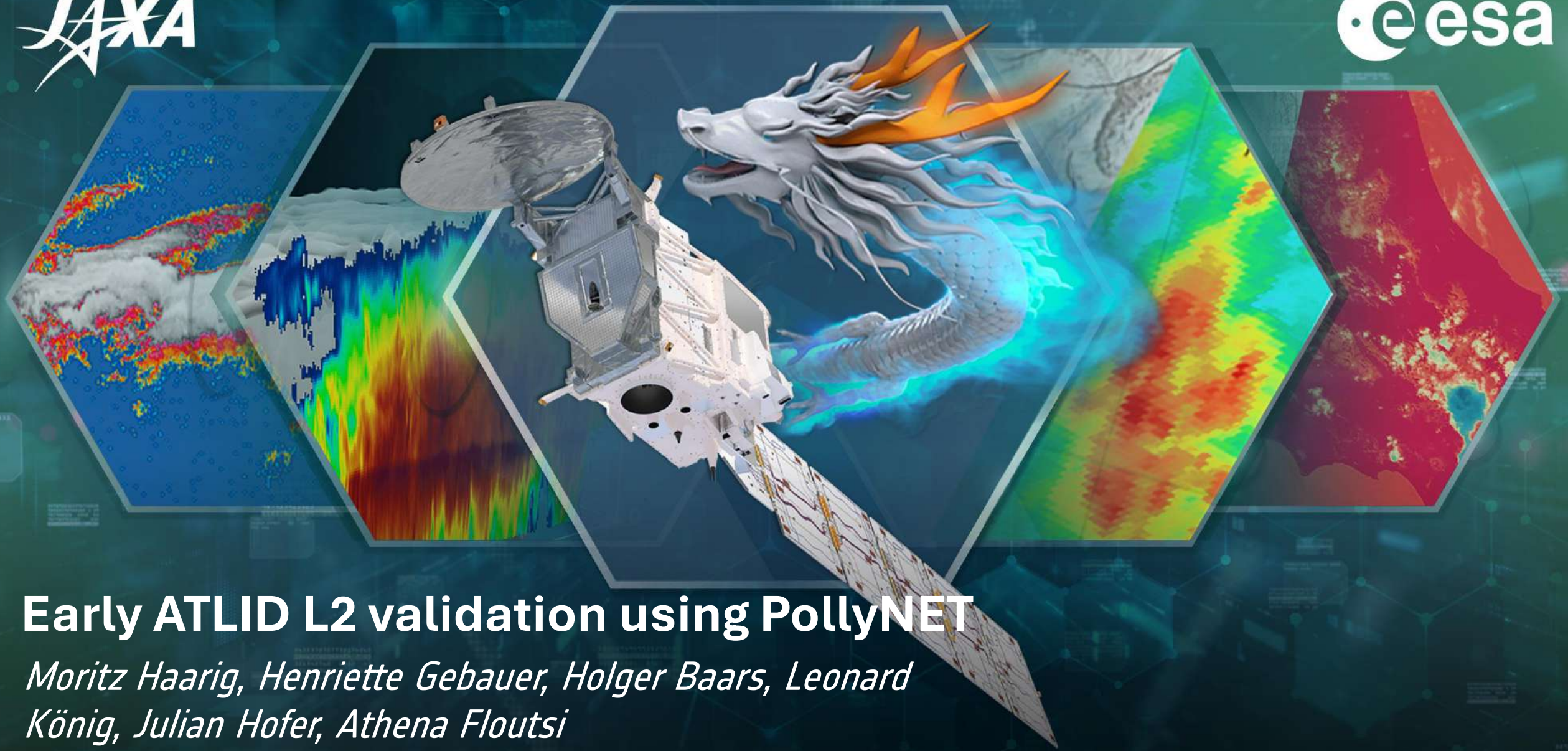


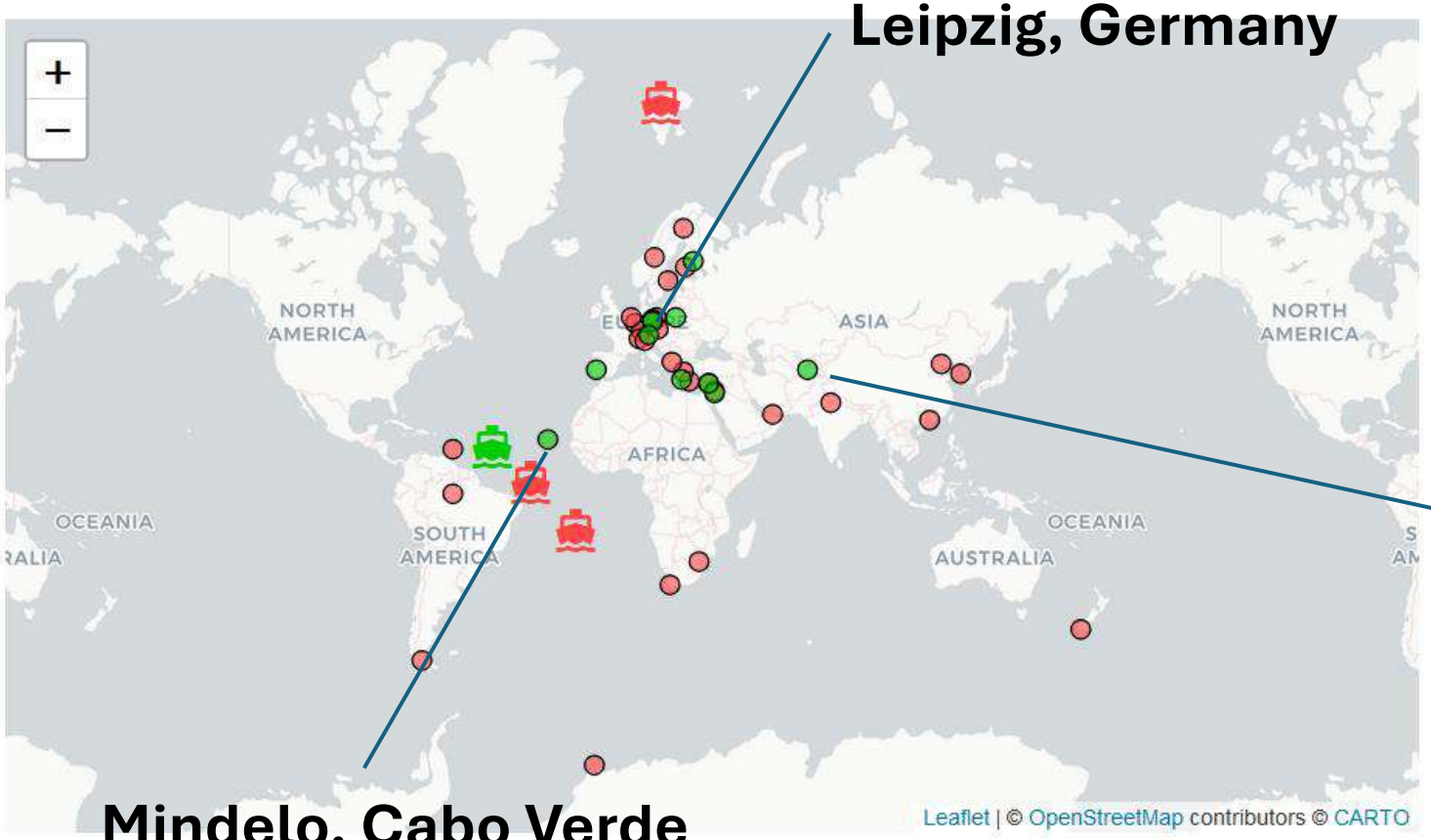
Early ATLID L2 validation using PollyNET

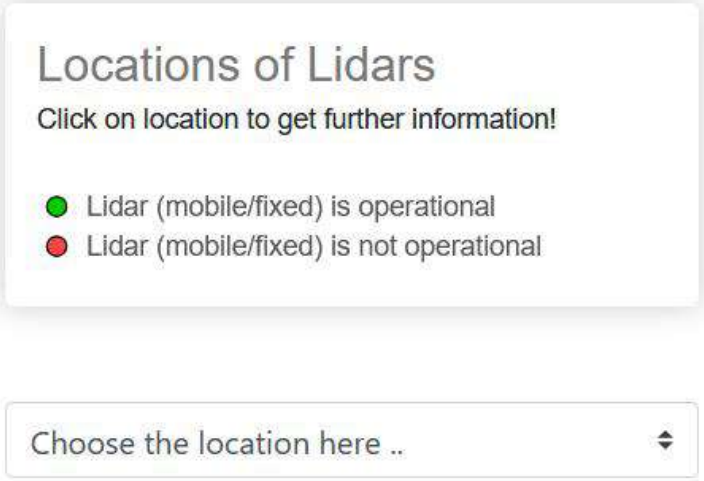
Moritz Haarig, Henriette Gebauer, Holger Baars, Leonard König, Julian Hofer, Athena Floutsi
TROPOS, Leipzig, Germany

1st ESA-JAXA EarthCARE In-Orbit Validation Workshop
14 – 17 January 2025 | VIRTUAL EVENT

PollyNET – a network of polarization Raman lidars

Map of worldwide observations with the portable Raman lidar systems (Polly)

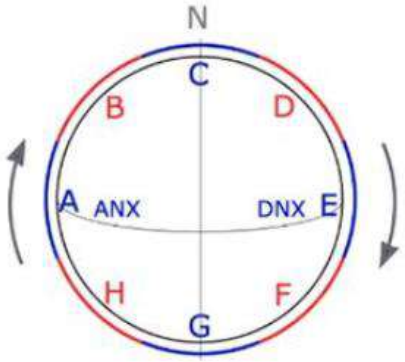


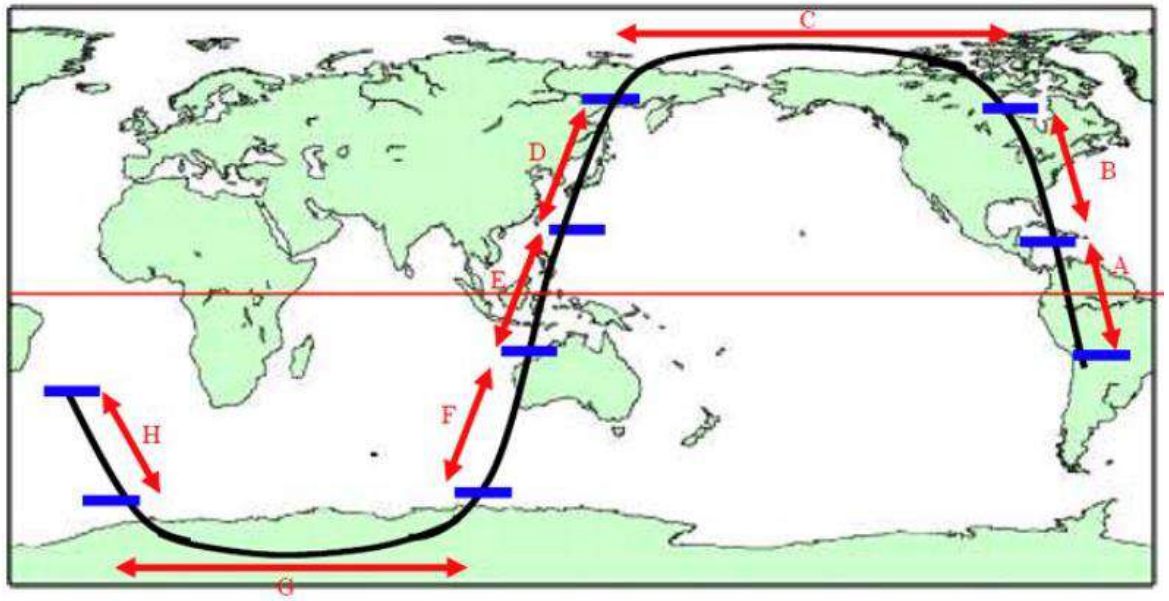


https://polly.tropos.de/

Day and Night Frames

Latitude of the Different Frames





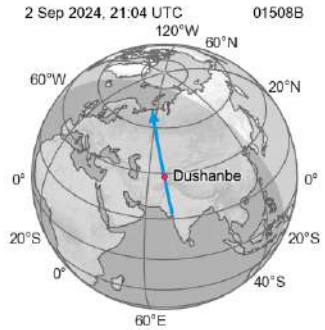
A, B, H: night
D, E, F: day
C, G: day or night depending on the season

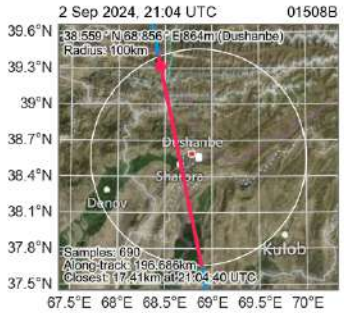
Leipzig & Dushanbe
B and D frames

Cabo Verde
A and E frames

- Validation of A-EBD
  ATLID – Extinction, Backscatter, Depol
- Validation of A-CTH
  ATLID – Cloud Top Height

1. Central Asia – Night – L1

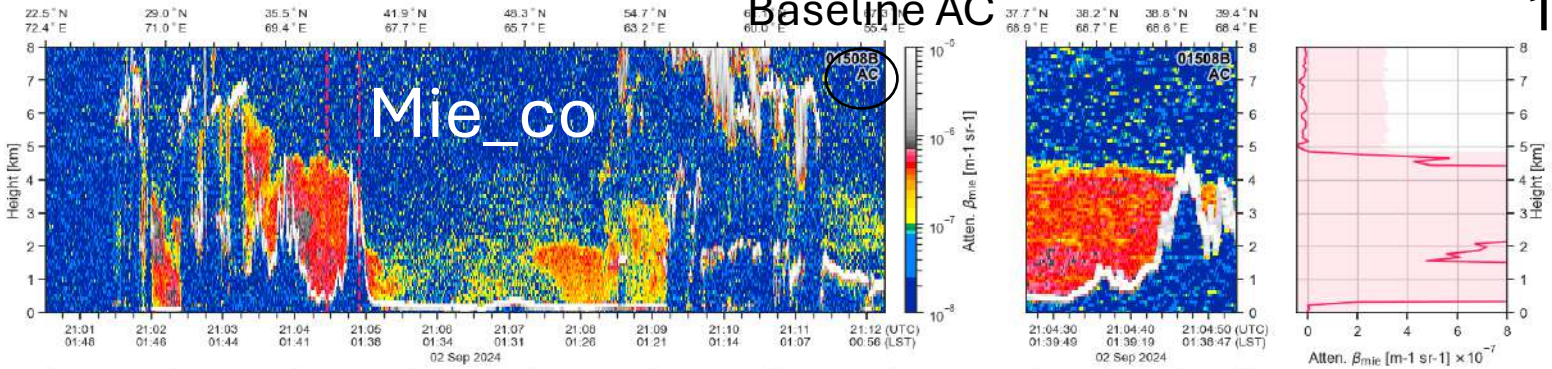


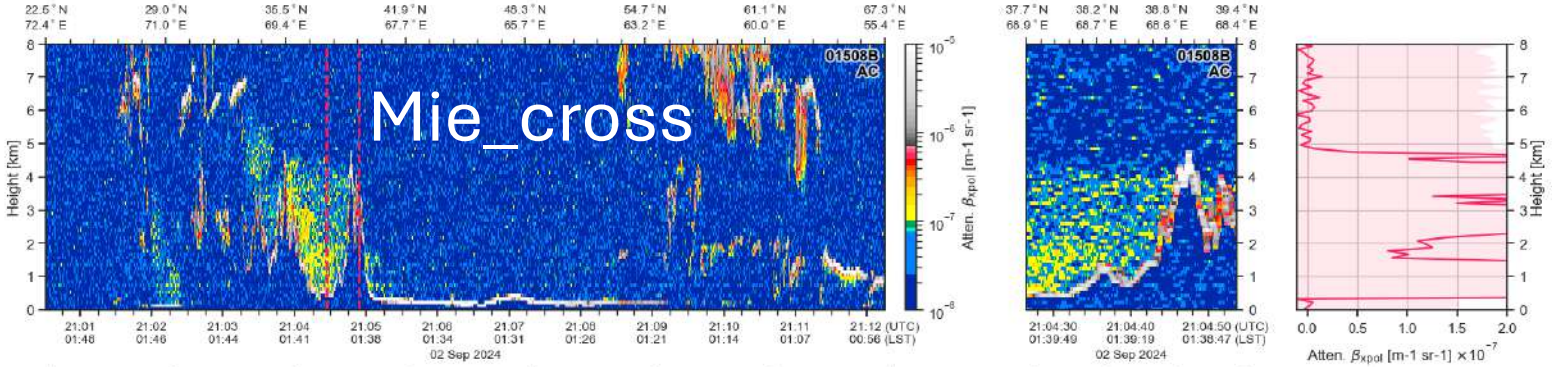


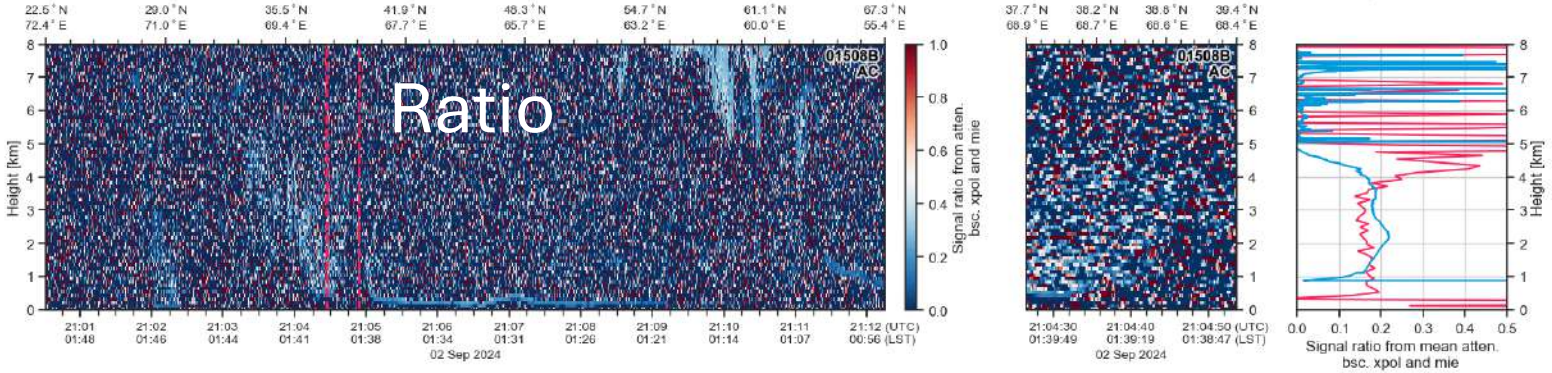
Dust layer in the mountains of Central Asia

Baseline AC

1508B



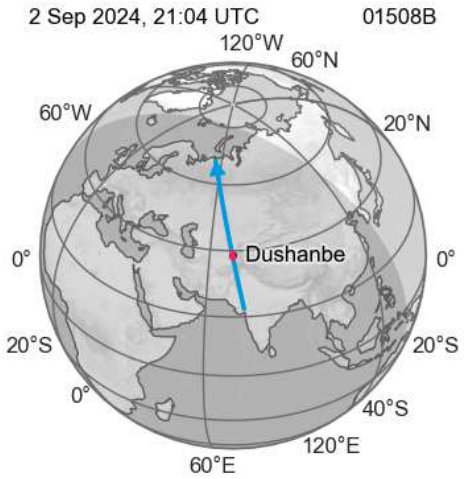


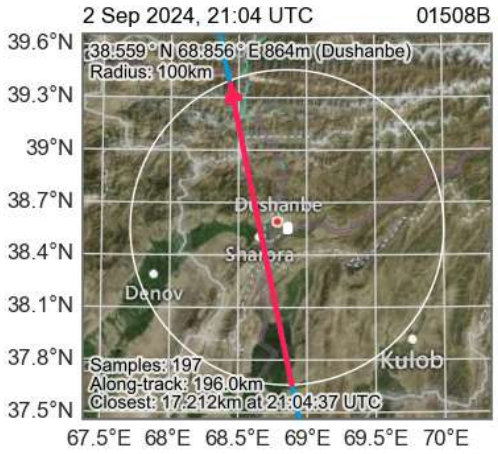


100 km around the station

Improvements to be expected with new L1 data

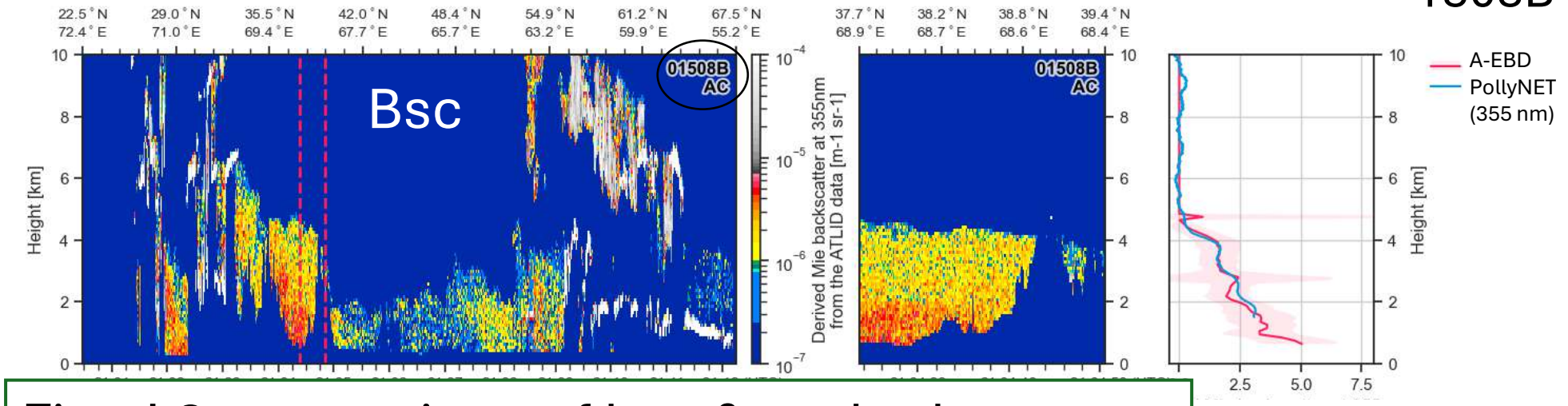
1. Central Asia – Night – L2



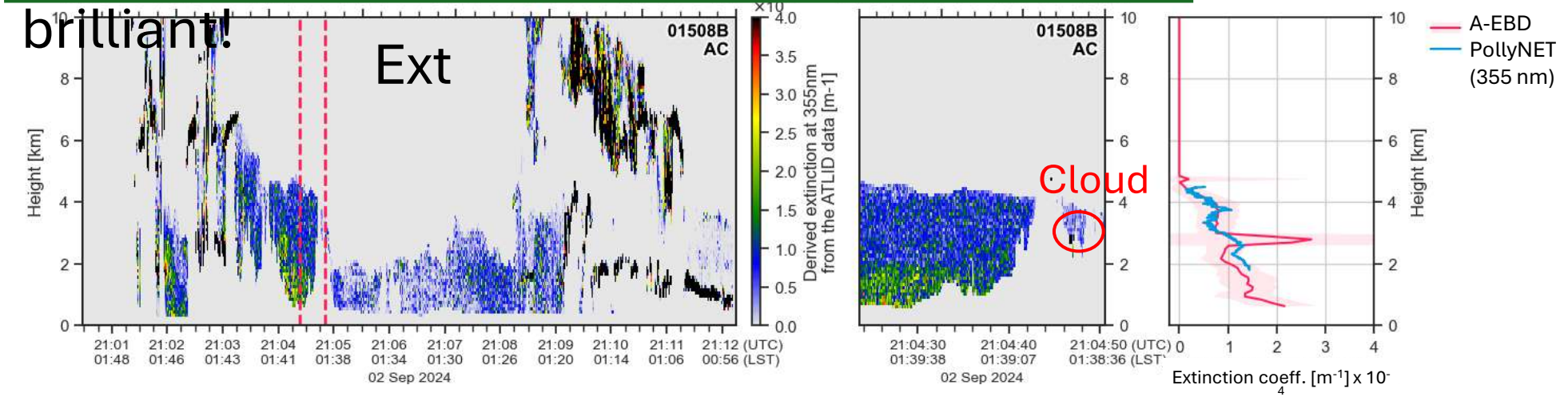


Baseline AC

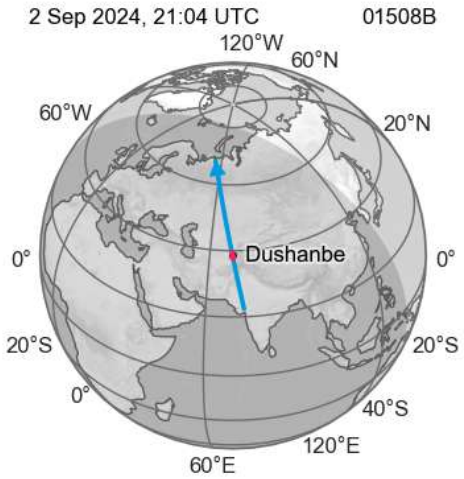
1508B

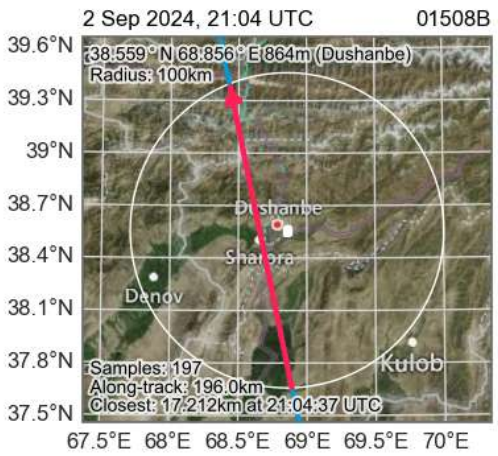


First L2 comparison of bsc & ext looks brilliant!



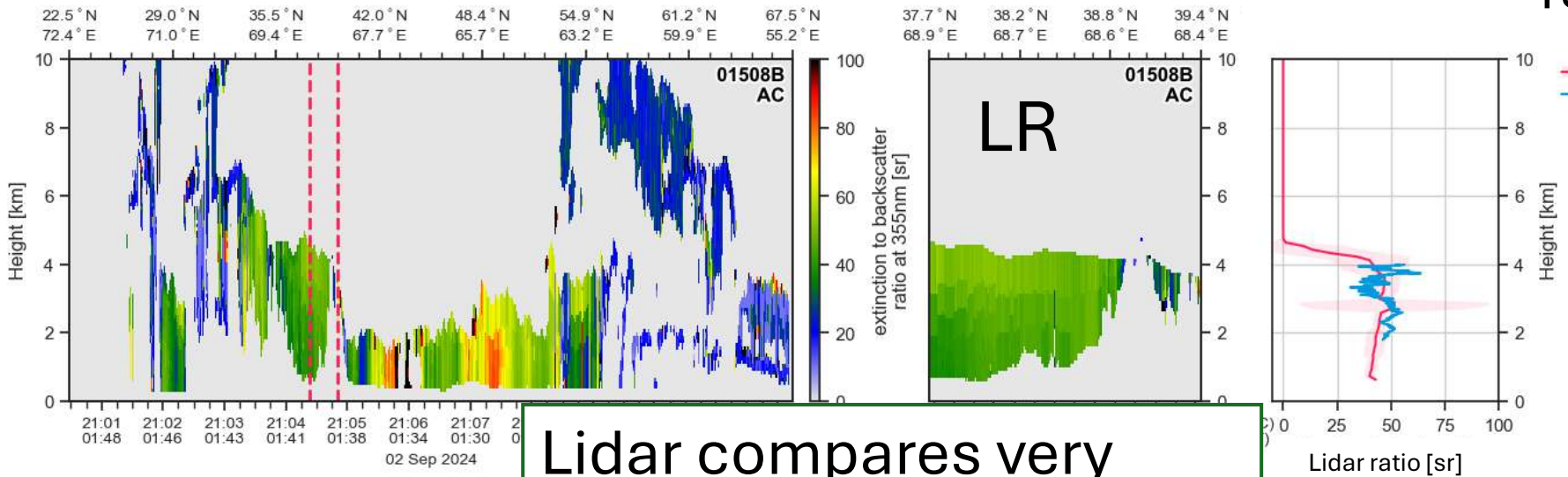
1. Central Asia – Night – L2



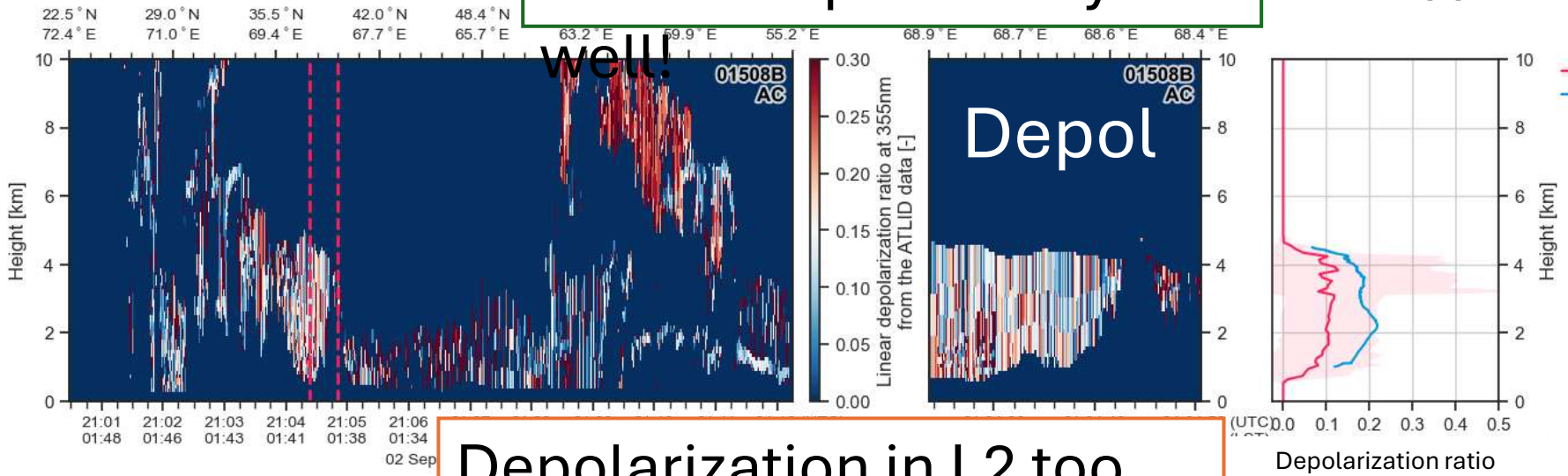


Baseline AC

1508B

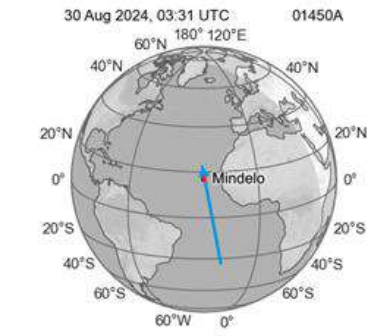


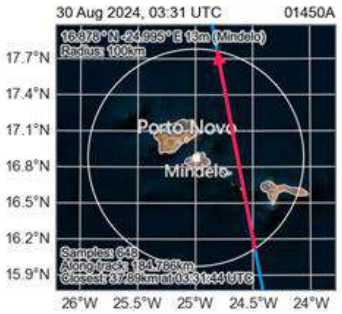
Lidar compares very well!



Depolarization in L2 too low

2. Tropical Atlantic– Night – L1

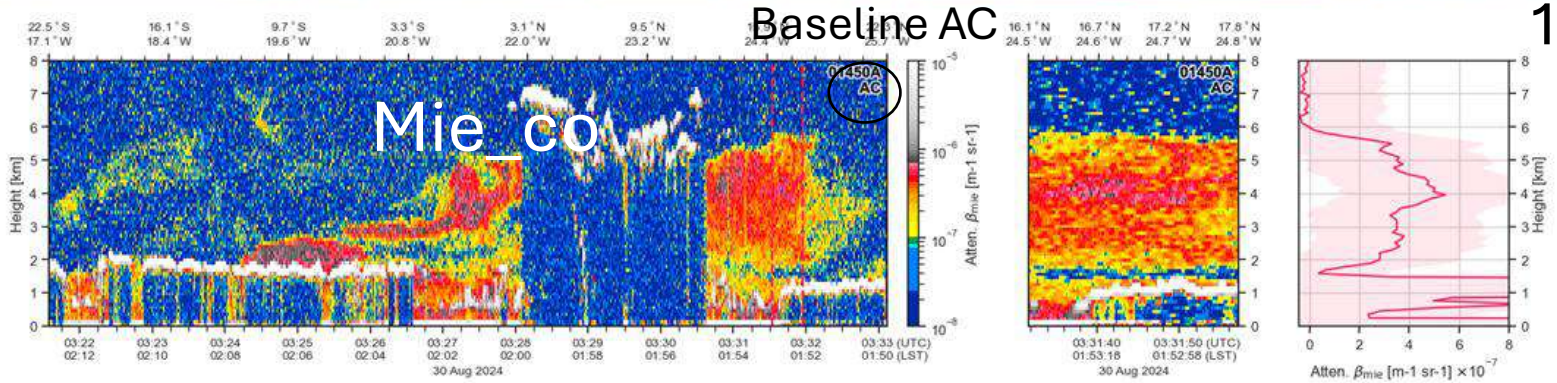


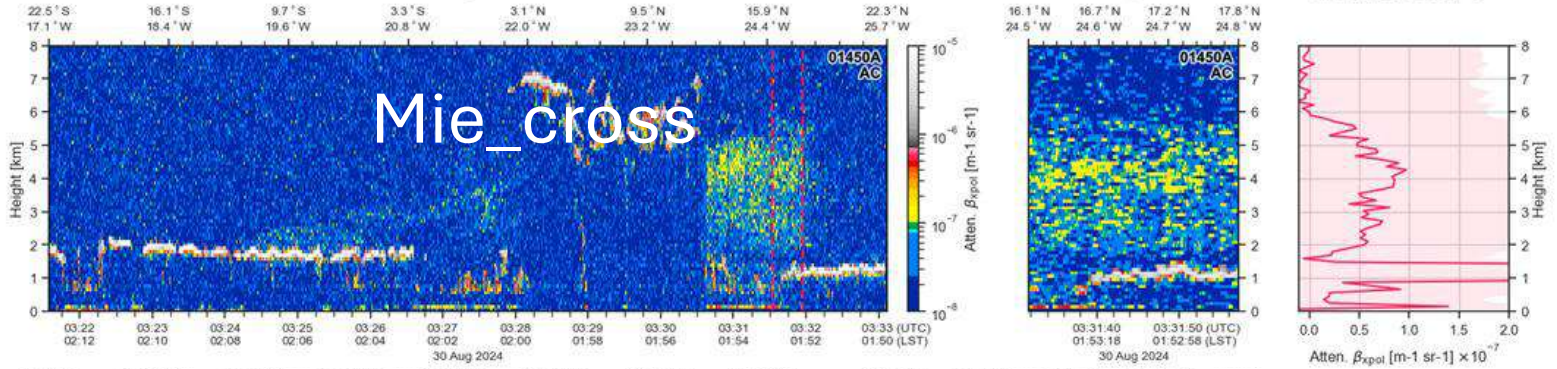


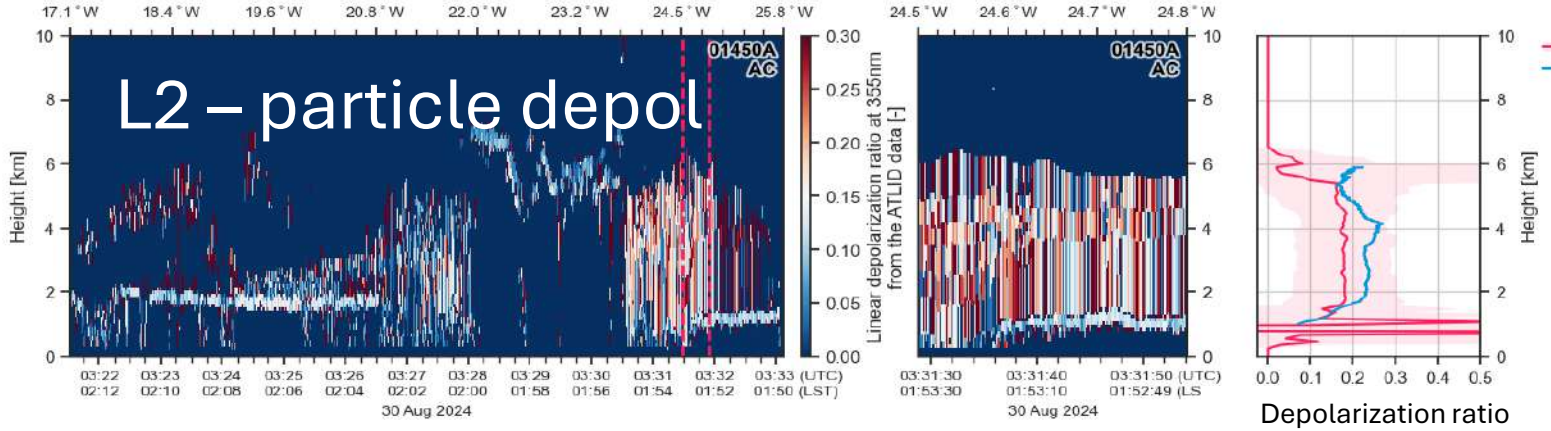
Saharan dust over the Atlantic Ocean

Baseline AC

1450A

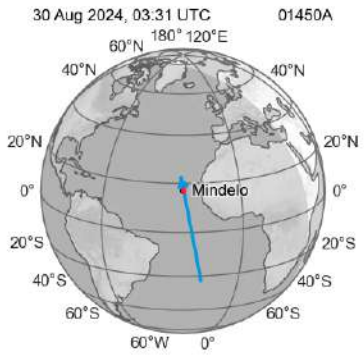


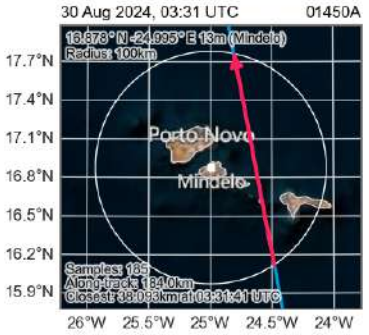




Improvements to be expected with new L1 data

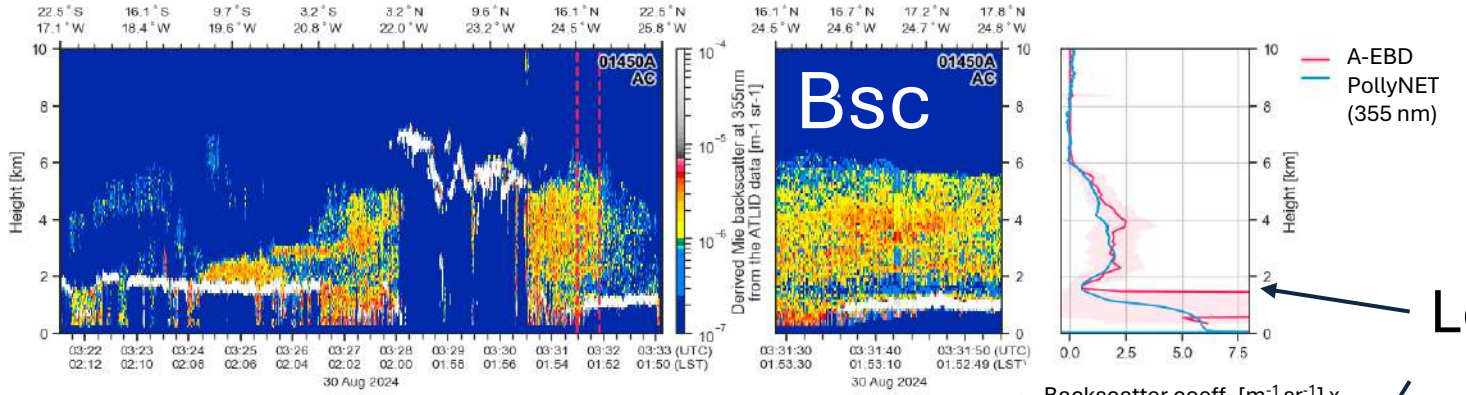
2. Tropical Atlantic– Night – L2



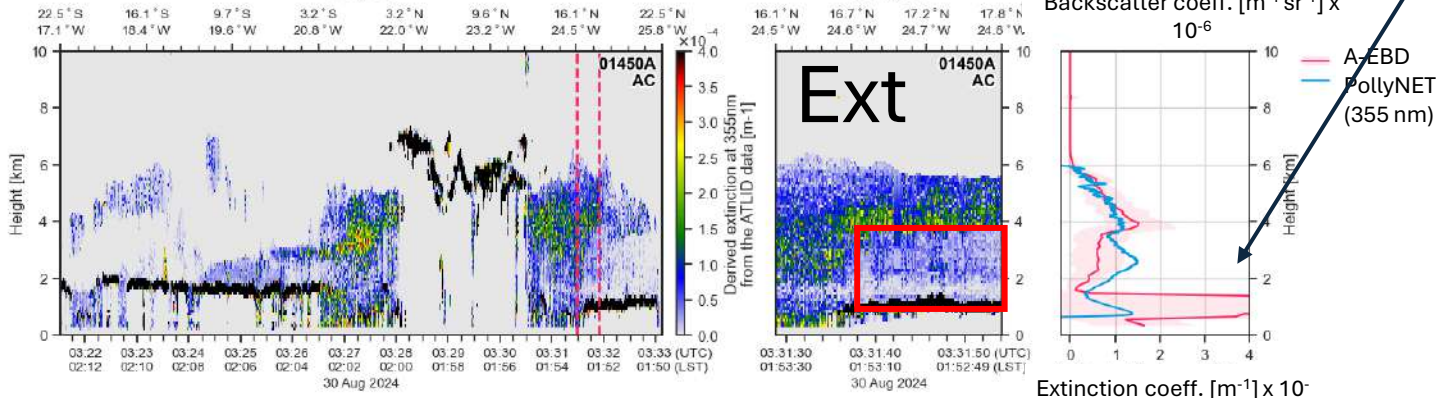


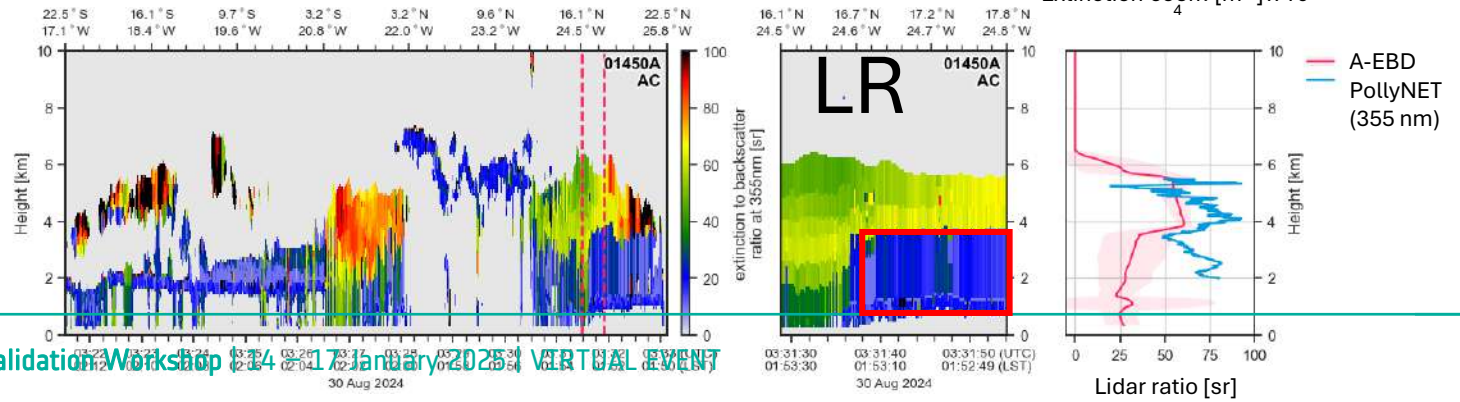
Saharan dust over the Atlantic Ocean

1450A



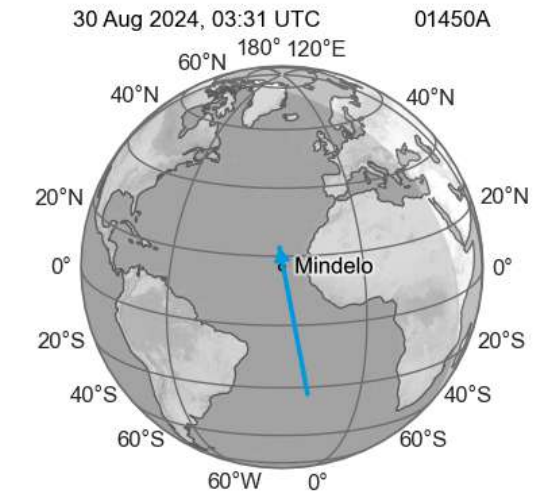
Low level clouds

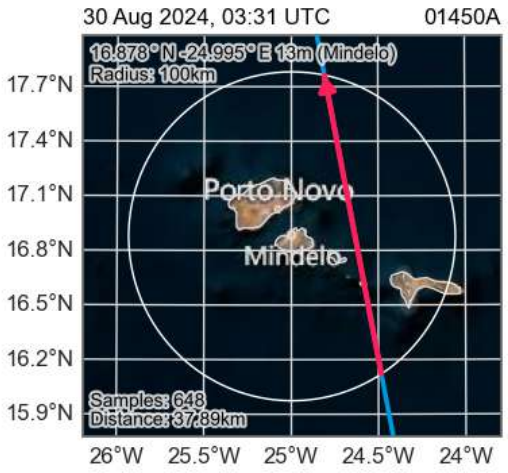


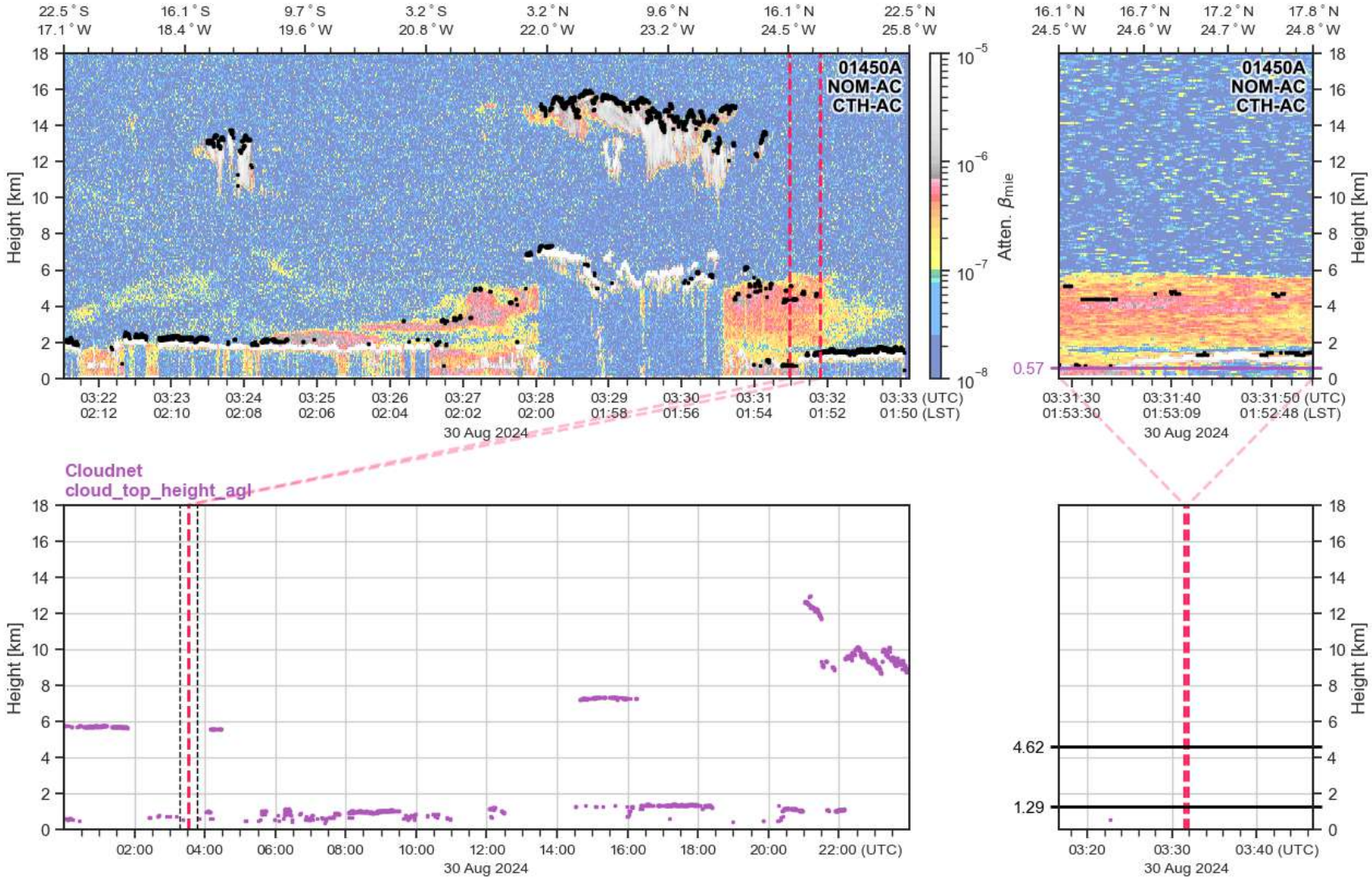


Low extinction above clouds: spatial distance might be the reason

2. Tropical Atlantic– Night – L2 – A-CTH

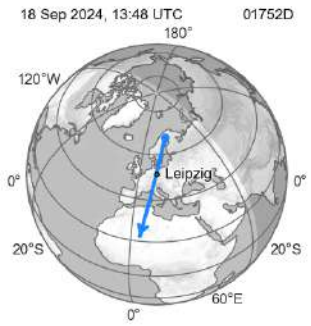




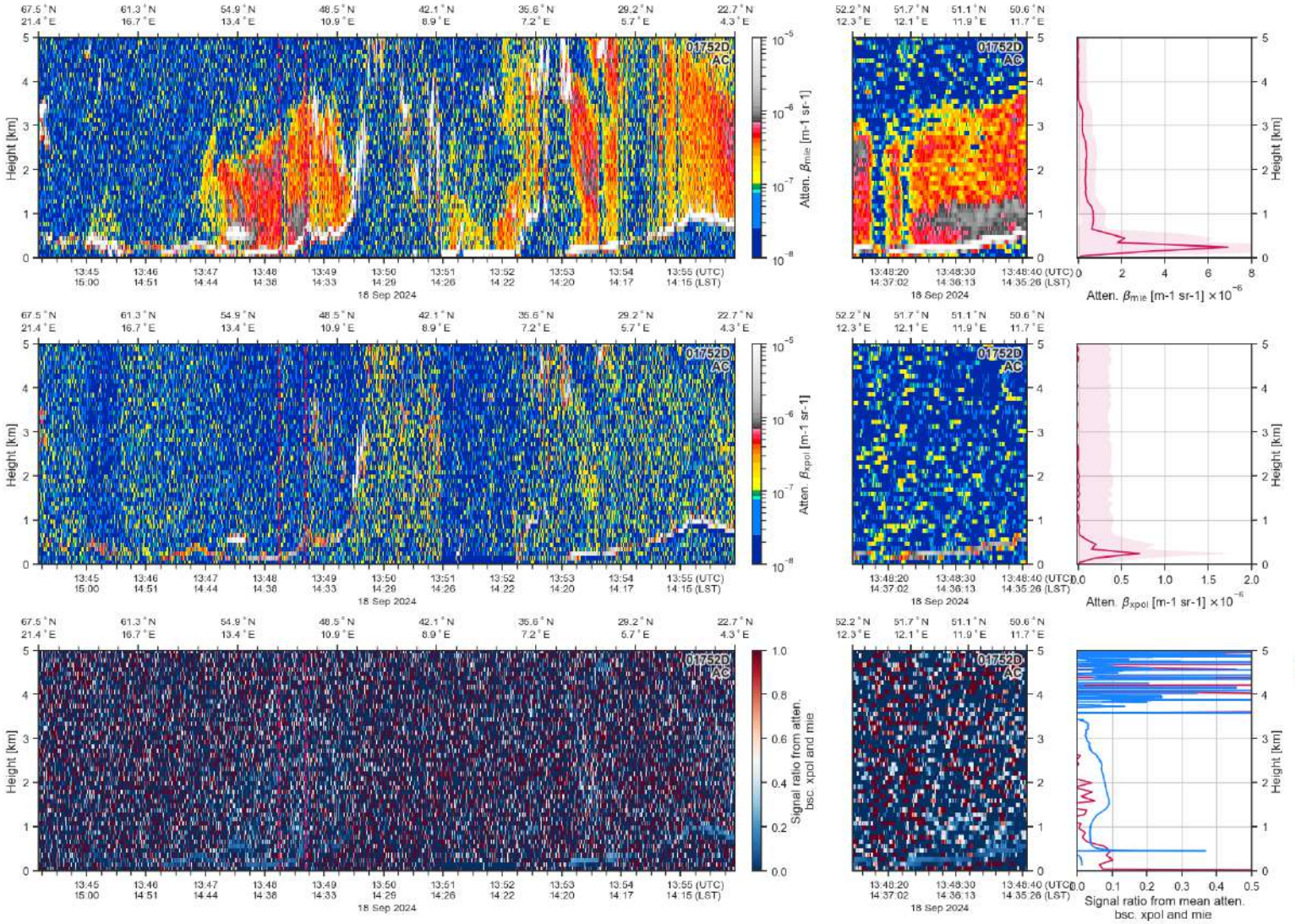


3. Central Europe – Day – L1

1752D

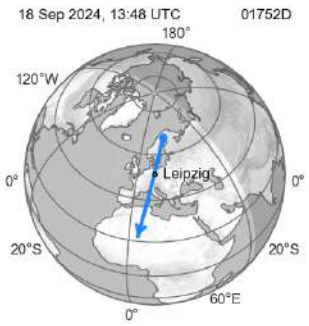


Leipzig, Germany

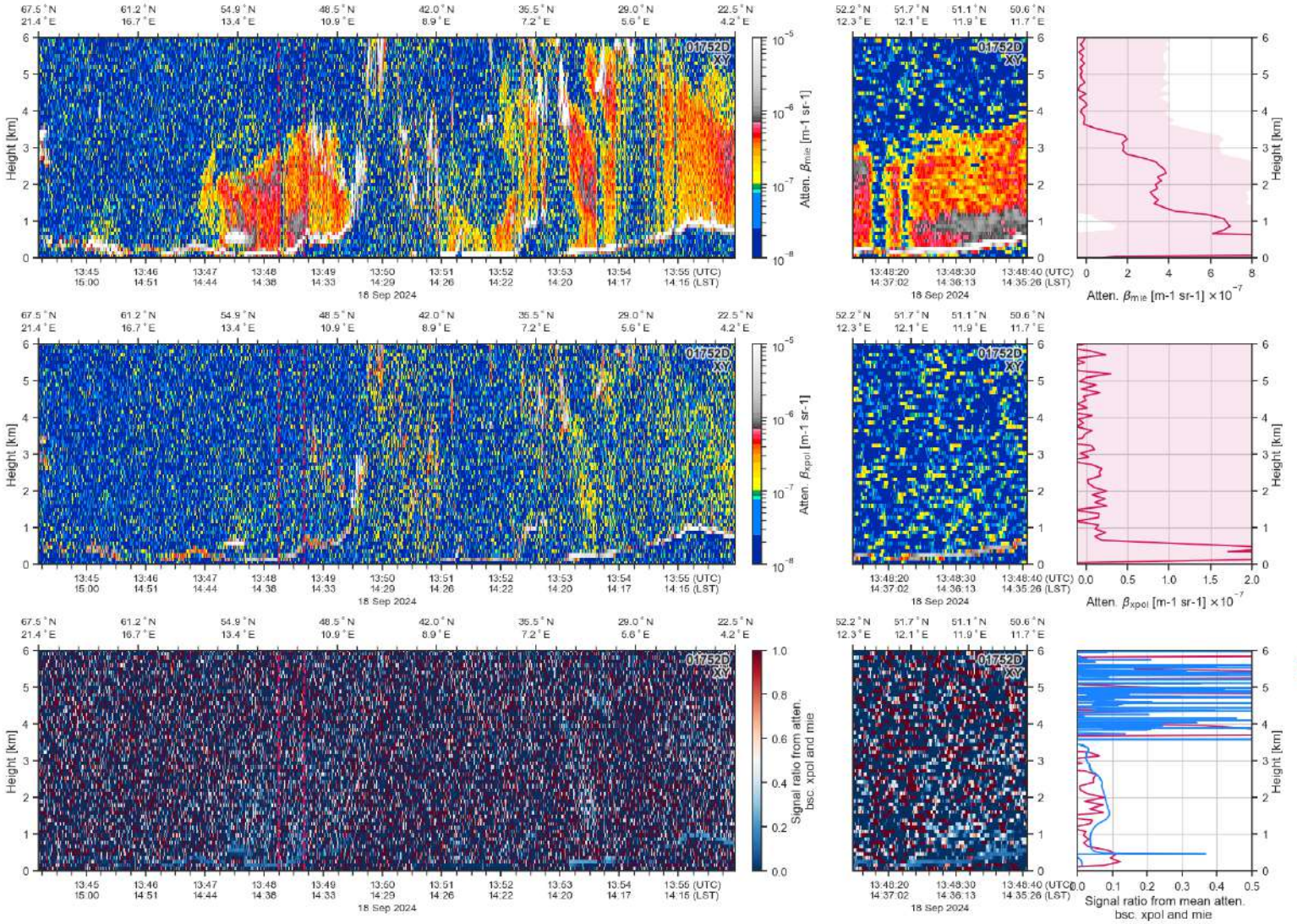


Depolarization ratio negative

3. Central Europe – Day – L1



Leipzig, Germany

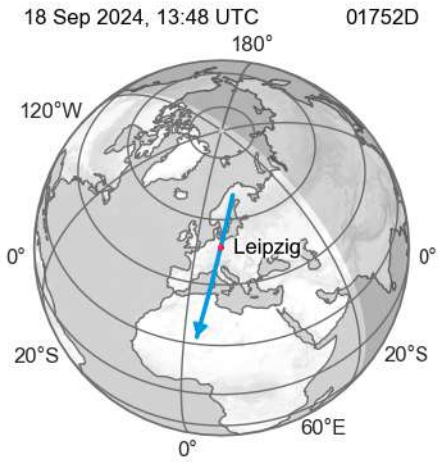


1752D ☀

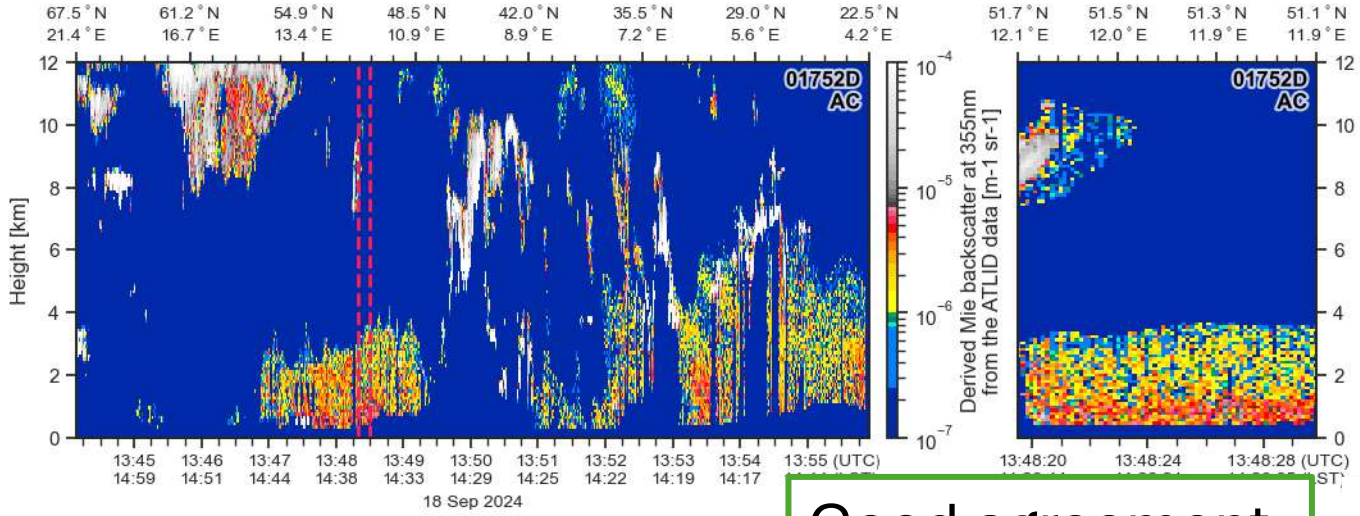
Offset bug solved in manual reprocessing by gmv (baseline XY)

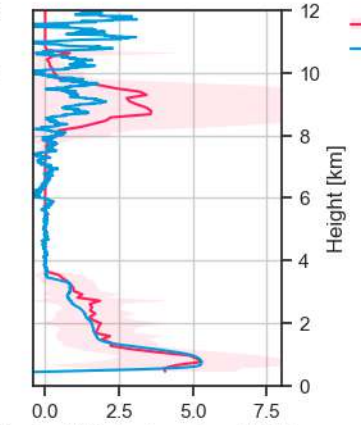
Improvements with new L1 data

3. Central Europe – Day – L2

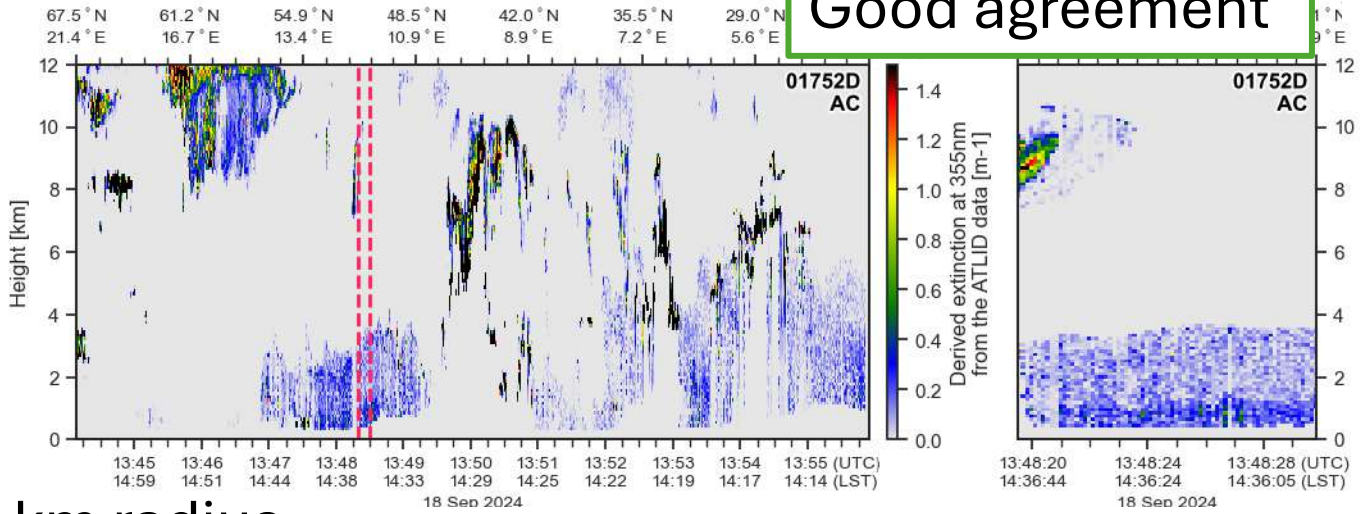


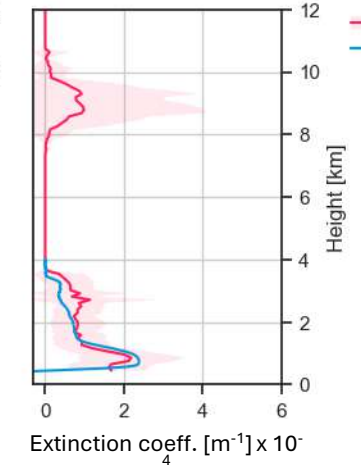
1752D





Good agreement



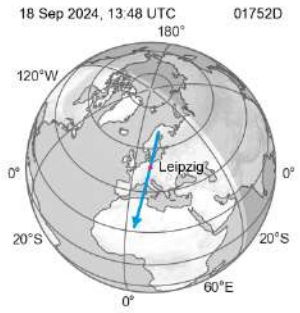


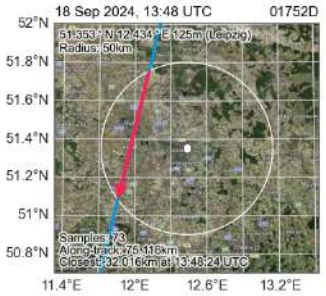
Leipzig, now just 50 km radius

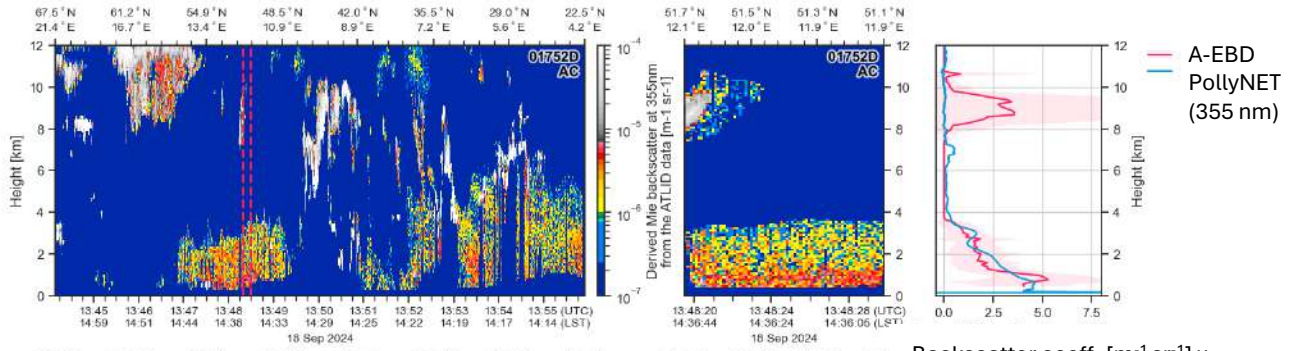
Klett, LR = 45 sr

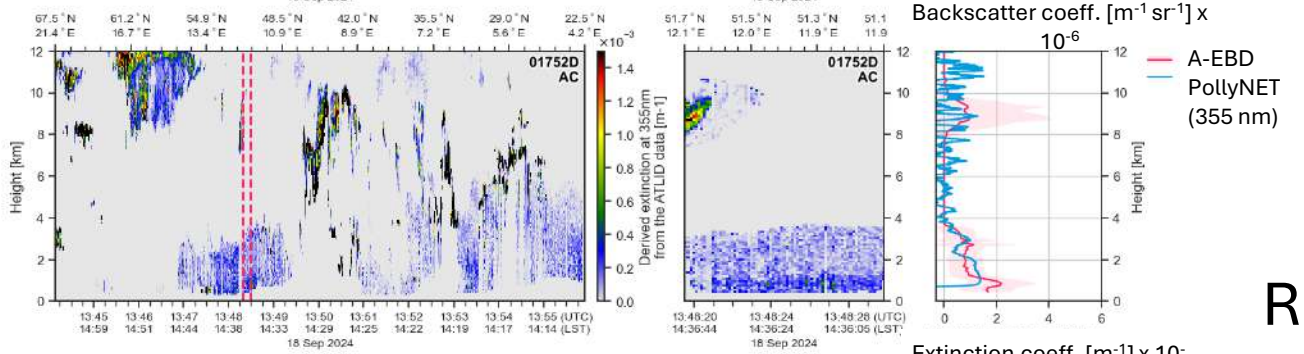
3. Central Europe – Day – L2

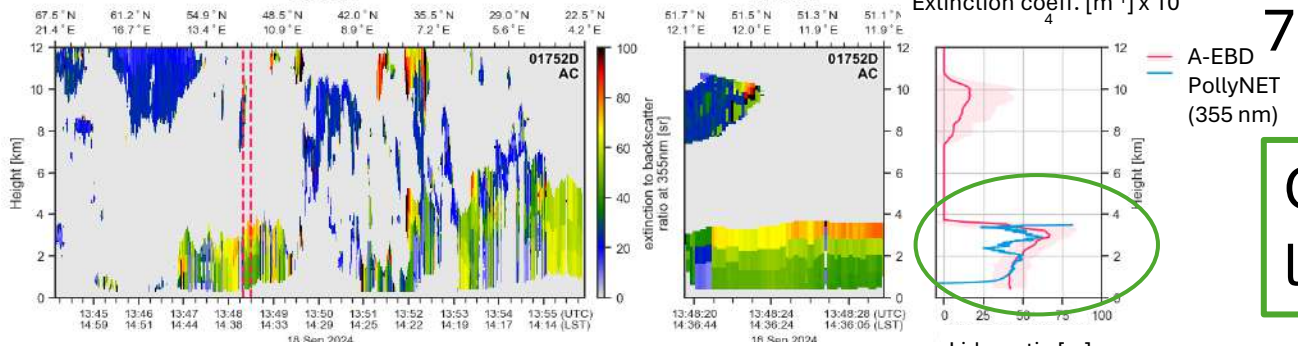
1752D











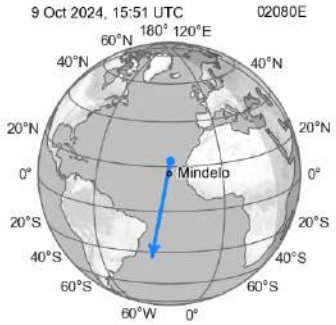
Raman solution at night 7 hours later

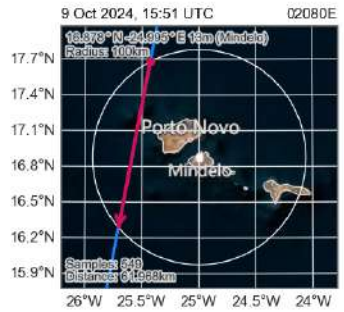
Good agreement of lidar ratio

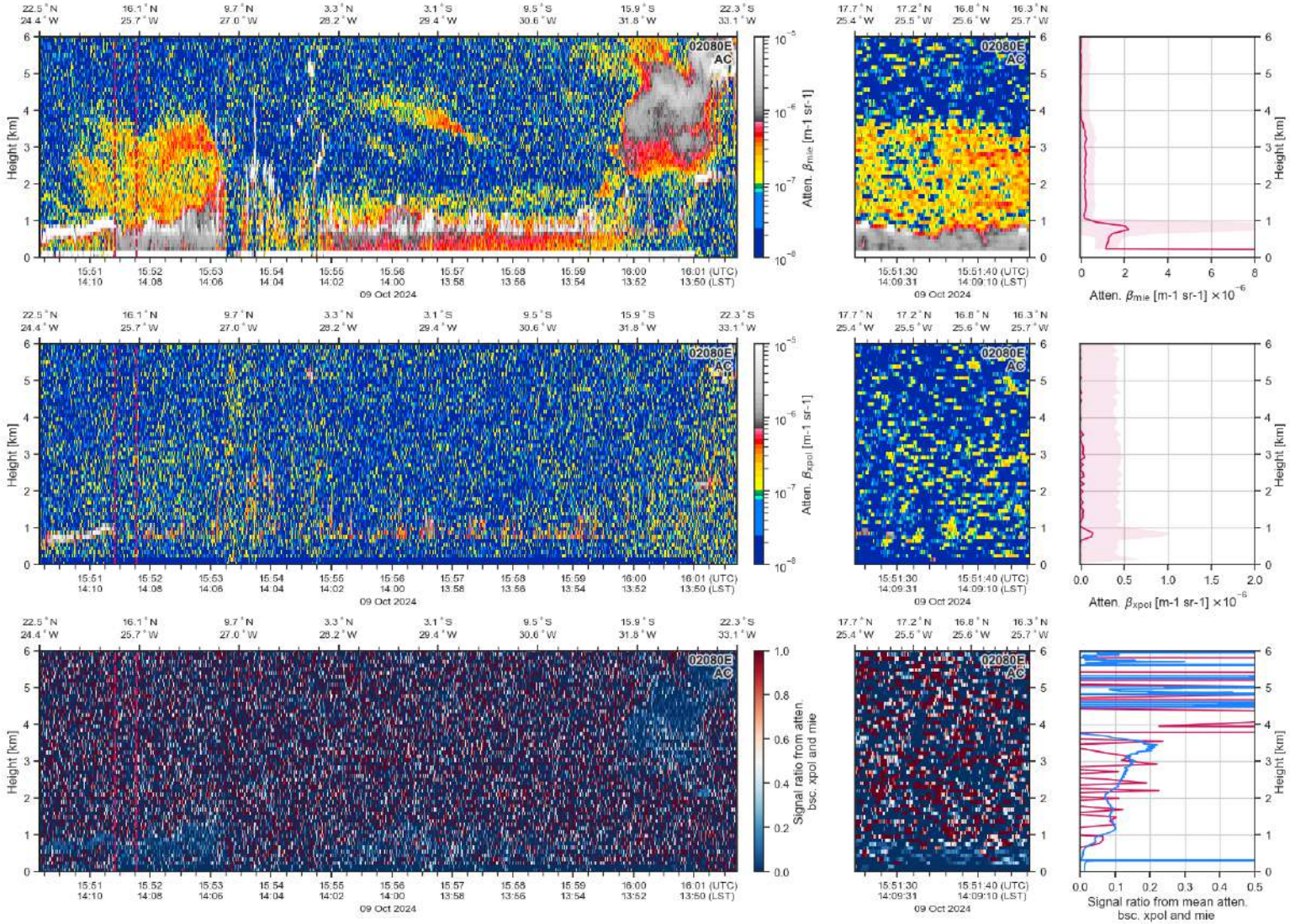
Leipzig, now just 50 km radius

4. Tropical Atlantic– Day – L2

2080E



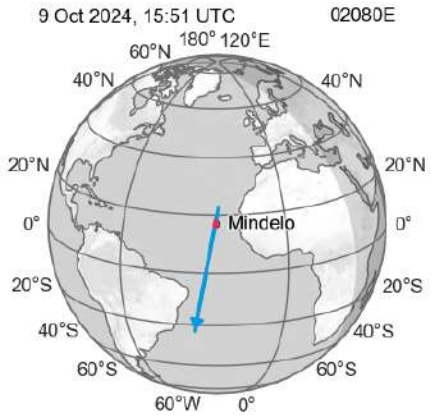


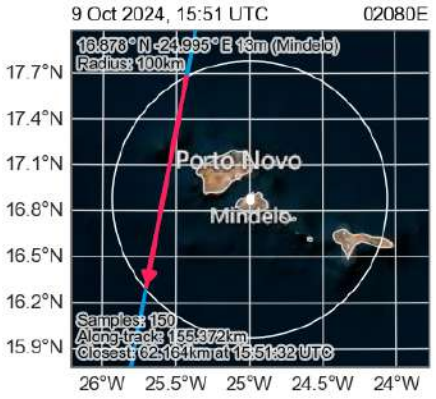


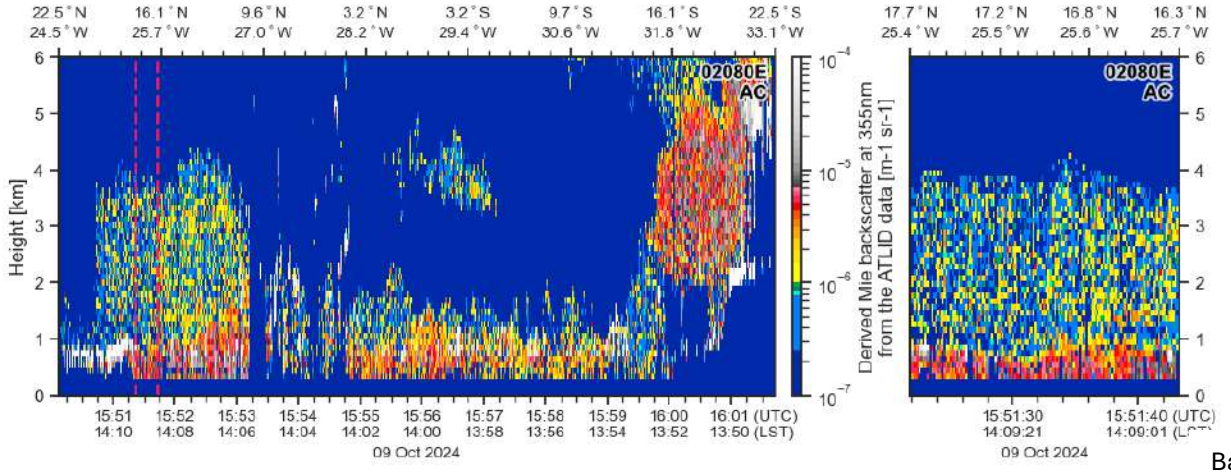
Dust mixture at Cabo Verde

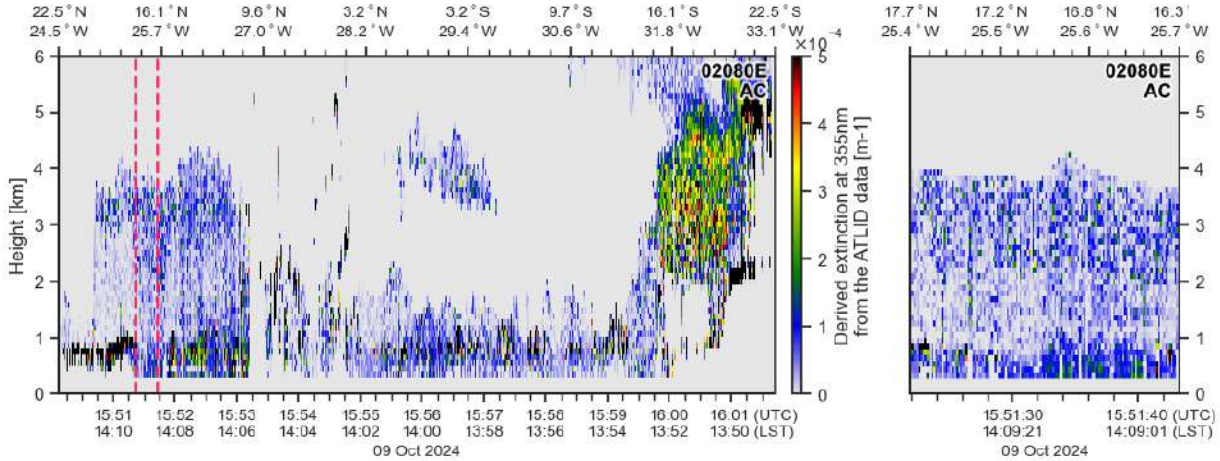
Improvement to be expected for new L1 data

4. Tropical Atlantic– Day – L2

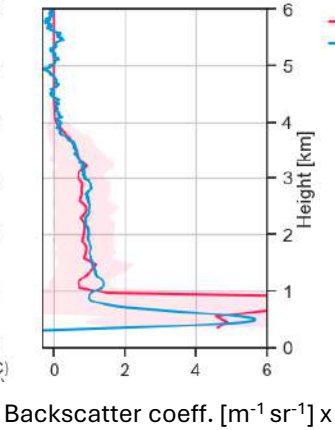


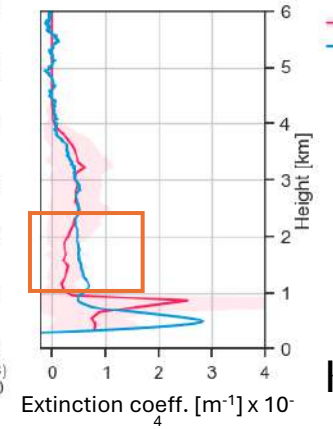






2080E





Klett, LR = 50 sr

Dust mixture at Cabo Verde

Lower extinction above clouds:
Hard to evaluate with Raman lidar during daytime

Conclusion

- Daytime depolarization ratio improved significantly by fixing the offset bug
- However, ATLID's depolarization ratio still slightly too low
  → improvements expected for L1 data released this week (baseline AD)
- Check L2 depolarization ratio

- Good agreement for Backscatter & Extinction
  → Lidar ratio as well
- Not affected by surface even in complex orography (Central Asia)
- L2 Extinction above clouds should be checked in more detail

- PollyNET: ground-based polarization Raman lidars for continuous observations organized by TROPOS