PROBE achievements

PROfiling the atmospheric
Boundary layer at
European scale

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2019-2023

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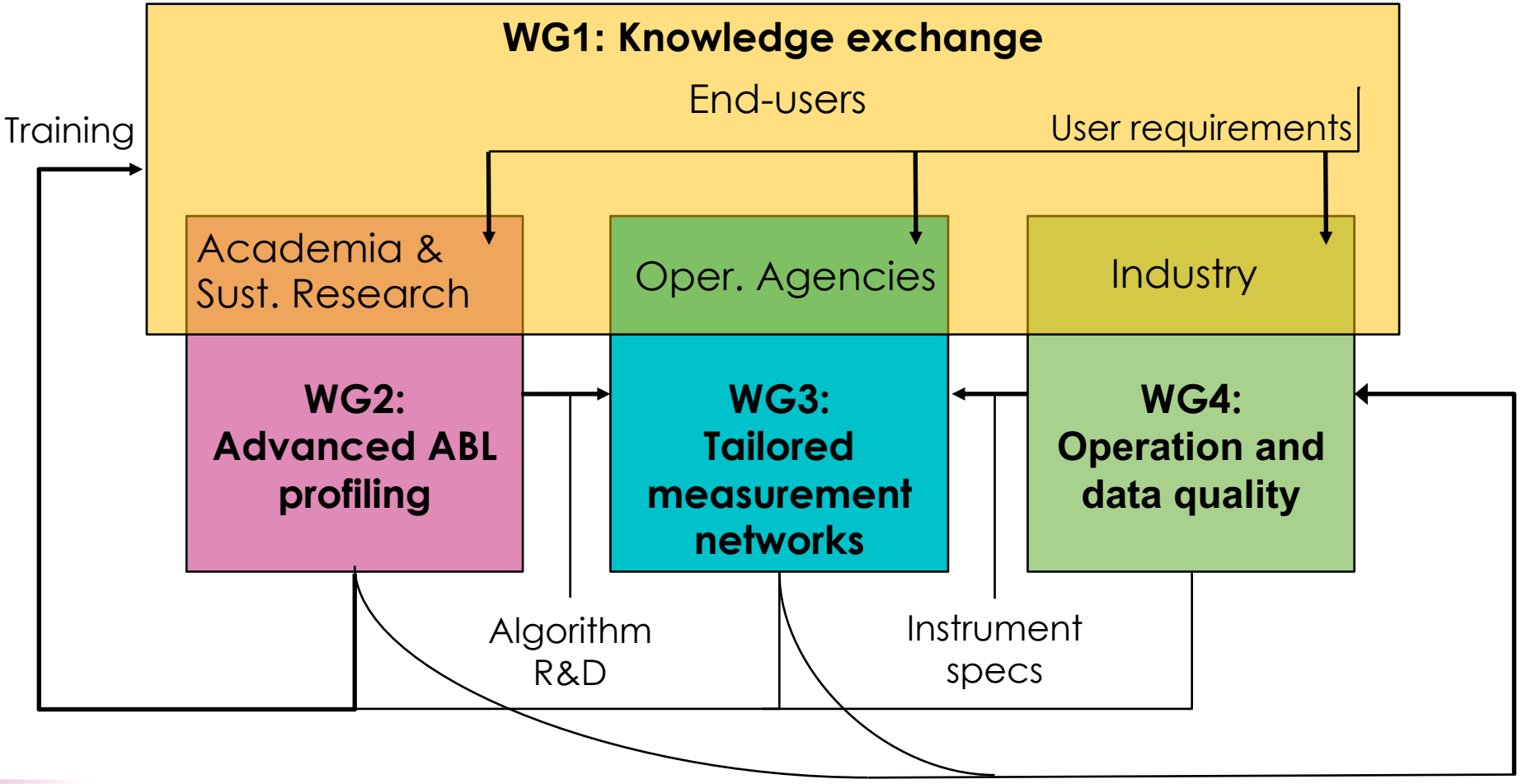
COST is supported by the EU Framework Programme Horizon 2020

Objective and organisation

To improve overall capacity, quality and use of Atmospheric Boundary Layer Profiling at European scale



Who is involved ?

Participants from 30 European and 7 non-EU countries

- 20 Universities (Physics, Atmospheric science, Meteorology dep.)
- 16 National weather services and EUMETNET E-PROFILE
- 8 National research institutions
- 1 European research organization (ECMWF)
- 3 Instrument manufacturers
- 200+ registered end-users
- WMO endorsement

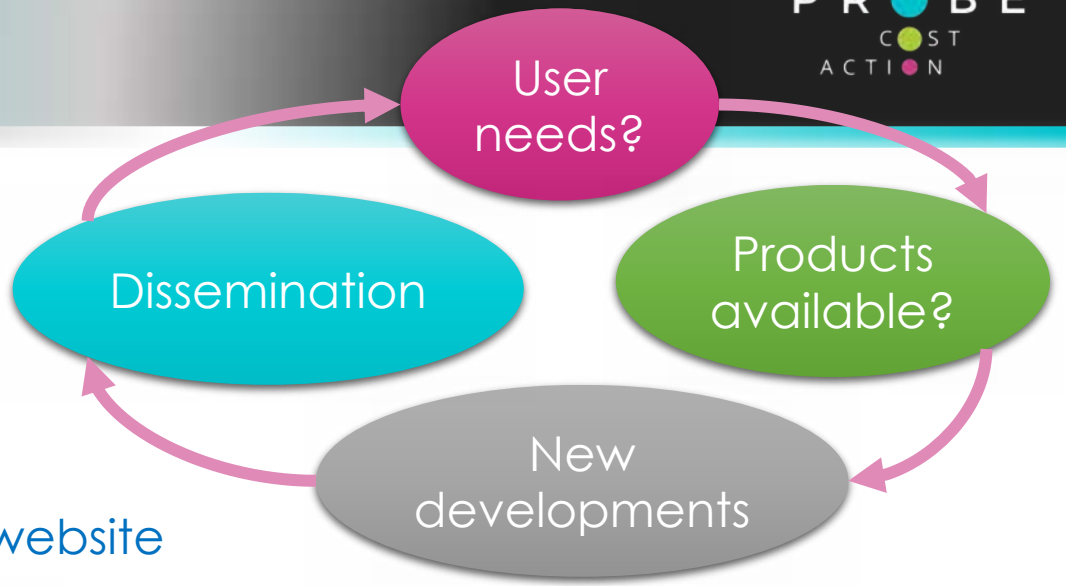
Instruments

- Automated lidar ceilometers (ALC)
- Doppler wind lidars (DWL)
- Microwave radiometers (MWR)
- Cloud Radars (CR)
- Emerging technologies (DIAL, UAVs,…)

Inclusiveness Targeted Countries (ITC)

- **Full/Cooperating members:** Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Rep., Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Lithuania, Netherlands, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Switzerland, Turkey, UK
- **International Partners:** China, Japan, South Korea, UAE, USA
- **Near-Neighbour Countries:** Armenia, Russian Fed.

1. Knowledge exchange



Who are PROBE users?

- **Operators** of instruments and networks
- Product and algorithm **developers**
- **End-users** working with products (e.g. fog alerts, ABLH)
- **Specific environments**: complex terrain, urban

Dissemination activities

- Introductory lectures (PROBE youtube), newsletters, PROBE website

Profiling the atmospheric boundary layer at a European scale (AMT/GMD inter-journal SI)

Editor(s): Domenico Cimini, Claudia Acquistapace, Joelle Buxmann, Volker Lehmann, Markus Kayser, Stelios Kazadzis, Anca Nemuc, and Klara Jurcakova

Special issue jointly organized between Atmospheric Measurement Techniques and Geoscientific Model Development

https://amt.copernicus.org/articles/special_issue1209.html
Including Review on ABL height observations

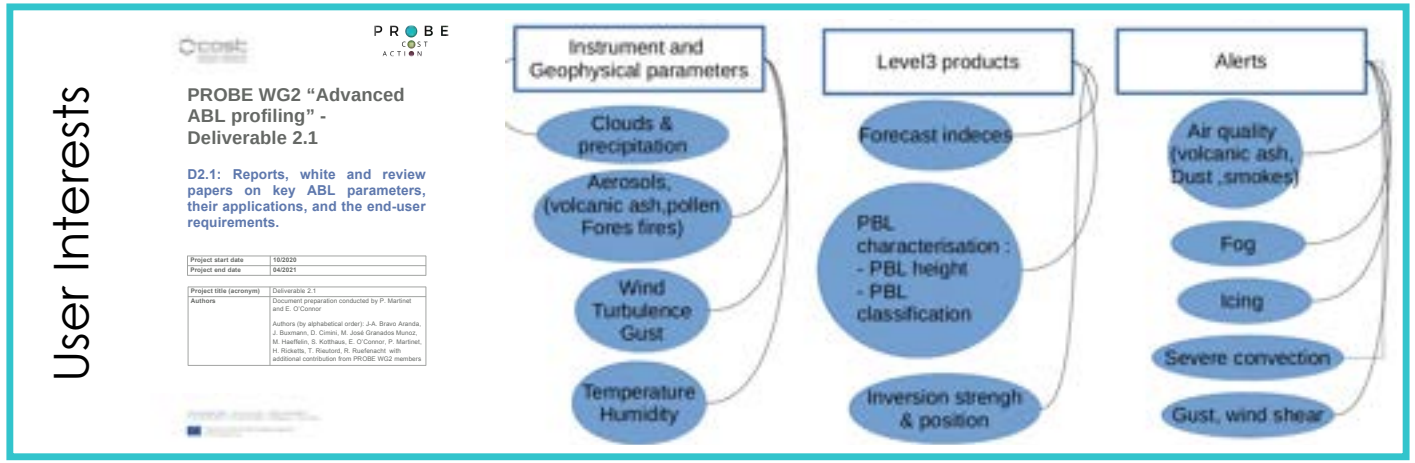
Specific domains of interest:

- **Complex terrains:** 2 active workshops, conducting comprehensive literature review as community effort
- **Urban environments:** 2 workshops, contribution to intensive observations in Paris 2022 #PANAME

Upcoming:

- Mapping existing connections to users within PROBE
- User-needs workshop (e.g. NWP/CTM modelers)

2. Advanced ABL profiling



New products tested during 2022 Paris urban field experiments:

- Nowcasting of severe heat, convection and pollution events
- Advanced ABL height, temperature, humidity, LWC & wind profile retrievals

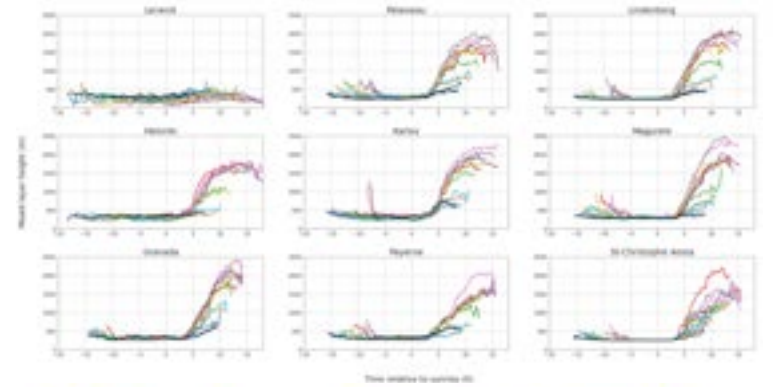
Improved aerosol profiling from multi-instrument synergy:

- Aerosol mass concentration (Lidar + sunphotometer)
- Size distribution and fall velocity

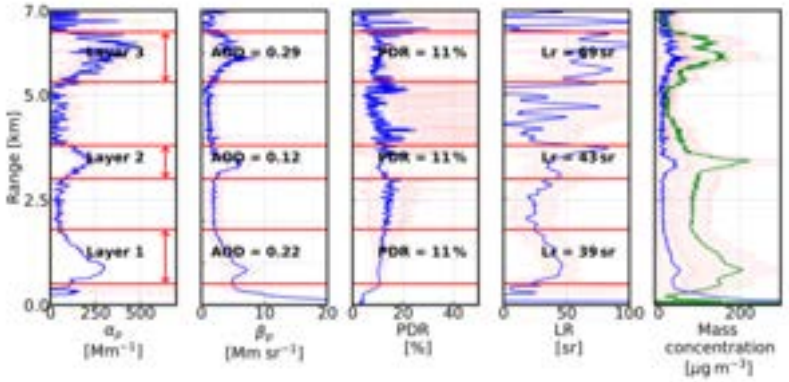
Improved fog forecasts and fog understanding:

- Data assimilation, fog LWC retrievals
- Real-time alerts based on observations

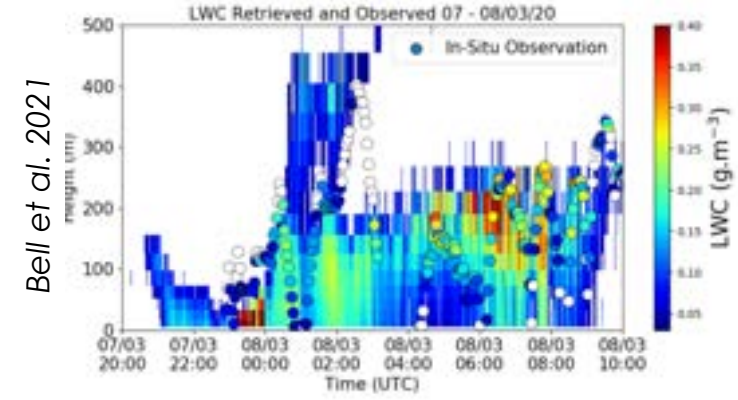
Kotthaus et al. 2021



Osborne et al. 2019



Bell et al. 2021

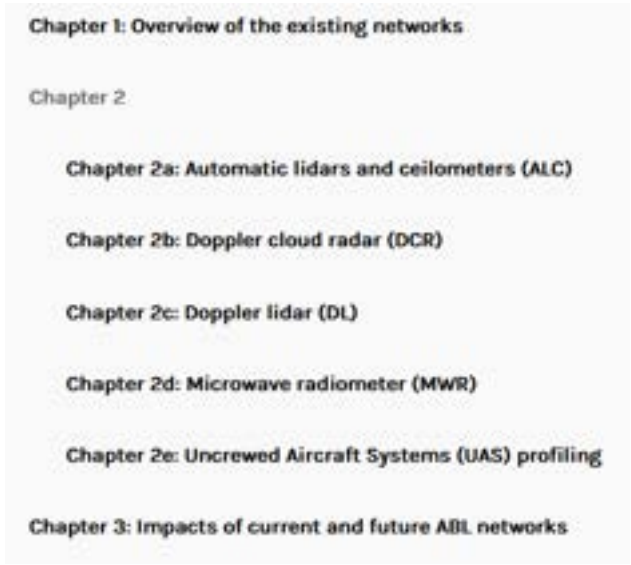


3. Tailored measurement networks

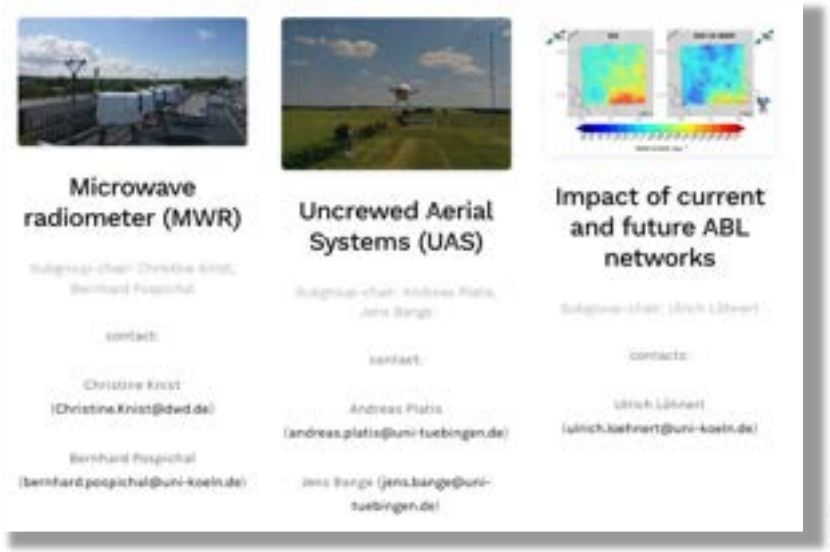
Online ressources
Documents

European networks observing the atmospheric boundary layer: Overview, access and impacts

Available at https://www.probe-cost.eu/



Task
Groups



4. Operation and data quality

"Doppler Lidar stations"

Python software: Freely avalaible

- Instrument configuration and scan schedule
- Common data processing for networks
- Calibration and QC/QA for networks

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

"Microwave Radiometer stations"



- Calibration standards/instructions for network operations
- Development of common data processing for networks
- QC/QA for network application

"Automatic Lidar & Ceilometer stations"

- Sensor-specific guidelines (SOPs) in coordination with E-PROFILE & ACTRIS
- Standardised calibration procedures and implementation
- Optical overlap correction
- Capabilities and limitations of new ALC models (e.g. Vaisala CL61)

Communication & dissemination

http://probe-cost.eu/

Activities:

- Emaling lists
- Website
- Videos
- Newsletters
- Webinars
- Social channels
  - Twitter, Facebook, Instagram, Linkedin, Youtube, Slack

Go to probe-cost.eu

- Engages a large scientific community
- Develops methods, tools and scientific and technical documents, relevant for network applications

Register on PROBE website

Knowledge exchange

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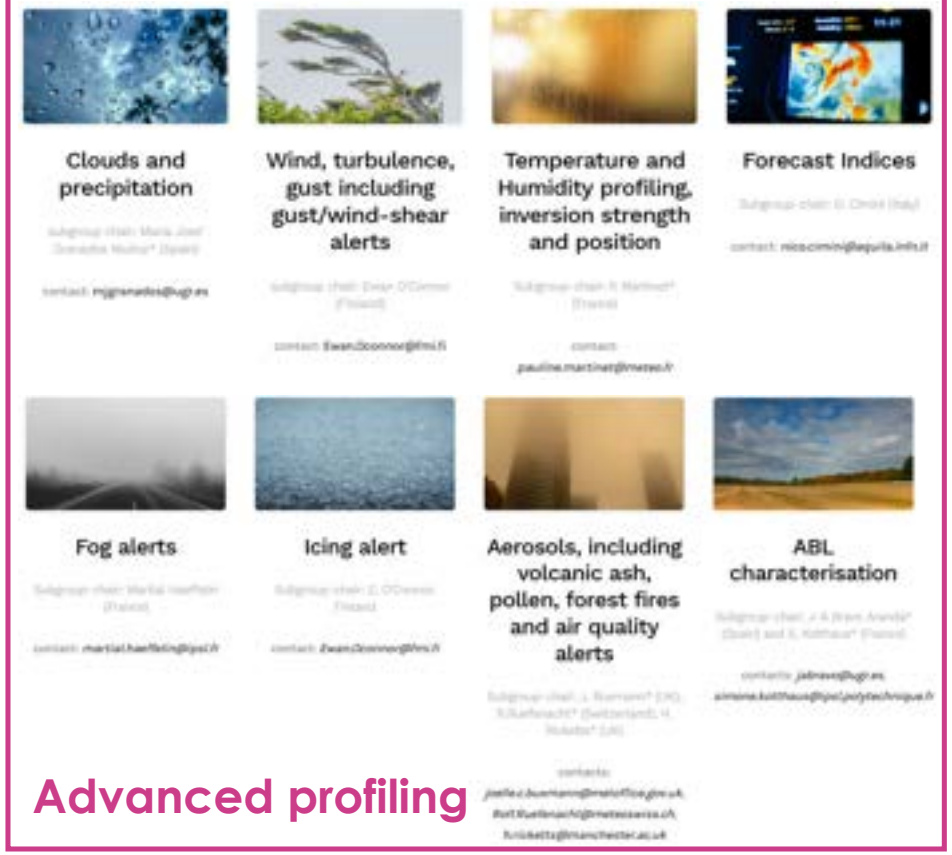
Networks and data quality



Advanced profiling

Annual workshop 6-7 October 2022

Evora, Portugal

Contacts

- https://probe-cost.eu/
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- https://www.instagram.com/probe_costaction/
- https://probe-cost-action.slack.com
- http://doi.org/10.1007/s42865-020-00003-8

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