

Long-range transport of wildfire emissions over Zugspitze, Germany

Jorge Saturno, Cedric Couret, Michael Elsasser, Bryan Hellack,
Michael Chilinski, Christopher Pöhlker and Andreas Nowak

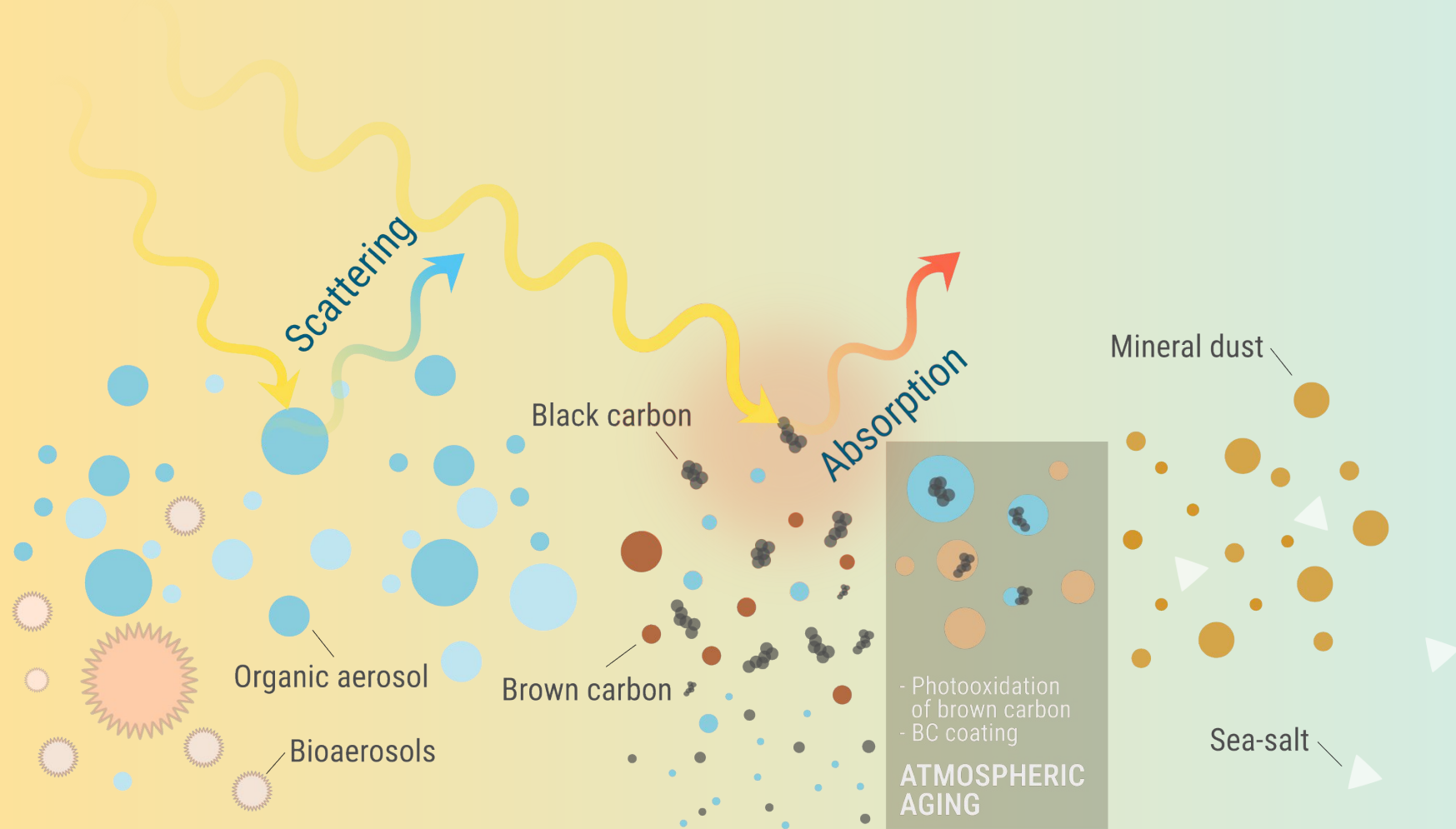


Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut



Jorge Saturno, CC-BY 4.0

Atmospheric aerosols



Essential Climate Variables (ECV) include aerosol extinction and single scattering albedo.

Long-range transport of aerosol-rich air masses are important in remote locations.

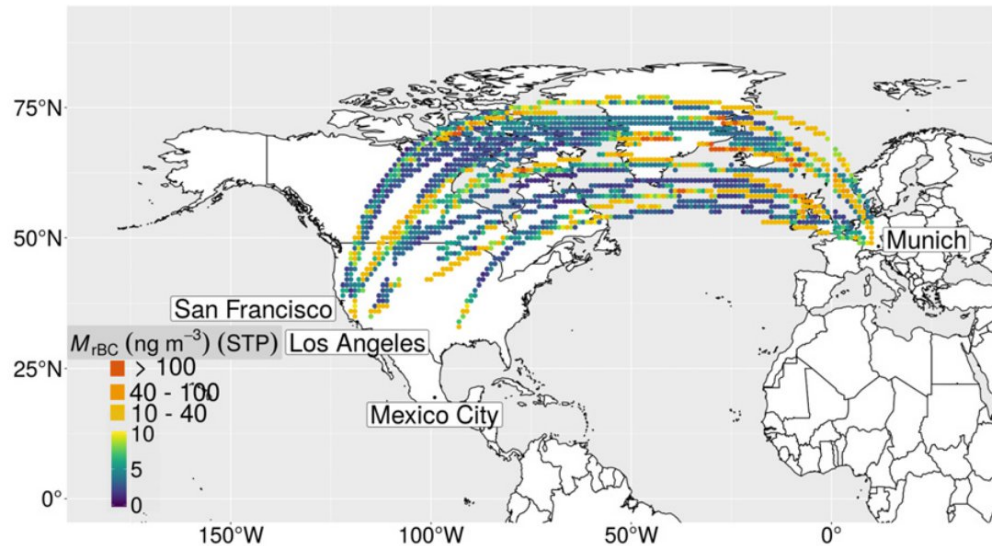
BIOGENIC

ANTHROPOGENIC

NATURAL

Wildfires

Long range transport of wildfire emissions will play an important role in a post-fossil-fuel world



Spatial distribution of refractory BC between North America and Europe

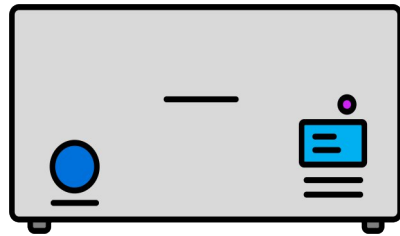
Ditas et al. (2018)
<https://doi.org/10.1073/pnas.1806868115>

Schneefernerhaus (2650 m NN)

Aerosol Inlets
Aerosol Lab

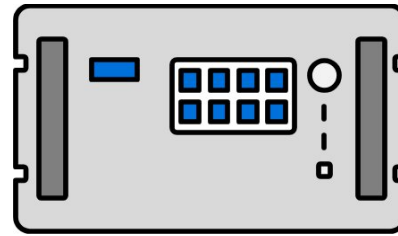


Traceability chain for aerosol light absorption



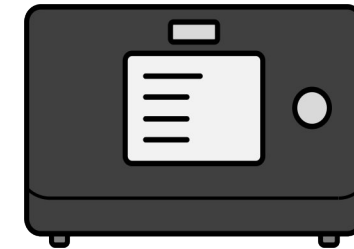
Extinction minus scattering (EMS)

CAPS calibrated with CO₂ and PSL at 630 nm



Photacoustic extinctionmeter (PAX)

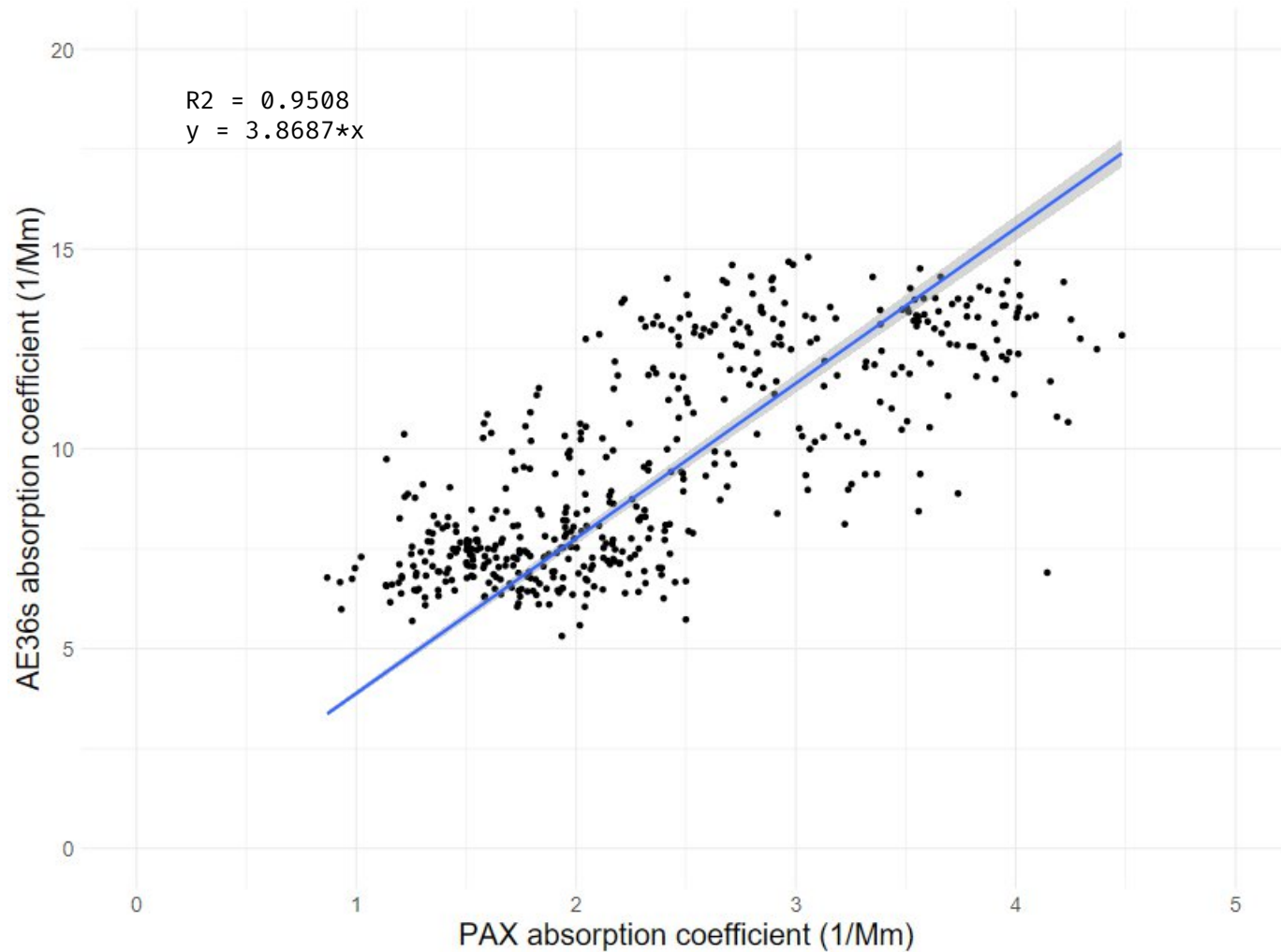
Intercomparison with EMS using light-absorbing aerosols (nigrosin/miniCAST)



Aethalometer AE36s

In-field intercomparison with PAX (880 nm)

Field intercomparison PAX vs. AE36s



Compensation factor, C

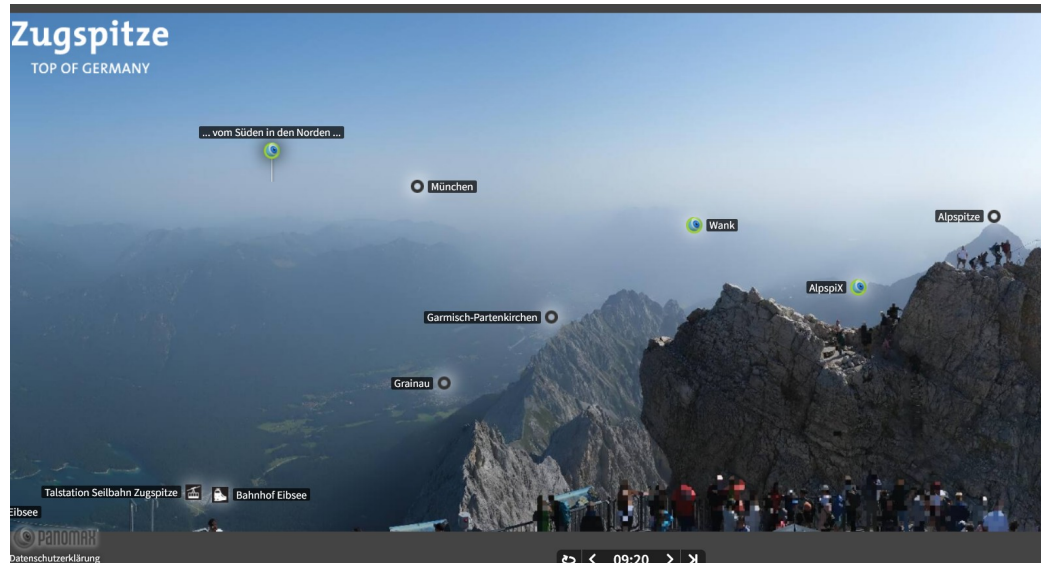
3.87 ± 0.04

880 nm

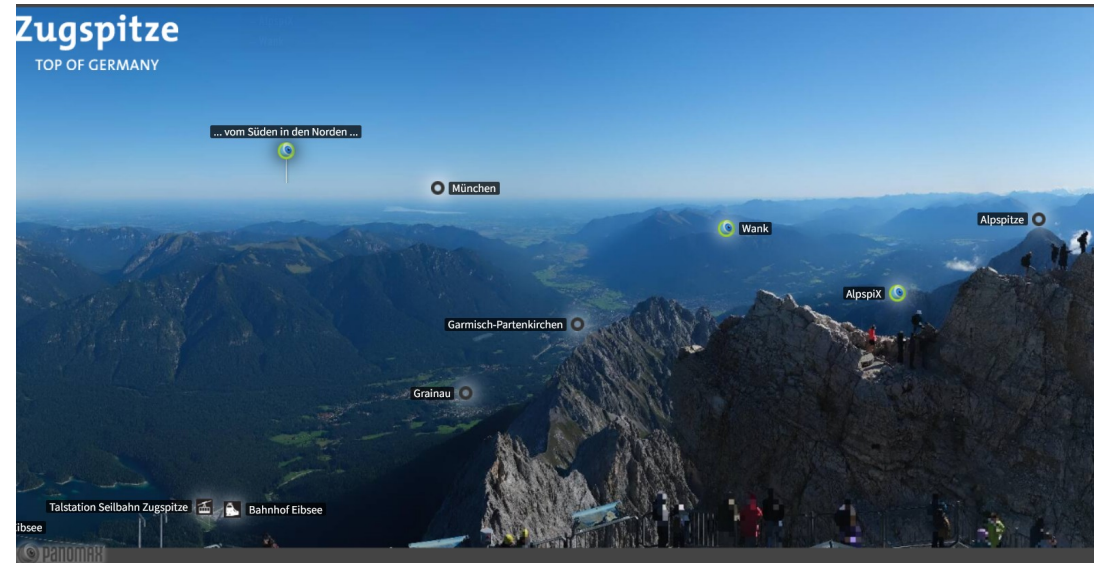
Observations in August 2025

Webcam view from Zugspitze

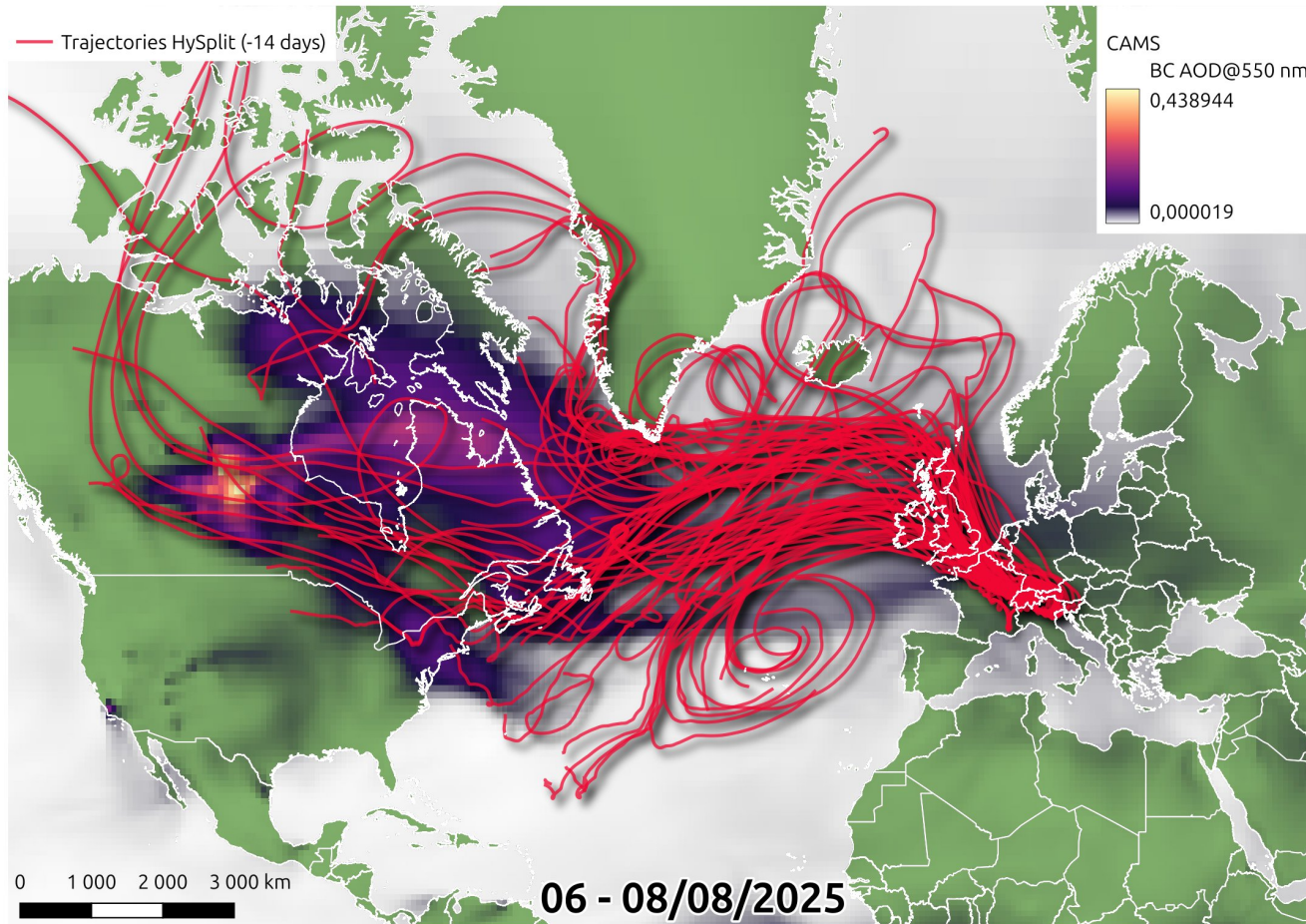
13 August 2025



31 August 2025



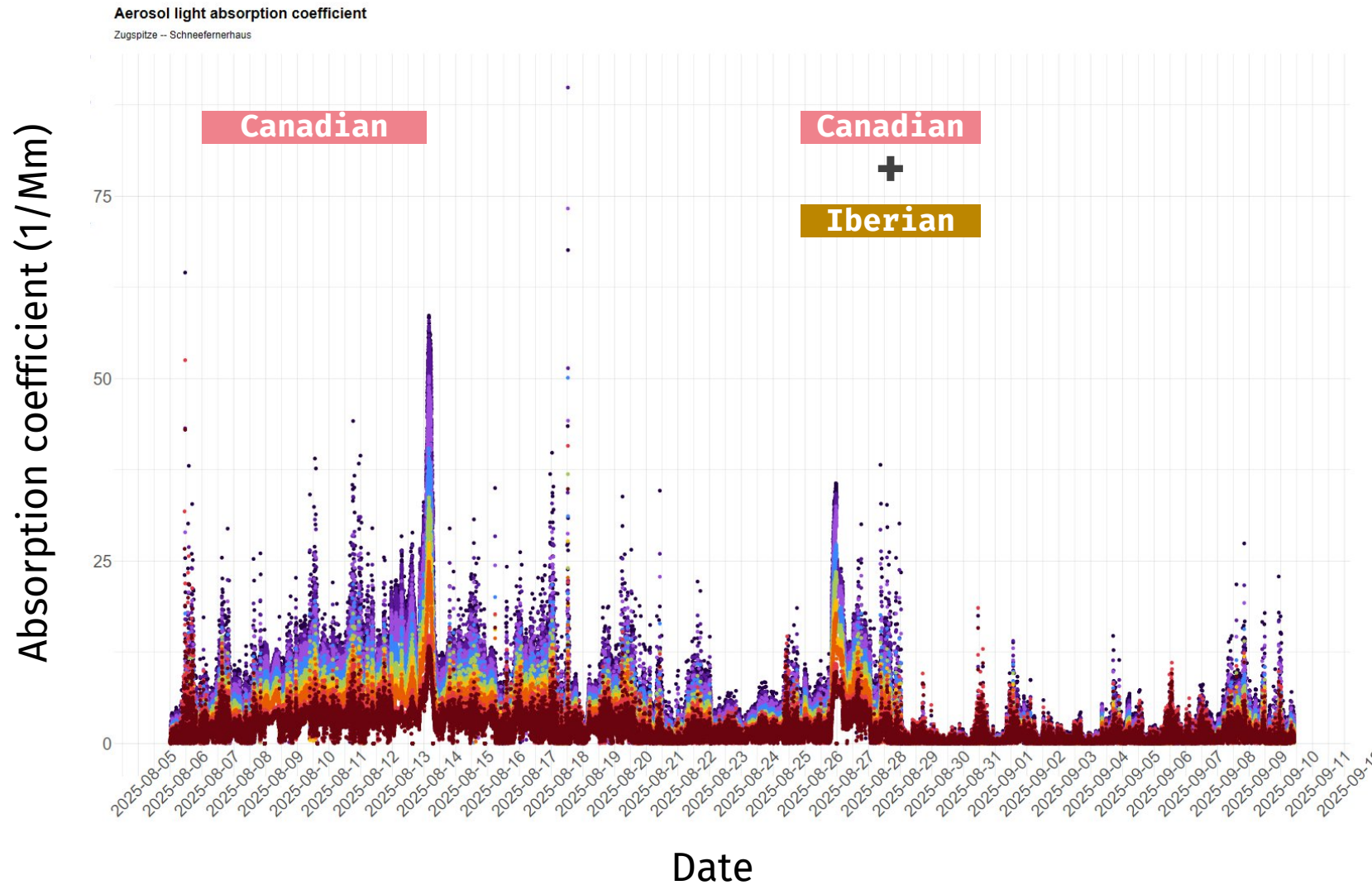
Long-range transport of wildfire emission



Canadian wildfire aerosol
reaching Schneefernerhaus
in August 2025

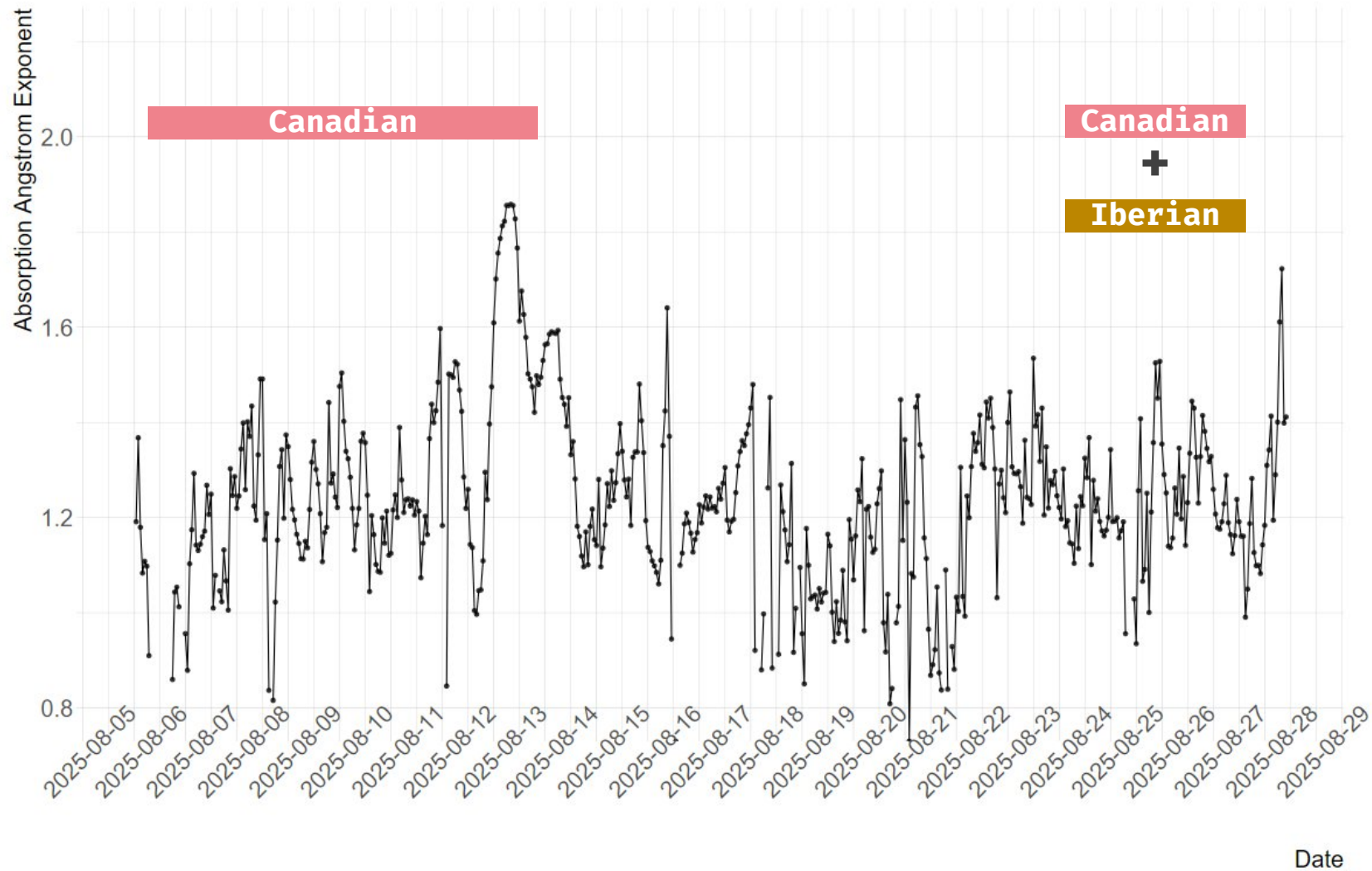
HYSPPLIT backward trajectories
(1h for period 6 to 8 August 2025) on top of CAMS BC AOD 550 nm

Long-range transport of wildfire emission



Multi-wavelength
Aethalometer
measurements

Absorption Ångstrom Exponent (AAE)



Wavelength pair
370 – 880 nm AE36s

Different aging
conditions?

Take-home message

- Improved accuracy of Aethalometer measurements:
PAX used as a transfer standard to calibrate AE36s at 880 nm using ambient aerosol (Correction factor in the order of 3.87)
- AAE observations do not clearly show a source signature. Different pathways for transporting air masses could result in air masses undergoing different degrees of aging.
- European standardization of BC measurements is starting within CEN TC 264 WG35. Call for experts is open. Join us!

Dr. Jorge Saturno

AG 3.43 Luftgetragene Nanopartikel
Physikalisch-Technische Bundesanstalt
Bundesallee 100, 38116 Braunschweig
Germany

jorge.saturno@ptb.de
+49 531 592 3217



Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut

 **stanBC**

EUROPEAN PARTNERSHIP  Co-funded by
the European Union

METROLOGY PARTNERSHIP 



Jorge Saturno, CC-BY 4.0