Cabauw

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In RuisdaelCabauw will fulfil the role of main station, where the largest and Observatory, most complete set of observations is collected;
The Cabauw dataset will be routinely used to initialize and verify the model runs performed by the computational models run for the Ruisdael Observatory;
Observing cloud-aerosol interactions over the central part of The Netherlands, under influence of varying air masses.

A combination of cloud, aerosol microphysics and chemistry measurements enables a detailed long-term aerosol-cloud interaction study and comparison with satellite measurements;
Observing the regional evolution of aerosol;
Observing and quantifying the Dutch anthropogenic greenhouse gas fluxes; Observing 3D time-resolved distributions of key atmospheric parameters.

Added functionality in Ruisdael
For the Ruisdael Observatory, the integrated observation strategy of the measurement program will be enhanced from the 'soda straw' view to a 3D cylinder for key parameters by including scanning radars and lidars as well as regional networks. These parameters will include radiation, aerosols, clouds and trace constituents, in a radius of 30 km around the site. In addition, the existing Cabauw greenhouse gas profile measurements (CO2, CH4, N2O,CO) will be brought to ICOS level 1 standard. The measurement will be extended with NO2/NO/O3/NH3 profiles to make the link between the gas and aerosol themes. The chemical speciation of the aerosols will both allow for air mass foot printing and aerosol chemical process studies and cloud formation studies. The optical instrumentation will provide the input for the aerosol physics.

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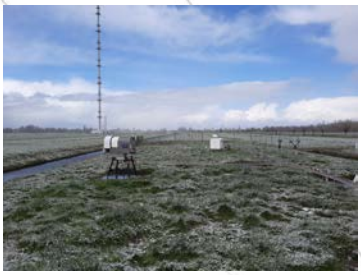
Scintillometer installed in Cabauw

Themes
- Cloud studies
- Interaction with aerosol and radiation
- Rainfall
- Greenhouse gas emissions
- Air Quality

Goals
- Better process understanding for improving climate and weather models
- Satellite validation
- Model validation

Concepts
- Long term observations in combination with high resolution modelling
- In-situ, Column integrated, profile and spatial observation strategies
- Sensor synergy

Scanning dual frequency cloud radar and microwave radiometer installed on wind profiler site in Cabauw



Scanning windlidar installed op the remote sensing site in Cabauw

Ruisdael Campaign(s) 2021

The goal of the pre-Ruisdael campaign in May 2021 is to test and align measurement strategies of different instruments involved as preparation for a Ruisdael campaign in Aug/Sept 2021. The Ruisdael campaign more broadly targets collocated measurements of surface-atmosphere interactions through momentum and scalar (heat/moisture/chemical tracers) transport, aerosols, clouds and radiation.

The following questions are addressed:
- What are the spatial and temporal characteristics of cloud shadows?
- What is the optimal frequency for radiation measurements?
- Which collocated wind lidar and cloud radar scanning strategy provides the highest resolution wind profiles and estimates of momentum flux?
- Can we visualize winds from the surface to cloud top?
- Do we achieve chemical mass closure and optical closure for aerosols at the surface?
- Can we predict LIDAR ratios from in-situ ground-based measurements?
- Can we achieve optical column closure combining LIDAR, groundbased, and sun-photometer data?
- Can we predict cloud droplet number concentrations from surface measurements?
- Test the platform and compare to ground-based data from tower and Cabauw AERONET station
- Investigate covariances between aerosols and trace gases (CO2, CH4, CO) in the column

Ideal weather situations involve considerably wind and broken cloud regimes, but measurements will be continuously performed during the two week test period.

Installation of ICOS Level 1 equipment in Cabauw main building.

Installation of Lysimeter in Cabauw

Instrumentation

Instrument	Parameters	Domain					Observing mode				
		precipitation	clouds	aerosol	trace Gases/Greenhouse gases	boundary layer/fluxes	in-situ	column	profile	spatial	Cabauw
Surveillance rain radar	Microphysics of rain; wind; turbulence	x	x						x	x	D
cloud radar	Microphysics of rain and ice clouds; wind, turbulence	x	x						x		N
Micro rain radar network	Vertical profile of microphysics of rain	x	x						x	x	N
Scanning UV-depol-Raman Lidar	Cloud microphysics, aerosols		x	x		x			x	x	N
Scanning Wind Lidar	Aerosols, clouds, wind vector		x	x		x			x	x	N
Automated thermodynamic profiling lidar	Aerosol microphysiscs, humidity, cloud physics		x	x		x			x		D
Vertically pointing wind lidar	Aerosols, clouds, vertical wind/turbulence		x	x		x			x		N
ceilometer	Aerosols, clouds		x	x		x			x		E
Disdrometer grid	Rain microphysics at the ground	x					x			x	N
Spatial radiation observations	Broadband solar irradiance		x	x			x			x	N
Scanning Microwave Radiometer	Microwave radiometer. Water vapour, liquid water and temperature	x	x						x	x	N
Scintillometer	Turbulent fluxes of heat and water vapour				x	x			x	x	D
Continuous O2 analyzer	O2 observations				x		x				E
CO2 isotope analyzer	Isotopic composition				x		x				N
Water vapor isotope analyzer	Isotopic composition				x		x				N
C14 sampler	Isotopic composition				x		x				E
Picarro G2401	CO2, CH4				x		x				E
Picarro G2210-I 13	CH4, C2H6				x		x				E
N2O analyzer	N2O concentration				x		x				E
NO_x analyzer	NO_2 concentration				x		x				E
NO2 / NO /O3 analyzer	Fast response concentration measurements				x		x				E
Bruker EM27/SUN FTIR	CH4, CO2, CO gas burden				x			x			C
SMPS	Aerosol particles size distribution size distributions			x			x				N
nano-SMPS	Aerosol particles size distribution size distributions			x			x				N
Distributed temperature sensing	Soil temperature and moisture, evaporation; air temperature, humidity					x	x		x		N
Fast mobility particle sizer	Aerosol size spectrum			x			x				N
Humidified nephelometer	Aerosol light scattering, aerosol hygroscopicity			x			x				N
Black Carbon instrument	Aerosol light absorption, soot			x			x				E
TSI-laser Aerosol Spectrometer 3340	Aerosol particles size sepectrum			x			x				E
Cimel sun photometer	Aerosol optical depth and depolarisation			x				x			E
CCN Droplet Technologies	Size distribution cloud condensation nuclei		x	x			x				N
HTDMA	Hygroscopic Tandem Differential Mobility Analyser, aerosol hygroscopicity			x			x				N
ACSM	Aerosol Chemical Speciation Monitor			x			x				E
Lysimeter	Soil evaporation					x	x				N
mini-Doas	NH3 gradient profile				x			x		x	N
AirCore	Trace gas sampler (time vs. heigt or distance)				x		x		x	x	C
Turbulence equipment	Turbulence/mixing					x	x				D
Eddy covariance system	CO2, H2O and sensible heat fluxes				x	x	x				E
Rn flux determination	Rn fluxes				x	x	x				E
Synoptic Station/meteo instruments	Meteorological observations	x	x	x	x	x	x	x			E
NO2 / NO / O3 / valve system	technical installation				x		x		x		N
Sonde facilities	technical installation				x		x		x		N
Flask sampler	technical installation				x		x				N

Overview of instrumentation installed in Cabauw in the framework of Ruisdael Observatory. The rightmost column contains the development status. E: existing, N: new, D: development upon existing instrumentation, C: campaign mode. New instrumentation thas has been installed is marked in green, Other new instrumentation is pending procurement and development.

ACTRIS – ATMO-ACCESS

ATMO-ACCESS is the organized response of distributed atmospheric research facilities for developing a pilot for a new model of Integrating Activities. The project will deliver a series of recommendations for establishing a comprehensive and sustainable framework for access to distributed atmospheric Research Infrastructures (RI), ensuring integrated access to and optimised use of the services they provide. ATMO-ACCESS mobilizes extensive resources in the atmospheric RIs communities to engage into harmonizing access procedures in relation to policies, financial regulations and conditions for access. It will develop and test innovative modalities of access to facilities and complementary and more advanced services, including digital services, developed as part of cross-RI efforts. ATMO-ACCESS will open physical and remote access to 43 operational European atmospheric research facilities, including ground-based observation stations, simulation chambers, but also mobile facilities and central laboratories that are fundamental elements in distributed RIs. Innovative cross-RI cloud services, addressing the management of data produced via access and the use of new, integrated data products, but also virtual tools for training, are offered through virtual access to RI data centres. All work in ATMO-ACCESS integrates experiences from past access programs, thus, synergistically streamlining the work and avoiding duplication of efforts. ATMO-ACCESS will continuously engage with users and with national and international stakeholders to propose optimal conditions for a coherent and effective framework of access that has been sufficiently tested and is supported by the relevant user and stakeholder groups to establish and ensure the long-term sustainability of access with the European RI landscape.