

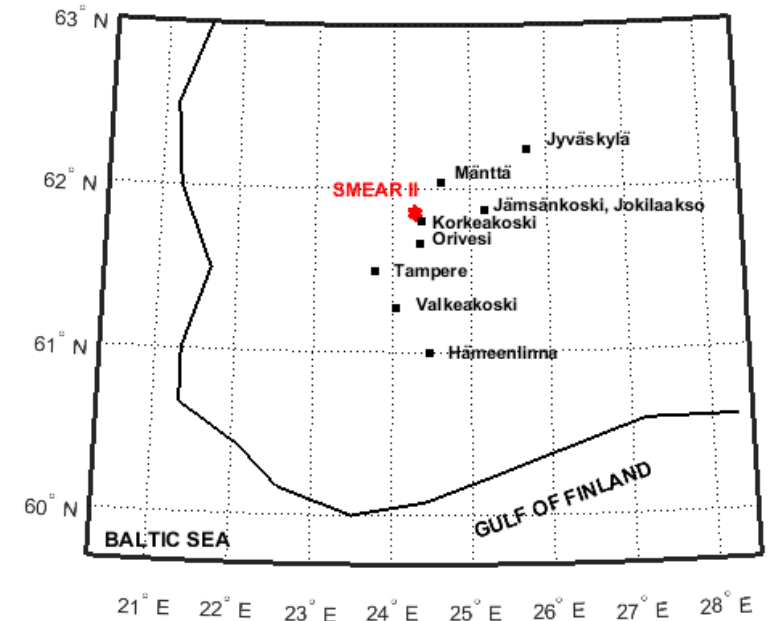
Hyytiälä FI0050R, SMR (Finland):
submitter Petri Keronen, UHEL
originator Tuukka Petäjä, UHEL



The measurements are performed at SMEAR II (Station for Measuring Forest Ecosystem-Atmosphere Relations II, <https://www.atm.helsinki.fi/SMEAR/index.php/smear-ii>).

SMEAR II is a rural background site surrounded by large forest area with low local NO_x emissions.

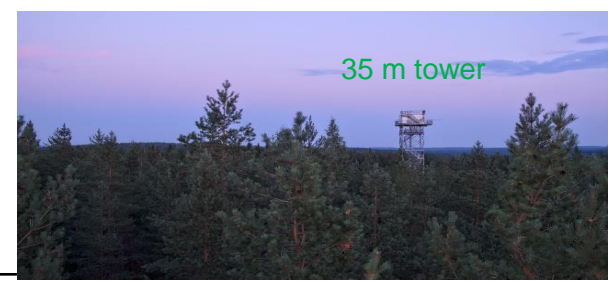
- a sawmill and a local power plant in village Korkeakoski (about 2000 inhabitants) is at a distance of 7 km
- nearest villages/towns (Orivesi and Mänttä with about 10000 inhabitants each) are at a distance of 22 – 30 km
- paper mills 40 to 70 km away (Jämsänkoski, Jokilaakso and Valkeakoski)
- closest bigger towns (more than 50000 inhabitants) are at a distance of 40 km (Tampere), at a distance of 100 km (Jyväskylä) and at a distance of 95 km (Hämeenlinna)
- sectors 270° – 39° and 60° – 140° are relatively free from any major NO_x sources to distance up to 300 km



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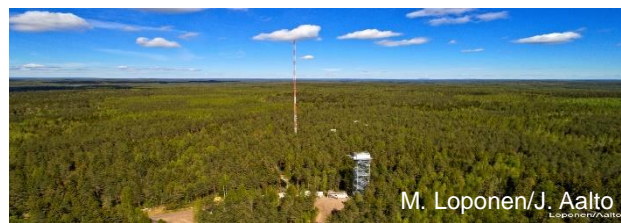
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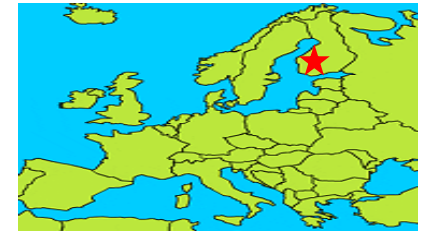
	NO	NO2
Current instrumentation/ measurement principle	TEI 42iTL / type CLD (Thermo Electron) <ul style="list-style-type: none">- sample inlets at 8 heights in a 125 m high guyed mast- Data from 33.6 m height submitted- sample line length 150 m, lag time 35 s- sample line 16/14 mm PTFE, slightly heated	TEI 42iTL with UV-led photolytic converter (BLC, Droplet Measurement Technologies)
Future (in 2022...) instrumentation/measurement principle	CLD 780 TR / type CLD (Ecophysics) <ul style="list-style-type: none">- one sample inlet at 35 m height in a tower- sample line length < 5 m & lag time < 5 s- sample line 6/4 mm PTFE	LGR NO2 / type CRDS (Los Gatos Research)
Scale	<ul style="list-style-type: none">- NO 1.04 ppm ± 1.4 % (rel.) in N₂, LINDE (Germany) cylinder No. 7523112639859- NO2 GPT-method- dilution of NO standard and GPT with TEI 146i calibrator (Thermo Electron)	
calibration interval	Automatic zero by the instrument at 30 s interval Calibration check (zero + 5 span points) generally twice a year	
quality checks	Chamber & PMT temp + sample pressure & flow and consistency of data with other measurement systems checked on a daily basis	
intercomparisons	- informal intercomparison with MPI, Germany summer 2010 & RoundRobin-experiment 2012	

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	O₃	Air temperature, dew point/relative humidity
<p>Current gas instrumentation/measurement principle</p> <p>Future (in 2023...) gas instrumentation/measurement principle</p>	<p>TEI 49i / UV-absorption (Thermo Electron)</p> <ul style="list-style-type: none"> - sample inlets at 8 heights in a 125 m high guyed mast <ul style="list-style-type: none"> - Data from 33.6 m height submitted - sample line length 150 m, lag time 35 s - sample line 16/14 mm PTFE, slightly heated <ul style="list-style-type: none"> - pressure drop 60 hPa <p>TEI 49i / UV-absorption (Thermo Electron)</p> <ul style="list-style-type: none"> - one sample inlet at 35 m height in a tower - sample line length < 5 m & lag time < 5 s - sample line 6/4 mm PTFE 	<ul style="list-style-type: none"> - Air temperature: PT-100 temperature sensors, which are protected from solar radiation and ventilated by fans (both custom self-made and Rotronic Hygromet MP102H + Rotronic shield RS-24T, Rotronic AG) - Dew point: a chilled mirror sensor (DewTrak Model 200M Meteorological Humidity System, EdgeTech). - Relative humidity: Hygroclip sensors (Rotronic Hygromet MP102H with Hygroclip HC2-S3, Rotronic AG)
Scale	<ul style="list-style-type: none"> - reference O₃ photometer of the SMEAR-stations (Teledyne T703U, Teledyne API) - the reference O₃ photometer is yearly calibrated at the national calibration laboratory K043 of Finnish Meteorological Institute against the national primary ozone photometer (SRP-37) traceable to the Standard Reference Photometer (SRP-27) of the International Bureau of Weights and Measures (BIPM) 	
calibration interval	Calibration check (zero + 5 span points) generally twice a year	

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- **TEI 42iTL + BLC instrumentation:**
 - measurement chamber pressure on the average 130 hPa; PMT temp -9 C on the average; the instrument room air temperature conditioned to 24 +/- 0.5 C
 - measurement interval 6 min per sample height
 - Inlet description: Rain protected inlet with apertures in a machined piece of a PTFE rod; 157 m long sample line of 16/14 mm diam. PTFE tube; main flow 45 l/min (continuous); inlet + line heated at 5 C above air temp; 5 um PTFE filters at analyser inlet
 - Quenching caused by water vapour and artefacts caused by reaction with ozone inside the sample line + Baseline/nocturnal correction due to instrumental offset corrected for (according to SOPs for NO_x measurements, Deliverable D4.10 + Baseline determination for NO data Version 1 2019/02/02 by Wegener and Holla)

That was all for Hyytiälä.

- Thank you for your time!