

Pallas, Global Atmospheric Watch Station



The Pallas station is located in a remote, subarctic region at the northernmost limit of the boreal forest zone in Europe. The infrastructure consists of several separate sites, the most important of which are Sammaltunturi, Matorova, Kenttäröva, Lompolojänkkä and Laukukero. All the sites are within 12 km of each other. The main site with the largest measurement programme is Sammaltunturi, residing on a top of a hill some 100 m above the treeline. Both Sammaltunturi and Laukukero are inside the cloud layer in approximately 10% of days. Matorova is located in a forest clearing, and it was chosen as another aerosol measurement site because the conditions in Sammaltunturi are too harsh for wintertime collection of filter samples. In Kenttäröva there is a 20-m-high tower for micrometeorological flux measurements. The main part of the infrastructure has been operated continuously since 1994 when Pallas was incorporated into the Global Atmosphere Watch (GAW) programme of the World Meteorological Organization (WMO). Currently about 30 automatic measuring installations are operated continuously in Pallas.

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1. RESEARCH INTEREST AND PARTICULAR COMPETENCES

The research interests of the Research & Development unit of the Finnish Meteorological Institute include both continuous and campaign-based field measurements of atmospheric chemistry covering both the aerosol and the gas phase. Research competences include:

- Atmospheric aerosols: climate change, health effects, acidification, instrument development, and modeling.

- Inorganic and organic trace gases: atmospheric concentrations, variability, long-term trends, and emissions.
- Greenhouse gases: atmospheric concentrations, sources and sinks, and flux measurements.

2. GEOGRAPHICAL INFORMATION

Geographical coordinates: 24° 06' 58" E , 67° 58' 24" N

Altitude above sea level: 565 m

In operation since: 01.01.1991

3. METEOROLOGICAL INFORMATION

Main wind direction: not available

Air pressure: Avg :941.6 ; Min: 894.8 ; Max: 976.8

Air temperature: Avg:-1.1 ; Min: -32.7 ; Max: 20.7

4. INSTRUMENTATION / MONITORING ACTIVITIES

Type	Parameter	Instrument/Method	Time Resolution	Start of Measurements	End of Measurements
Aerosol	Light absorption coefficient	Aethalometer	10 min		
	Light scattering coefficient	Nephelometer	10 min		
	Mass (major inorganic components)	Filter	Daily		
	Mass (total aerosol)	PM10 beta gauge	1 h		
	Number concentration	CPC	10 min		
	Size	DMPS	5 min		

	distribution (Number)				
Greenhouse Gas	CH4	gc-analysis	1 h		
	CO2	NDIR analysis	1 h		
	N2O	gc analysis	1 h		
	SF6	gc analysis	1 h		
Meteo	Precipitation	FD12P	1 min		
	Humidity	HUMICAP	1 min		
	Pressure	VaisalaDPA	1 min		
	Temperature	Pt100	1 min		
	Trajectories	FLEXTRA	3 h		
	Wind direction	sonic anemometer	1 min		
	Wind speed	sonic anemometer	1 min		
Ozone	Surface ozone	UV absorption	1 h		
POP	POP	filter	weekly		
Precipitation	Acidity/Alkalinity)	conductivity	monthly		
	Ammonium (NH4+)	ic analysis	monthly		
	Anions (inorganic)	ic analysis	monthly		
	Calcium (Ca++)	ic analysis	monthly		
	Cations	ic analysis	monthly		
	Chemical Compositions (general)	ic analysis	monthly		
	Chloride (Cl-)	ic analysis	monthly		

	Fluoride (F-)	ic analysis	monthly		
	Inorganic Ions	ic analysis	monthly		
	Magnesium (Mg++)	ic analysis	monthly		
	Nitrate (NO3-)	ic analysis	monthly		
	pH	conductivity	monthly		
	Potassium (K+)	ic analysis	monthly		
	Sodium (Na+)	ic analysis	monthly		
	Sulfate (SO4-)	ic analysis	monthly		
	Trace Metals	ICP-MS	monthly		
Radio Nuclide	radon [Ra-222]	filter + beta counting	1 h		
Reactive Gas	1-C4H10 (iso-Butane)	gc analysis	twice a week		
	Acetylene	gc analysis	twice a week		
	C2H6	gc analysis	twice a week		
	C3H4 (Propyne)	gc analysis	twice a week		
	C3H6 (Propene)	gc analysis	twice a week		
	C3H8 (Propane)	gc analysis	twice a week		
	c-C4H8 (cis-2-Butene)	gc analysis	twice a week		
	CO reduction	gas analyser	twice a week		
	H2	chemiluminescence	1 min		
	i-C4H10 (iso-Butane)	gc analysis	twice a week		
	i-C4H8 (iso-	gc analysis	twice a		

	Butene)		week		
	i-C ₅ H ₁₂ (iso-Pentane)	gc analysis	twice a week		
	n-C ₄ H ₁₀ (n-Butane)	gc analysis	twice a week		
	n-C ₅ H ₁₂ (n-Pentane)	gc analysis	twice a week		
	NMHC	gc analysis	twice a week		
	NO	chemiluminescence	1 min		
	NO _x	chemiluminescence	1 min		
	NO ₂	chemiluminescence	1 min		
	NO _y	chemiluminescence	1 min		
	SO ₂ UV	fluorescence	1 min		
	t-C ₄ H ₈ (trans-Butene)	gc analysis	twice a week		
	VOC	gc analysis	twice a week		
Solar Radiation	Global Irradiance	pyranometer	continuous		

5. SPECIFIC INFORMATION

a) URL of field site:

<http://fmigaw.fmi.fi>

b) Policy in relation to data availability and data access:

c) Access to the facility:

The Pallas station is accessible throughout the year. Accommodation can be arranged for 4-6

people all the time, and up to 50 people for shorter visits. Access is offered both for short-term field campaigns and long-term monitoring activities. Outdoor and indoor laboratory space is available. Aerosol measurements will be able to profit from the existing sampling systems built by FMI. Help is offered in the planning of the activities at FMI or in Pallas.

d) Fee for using the facility:

The fee for the usage of the facility will be agreed on case by case.

e) Scheduled scientific activities at the site:

f) Association to national, European and/or international networks:

In 2004 Pallas was involved in the following major programs/projects: GAW Global Atmosphere Watch, AMAP Arctic Monitoring and Assessment Program, EMEP Co-operative program for monitoring and evaluating the long-range transmissions of air pollutants in Europe, CREATE Construction, Use and Delivery of European Aerosol Database, CARBOEUROPE Assessment of the European Terrestrial Carbon Balance, METHMONITEUR Methane Monitoring in the European Union and Russia.

g) Indication on specific issues for which collaboration is sought:

6. INSTITUTION IN CHARGE

Finnish Meteorological Institute (FMI) is a research and service organisation under the Ministry of Transport and Communications of Finland. The main objective of FMI is to provide the Finnish nation with the best possible information about the atmosphere above and around Finland, for ensuring public safety relating to atmospheric and airborne hazards and for satisfying requirements for specialised meteorological products. The FMI has about 550 employees, of which more than 200 are working in the sector Research and Development . The atmospheric chemistry research of the FMI covers a wide spectrum of topics, including the development and application of new methods for size-resolved aerosol measurements, modelling of aerosol dynamics and aerosol-cloud interaction, long-term monitoring of aerosol properties and greenhouse concentrations, as well as studies related to biogenic emissions, ozone exposure and trace gas exchange between terrestrial ecosystems and the atmosphere.

7. CONTACT PERSON

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8. IMAGES

