Cabauw Experimental Site for Atmospheric Research: An Overview

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This poster describes the contours of a national monitoring and research site in the Netherlands for climate change and related atmospheric processes. This initiative builds on recent IPCC conclusions and recommendations, and forms the logical continuation of the collaboration between Dutch universities and research organizations in this field, as organized and stimulated during the last decade by the Dutch National Research Program on Global Air Pollution and Climate Change (NRP).

The overall objective of the Cabauw Experimental Site for Atmospheric Research (CESAR) is:
To set-up and operate at the Cabauw site an observational facility with a comprehensive set of remote sensing and in-situ equipment to characterize the state of the atmosphere, its radiative properties and interaction with the land surface, for the study of physical processes, climate monitoring and validation studies.

The driving motivations for this site are

- the need for observational data to address crucial questions regarding climate change,
- the notion based on previous work, that this can only be accomplished with the synergetic use of collocated remote sensing instruments in combination with in situ data,
- the conviction that joining forces of the participating research institutes will add significant value to Dutch and international science in this important field.

CESAR will serve as a

- Permanent bridge between (national) universities and research institutes
- Reference station in international projects and networks
- Facility for visiting (inter-) national research groups

Scientific Issues

- Clouds-Aerosol-Radiation interaction
- Land-Atmosphere interaction
- Atmospheric composition

Scientific approach

- Process and model evaluation studies
- Monitoring of long term tendencies in atmospheric change
- Development of new observational techniques
- Validation of satellite products

Data Management Plan

A common structure and protocol will be created facilitating the open sharing of scientific data and ancillary information, across CESAR and with collaborative programs and scientists.

Schedule

May 23, 2002 ,is the formal kick- off of CESAR. An operational period of 10 years is envisaged to ensure satistical significance of the database. Furthermore, intensive observational periods are foreseen.

	Instrument	Topic									
		1	2	3	4	5	6	7	8	9	10
Remote Sensing Instruments	1 GHz wind profiler						X	X	X		X
	3 GHz radar	X	X		X	X	X	X	X	X	
	10 GHz radar	X	X		X	X		X			
	35 GHz radar	X	X		X	X		X			
	42 GHz Beacon receiver					X					
	94 GHz radar	X	X		X	X		X			
	C-band weather radars					X	X			X	
	Ceilometer	X	X		X	X	X	X			
	GPS-receiver					X			X	X	X
	Ir-radiometer	X		X	X	X					
	Microwave radiometer	X				X				X	X
	Raman lidar	X	X	X	X	X					
	Scanning lidar	X	X	X	X			X			
	Scintillometer								X		
	Pyranometer	X		X	X	X					
	UV radiometer			X	X	X					
In-situ instruments Measurement tower	Aethalometer	X		X	X	X					
	FSSP-95	X		X	X	X					
	Gas analyzer					X					X
	Humidograph	X		X	X	X					
	LAS-X	X		X	X	X					
	Nephelometer	X		X	X	X					
	Optical particle counter	X		X	X	X					
	SJAC	X		X	X	X					
	Sonic anemometer	X		X	X	X			X		X
	Sun photometer	X		X	X	X					
In-situ instruments ground-based	Disdrometer						X	X	X	X	X
	Rain gauges						X	X	X	X	X
	TDR								X	X	X
	Tethered balloon		X	X					X		
	Radio sonde		X	X					X		

Synergetic use of instruments for the specific research topics:
1. Indirect aerosol effect – 2. Aerosol/cloud transitions – 3. Direct aerosol effect
4. Ultraviolet radiation and clouds/aerosols – 5. Validation of satellite products
6. Macrostructure of precipitation – 7. Microstructure of precipitation
8. Surface energy fluxes – 9. Spatial and temporal monitoring of the soil moisture balance – 10. Emission of greenhouse gases in relation to local water management and hydrological response

Instrument	Physical quantity	Sample area	scale
1 GHz wind profiler	3d wind field	3-dimensional	medium
Ir-radiometer	Infrared radiation intensity	Integrated column	
Ceilometer	Cloud structure, cloud base	Vertical profile	medium
3 GHz radar	3d wind field, of clouds, microstructure, rain structure and boundary layer processes	3-dimensional	medium
35 GHz radar	Cloud geometry,microstructure	Vertical profile	medium
10 GHz radar	Cloud geometry, microstructure, rain	Vertical profile	medium
94 GHz radar	Cloud geometry, microstructure, aerosols	Vertical profile	medium
Raman lidar	Aerosols, humidity, cloud structure, temperature	Vertical profile	medium
Scanning lidar	Aerosols	Slant plane	medium
Microwave radiometer	Liquid water path, Water vapour path temperature profile	Integrated column Vertical profile	
UV radiometer	Intensity of UV radiation	Integrated column Slant path	
42 GHz Beacon receiver	Cloud liquid water content	Integrated column Slant path	
GPS-receiver	Horizontal water vapour distribution	2-dimensional	large
Scintillometer	Surface energy fluxes	Horizontal path	medium
Pyranometer	Radiation at several wavelengths	Integrated hemisphere	
SJAC	Aerosol size distribution	point	
LAS-X	Aerosol size distribution	point	
Optical particle Counter	Aerosol size distribution	point	
FSSP-95	Aerosols/mist size distribution	point	
Nephelometer	Light scattering	point	
Sonic anemometer	Wind speed and direction	point	
Gas analyzer	CO2 concentration	point	
Aethalometer	Light absorption	point	
Sun photometer	Light intensity	point	
Humidograph	Humidity	point	
Rain gauge	Rain intensity	point	Medium
Disdrometer	Rain dropsize distribution	point	
TDR	Soil moisture content	point	Medium
C-band weather Radars	Large scale structure of rain,wind profiles and (radial) wind fields	3 dimensional	Large
Tethered balloon	Temperature, humidity, wind direction and speed	Vertical profile	
Radio sonde	Temperature, humidity, wind direction and speed	Vertical profile	

Overview of the physical phenomena that can be observed with the CESAR instruments. The indicated spatial scales are: medium scale (up to 10 km); large scale (up to hundreds km)

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