Cabauw

Ruisdael observatory

ICOS INTEGRATED CARBON OBSERVATION SYSTEM

ACTRiS THE NETHERLANDS

NWO Netherlands Organisation for Scientific Research

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In the Ruisdael Observatory, Cabauw will fulfil the role of main station, where the largest and 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

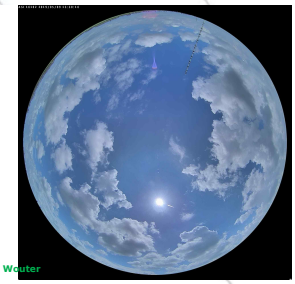
For the Ruisdael Observatory, the integrated observation strategy of the measurement program will be enhanced from the 'soda straw' view to a 3D cylinder for key parameters by including scanning radars and lidars as well as regional networks. These parameters will include radiation, aerosols, clouds 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.

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

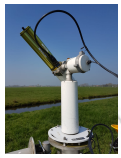
Concepts
- Long term observations in combination with high resolution modelling
- In-situ, Column integrated, profile and spatial observation strategies
- Sensor synergy

New instruments (to date)



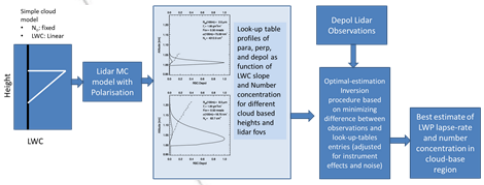
EKO ASI-16 All sky imager - CABAUW

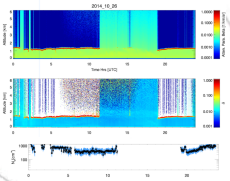
RPG Cloud Radar and Microwave Radiometer



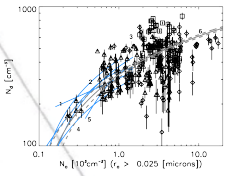
Cimel Sun/Lunar photometer

Depolarization lidar based measurements of water cloud droplet number density. *D. Donovan et al.*





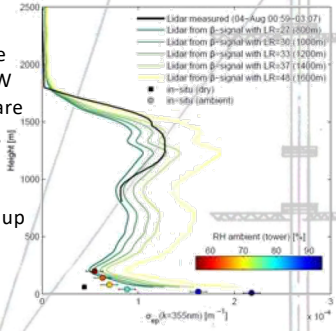
One-Day example



Several months data from Cabauw

Examples

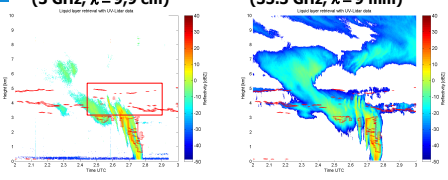
Radiation effects of humidified aerosols (B. Henzing et al.)
From surface in-situ observations and modelling, we will estimate the LR with bottom up error estimation to calculate an extinction profile for the lowest kilometer. Following GAW and ACTRIS recommendations, aerosol in situ observations are performed sampling from dried aerosol sampling flows. This year (2019) we will operationalize measurements at fixed enhanced humidities so that we can calculate the optical aerosol properties at ambient relative humidity. For heights up to 200m, we make use of RH and Temperature profiles measured in the tower. From 200 -1000 meter, we rely on modelling results (at later stage DALES)



Lidar and in-situ measurements of the aerosol extinction coefficient 355 nm (4 August 2009, 00:59–03:07). From P. Zieger et al.: Aerosol extinction coefficients at ambient conditions, ACP 2011

ACCEPT: example size & liquid layers

(3 GHz, λ = 9,9 cm) **(35.5 GHz, λ = 9 mm)**



TARA reflectivity at 45° elevation
red lines: retrieved liquid layer from lidar

Mira 35 reflectivity, zenith pointing
red lines: retrieved liquid layer from lidar

TUDelft

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