

EUCAARI

European Integrated Project on
Aerosol - Climate - Air Quality
Interactions





EUCAARI



Objective 1:

Reduction of the current uncertainty of the impact of aerosol particles by 50% and quantification of the relationship between anthropogenic aerosol particles and regional air quality.

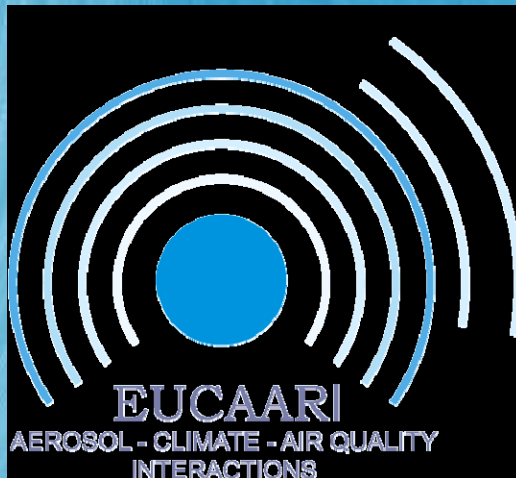
Objective 2:

Quantification of the side effects of European air quality directives on global and regional climate, and provide tools for future quantifications for different stakeholders.





Intensive Observation Period at Cabauw Tower (IMPACT) (1 – 31 May 2008)



••• Overall objective of IMPACT:

- Observations of boundary layer, cloud and aerosol processes in order to quantify the indirect aerosol effect
- Therefore: IMPACT will focus on the link between surface aerosol and cloud formation, evolution (physics, dynamics, vertical velocity)

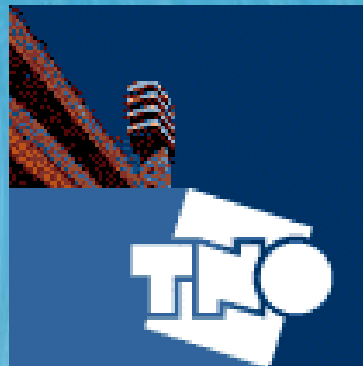


IMPACT Contributors : KNMI, FMI (Finland), CESAR consortium (Netherlands and ESA), CNRM (France), IFT (Germany), IGFUW (Poland), CNRS – LAMP (France)

Tools: Cabauw Experimental Site for Atmospheric Research (CESAR) and airborne measurements



••• CESAR: Cabauw Experimental Site for Atmospheric Research, 
••• Run by a consortium of Dutch national research institutions and 
universities



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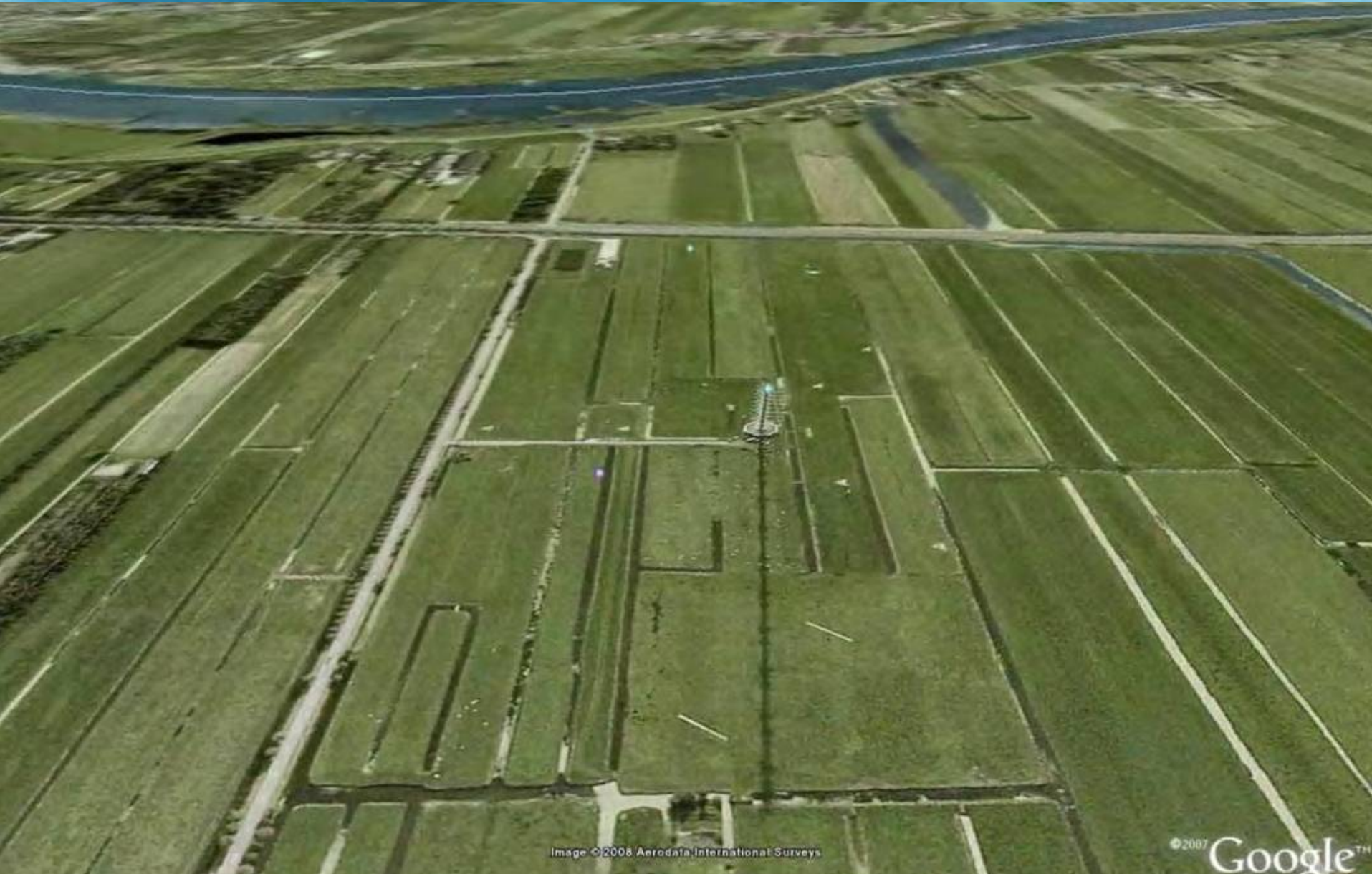
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Definition of Aerosol Indirect Effect according to IPCC report

Page 307 IPCC 2001:

‘Indirect forcing by aerosols is broadly defined as the overall process by which aerosols perturb the Earth-Atmosphere radiation balance by modulation of cloud albedo and cloud amount’

The Cabauw Experimental Site for Atmospheric Research (*CESAR*)



The Cabauw Experimental Site for Atmospheric Research (CESAR)

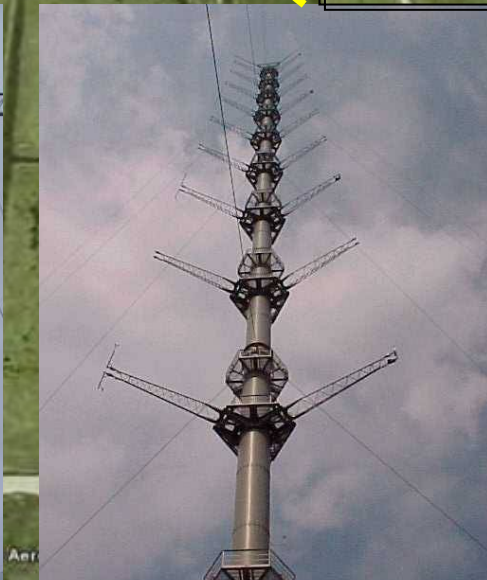


• BSRN



• Advanced remote sensing

• Tower flux profiling



• Scanning radar

Scanning cloud radar (TUDelft) 10 GHz



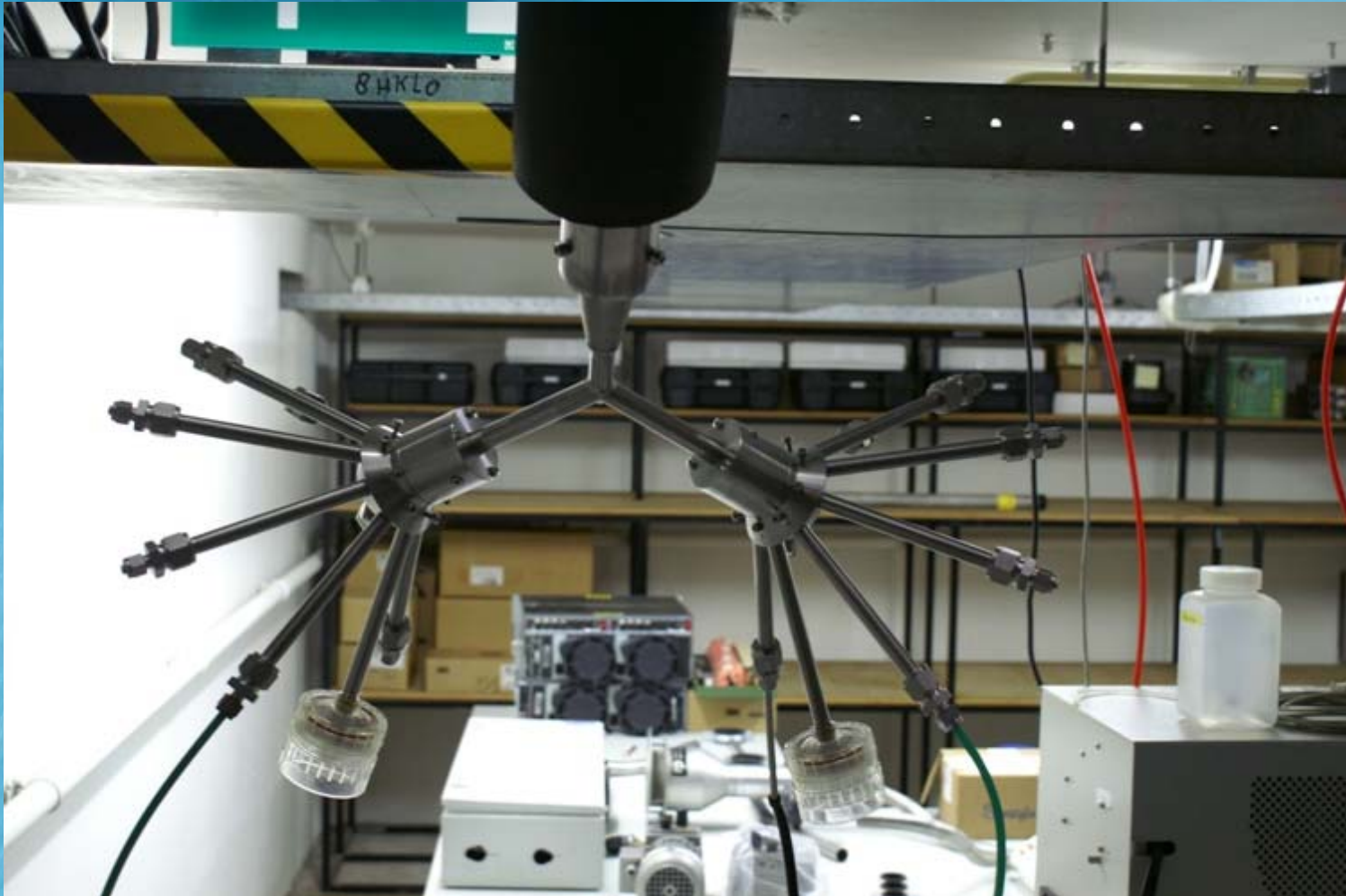
TU Delft



Aerosol inlet at 60 m [TNO, KNMI, FMI Finland]



Expansion of laboratory space / installation of aerosol equipment [Finland, Germany, Netherlands (TNO, ECN)]



A Raman Lidar system



Caeli – List of parameters

- Water vapour mixing ratio profile

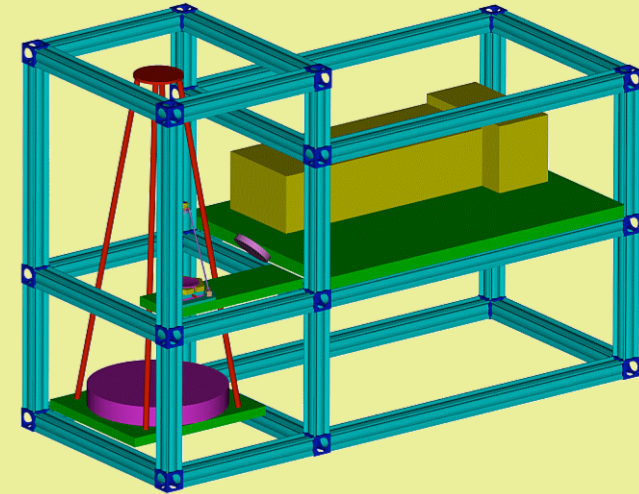
- Nighttime: 0 - 8 km (or better)
- Daytime: 0 - 5 km (or better)

- Aerosols

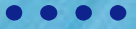
- Geometrical parameters (PBL height, other layers)
- Backscatter (1064 nm, 532 nm, 355 nm)
- Extinction (607 nm, 387 nm)

- Clouds

- Geometrical parameters (Cloud base, multi layer)
- Depolarisation ratio



• Airplane Instrumentation [France, CNRM]



F-ATR42



PCASP

CVI



Aerosol Inlet (CAI)



X-Probe



RASTA

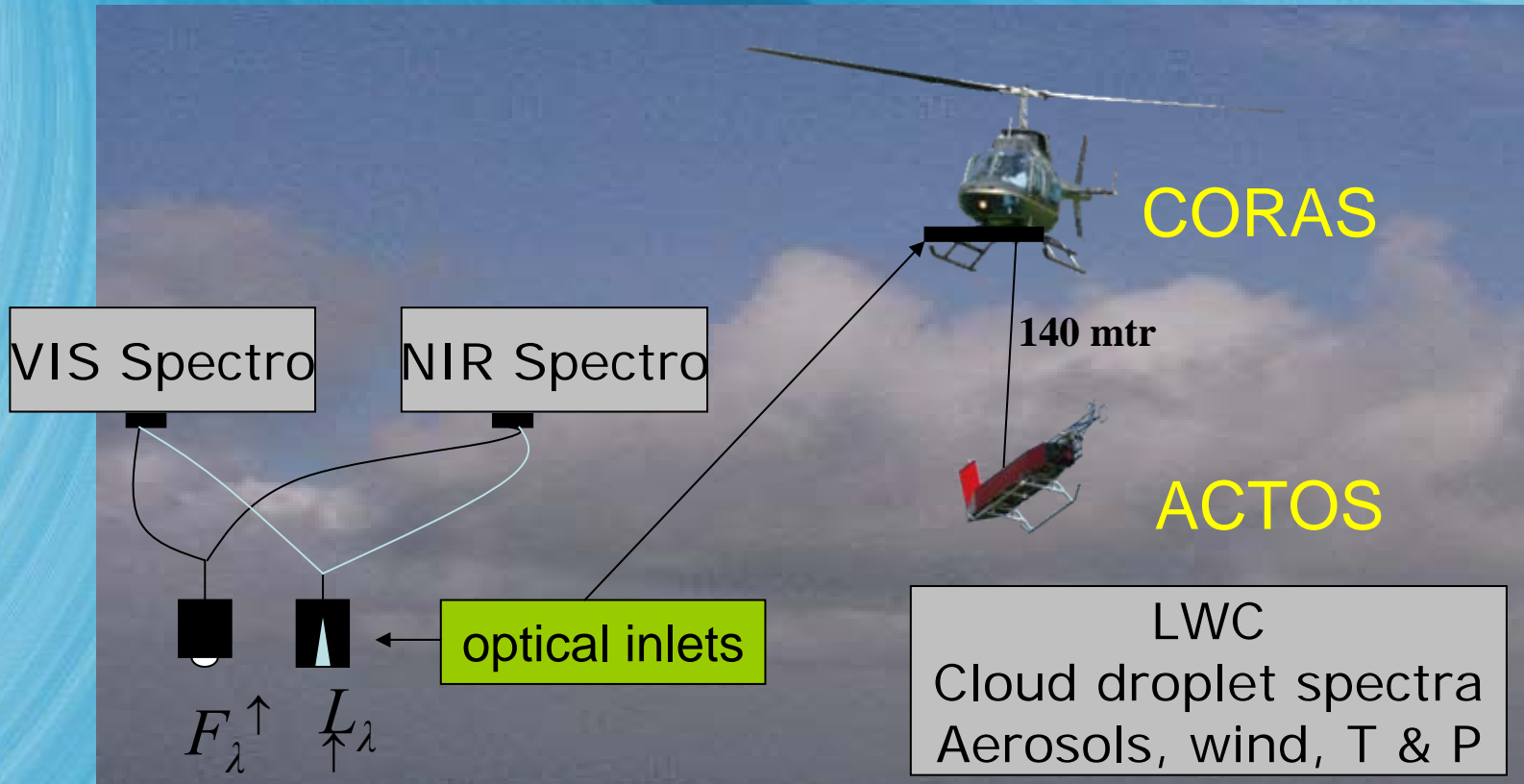
Gerber PVM100



Helicopter [IfT, Germany]



ACTOS: Airborne Cloud Turbulence Observation System
CORAS: COmpacted RAdiation System



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Why Observations at Cabauw / CESAR ?

Because:

- Cabauw is within the centre of the Netherlands / Northwest Europe, therefore it is representative of the Netherlands and of Northwest Europe.
- Cabauw is a continental / maritime site. A great variety of air masses come across this region depending on air mass history
- No orography to confuse you

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Summary of scientific questions for IMPACT



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What is the influence of the vertical velocity on the formation of cloud droplets?

What is the influence of development / structure of the PBL on the formation of cloud droplets? [coupling / decoupling / stability / sub-adiabaticity issues]

How variable is the cloud microphysical structure at Cabauw? [influence of synoptics and dynamics, air mass]

How important is the precise quantification of the cloud microphysical link between cloud effective radius and modes of the size distribution [k – factor]?

Is the nucleating ability of aerosols predominantly determined by aerosol size / number or specific constituent characteristics?

