



The 1st EarthCARE MAAP Hackathon

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EUROPEAN SPACE AGENCY

The Event

From 20 to 24 April 2026, ESA-ESRIN hosted the 1st EarthCARE MAAP Hackathon, where 34 on-site participants from 12 nationalities, plus a remote team from NASA PACE mission, joined forces to tackle 8 projects.

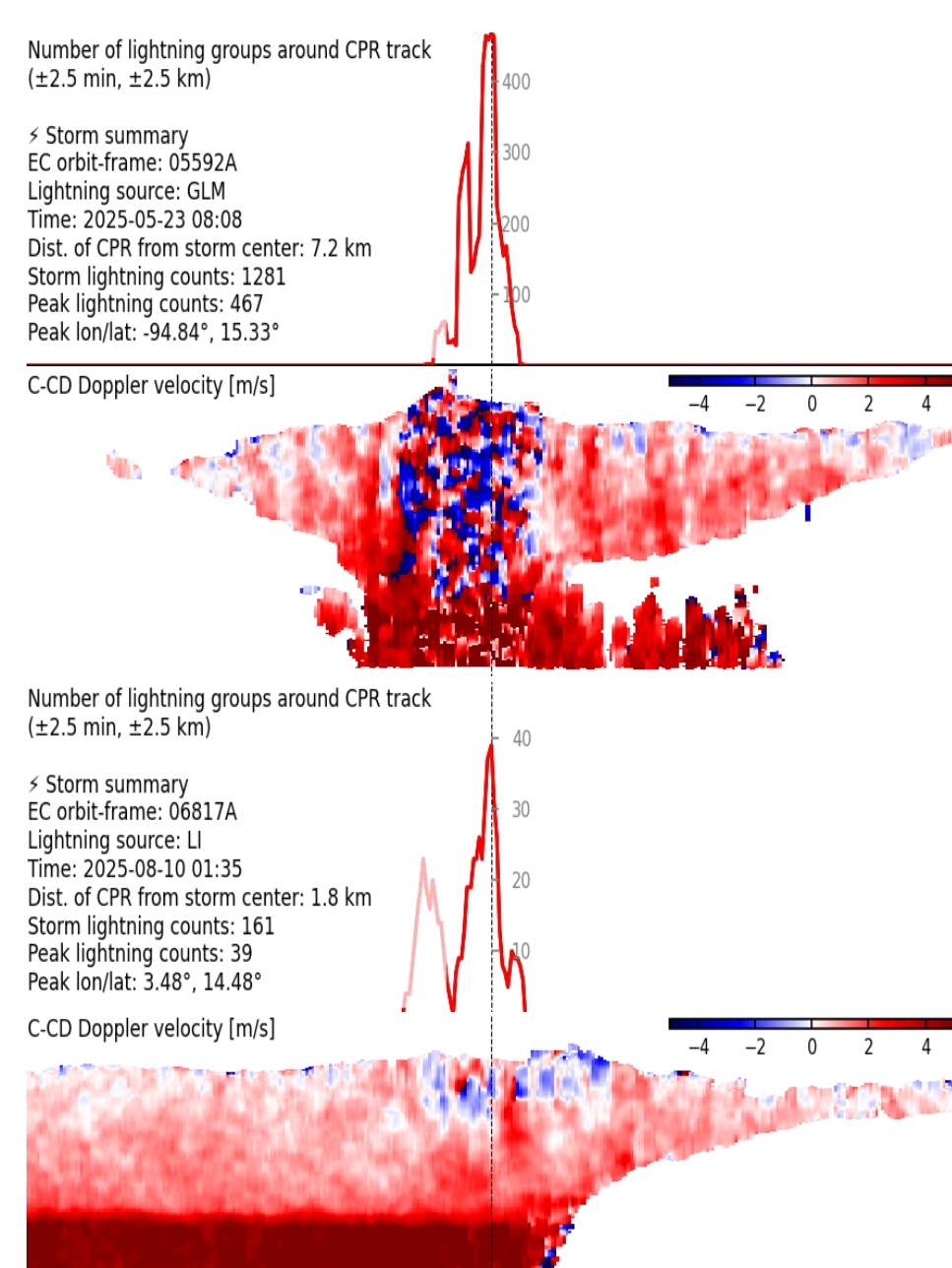
Three main objectives:

- explore usage of EarthCARE data through the ESA MAAP
- enhance accessibility of data and data-related resources
- promote collaboration on science and data analysis workflows

Contributions from all participants are presented here.

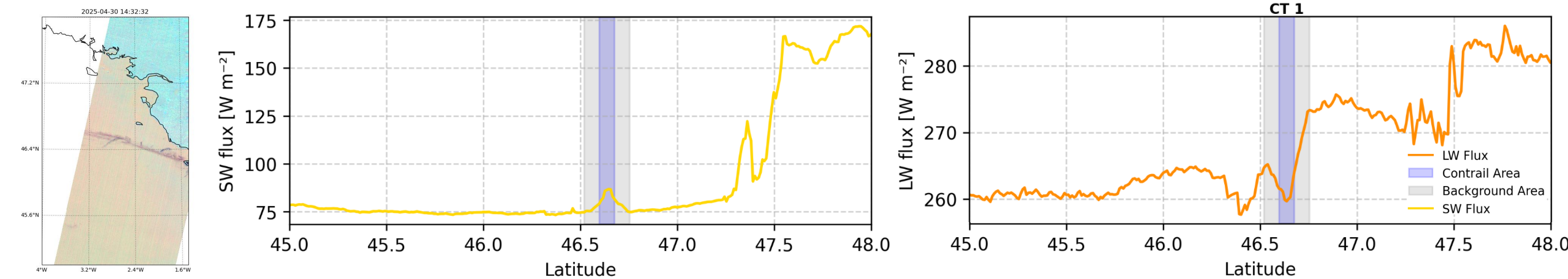
02 Lightning Activity

- lightning activity prediction from EarthCARE profiles with CNN ML
- analysis of EC variables contribution to the prediction model
- lightning parametrisations comparison
- analysis of differences between core vs anvil lightning cases



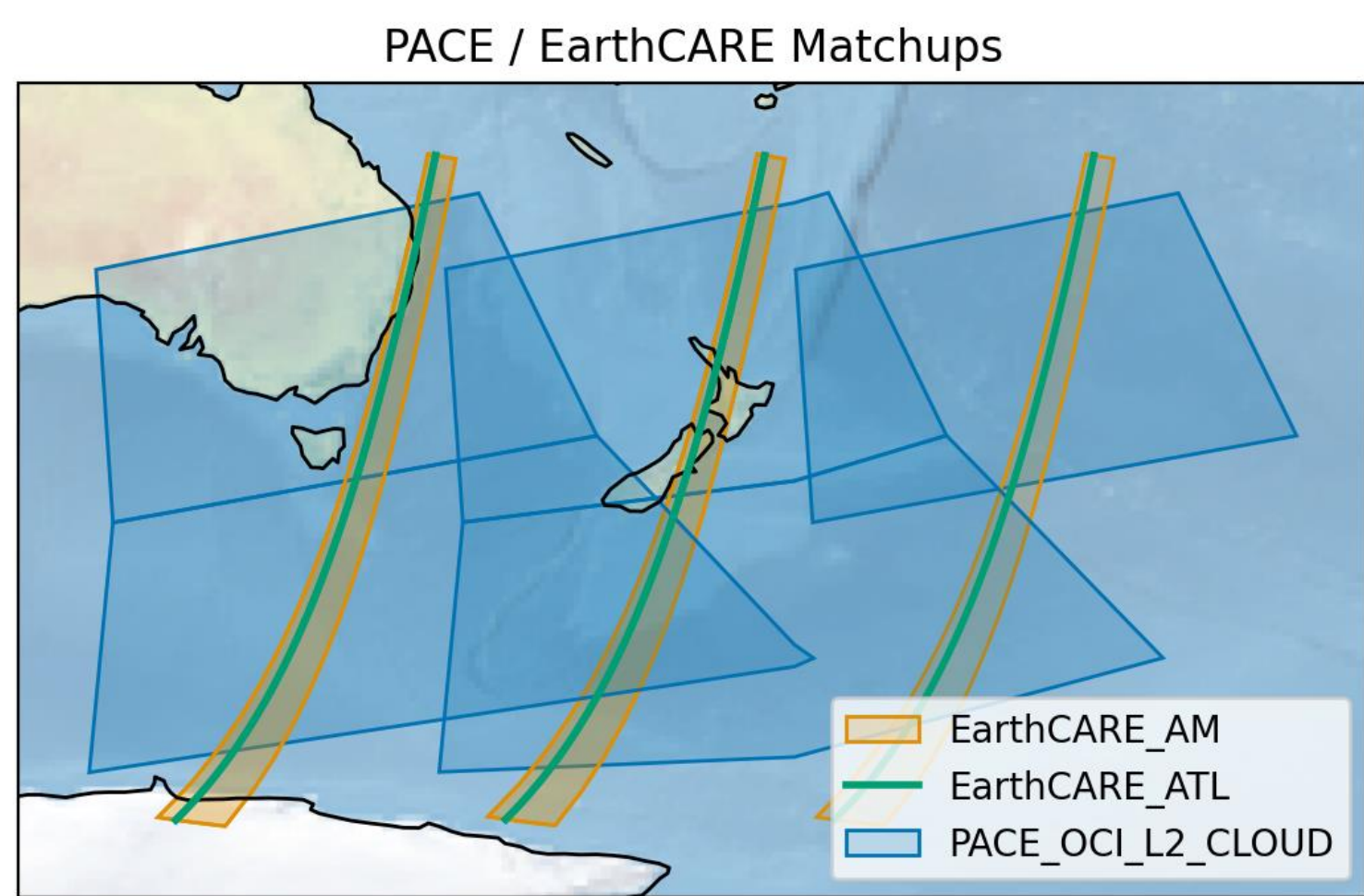
04 Contrails

- contrails detection crossing MSG and EC MSI and ATLID
- radiative forcing (SW and LW) analysis from EC BBR
- binary maps generation to train and test a detection model



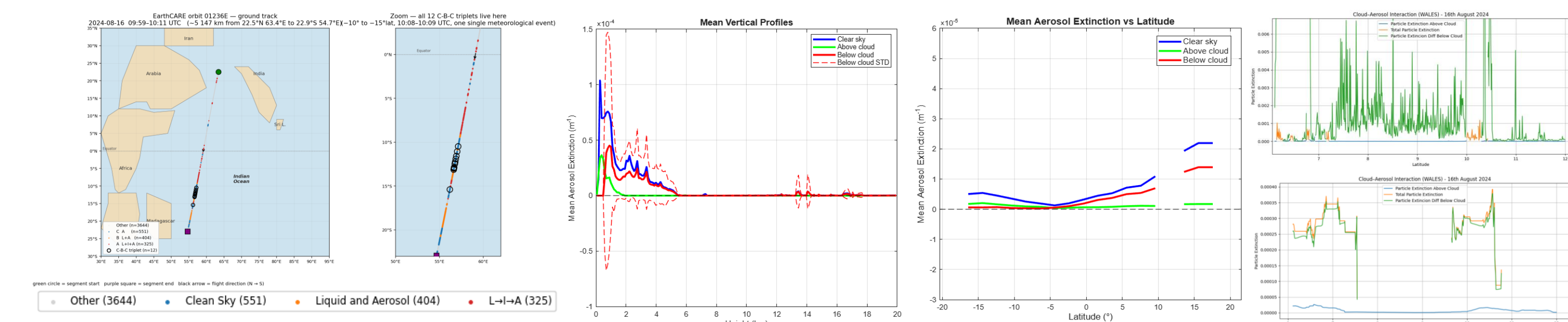
06 PACE Matchup Tool

- test and development of PACE-EarthCARE matchup tool (available on GitHub)
- handling of the diverse AuthN/AuthZ schemes used by NASA and ESA



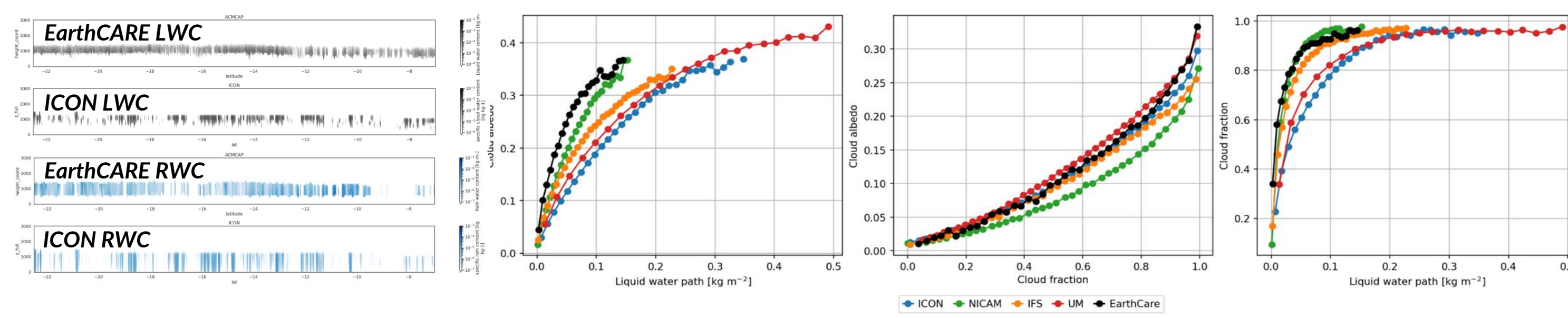
08 Below-Cloud Aerosol

- analysis of below-cloud aerosol and clouds interactions
- ACM_CAP_2B vs WALES airborne campaign data
- validation of above-cloud aerosol extinction predictions



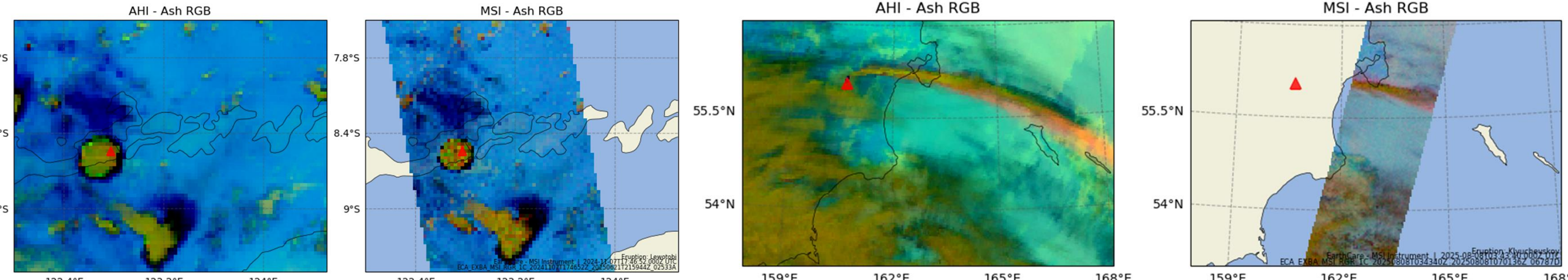
01 Stratocumulus Clouds

- cloud water properties (LWC /RWC) EC vs ICON
- macroscopic cloud properties EC vs ICON, NICAM, IFS, UM
- quasi-3D cloud fields extrapolation from EC
- remapping of MSI and ATLID data to HEALPix format



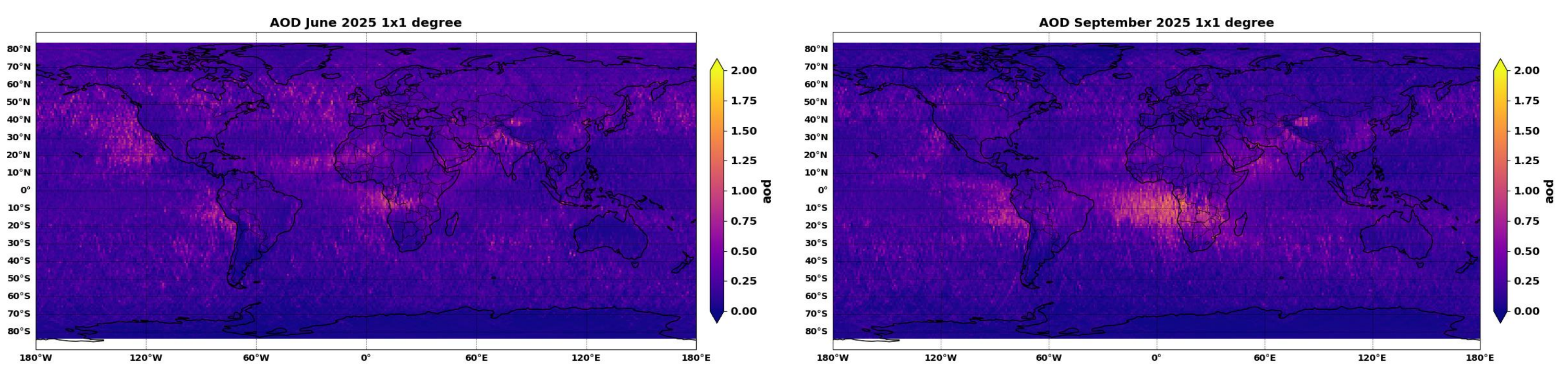
03 Ash and SO₂

- ash and SO₂ RGB composite recipe for EarthCARE
- comparison of IRFs EC vs GOES18, GOES19, MSG, Himawari9
- analysis of volcanic clouds properties and classification



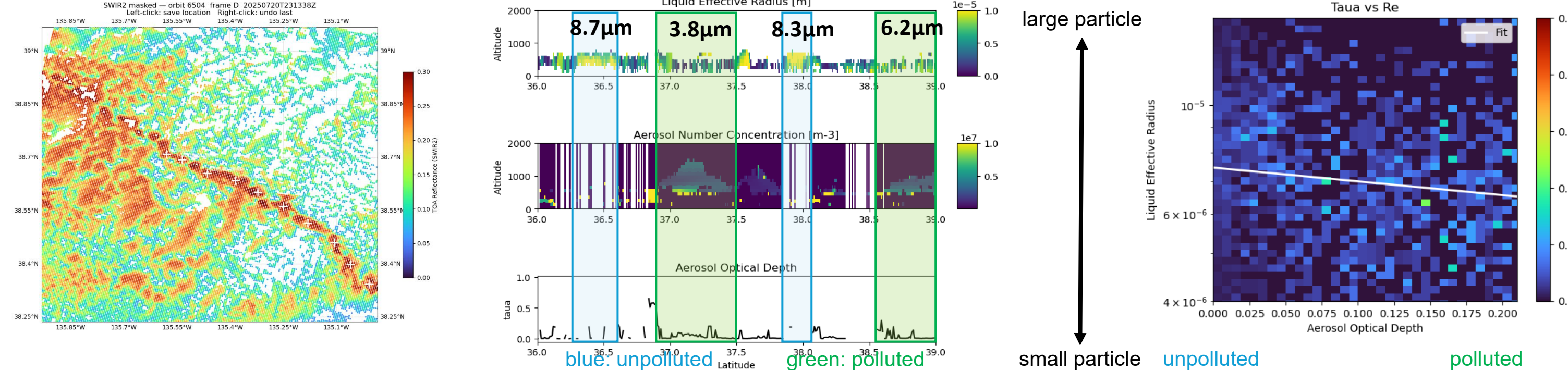
05 Global Maps

- creation of global maps for columnar and by type AOD and ALH
- comparison with PACE L3 products
- comparison of JAXA and ESA AOD products and classifications



07 Aerosol-Cloud Pollution

- analysis of aerosol on low-level clouds microphysical properties
- detection of wildfires and ship tracks aerosol signature
- observation of Twomey effect in EC products



Conclusions

Participants gained practical experience with MAAP and a deeper knowledge about EarthCARE and atmospheric science. Most of them wish to continue their projects. Details of the projects can be found in the linked hackathon repository. Valuable feedback was collected on how to make EarthCARE data more user friendly and improve MAAP.

A heartfelt thank you to everyone that contributed to the event!



EarthCARE 2026 Science and Validation workshop

8–12 June 2026 | Rhodes House | Oxford, UK

