The first comparisons between level-2 EarthCARE products and in-situ measurements during the VERIFY campaign over the UK

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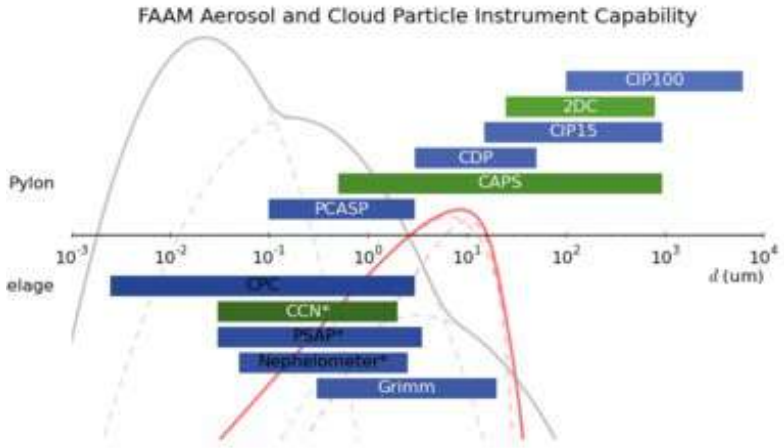
2nd ESA-JAXA EarthCARE In-Orbit Validation Workshop

17 – 20 March 2025 | ESA-ESRIN | Frascati (Rome), Italy

The FAAM Airborne Laboratory

- Based at Cranfield Airport at Cranfield University
- BAe-146-301 large research aircraft
- Altitude: from 30m over water (150m over land) to 11km
- The aircraft can carry up to 4 tones of scientific equipment
- **Cloud physics instrumentation** : droplet counters, imaging probes covering sizes from 3um to 6.2mm ,
  bulk ice and water content (Nevzorov & TWC probe)
- Aerosol, Meteorology, Chemistry instrumentation



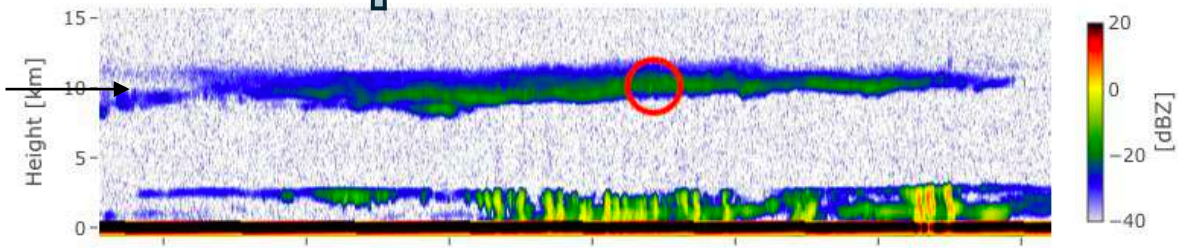
Campaign Objective

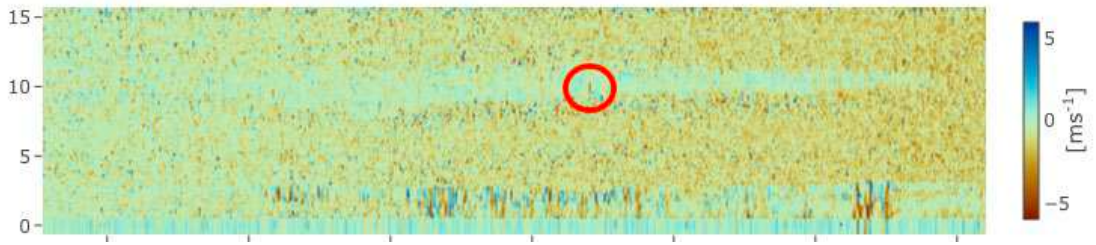
- Collect aircraft measurements of clouds and aerosols
- Within 10 minutes of the EarthCARE track
- at least 120 km long
- prioritise runs beneath EarthCARE
- Sample wide range of meteorological conditions (not covered by GEM simulations)
- 34 h of flights

CPR;
ATLID;
MSI;
BBR

7th Nov. 2024

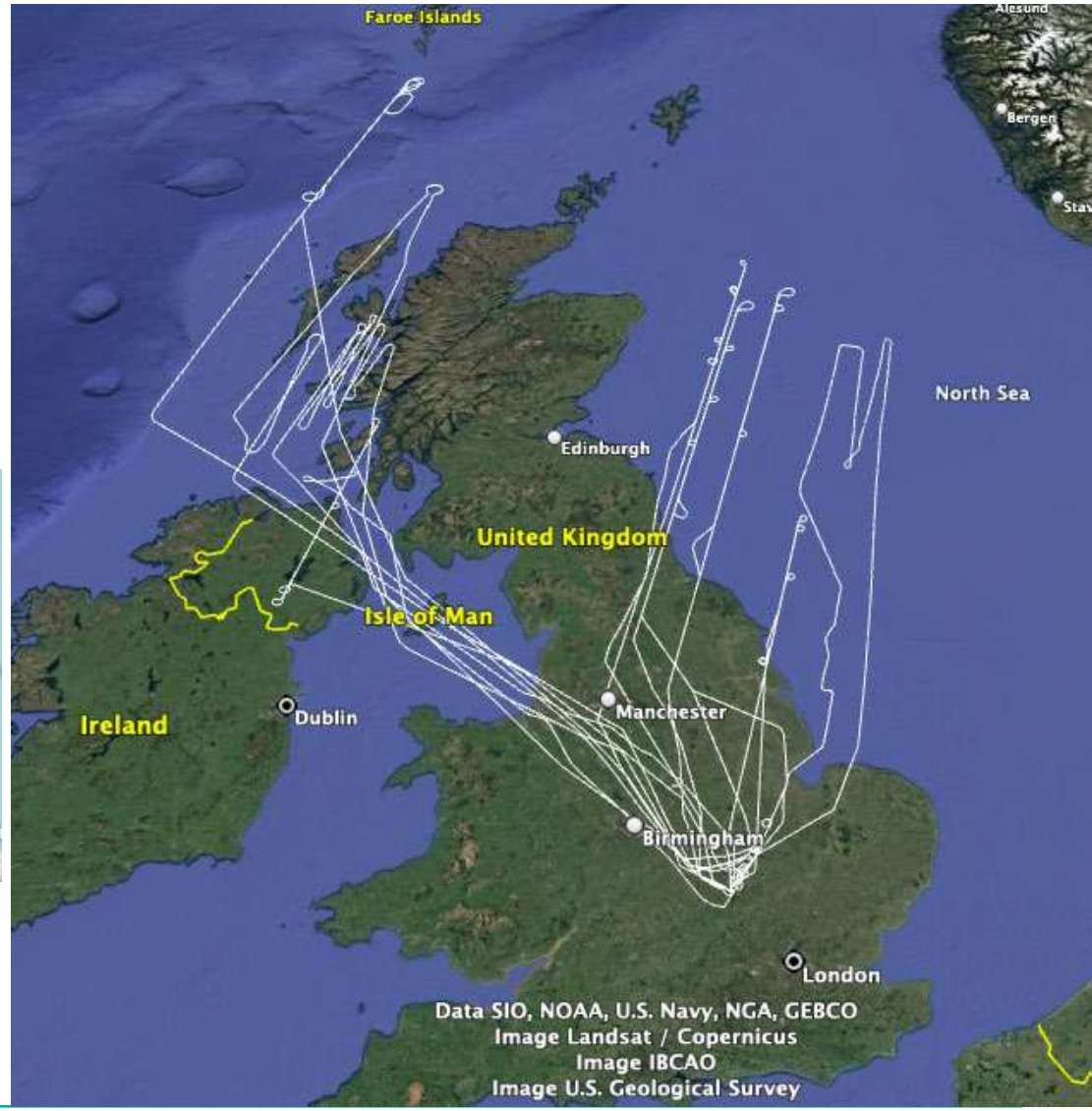
PCASP;
CDP;
CIP-15, CIP-100;
Nevzorov;
Broadband radiometers





Performed Sorties

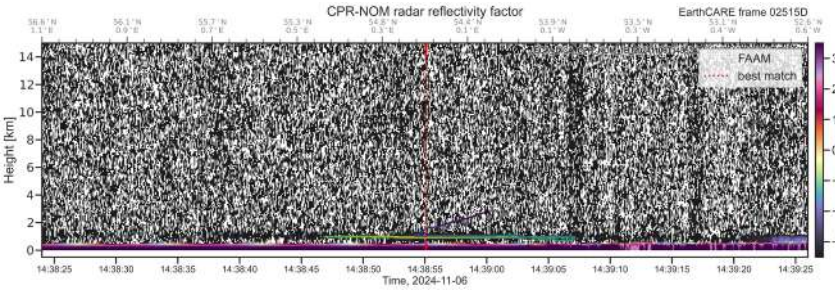
- 9 flights performed (C393-C402)
- https://data.ceda.ac.uk/badc/faam/data/2025
- https://data.ceda.ac.uk/badc/faam/data/2024

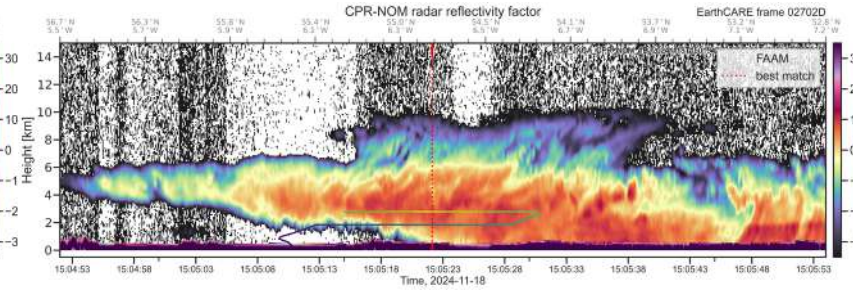


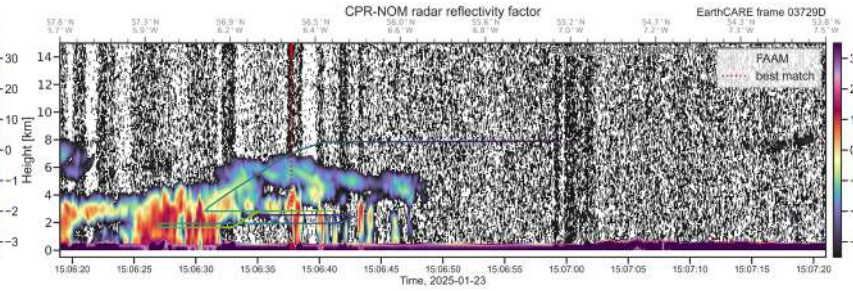
Performed Sorties

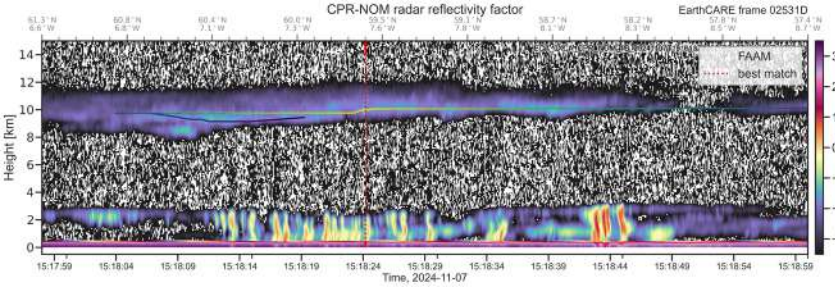
BASELINE: CA

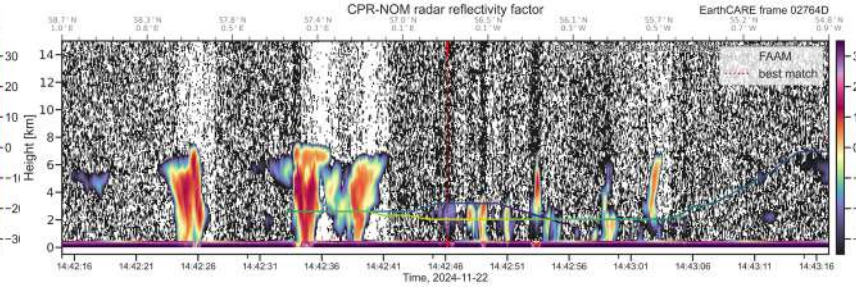
Credit: ectools of S. Mason (ECMWF)

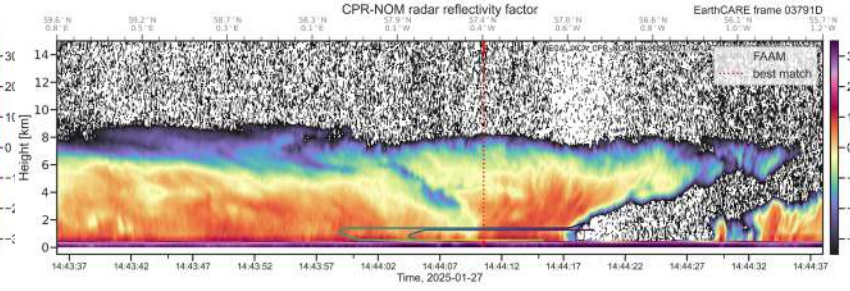


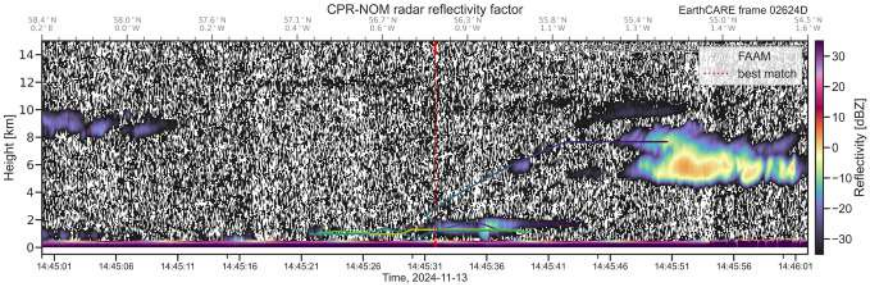


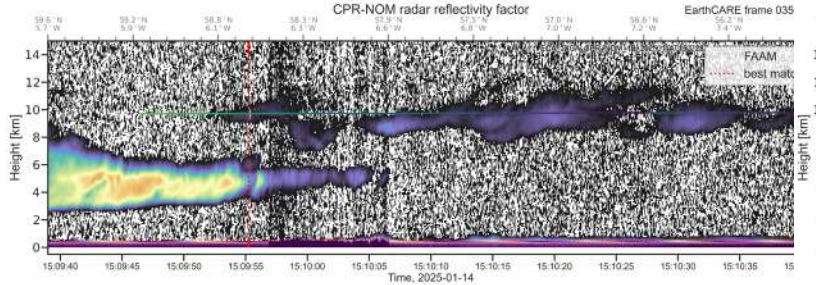


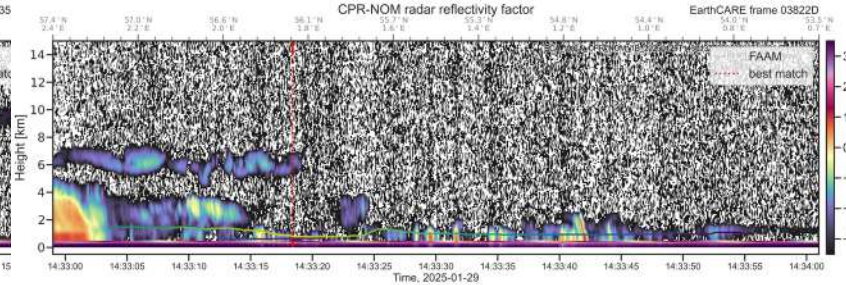




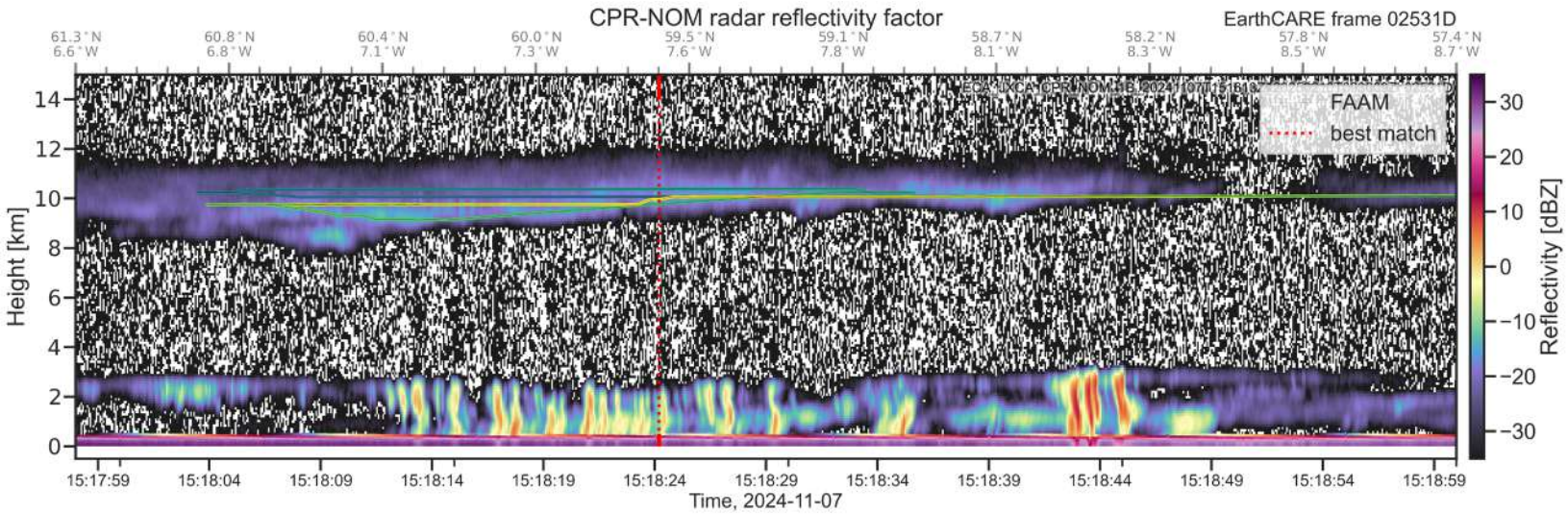


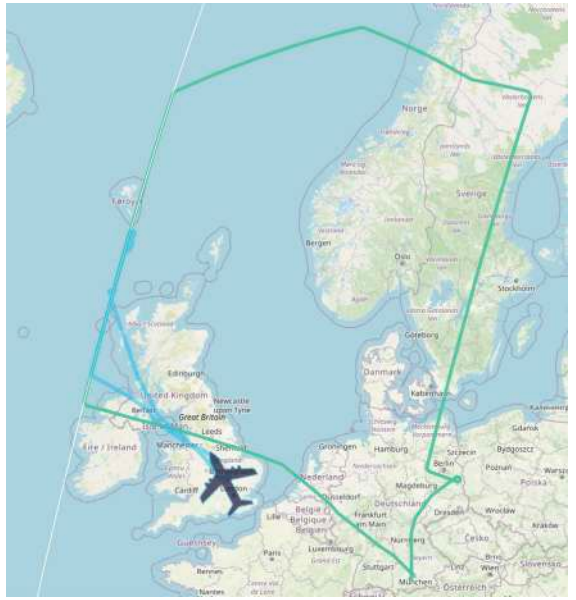


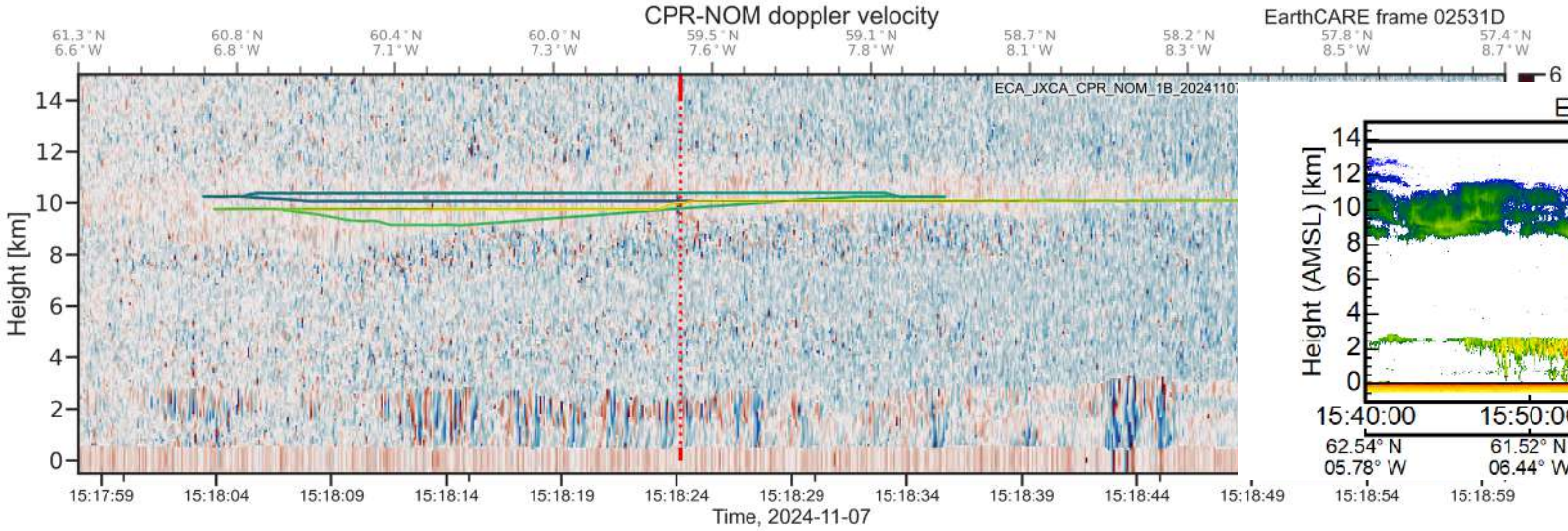


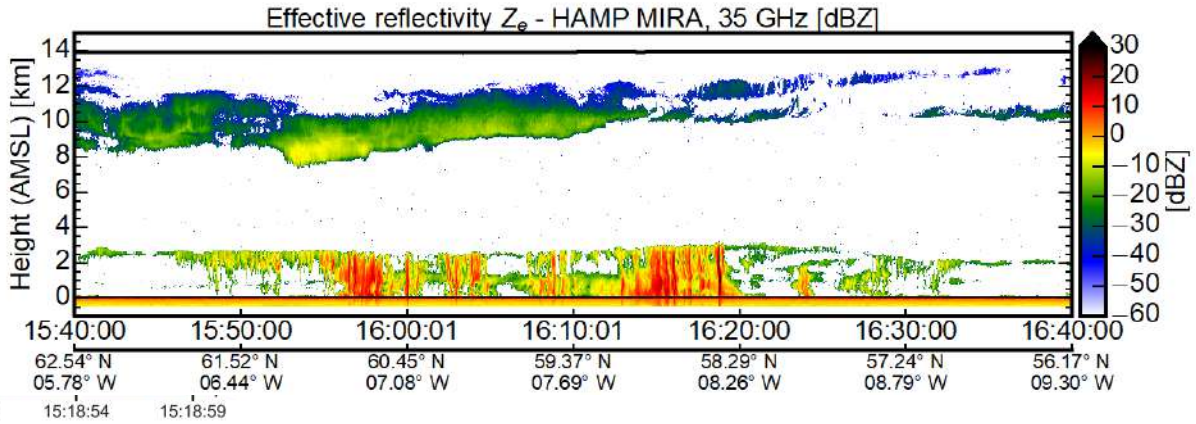


Flight C394 (7.11.2024)









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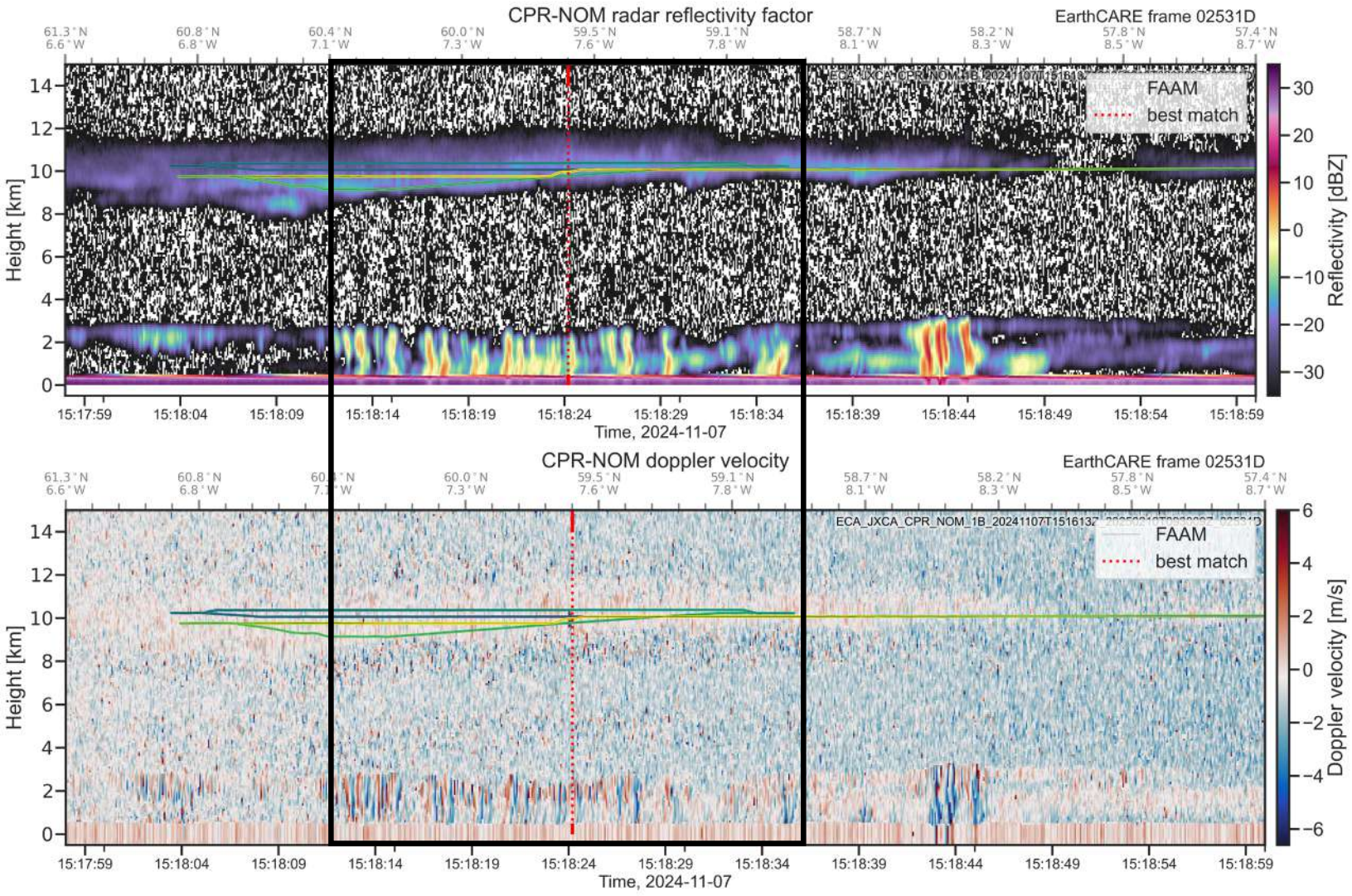

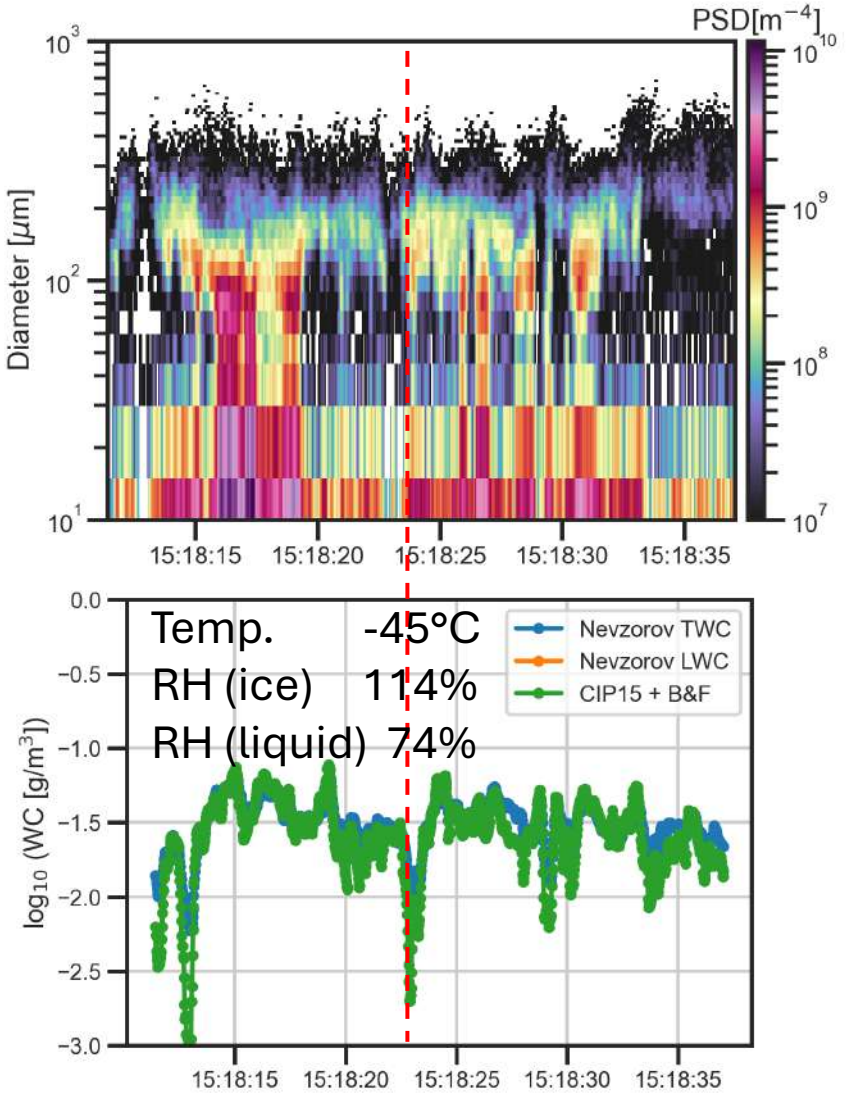

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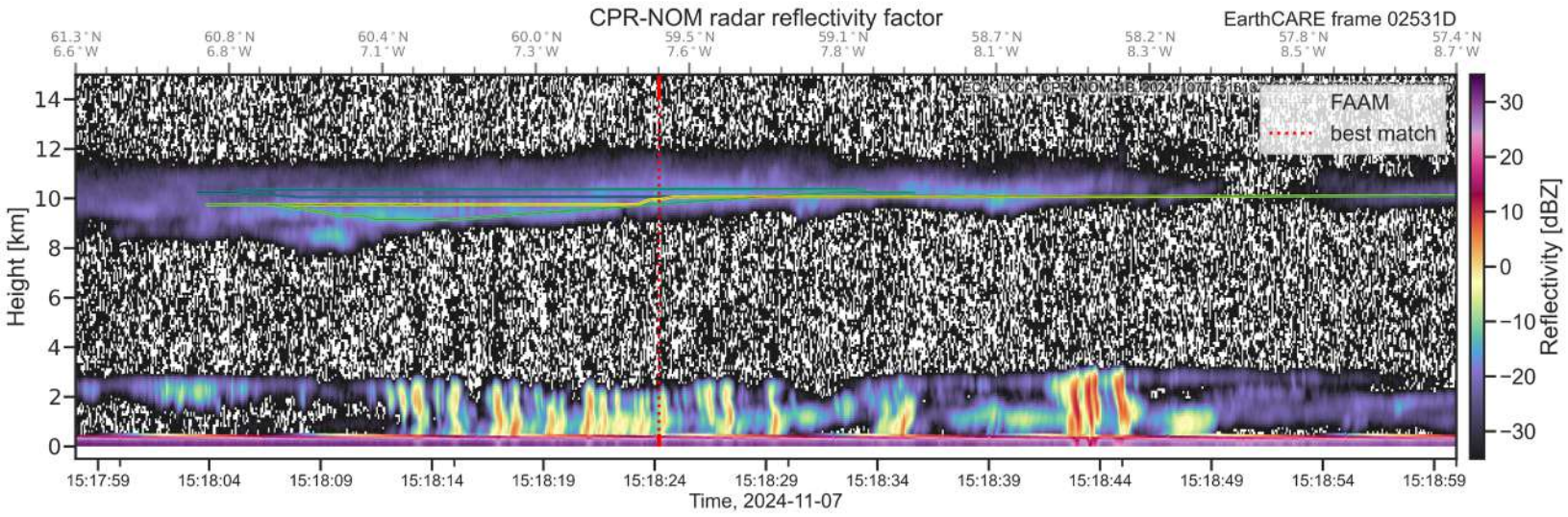
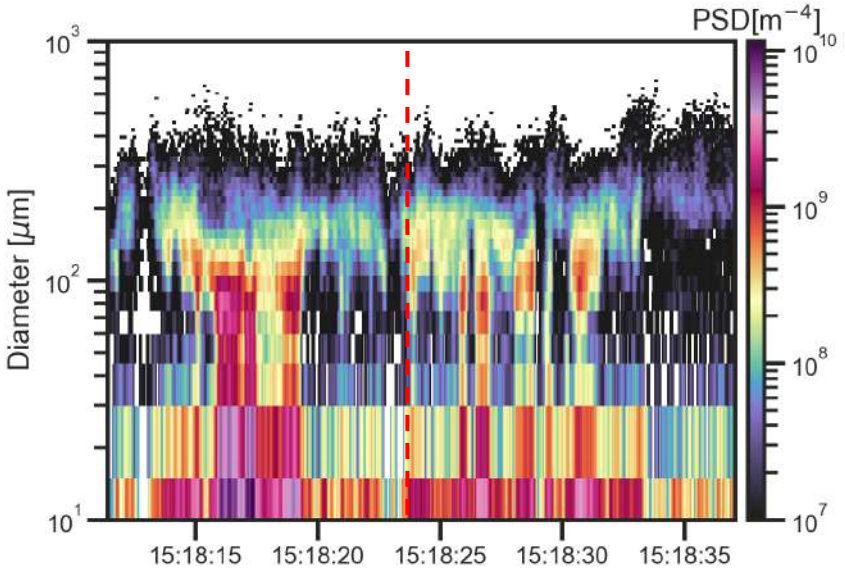
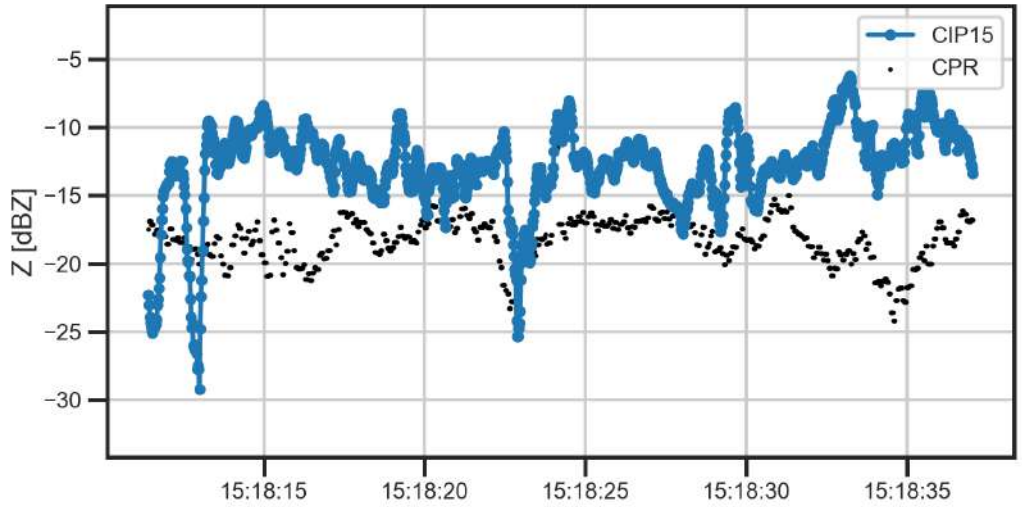


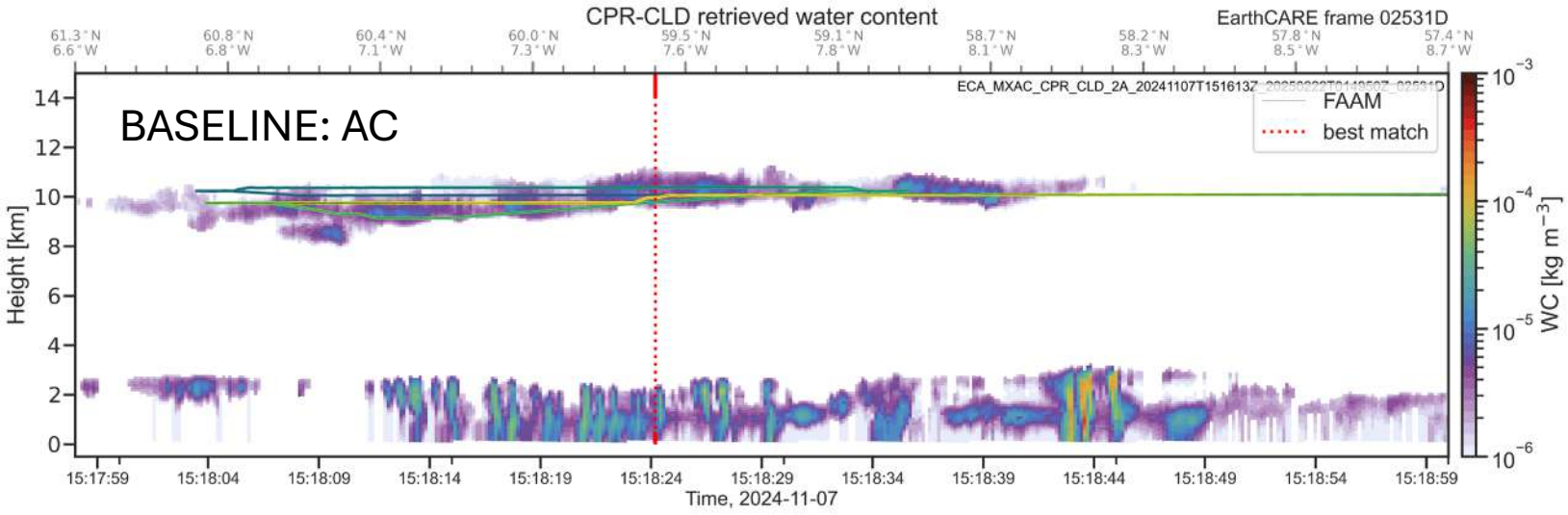


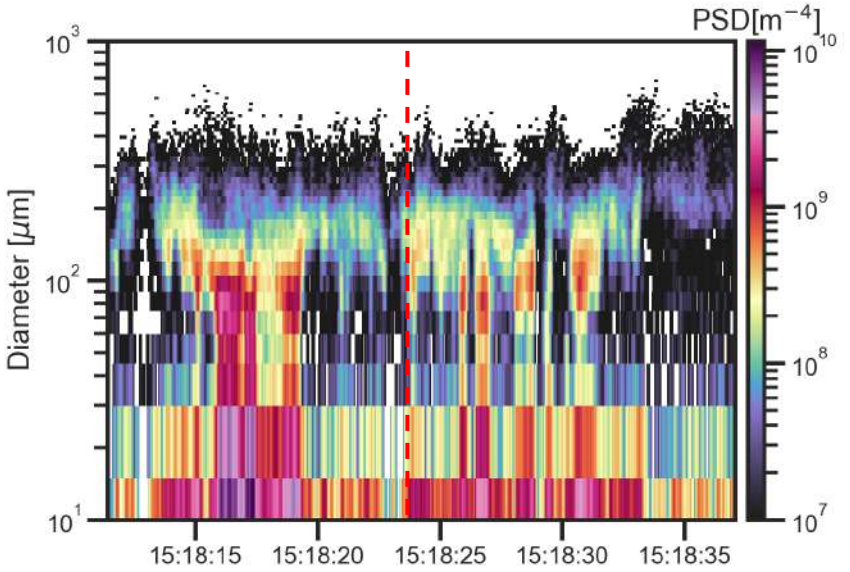


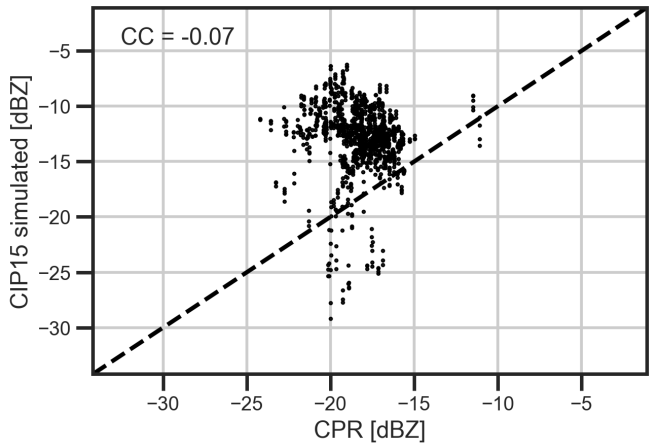
- Particles smaller than 0.1 of the wavelength
- B&F mass-size relation provides a good match with the Nevzorov probe but **not** with the CPR reflectivity

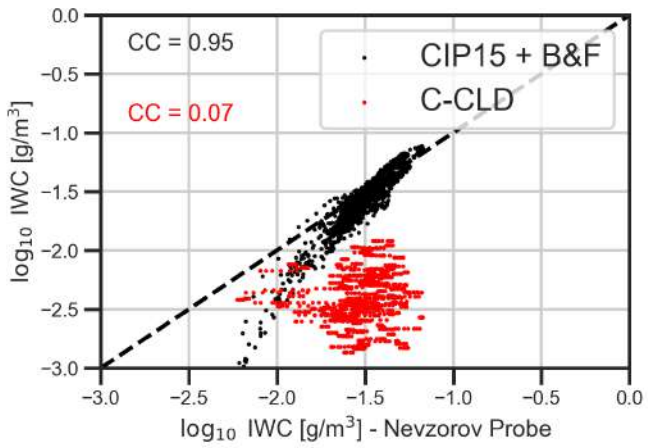
Brown & Francis
+
Rayleigh

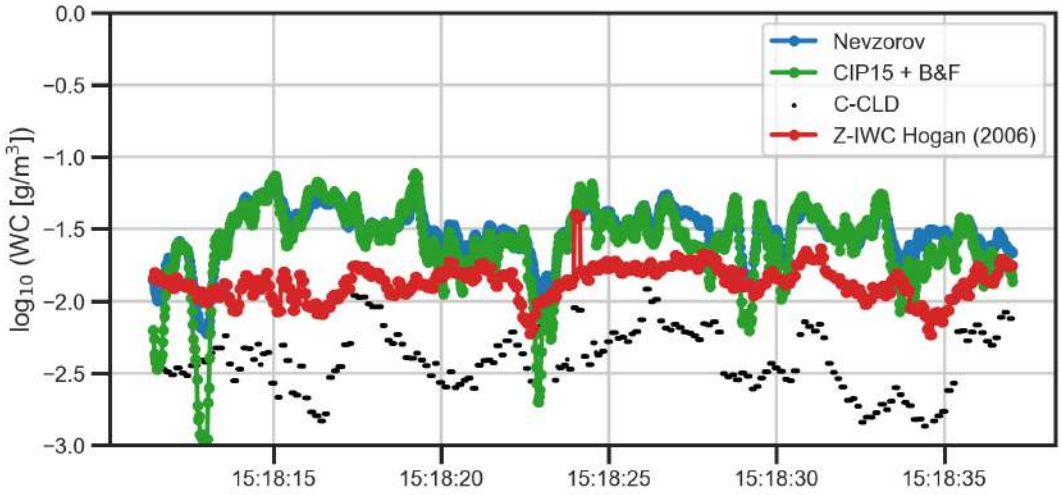
Flight C394 (7.11.2024)











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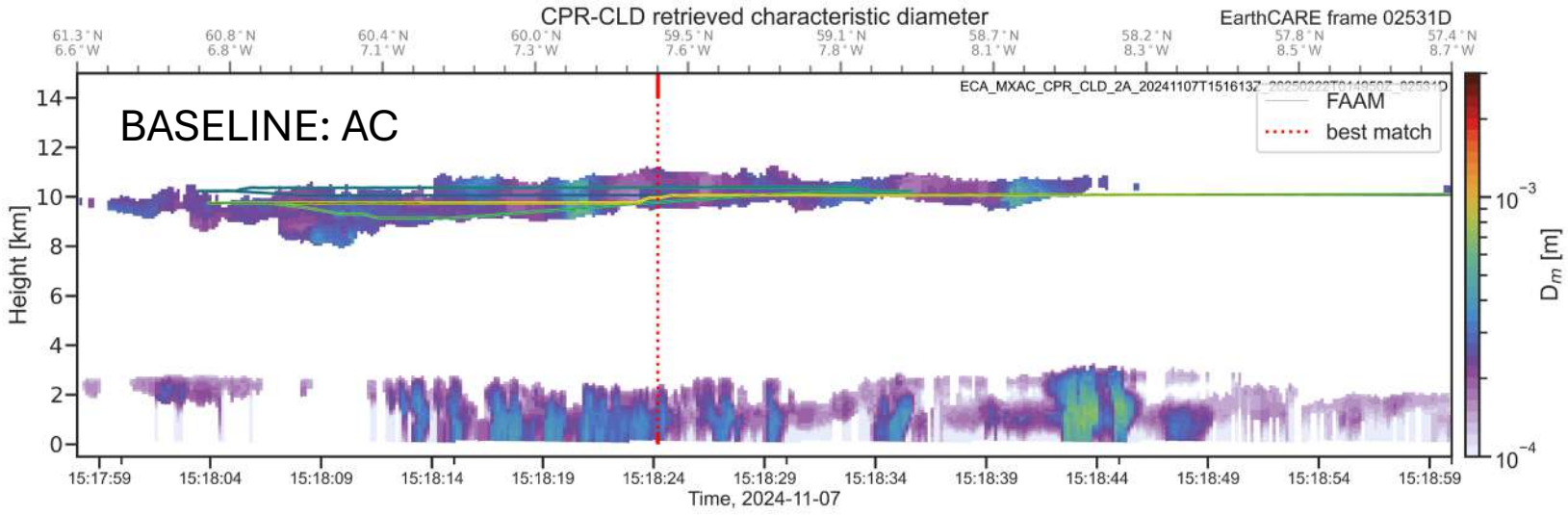
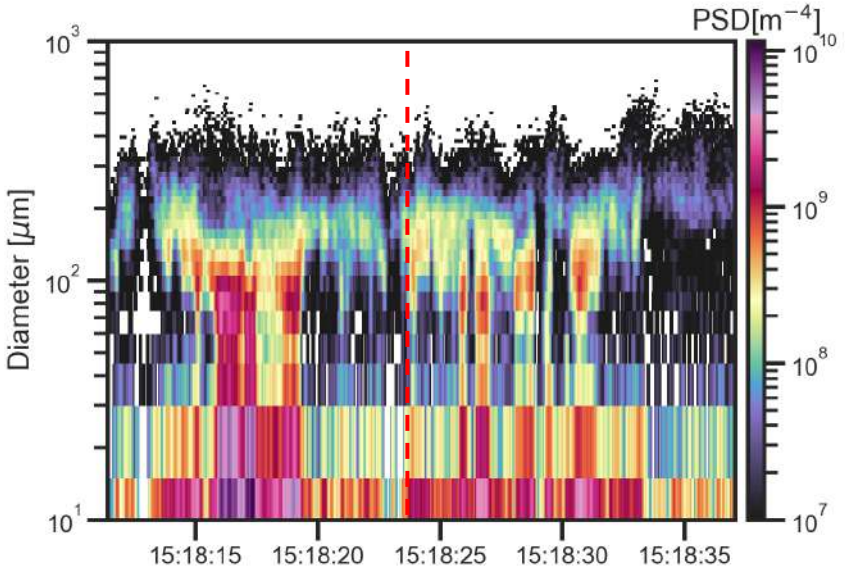
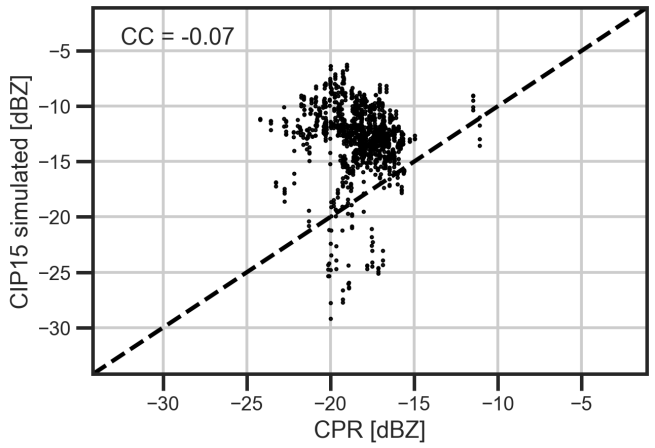
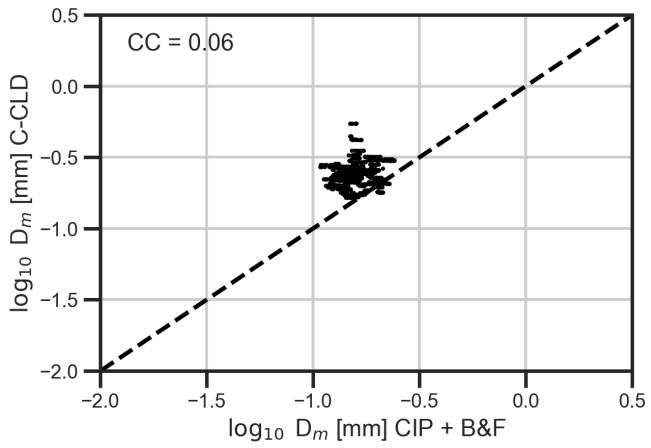
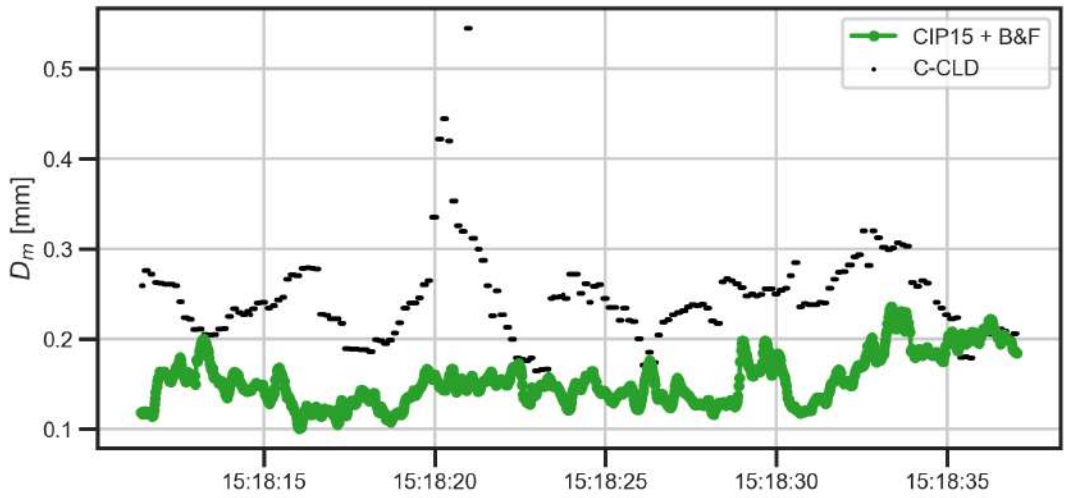


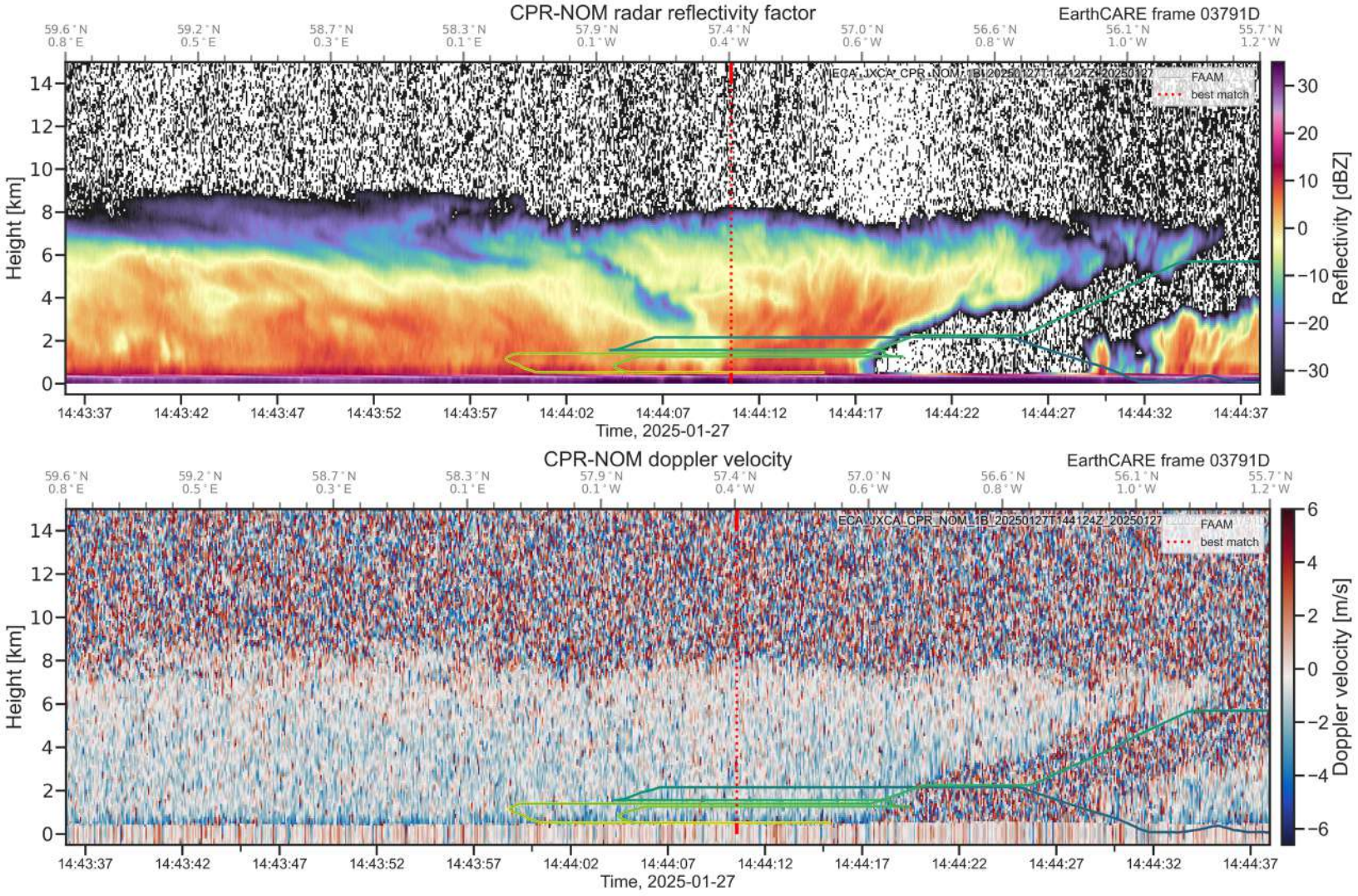


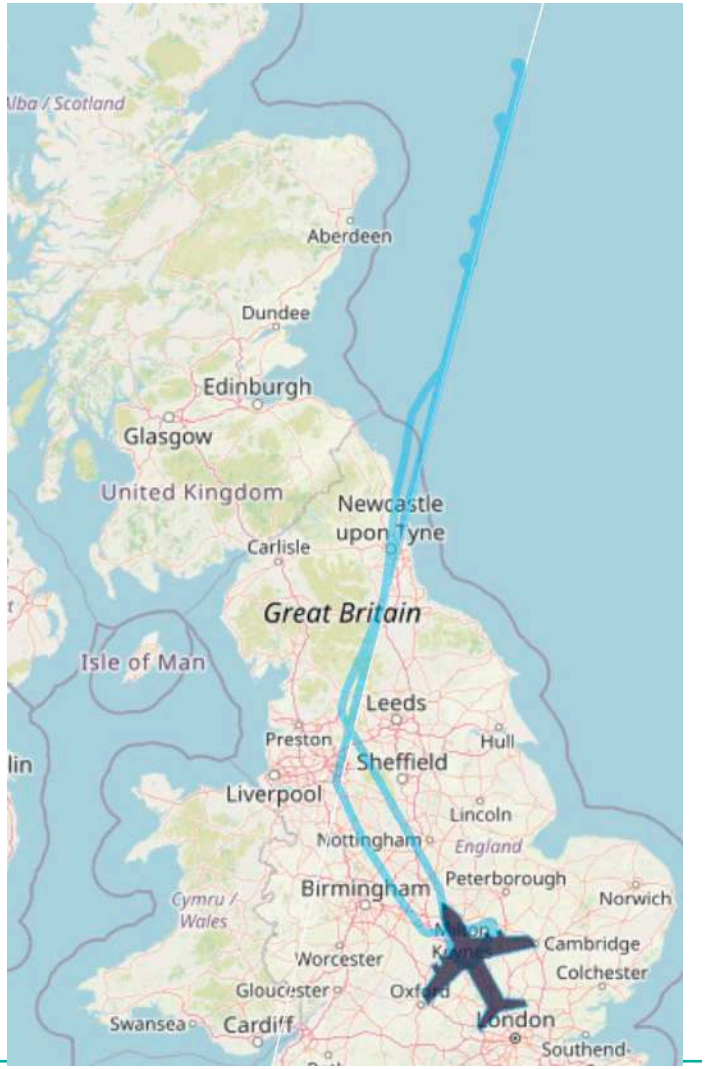






Flight C401 (27.1.2025)





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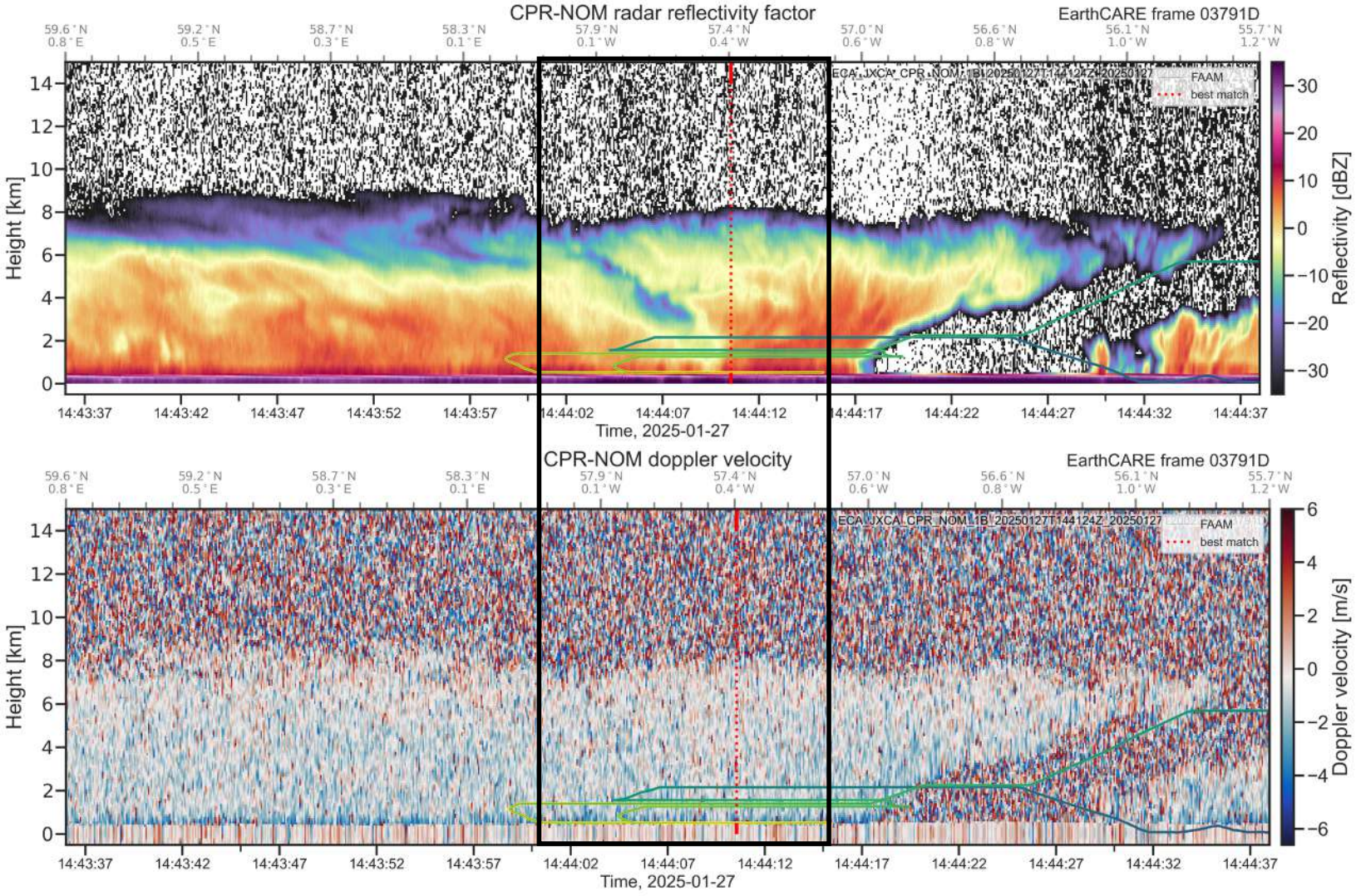
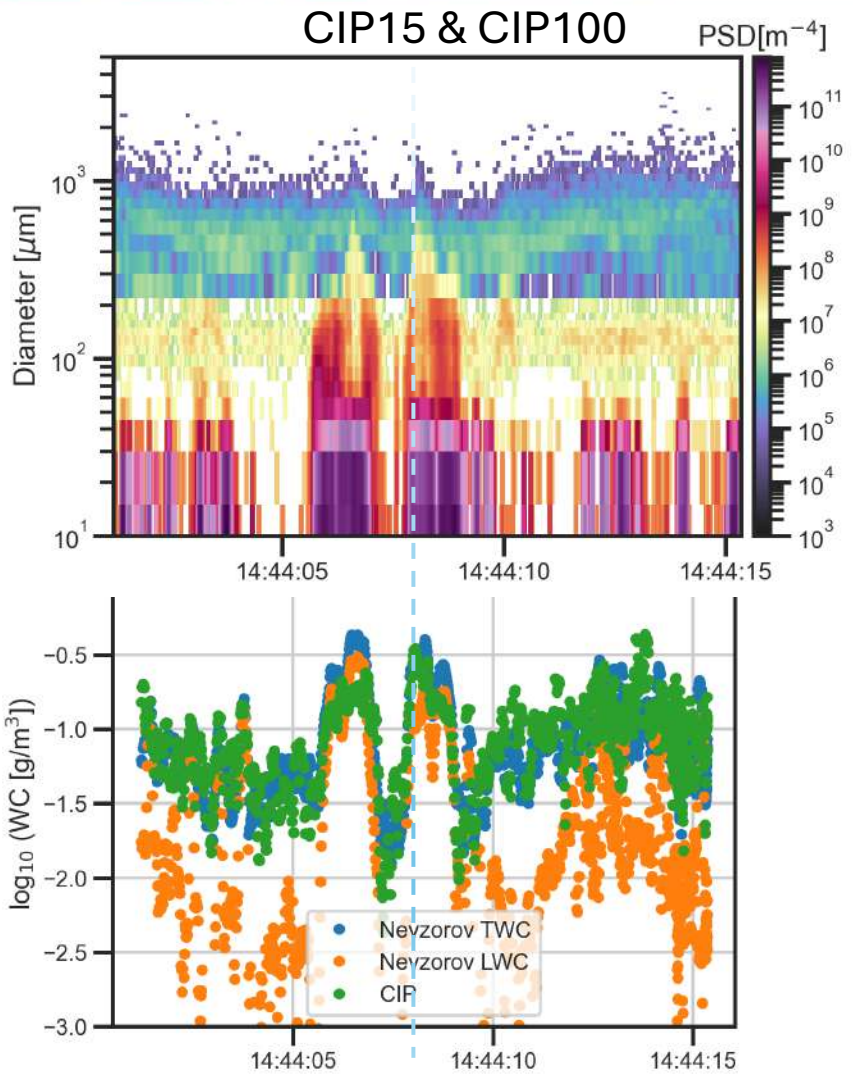
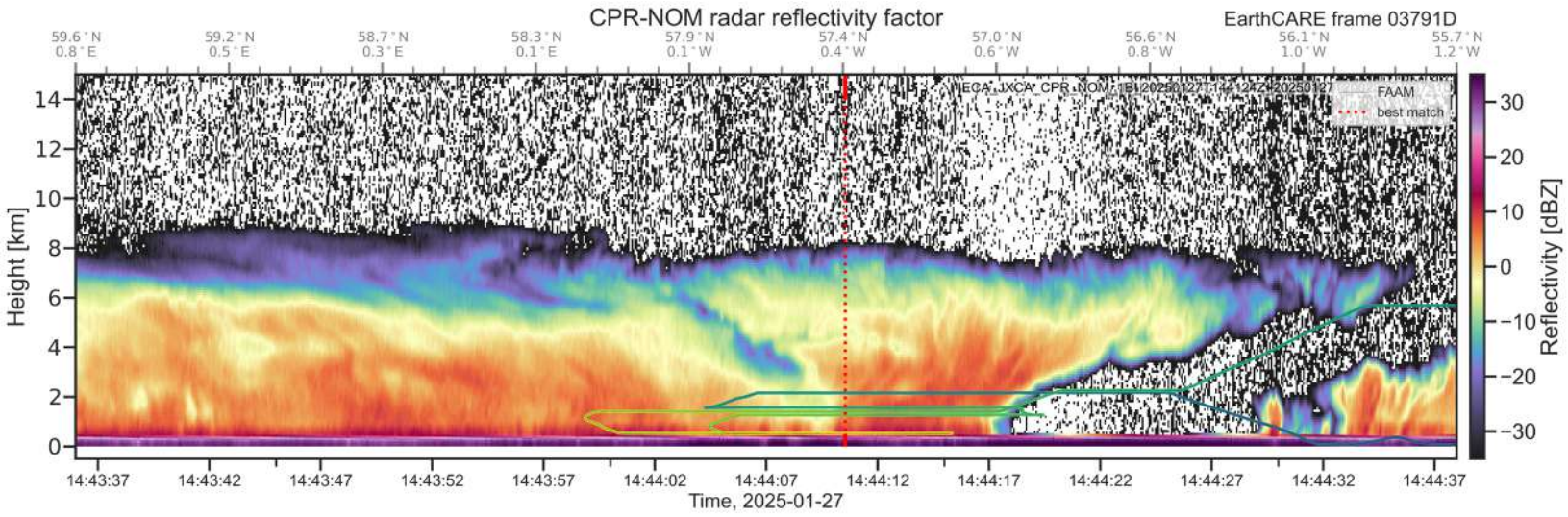


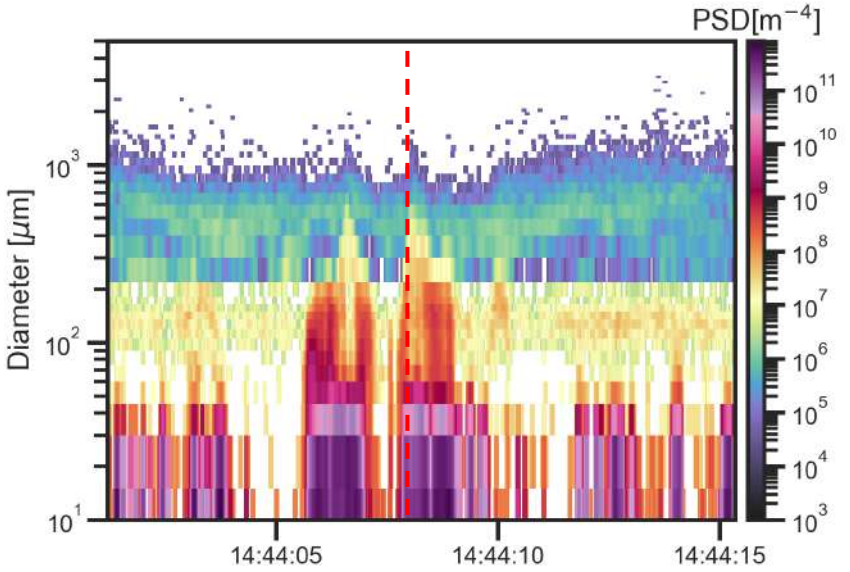


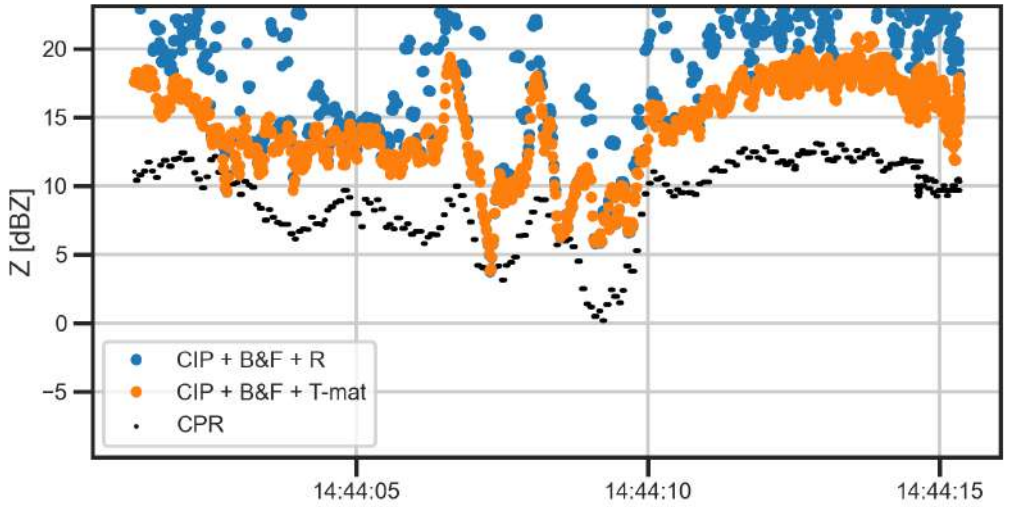
Temp. 2°C

RH (liquid) 99%

Flight C401 (27.1.2025)

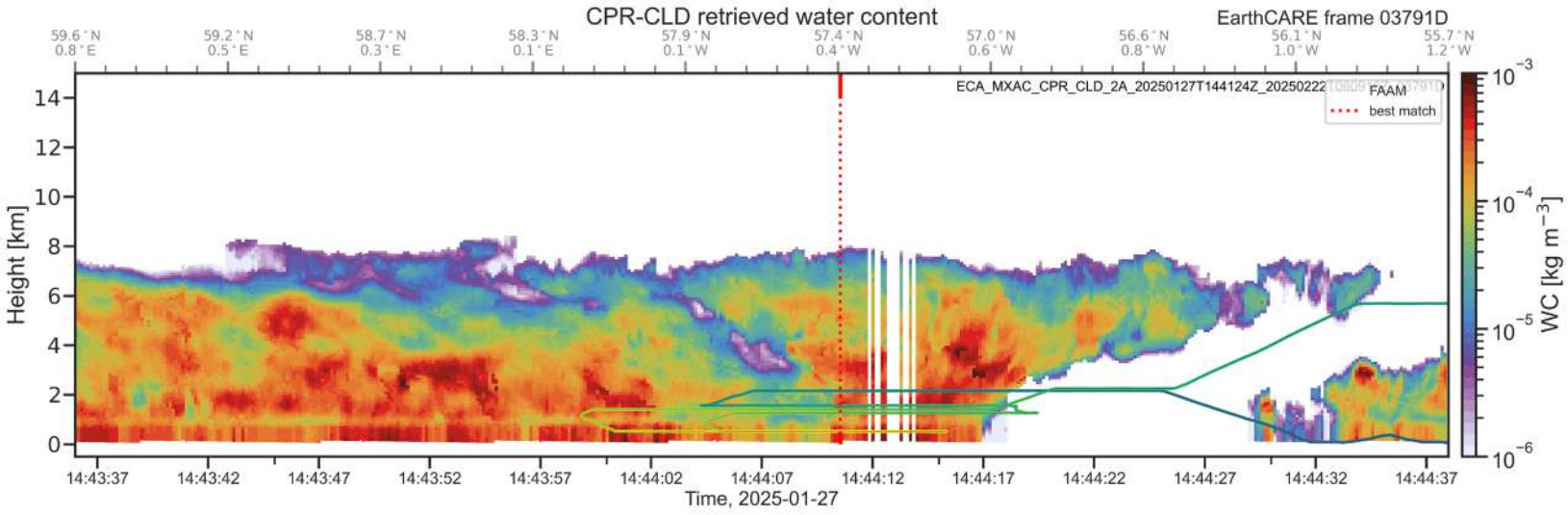


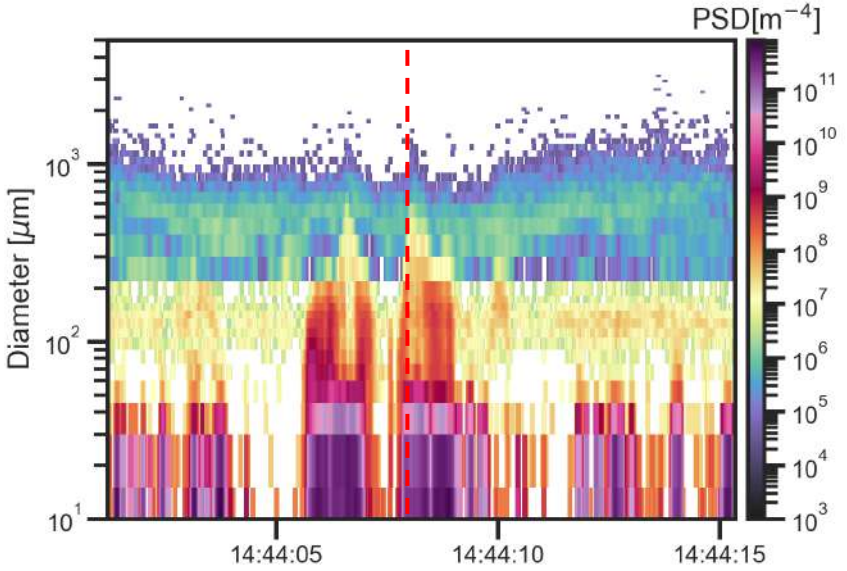


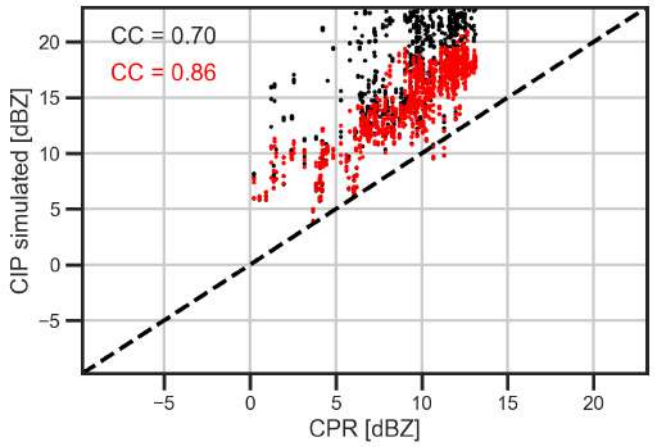


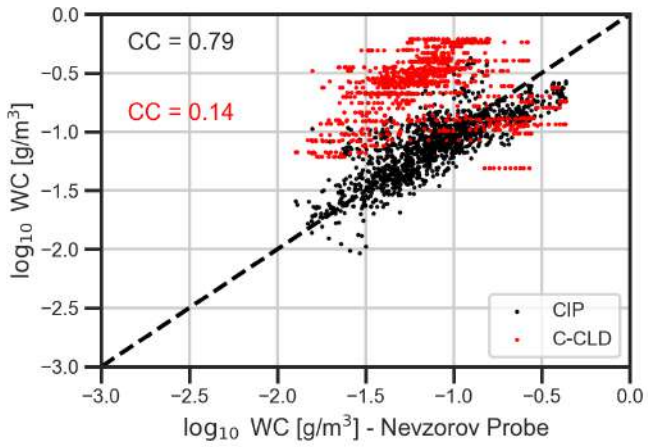
Rayleigh or T-matrix

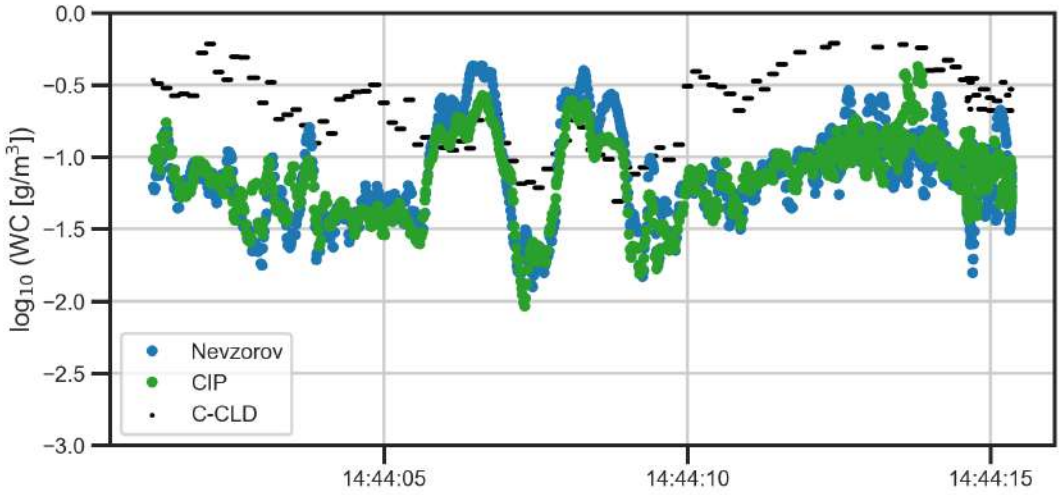
Flight C401 (27.1.2025)











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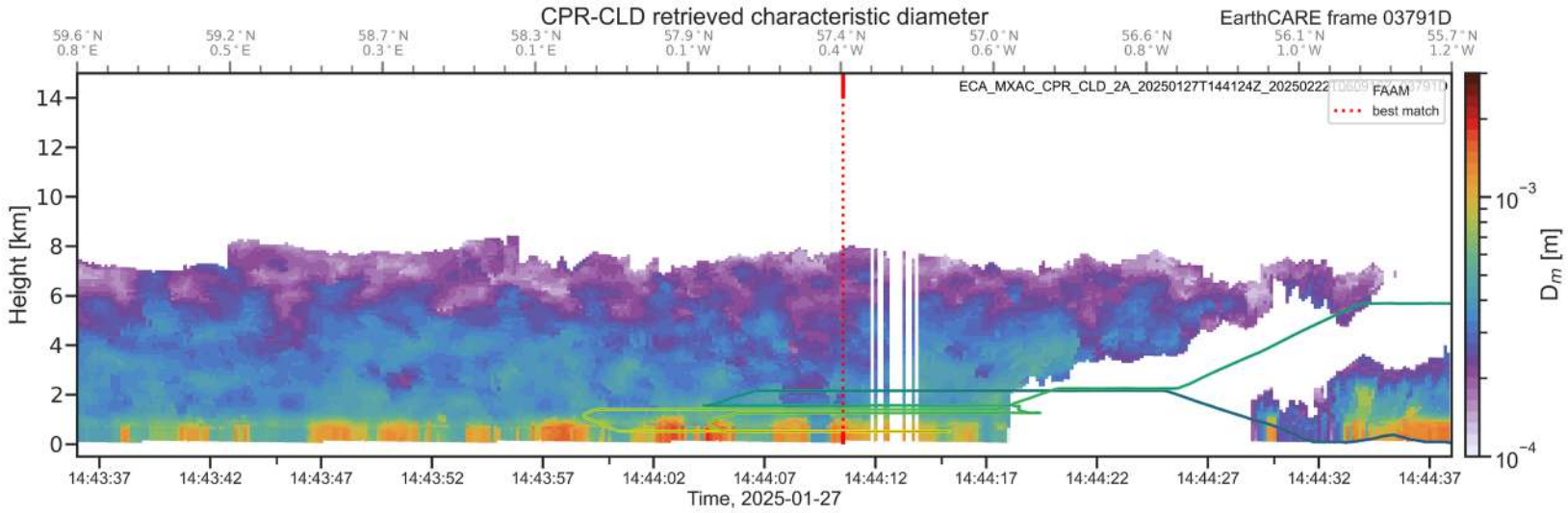

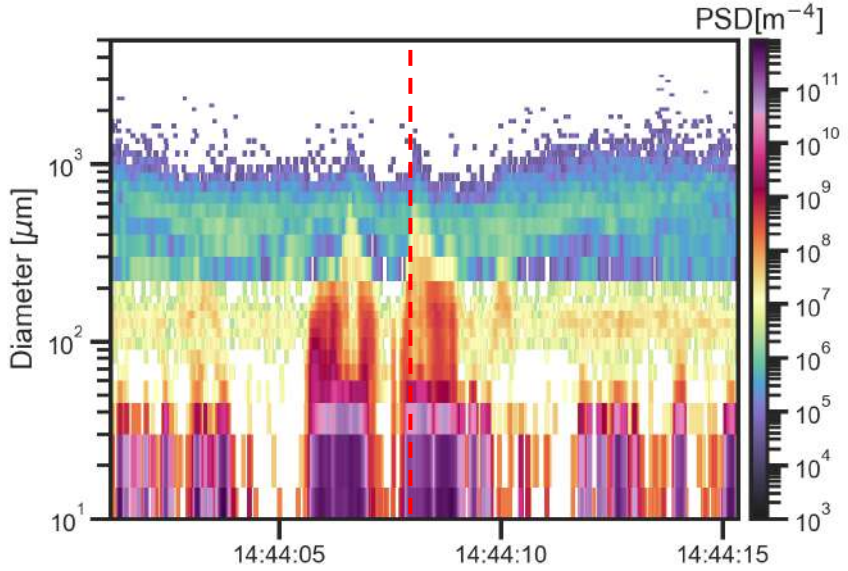

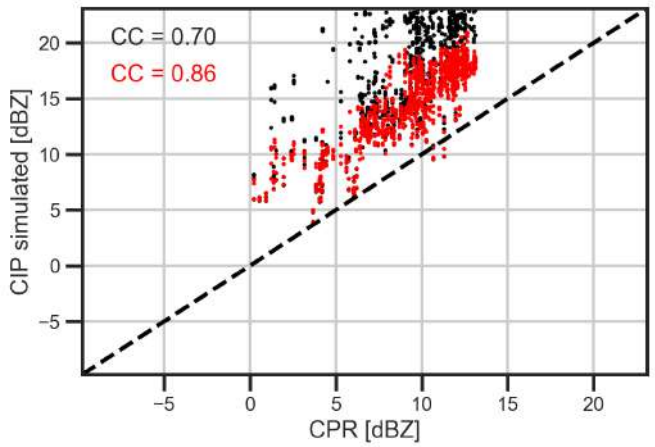

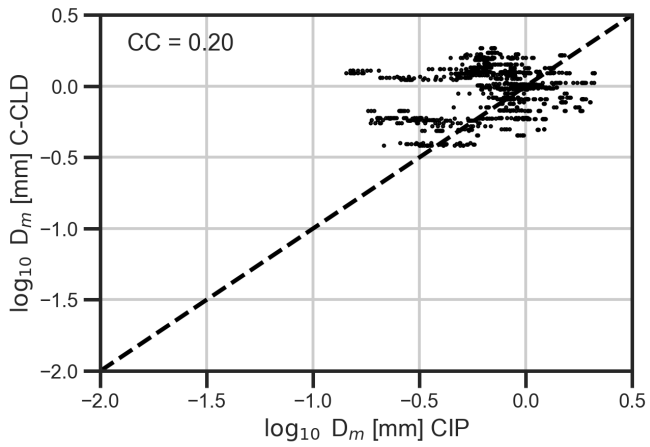

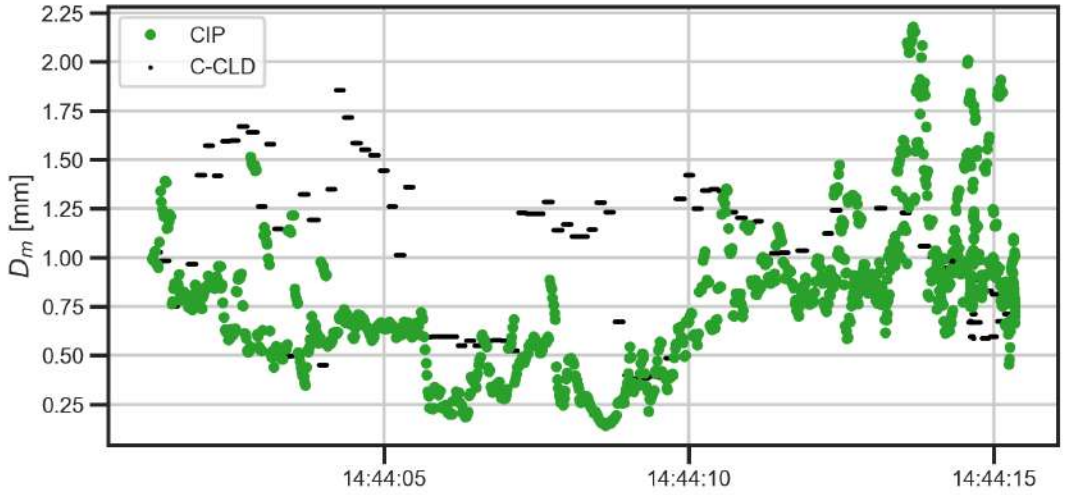

All Flights

Summary:

- 9 flight performed
- Variable cloud regimes
- Close match-up
- Comparison results are still preliminary
- More comparisons are needed with other instrument/products
- **Please use the data.**