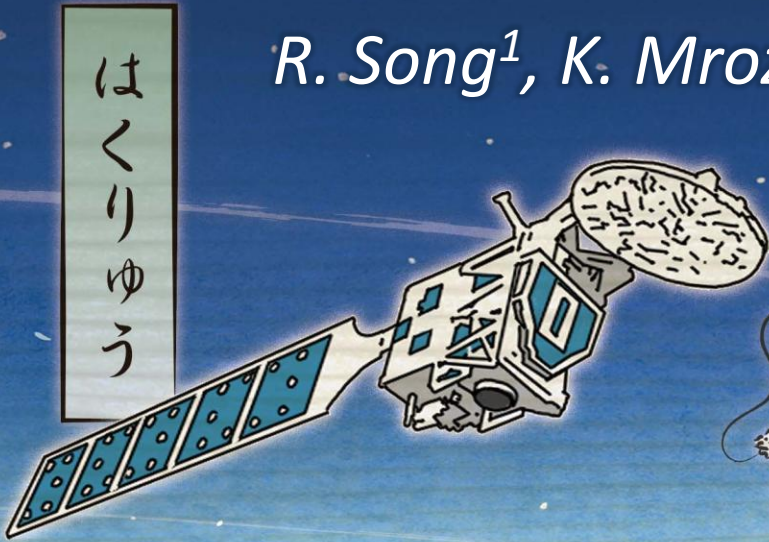


Validation of EarthCARE Cloud and Precipitation Products Using FAAM Aircraft Observations: VERIFY Campaign

R. Song¹, K. Mroz^{2, (prev. 3)}, A. Povey³, Yixuan Pu¹, C. Westbrook⁴, T. Stein⁴,
FAAM Team

¹Uni. Oxford; ²ECMWF; ³Uni. Leice

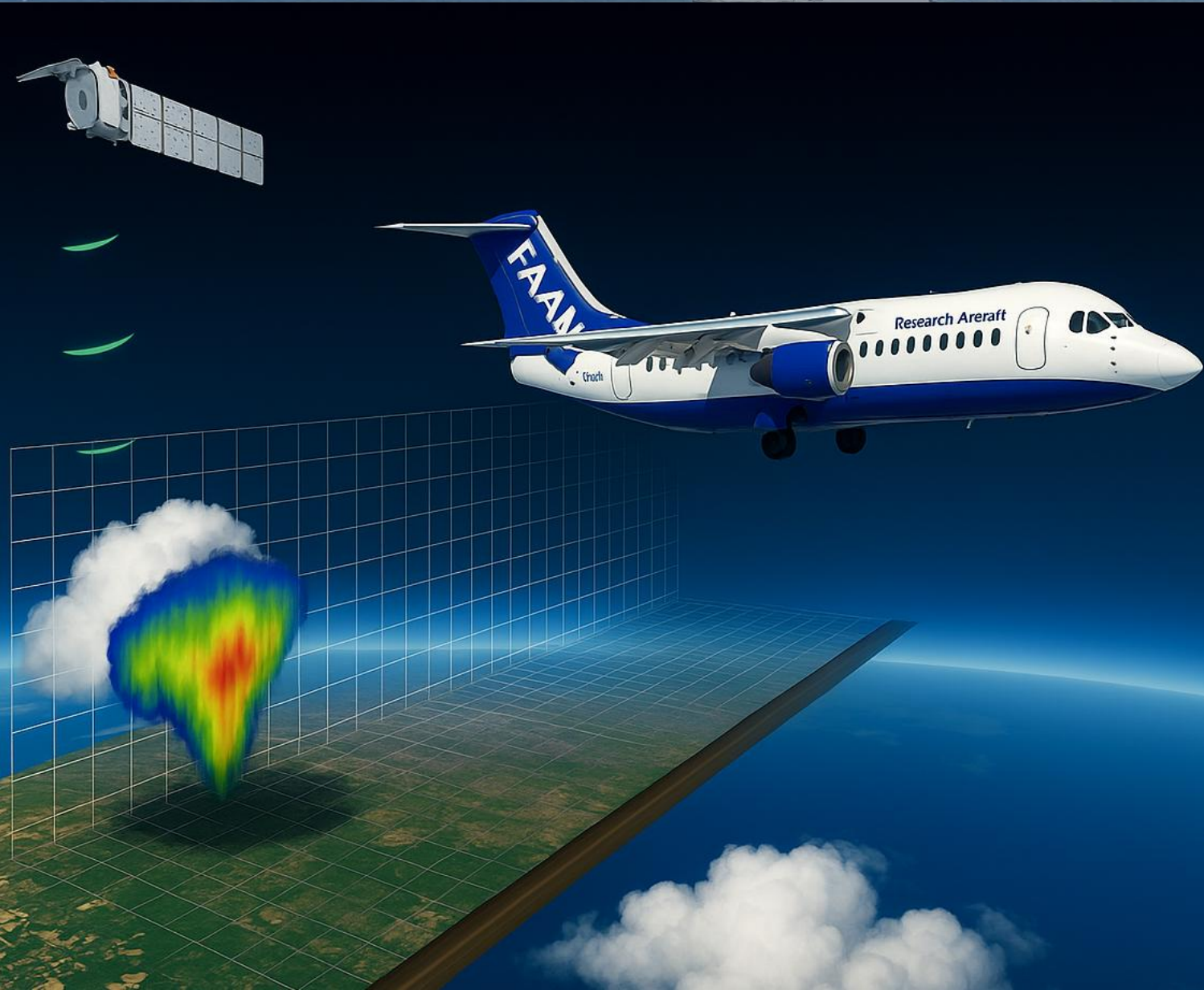


EarthCARE Science and Validation Workshop 2025

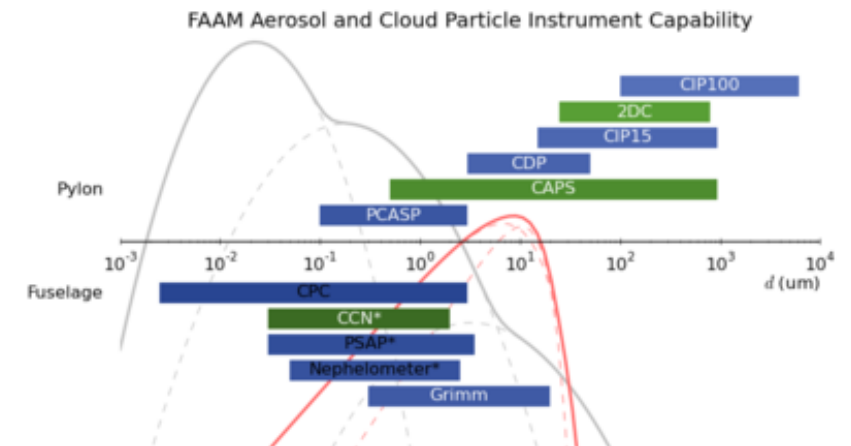
1-5 December 2025 | The University of Tokyo | Tokyo, Japan



The FAAM Airborne Laboratory



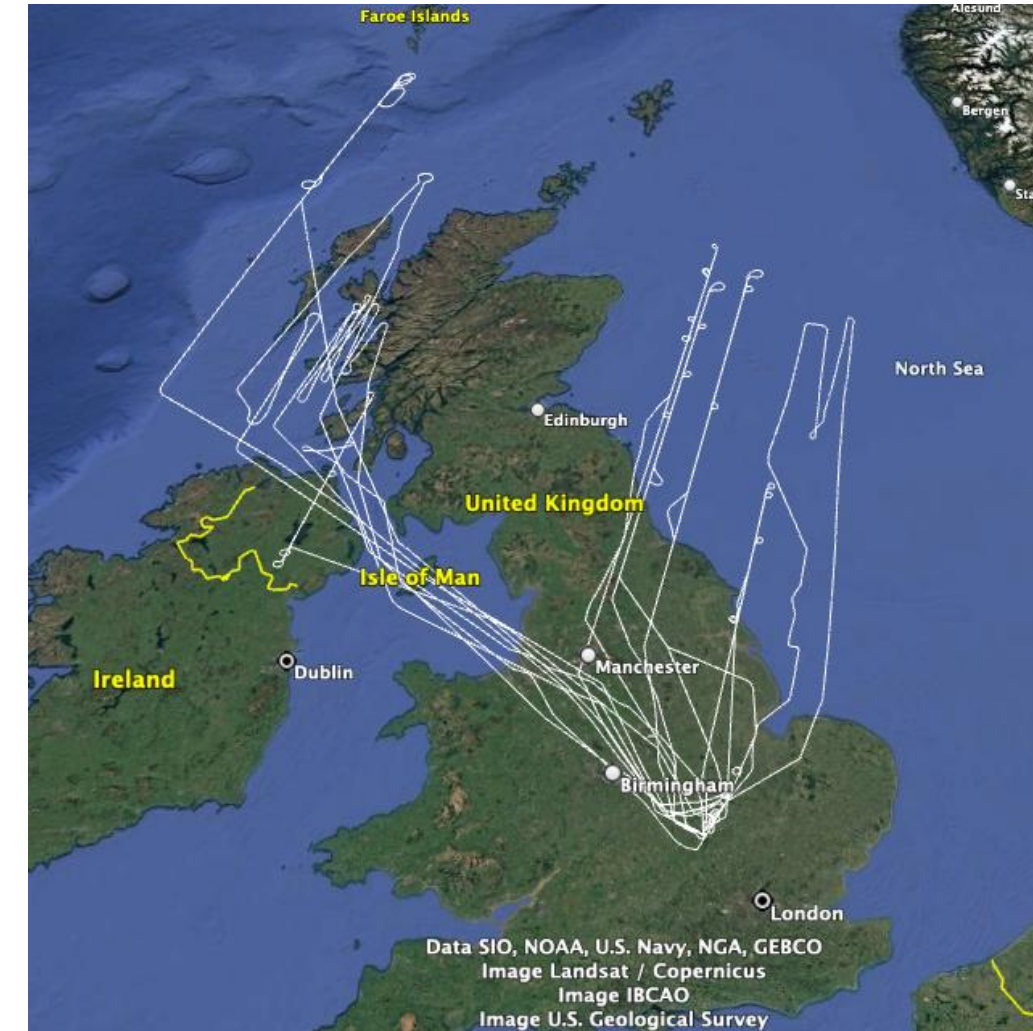
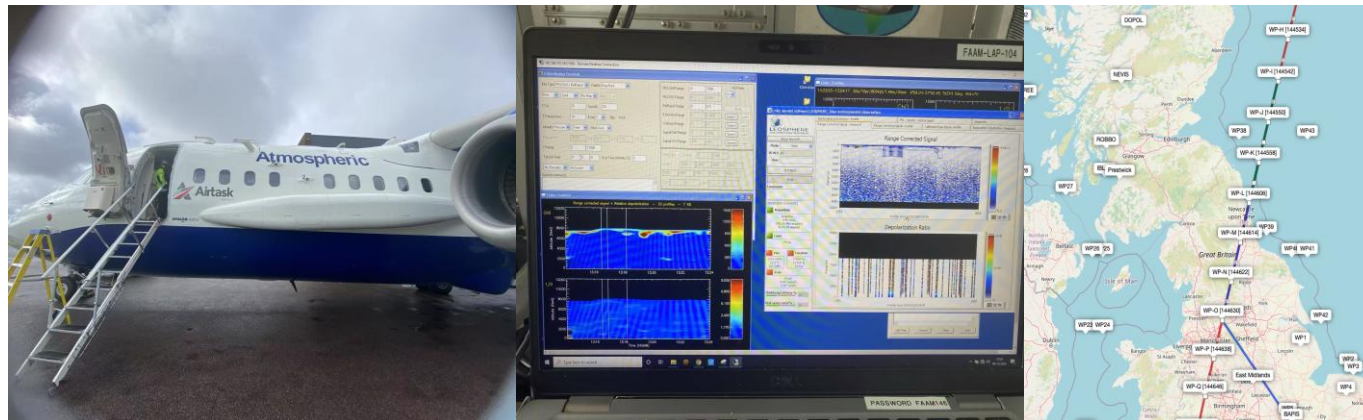
- BAe-146-301 large research aircraft based at Cranfield Airport at Cranfield University
 - 30/150m (water/land) up to 11km
 - Up to 4 tones of scientific equipment
- Cloud physics instrumentation
 - Droplet counters
 - Imaging probes covering sizes from 3 μ m to 6.2mm
 - Bulk ice and water content
- Standard suite of aerosol, meteorology, chemistry instrumentation



The VERIFY Campaign



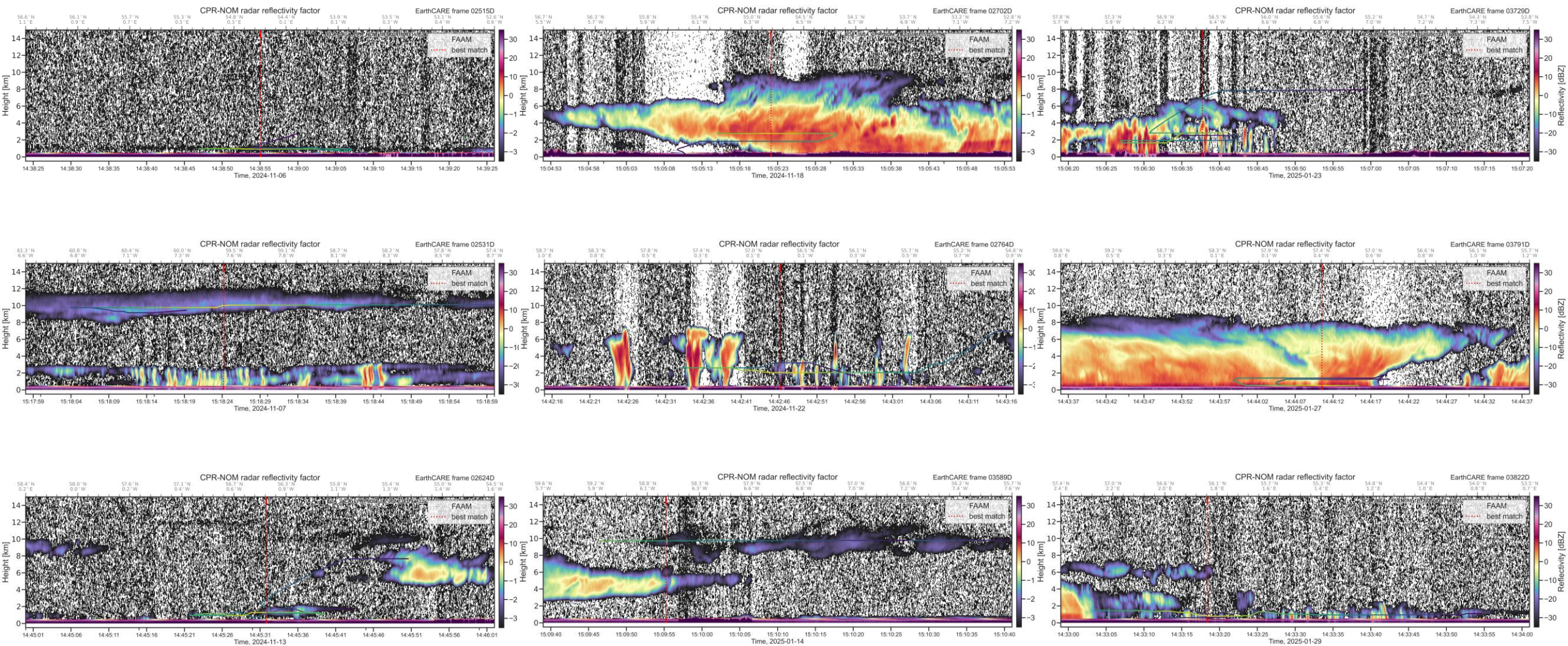
- In situ clouds and aerosols
 - Within 10 minutes of the EarthCARE track
 - 34hr of flights collected over 9 sorties
- Data freely available at
 - <https://data.ceda.ac.uk/badc/faam/data/2025>
 - <https://data.ceda.ac.uk/badc/faam/data/2024>
 - Flights C393-397, C399-402



The VERIFY Campaign



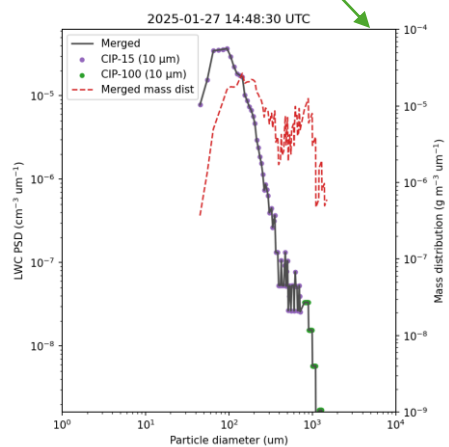
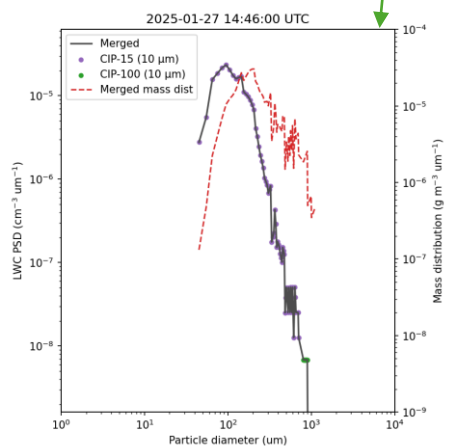
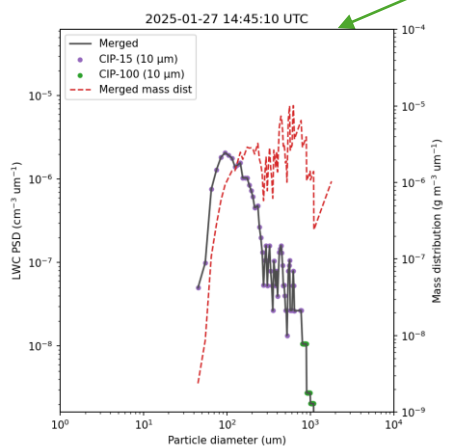
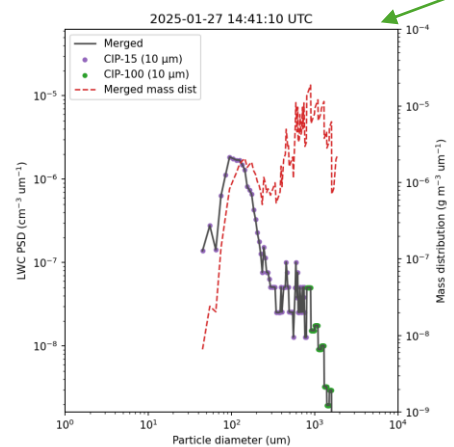
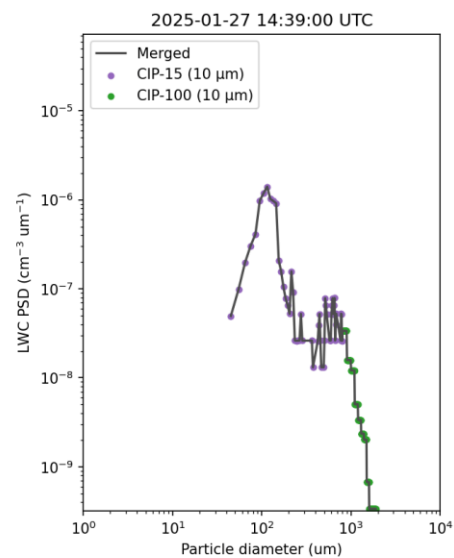
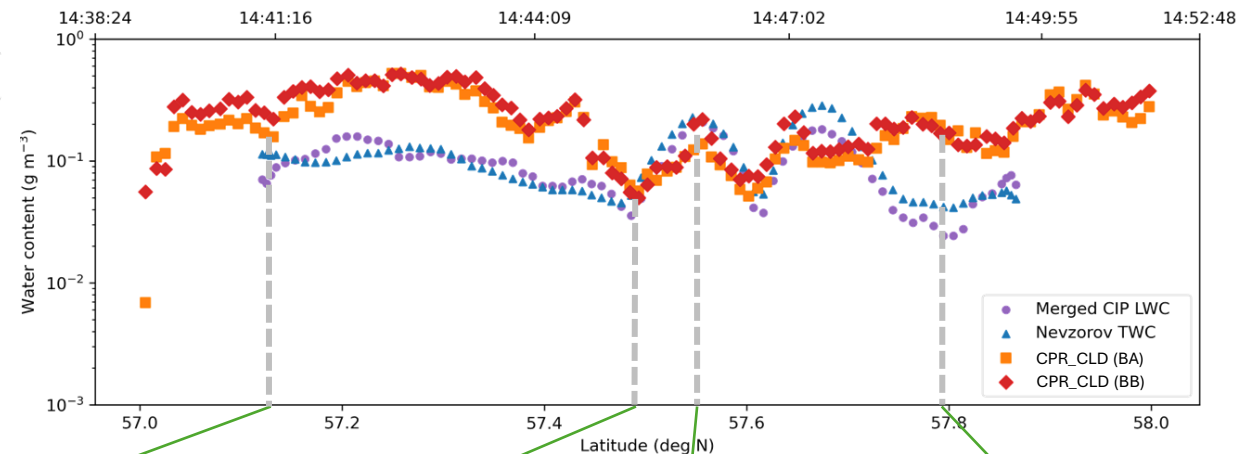
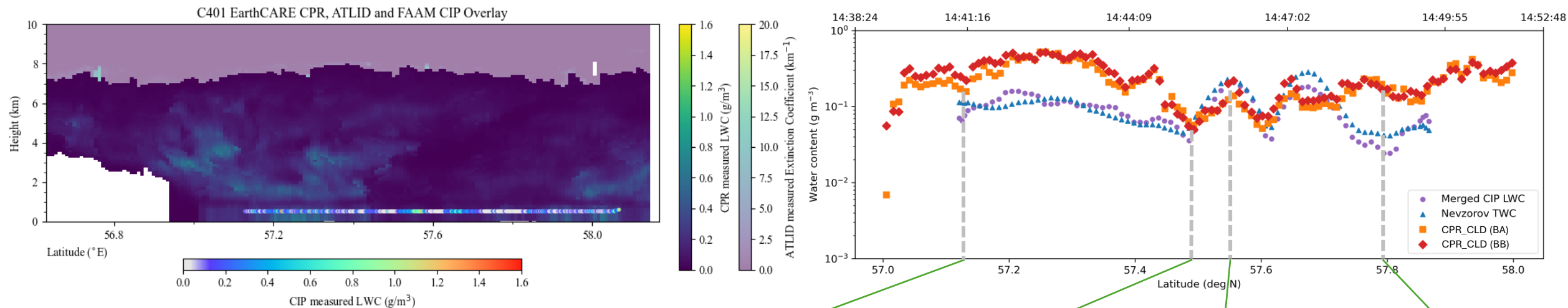
Baseline: CA, reflectivity elevated by 1.6 db (to match CB); Credit: S. Mason (ECMWF) using ectools



Validation of LWC



Flight 401: 27th January 2025

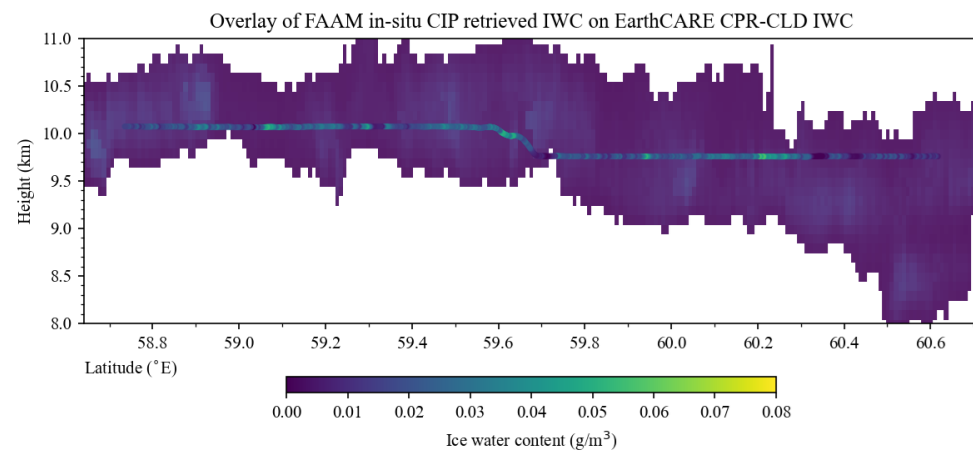
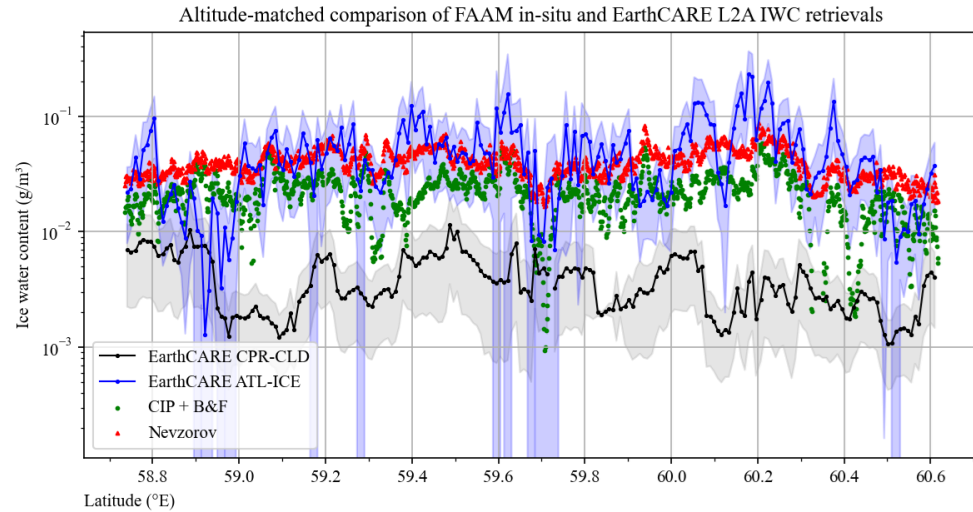


Validation of IWC

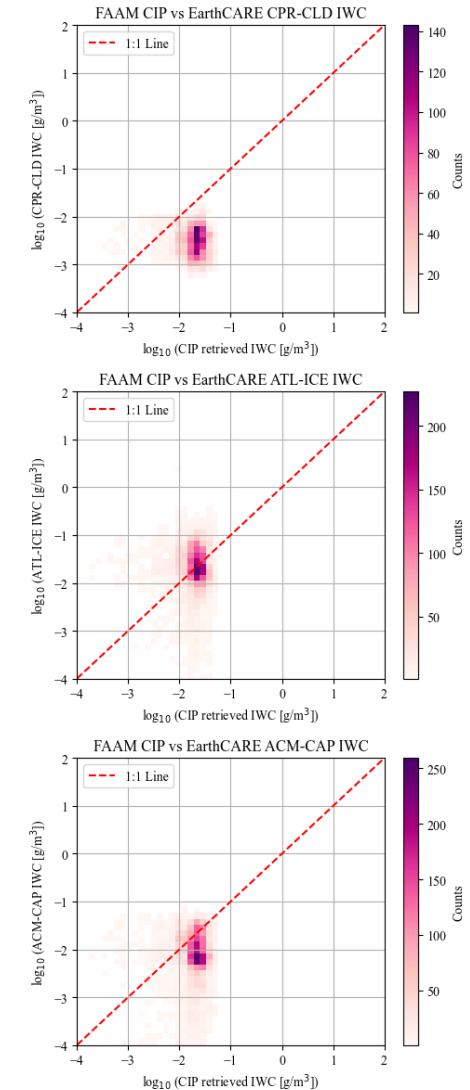
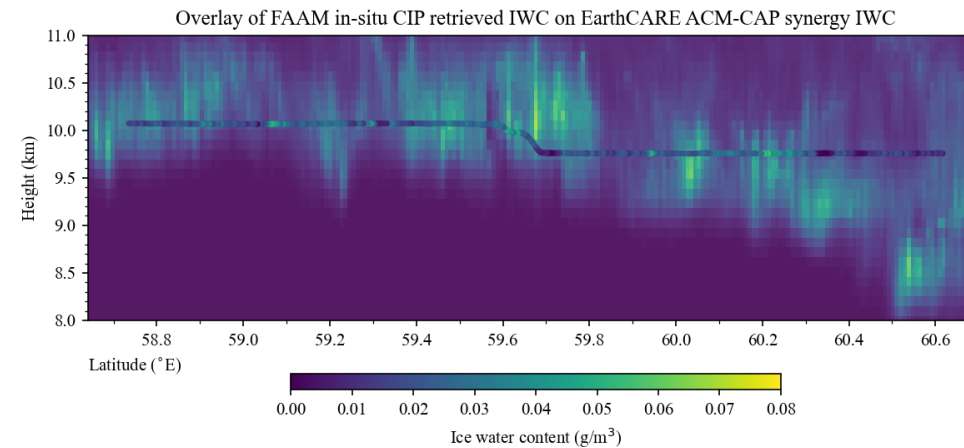
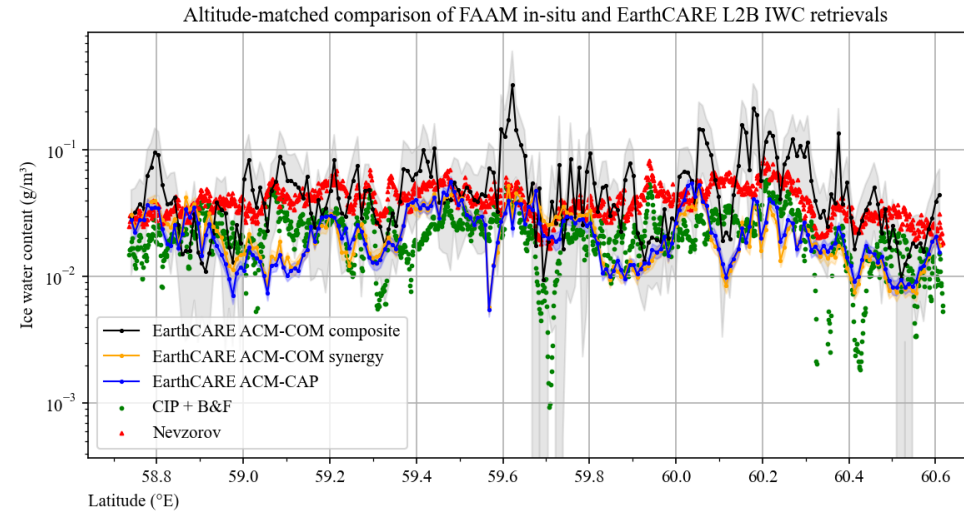


Flight 396: 18th November 2024

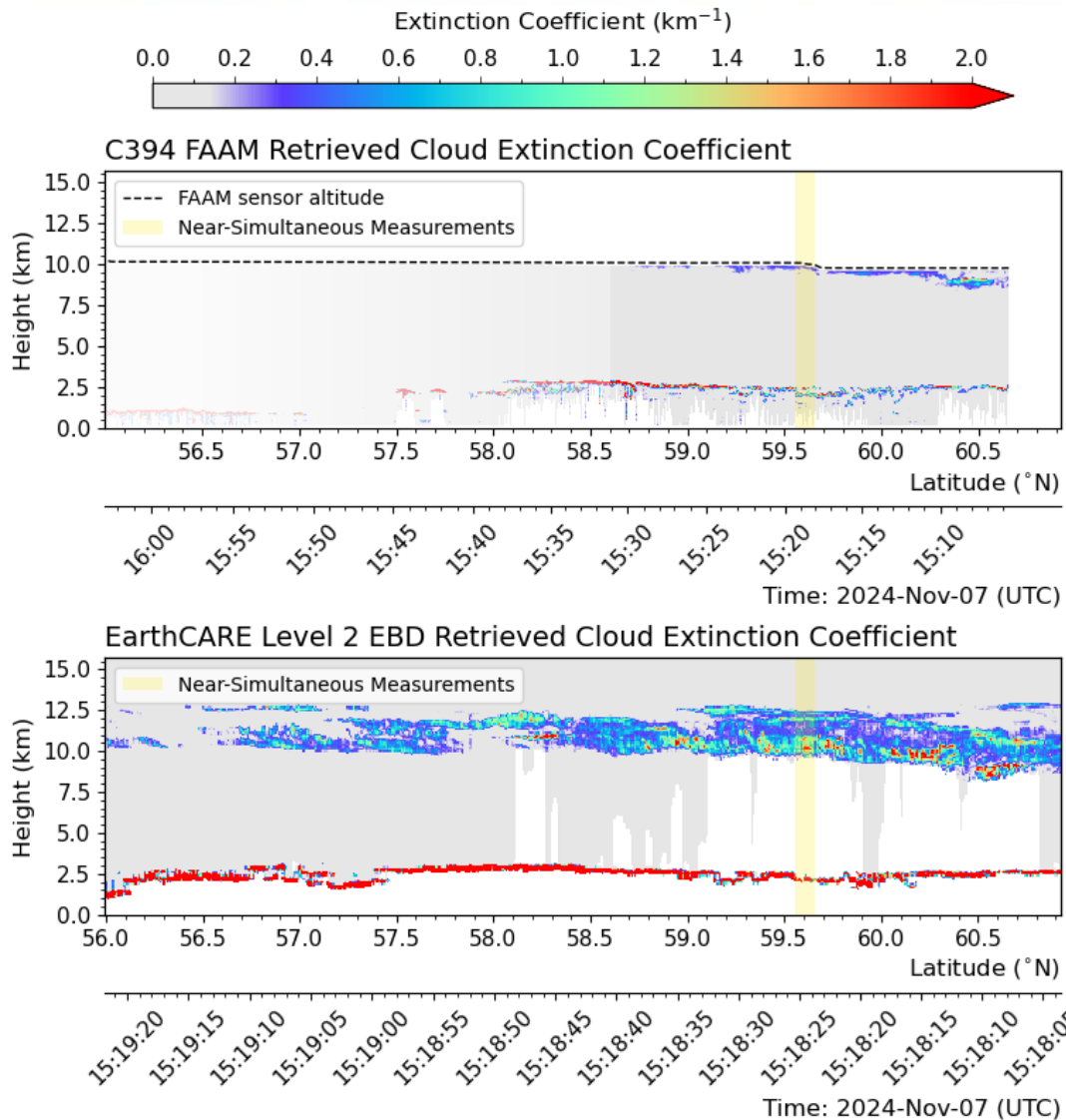
FAAM CIP and EarthCARE CPR



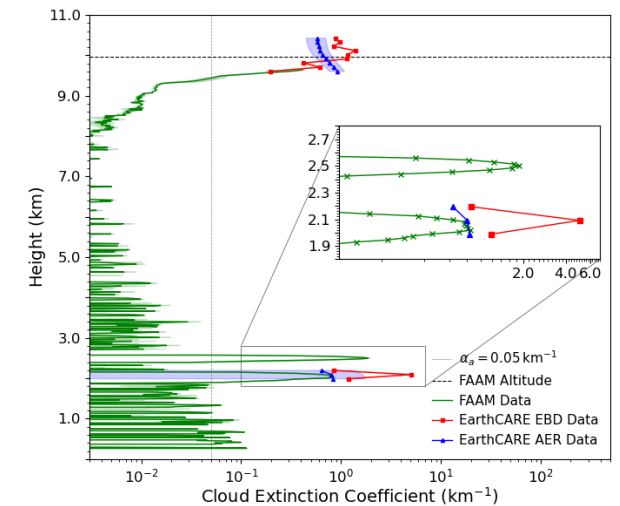
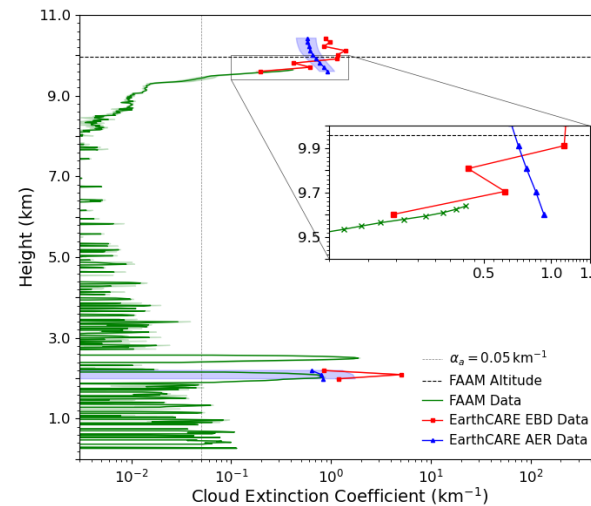
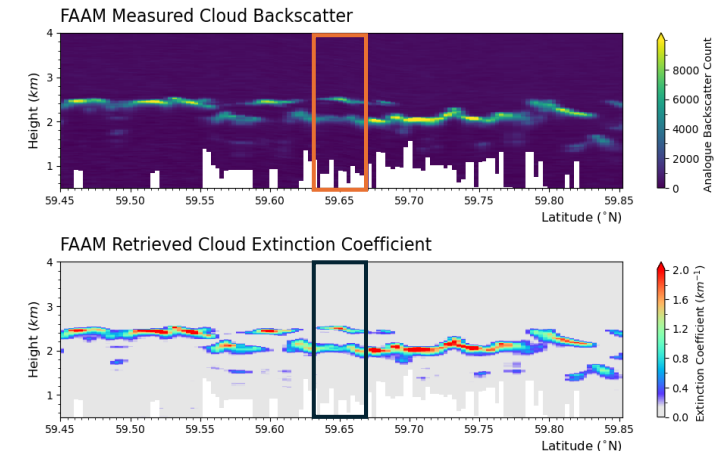
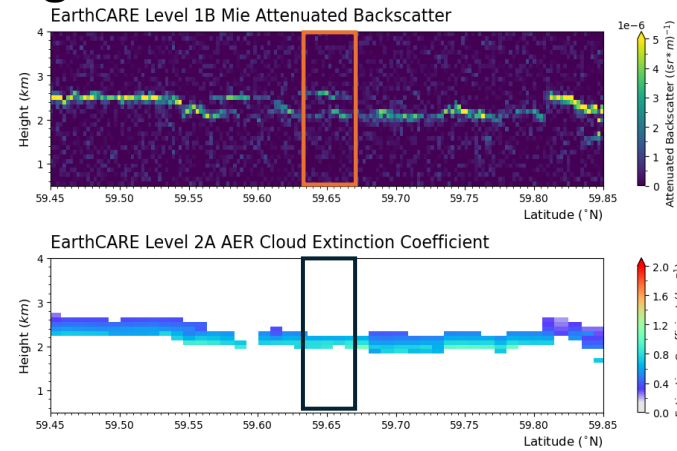
FAAM CIP and EarthCARE synergy



Validation of lidar profiles



Flight 394: 7th November 2024





- VERIFY completed 34hr of flights over 9 sorties through a range of aerosol/cloud environments
 - Freely available at <https://data.ceda.ac.uk/badc/faam/data/>
- Strong agreement between EarthCARE and FAAM lidars
- Good comparison of mass-size relationship against Nevzorov probe but not against CPR's reflectivity
- CPR underestimates IWC in thin cirrus, while ATLID retrievals align well with CIP and Nevzorov; the two synergy products ACM-COM and ACM-CAP also show good agreement with in-situ measurements.
- Flight 401 shows a larger CPR bias in LWC, particularly when scanning through large cloud droplets.

