SEPTEMBER 2021 | VOL. 4

PROBE NEWS - SUMMER 2021

WELCOME TO THE PROBE NEWSLETTER!

Here you will find the latest updates on the topic of PRObing the atmospheric Boundary layer at European scale.

FLASH NEWS

- **Open call: PROBE virtual mobility grants -- apply NOW!**
- **Come join the upcoming PROBE general meeting (11-12 Oct 21)**
- **New interactive workshop series for Early Career Investigators (ECI)**

EMS ANNUAL MEETING 2021 ONLINE | 3–10 SEPTEMBER 2021

Latest PROBE research results were presented at the EMS2021, with many contributions in the session UP1.5: "Atmospheric measurements: Instruments, experiments, networks and long-term programs using in-situ and remote sensing techniques".

COMPLETED STSM: ABL IN COMPLEX TOPOGRAPHY

Alessio Golzio, University of Turin, Italy hosted by Simone Kotthaus at IPSL, France

This short-term scientific mission focused on the atmospheric boundary layer in complex terrain. Mixed layer heights derived from ALC profile observations at St-Christophe Aosta (Northwestern Alps, Italy) were compared to simulations done with a high-resolution implementation of the Weather Research and Forecasting (WRF) model. Based on three case studies (local convection, horizontal advection, persistent aerosol layer) it was assessed how layer heights derived from model fields compared with the observations.

Check the online report!

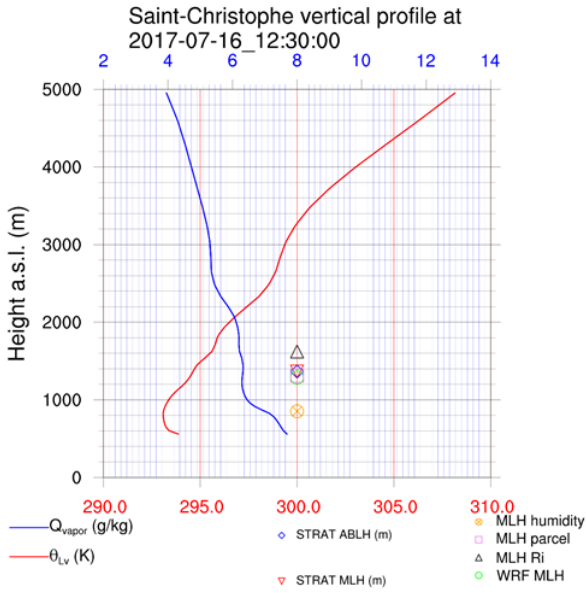
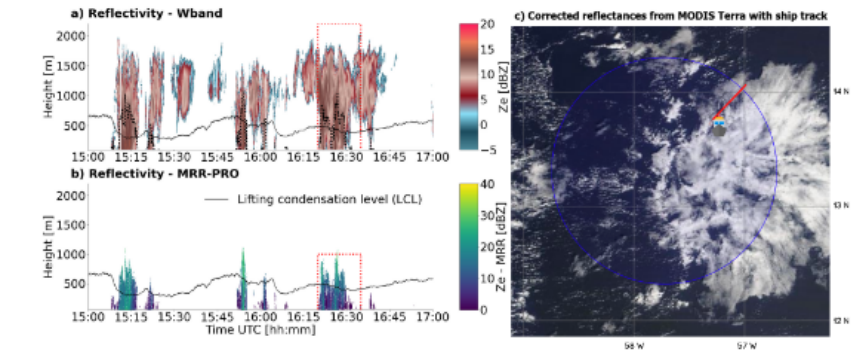


Fig 1; Vertical profile of specific humidity (blue curve) and virtual potential temperature (red curve) over the Aosta St-Christophe ALC position, predicted by the WRF domain 3. Symbols indicate the MLH from the different methods

PROBE PUBLICATIONS

Acquistapace, C., Coulter, R., Crewell, S., Garcia-Benadi, A., Gierens, R. T., Labbri, G., Myagkov, A., Risse, N., and Schween, J. H.: EUREC4A's Maria S. Merian ship-based cloud and micro rain radar observations of clouds and precipitation, Earth Syst. Sci. Data Discuss. [preprint], https://doi.org/10.5194/essd-2021-265, in review, 2021.



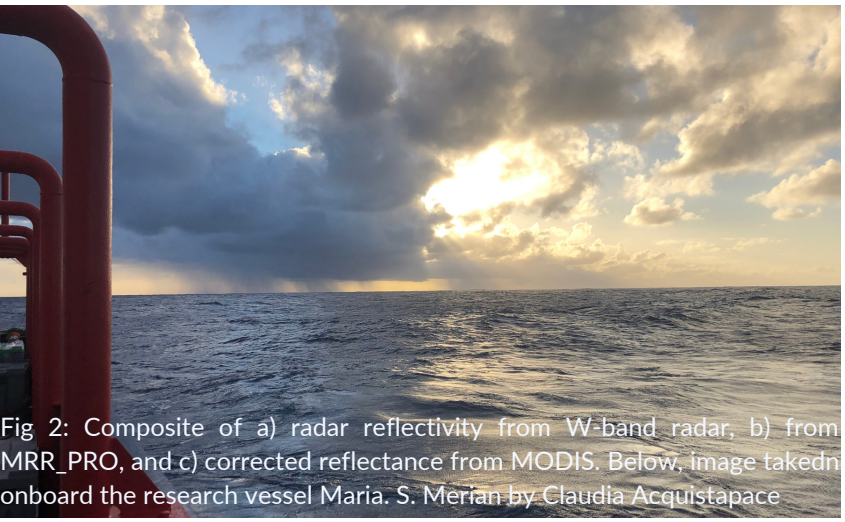


Fig 2: Composite of a) radar reflectivity from W-band radar, b) from MRR_PRO, and c) corrected reflectance from MODIS. Below, image takedn onboard the research vessel Maria. S. Merian by Claudia Acquistapace

Clouds in the tropics are hard to predict. Even if we might think that what happens in the tropics is does not impact our weather, that's not true: the consequences of badly predicting climate threaten our future everywhere on this planet.

So, what can we do? In 2020, an international community of scientists conducted a massive measurement campaign called EUREC4A in the oceanic region south-east of Barbados to look and characterize tropical clouds with different instruments (figure 1), using various platforms like planes, ships, or using measurements from the ground or the surface of the ocean.

This paper describes how we collected radar observations onboard the research vessel Maria S. Merian. Measuring on a ship is not like measuring on the ground: the ship moves, and the waves strongly impact the quality of the Doppler observations.

We developed a correction to remove such impact and tested the methodology on the data, showing its positive effects on some case studies. We also collected some lessons learned to make the future deployments of radars on ships easier. And! There is a short video of our experience on the ship! Happy reading!

Diémoz, Henri, Tiziana Magri, Giordano Pession, Claudia Tarricone, Ivan K.F. Tombolato, Gabriele Fasano, and Manuela Zublena. 2021. "Air Quality in the Italian Northwestern Alps during Year 2020: Assessment of the COVID-19 «Lockdown Effect» from Multi-Technique Observations and Models" Atmosphere 12, no. 8: 1006. https://doi.org/10.3390/atmos12081006

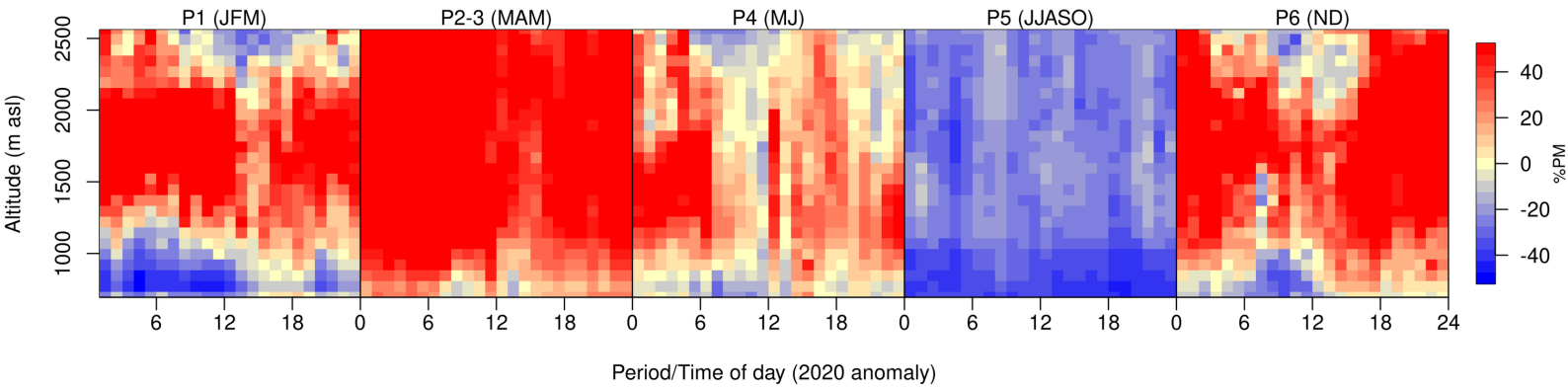


Fig 3: The 2020 relative anomaly in PM profiles compared to the previous years, as detected from the ALC. Every subfigure represents an "average day" (from 0 to 24 UTC) for the different periods.

The effect of COVID-19 confinement regulations on air quality in the northwestern Alps is assessed based on pollutant concentrations measured at the surface and with profile remote-sensing. In particular, an Automatic Lidar Ceilometer (ALC) is used to discriminate between the contribution of meteorology/transport and the impact of curtailed emissions. The latter are likely confined to a shallow layer (~500 m) close to the surface.

OTHER NEWS

- **FESSTVAL LECTURES:** All FESSTVaL lectures were successfully carried out (with > 60 participants, with PROBE participation) and are available on-line as pdf. More details can be found in the FESSTVal blog.
- **VIRTUAL MOBILITY GRANTS:** last call for applications to virtual mobility grants (VMG) for this grant period.
- **ECI WORKSHOP SERIES:** Are you within 8 years from your PhD? Did you start working in a company less than 8 years ago? ... then this workshop series is for you! PROBE wants to know who you are and what you are working on. **Make sure you are registered as PROBE USER on the website. Check that your ECI status is up to date and that you indicate your areas of interest and expertise.** PROBE will invite you to a new interactive workshop series for Early Career Investigators - stay tuned!

MONITORING: DUST STORM IN ICELAND

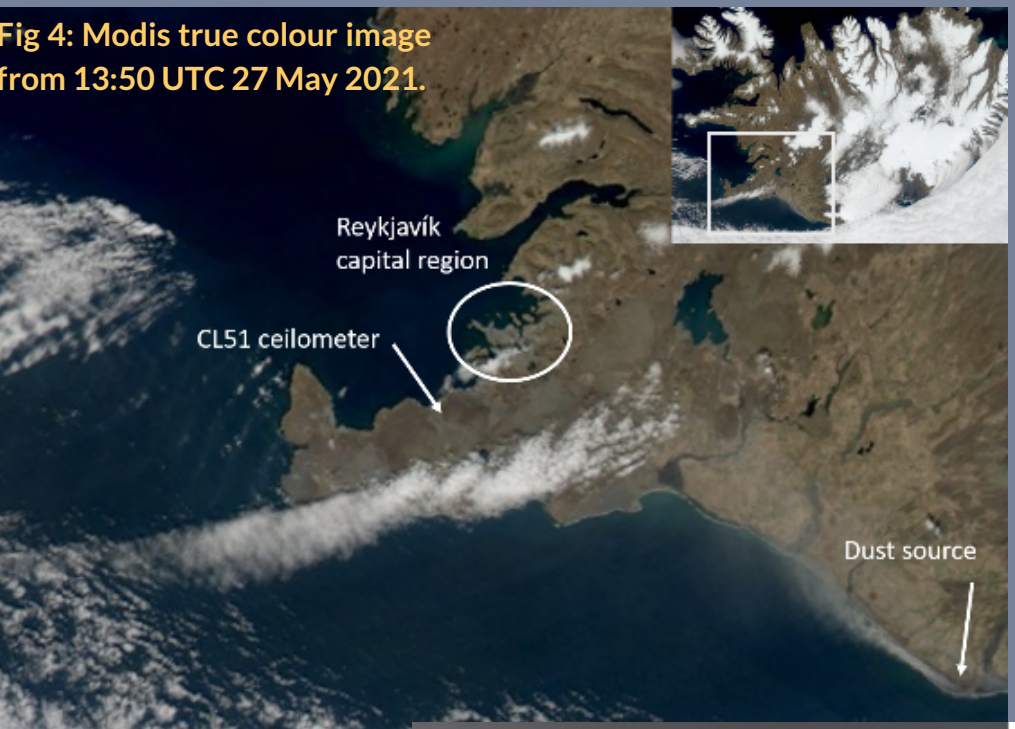


Fig 4: Modis true colour image from 13:50 UTC 27 May 2021.

In dry and windy conditions dust is frequently lofted in Iceland. On 27 May 2021 there was an intense dust storm that originated at the S-Iceland coast and dispersed dust over the capital region of Reykjavík. This was one of the largest dust episodes in the region since the Eyjafjallajökull eruption in 2010. A ceilometer in the outskirts of the capital region showed dust particles in the whole boundary layer from early morning to evening. PM10 exceeded 400 µm/m3 at several stations and visibility was low. For health reasons people were advised not to exercise outdoors.

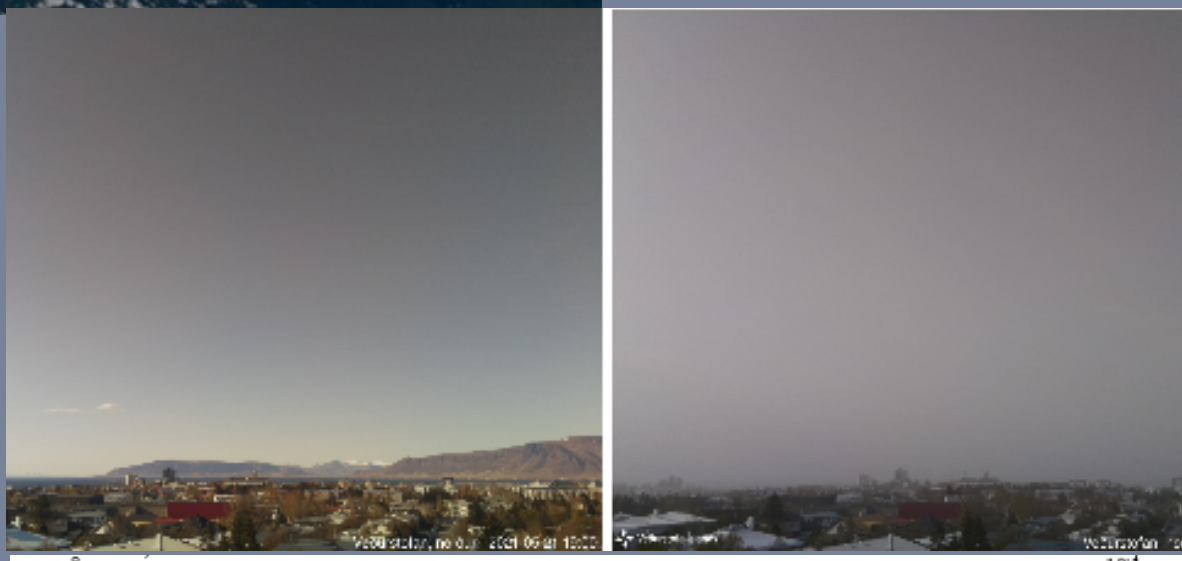


Fig 5: Web camera images looking north from the Icelandic Meteorological Office. The first one shows the view at 19 UTC on 27 May 2021 and the second on the view on 21 May, where visibility was at its best. The distance to the clocktower in the centre of the view is 1.3 km.

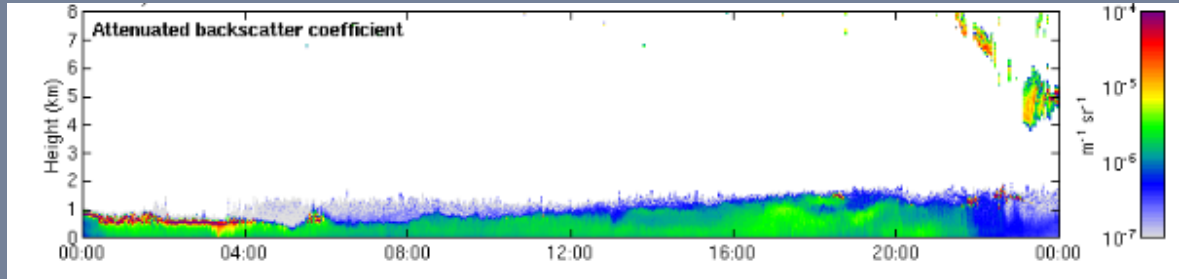


Fig 6: A quick-look from a CL51 ceilometer located just to the west of the capital region.

PARIS 2022

The Paris Region will host three field campaigns in summer 2022 (June-July) that will focus on the study of physical and chemical processes in the urban boundary layer using innovative observations and modelling.

- The **ACROSS project** is designed to improve the understanding of mixing effects of urban and biogenic air masses on the oxidation of tropospheric VOCs and of the resulting properties of the products.
- The **sTREET project** will study the impact of stress on urban trees and on city air quality through characterization of biological VOC emissions, physiology of trees submitted to water stress and VOC / aerosol air composition.
- **H2C (Heat and Health in Cities)** will study the impact of exposure to heat and atmospheric pollutants on human health, and will evaluate high resolution numerical simulation models that enable more precise mapping of exposure.

These project take place in a context of a WMO research demonstration project ahead of the 2024 Paris Olympics focusing on **future Meteorological Forecasting systems at 100m (or finer) resolution for urban areas**.

All three projects rely on precise in-situ measurements of atmospheric chemical composition, but a significant network of boundary layer profilers will be deployed. These include ALCs for aerosol and cloud profiling as well as monitoring of ABL heights, MWRs for temperature and humidity profiling, and Doppler Lidars for wind and turbulence profiling. Several international partners have shown interest in participating in these projects. We are currently finalizing the design of the urban remote sensing network and are considering additional contributions. If you would like more information or would like to participate, please contact martial.haeffelin@ipsl.fr

UPCOMING EVENTS

PROBE general meeting 11-12 October 2021

- Achievements of the four working groups
- Reports from short-term scientific missions
- Status of deliverables
- Work plan and engagement strategy

Workshop on ABL in urban environments: 25 November 2021, 14-16h

PROBE introductory Lecture #3:
Advanced products - part 1
Friday 22/10/2021 15:00-16:30 CEST

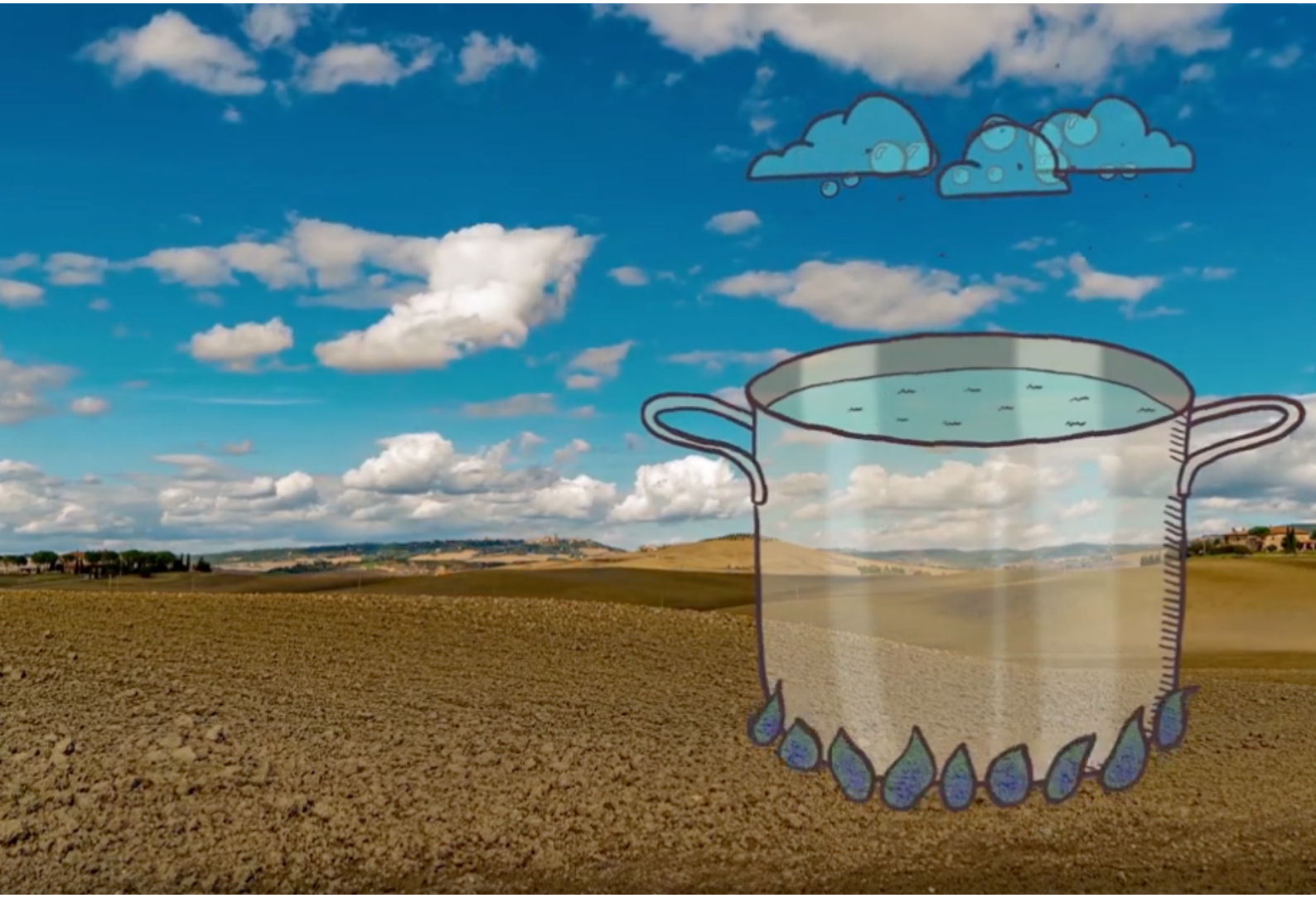
PROBE introductory Lecture #4:
Advanced products - part 2
Thursday 09/12/2021 15:00-16:30 CET

A NEW OUTREACH VIDEO FROM THE PROBE NETWORK

What is the atmospheric boundary layer? Why do we need to study it? How is this done? What is the contribution of the PROBE COST action? ... all these questions are answered in our **new outreach video** that we share on the **PROBE youtube channel**.

We live and work in the ABL. Understanding its thermodynamical processes is crucial for monitoring and prediction of air quality, renewable energy production, cloud processes, and natural hazards. Please share the video widely as we hope it may fascinate young minds and enhance their curiosity for the atmosphere.

The video was realised by the PROBE science communication manager and the company "Roberto Romani video agency", with funding support from COST and input from the PROBE CORE group.



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EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

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COST description
COST (European Cooperation in Science and Technology) is a funding agency for research and innovation networks. Our Actions help connect research initiatives across Europe and enable scientists to grow their ideas by sharing them with their peers. This boosts their research, career and innovation.COST description

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