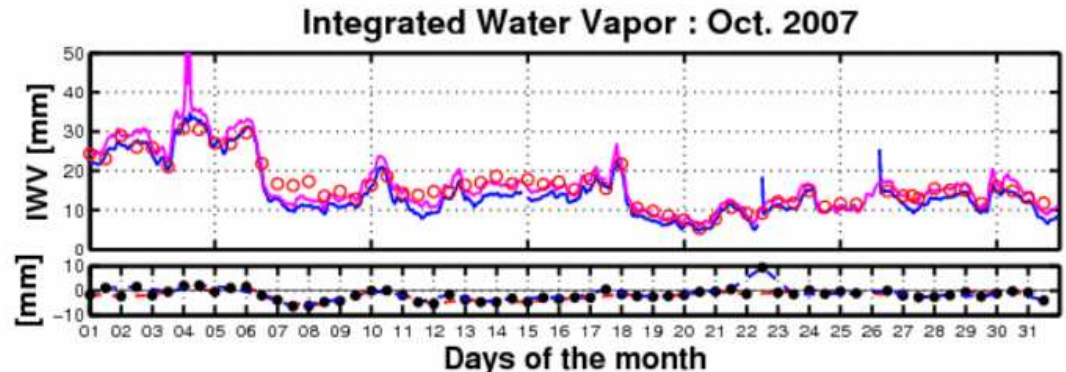
- Fully automatic and in operation at Payerne since 2001
- NDACC system
- Data delivered to NILU
- Data delivered to WOUDC





# Automated GPS Network Switzerland

## AGNES GPS network for integrated water vapor



Compare hourly Integrated Water Vapor/IWV measurements by GPS, microwave radiometer and soundings. Upper graph, the blue curve represents the GPS data, magenta curve: Hatpro IWV, the red dots, the values estimated from the sounding at 00 & 12 UTC, the green dots, the values estimated from the other soundings and the cyan dots, the values estimated from the snow white. Lower graph, the difference between sounding and GPS data recorded at 00 UTC (blue line) and 12 UTC (red line).

	00 UTC	12 UTC	00-12 UTC
<b>bias [mm]</b>	-2.04	-1.34	-1.69
<b>std [mm]</b>	1.91	2.83	2.43
<b>rms [mm]</b>	2.77	3.09	2.94
<b>corr</b>	0.96	0.9	0.93
<b>mean (soud)</b>	17.1	15.49	16.3
<b>mean (GPS)</b>	15.18	14.16	14.66

Overview of some statistics based on 30 days of Oct. 2007 for the 00 UTC and on 31 days for the 12 UTC.

- GPS data
- Radiosonde
- Microwave radiometer HATPRO



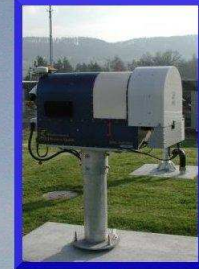
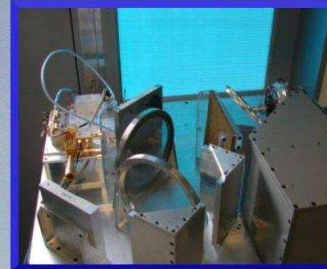
## SwissMetNet



## Rayonnement



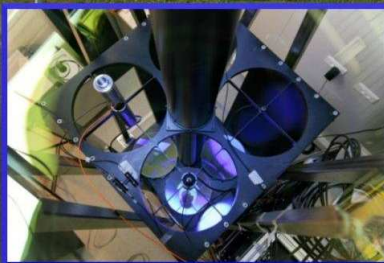
## Radiomètres micro-ondes



## Radiosondage



## Lidar



## Céilomètre



## GPS



## Wind profiler

