



ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

GRUAN site: Sodankylä, Finland

Rigel Kivi, Esko Kyrö
Finnish Meteorological Institute
Arctic Research Centre



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; Networks: GUAN (WMO 02836), NDACC, GAW. Campaigns: LAUTLOS-WAVVAP; SAUNA-1 & -2; EPS.

GCOS Reference Upper-Air Network





Observation	Starting year
Ground weather observations (Automated since 2004)	1908
Radiosondes (Automated 2006)	1949
Solar radiation observations	1957
Radioactivity	1960
Total Ozone observations	1988
Ozone sondes	1988
UV spectrum, NO2 column	1990
Aerosol backscatter profile 490 nm and 940 nm from backscatter sondes	1994
Meteorological Mast Experiment	1999
<ul style="list-style-type: none"> ✓ Soil parameters ✓ Snow parameters ✓ Flux measurements, ✓ Solar and IR radiation ✓ Bio-fluorescence 	

Stratospheric water vapor profile from frost point hygrometer and Lyman-alpha hygrometer	2002
Finnish Ultraviolet Research Centre (FUVIRC) <ul style="list-style-type: none"> ✓ UVB, UVA, air and soil temperature measurements from FUVIRC ambient UV modulation field for bio-effects of added UV 	2002-2004
Satellite validation/calibration pixel (new instrumentation) <ul style="list-style-type: none"> ✓ Continuous reflectance monitoring on a high resolution spectrometer (340 -2400 nm) from the 30 m tower for satellite image validation (pine forest; lichen covered bare land; snow surface) ✓ Atmosphere optical depth in four wavelengths ✓ Broad band albedo at variable heights,UV albedo ✓ Cloud camera ✓ Ground moisture grid ✓ GPS Intergrated water vapor column ✓ MW Temperature and RH profiler ✓ Lidar for cloud layer heights and fractional coverage ✓ Mobile radiosounding station ✓ FTIR for GHG columns (2009) 	2005-2009



Priority 1 variables:

- Surface observations: *available, close proximity to the sounding facility*
- Upper air measurements:
 - Radiosondes launched at 12 UT and 00 UT, RS92-SGP, DigiCora-3*
 - CFH together with RS92*
 - Sonde comparisons: for example APS*
- Ground-based GPS: *available, 20 km from the sonde station*



Priority 2 variables

Priority 2 measurements at the site include surface radiation measurements; microwave radiometer measurements of temperature and moisture profiles (22 to 36.5 GHz); integrated trace gas measurements (ozone by Brewer #037, methane by FTIR); column aerosol measurements from sunphotometer (wavelengths of 862, 500, 412 and 368 nm with 5 nm FWHM bandwidth); profiles measurements of ozone by ECC type of sondes; aerosol backscatter profile in situ measurements at 490 nm and 940 nm on campaign basis.



- Which guidelines/manuals do you use when taking measurements, if any?

Standard WMO guidelines; manuals provided by the manufacturers

- What is your data dissemination practice?

Data are submitted through the GTS and the FMI web server (fmiarc.fmi.fi)

Other data submissions: WOUDC, NDACC, NILU, AVDC



Needs: What do you need from lead centre / working group / secretariat?

- *Regular meetings to discuss the best practices and possible data corrections: for example time-lag corrections, empirical corrections, remaining uncertainties; what will be the reference instrument, how often the reference measurements should be made; timing in case of the sonde measurements; recommendations for the metadata; campaigns; publications; need for new instruments; funding possibilities, etc.*



News: Are there any scientific or organizational developments we should be aware of?

- *FTIR installation in December 2008: carbon dioxide, methane, etc.*
- *COBALD/BKS flights in January 2009: aerosol backscatter ratio profiles*
- *LAPBIAT campaign in January 2010: CFH/NOAA; FLASH-B; APS; RS92; COBALD/BKS; MW; GPS; www.sgo.fi/lapbiat2*



Sonde comparisons

Hygrometer intercomparison campaign in Sodankylä in Feb 2004. The focus of this project is the improvement of water vapor measurement techniques in the Upper Troposphere and Lower Stratosphere.

Radiosondes: **RS80-A, RS80-H, RS90, RS92** and **FN**

Frost point hygrometers: **NOAA/CMDL, CFH** and **Snow White**

Ly-alpha: **FLASH-B**

