Validation of EarthCARE Cloud Retrievals Using FAAM Aircraft Observations: VERIFY Campaign

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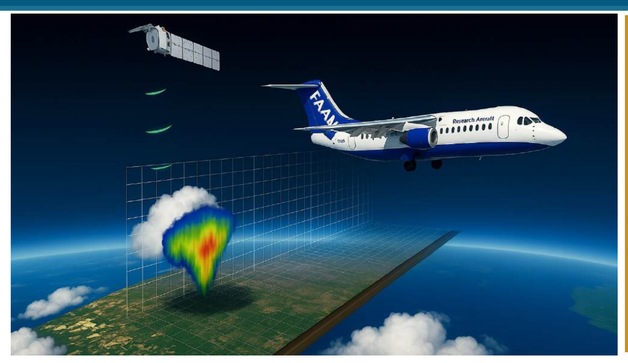
1 Overview · The VERIFY Campaign and Its Validation Activities

The VERIFY campaign deployed the FAAM BAe-146 on **9** sorties (**Nov 2024 – Jan 2025**) over the UK and adjacent North Atlantic, coordinated within 10 min of EarthCARE overpasses across marine stratocumulus, cirrus, convective and precipitating systems.

Collocated airborne lidar (ALS450) and in-situ microphysics (CDP, CIP-15/100, Nevzorov) are intercompared with EarthCARE ATLID, CPR and ACM-COM/CAP synergy retrievals at profile-by-profile resolution.



9 FLIGHTS **34h AIRBORNE** **4 REGIMES**

KEY OBJECTIVES

- Regime-dependent biases of EarthCARE L2 cloud retrievals
- L2 uncertainty refined with lidar + in-situ microphysics

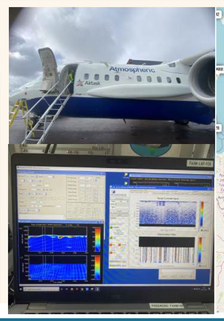
COLLOCATION

≤ 10 min temporal offset

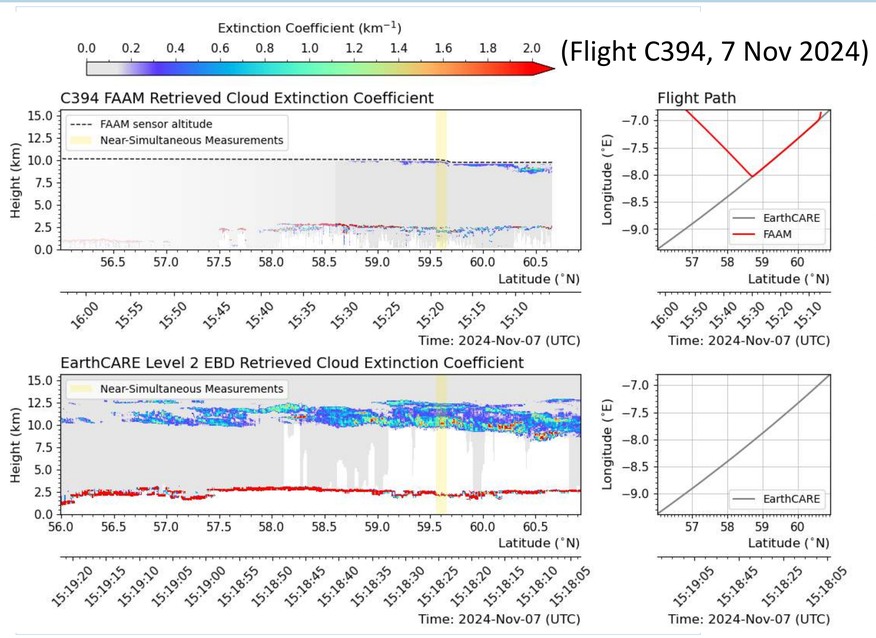
AIRBORNE PAYLOAD

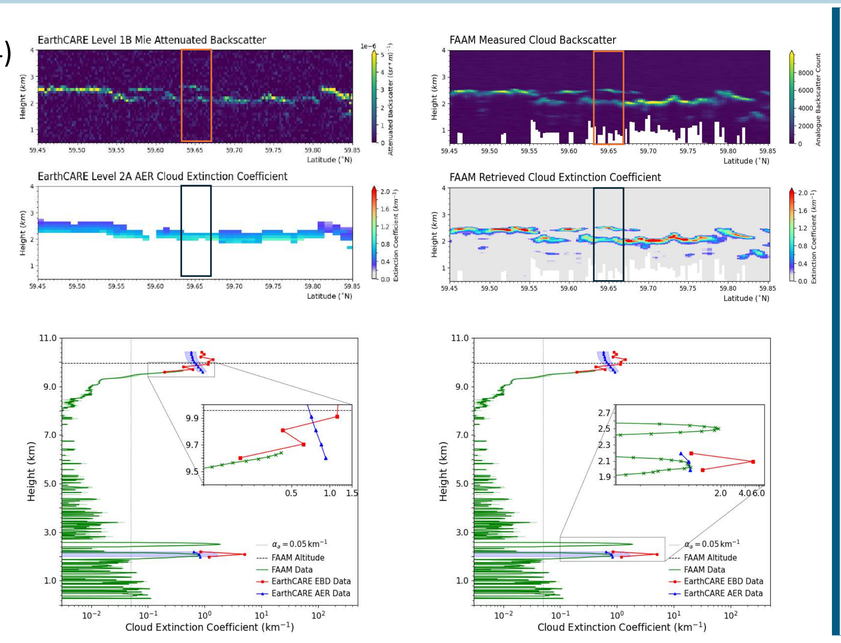
- ALS450 lidar
- CDP; CIP-15 / CIP-100
- Nevzorov
- PCASP
- Nephelometer
- BBRs

Flight	Date
C393	06 Nov 2024
C394	07 Nov 2024
C395	13 Nov 2024
C396	18 Nov 2024
C397	22 Nov 2024
C399	14 Jan 2025
C400	23 Jan 2025
C401	27 Jan 2025
C402	29 Jan 2025



2 FAAM ALS450 ↔ EarthCARE ATLID · Lidar Profile Intercomparison





Strong ATLID ↔ FAAM ALS450 agreement

Profile-by-profile comparison along the C394 collocated track captures cirrus + lower-layer cloud structure consistently between platforms.

FAAM ALS450 - reprocessed

First VERIFY use of newly processed FAAM lidar following improved instrument calibration (Pu, MPhys 2025). The reprocessing corrects baseline drift identified in the in-flight calibration and brings retrieved extinction into agreement with reference profiles.

ATLID L2 EBD

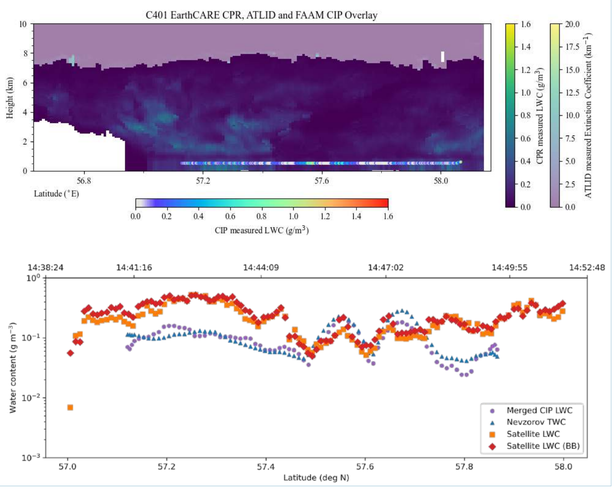
Reproduces the FAAM-resolved cloud-layer structure within retrieval uncertainty; near-simultaneous comparison (yellow band) shows consistent backscatter & extinction profiles across cirrus + lower stratus.

Limits & next steps

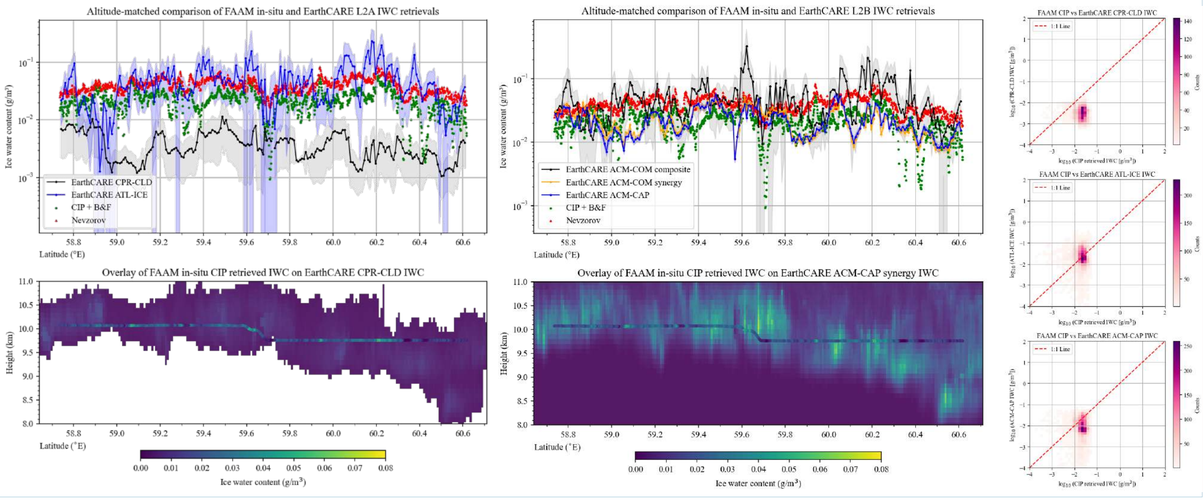
Investigating ATLID double-layer / top-layer threshold sensitivity.

3 FAAM in-situ ↔ EarthCARE CPR / ACM-CAP · Liquid & Ice Water Content Intercomparison

A · LWC · FAAM CIP vs CPR (BA/BB) + ATLID · C401, 27 Jan 2025



B · IWC · FAAM CIP + Nevzorov vs CPR-CLD / ATLID-ICE / ACM-COM/CAP · C396, 18 Nov 2024



Key findings

· LWC validation

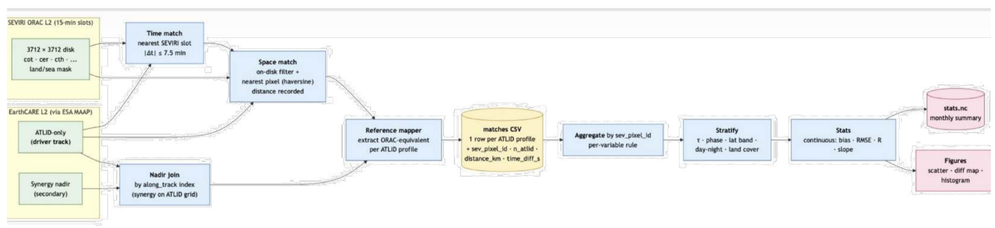
CIP-measured LWC tracks the CPR-CLD profile within the shallow stratiform liquid layer (56.6°–58.0° N) along the C401 track.

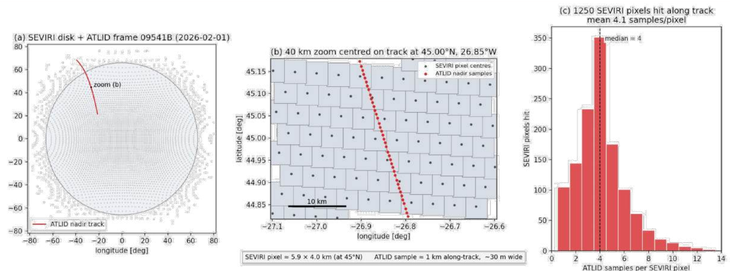
Residuals attributable to mass-size assumptions & partial-volume effects in stratiform liquid retrievals.

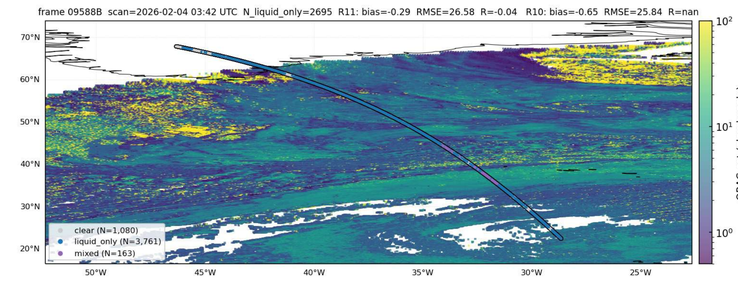
· IWC validation

Good FAAM ↔ Nevzorov-derived IWC agreement;
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.

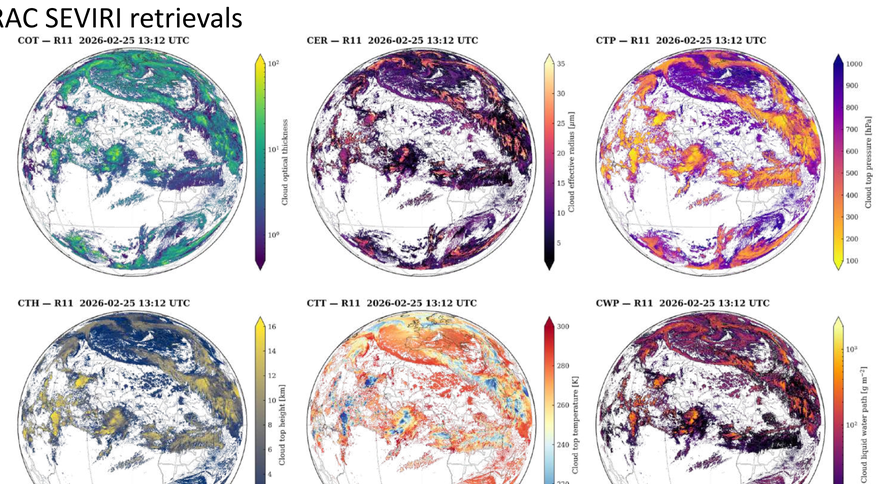
4 Intercomparison between EarthCARE and ORAC SEVIRI Cloud Retrievals · Feb 2026

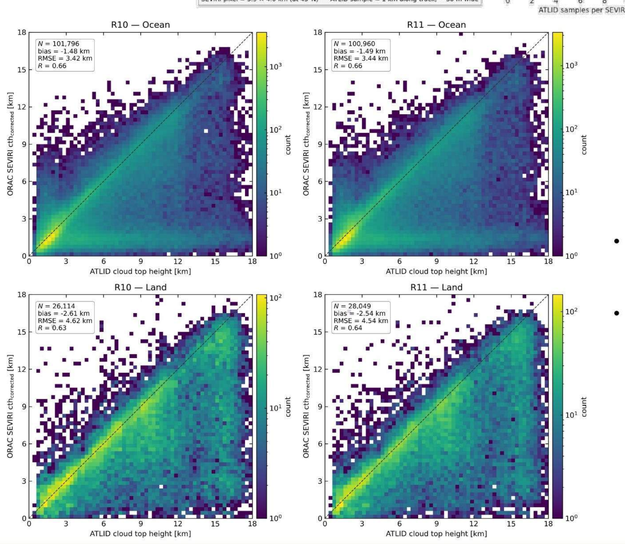


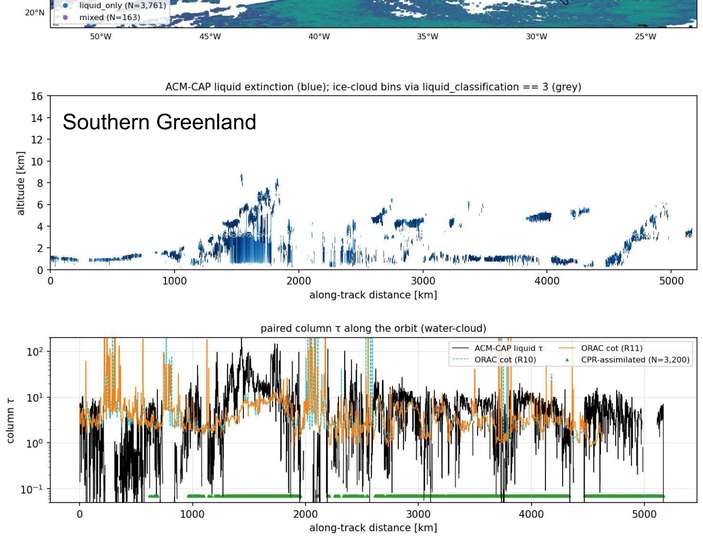




ORAC SEVIRI retrievals







Acknowledgements

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