BAIVEC project

Validation of Atlid products using the in-situ aerosols and cloud measurements performed with the LOAC2 instrument under weather balloons

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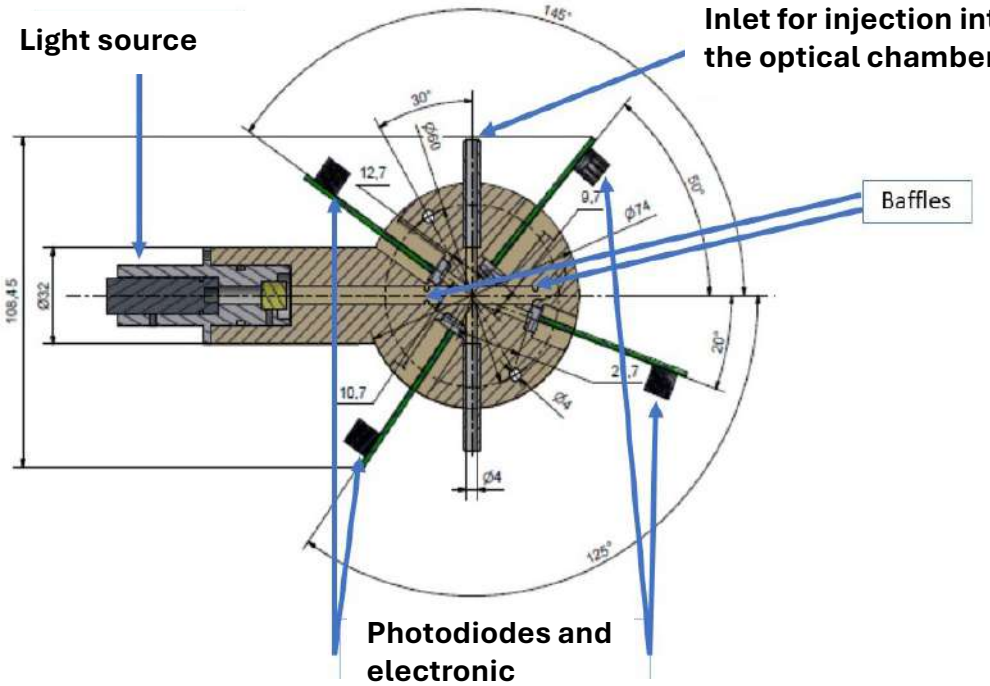
LOAC is an in-situ aerosol counter (gondola of 1 kg) that performs:

- Counting measurements for solid and liquid particles in 19 size classes between 0.15 and 50 µm
- Typology detection of the particles (using measurements at 4 scattering angles)

Concentrations measurements are converted into extinction values



BAIVEC project :

- **70 LOAC flights under balloon from different locations in France for 2025-2026, in very good coincidence with Atlid measurement (< 100 km, and often < 50 km, and <1 hour)**
- **One or two different instruments can be launched from the same location to ensure the quality of the results**

Launch from Orléans, France, March 2025

9 flights from Orléans and Ury, France (maximum altitude between 26 and 35 km)

1 flight by the Lulea University (T. Kuhn) from Kiruna, Sweden

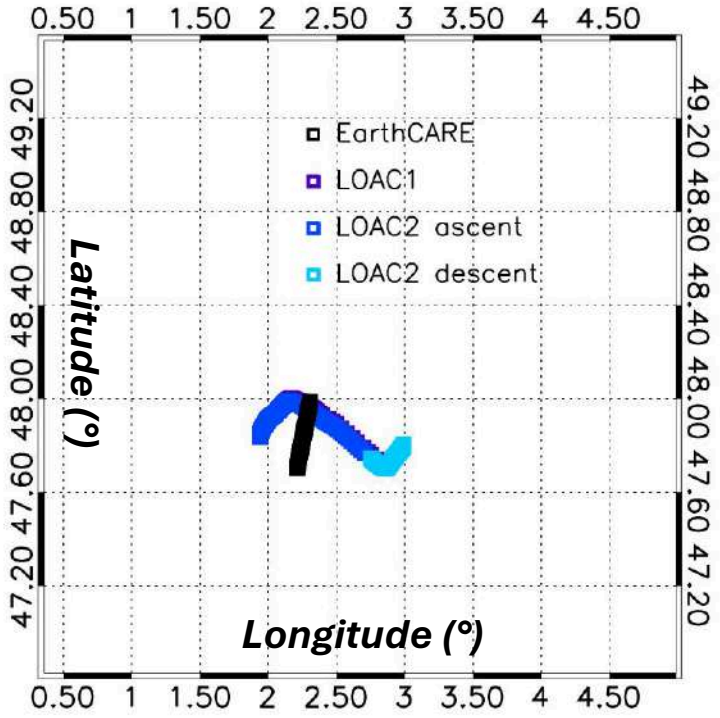
23 October 2024, Orléans
26 November 2024, Orléans
26 November 2024, Ury
5 December 2024, Orléans
15 January 2025, Orléans
22 January 2025, Kiruna, inside the polar vortex
18 February 2025,Orléans
6 March 2025, Orléans
10 March 2025 (night-time), Orléans
13 March 2025, Orléans, polar vortex above 20 km

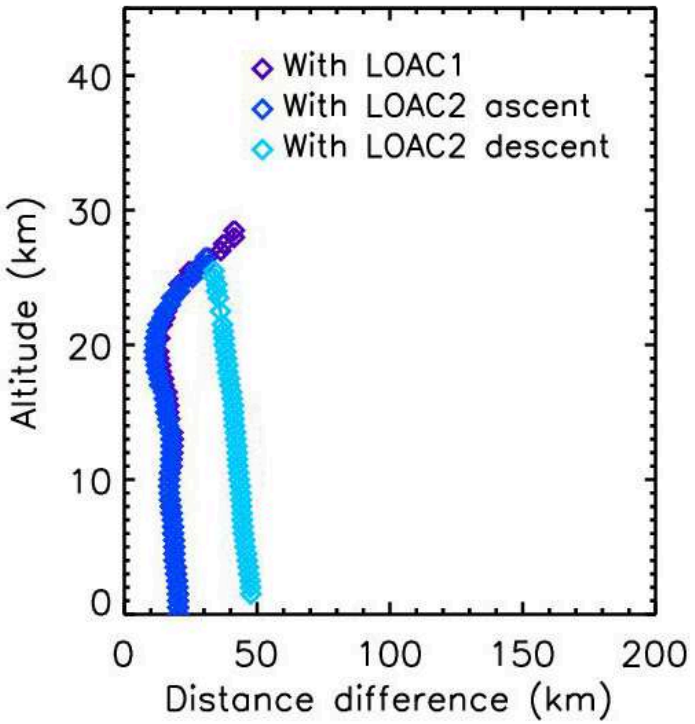
Main objectives: validation of Atlid extinction vertical profiles (L2a A-AER)

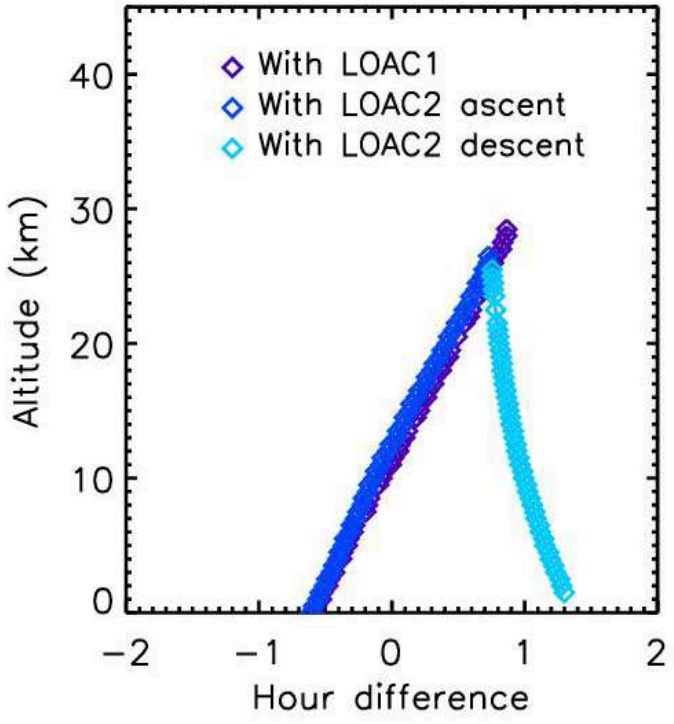
Secondary objectives : Classification (typology), cloud height, nature of particles inside water clouds

For the extinction profiles:

- The Atlid data closest to the LOAC balloons trajectories are considered and averaged
- At present, mean Atlid data and LOAC data are Integrated over 0.5 km (for clarity reasons)

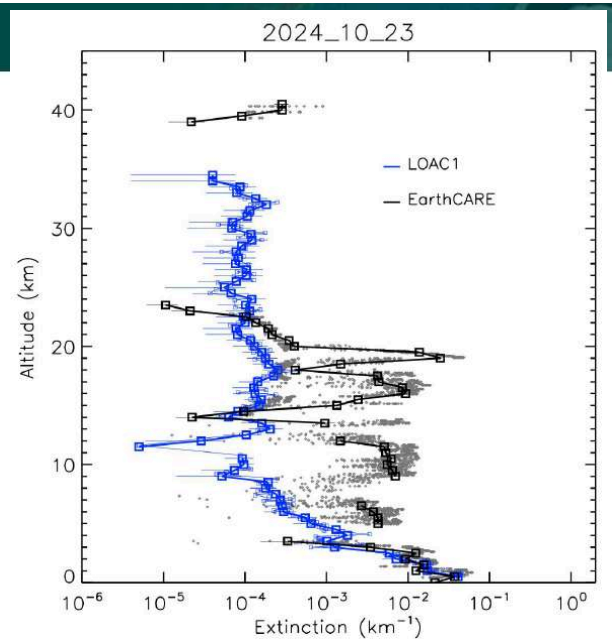


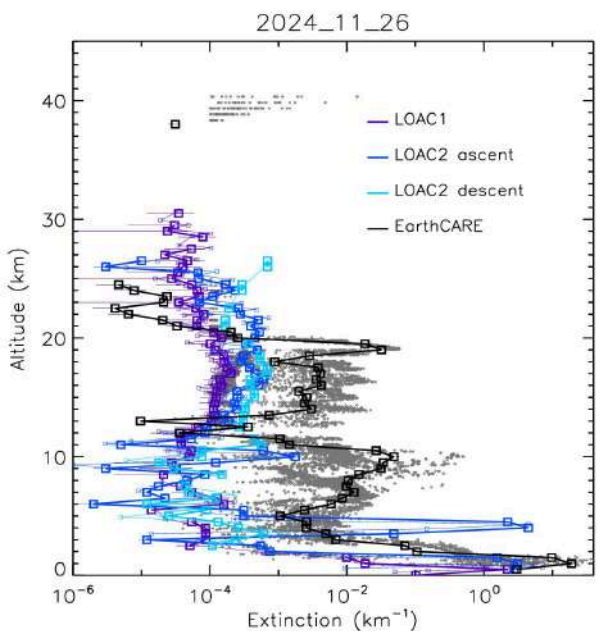


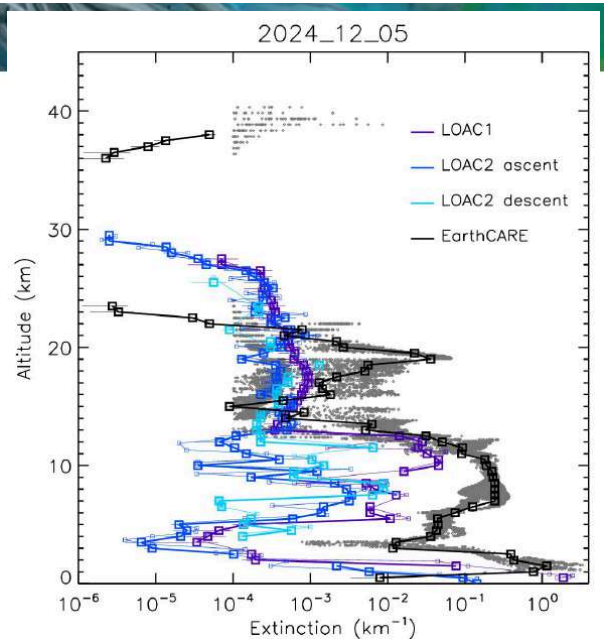


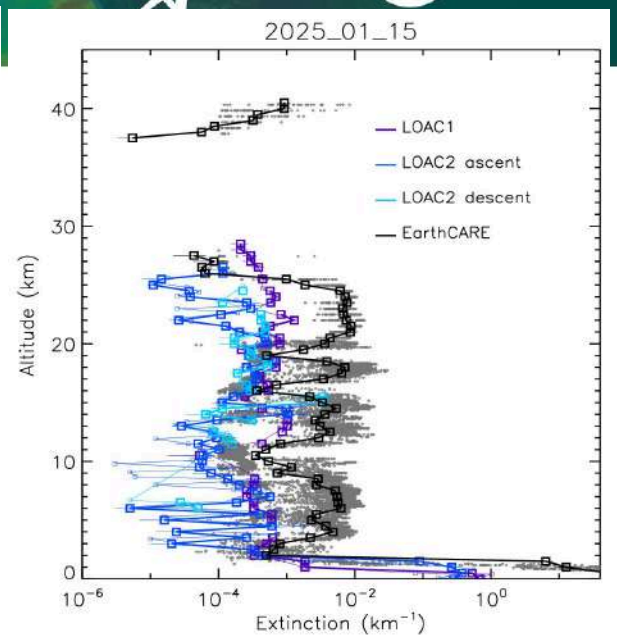
The best coincidence: 6 March 2025

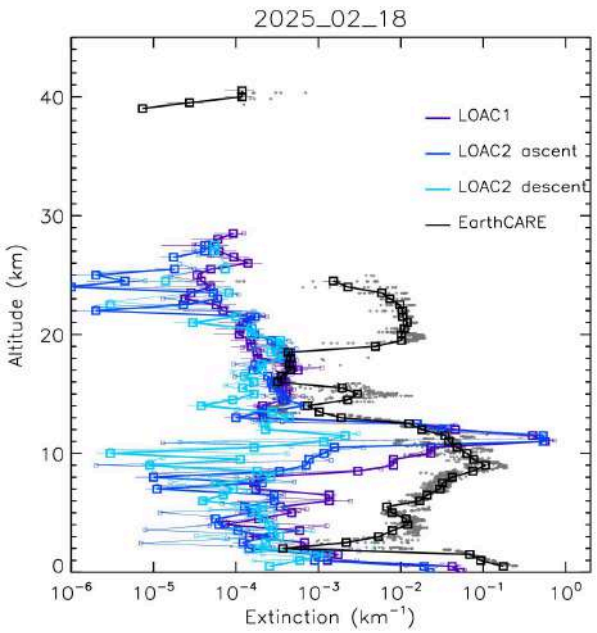
Extinction comparison (France): Various cloud conditions in the troposphere

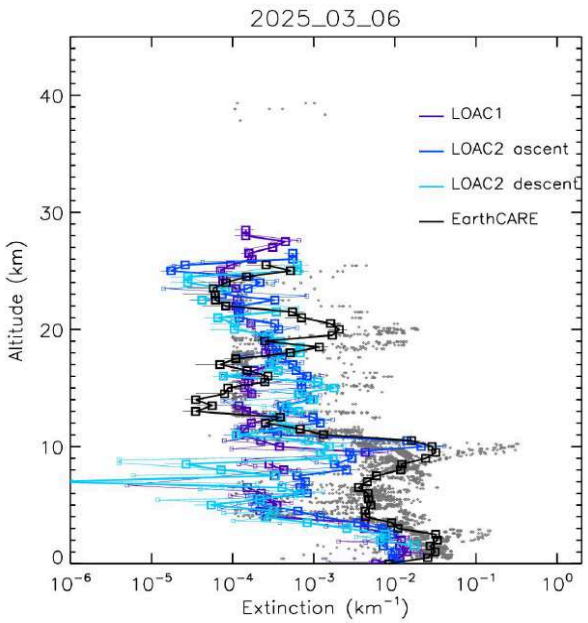


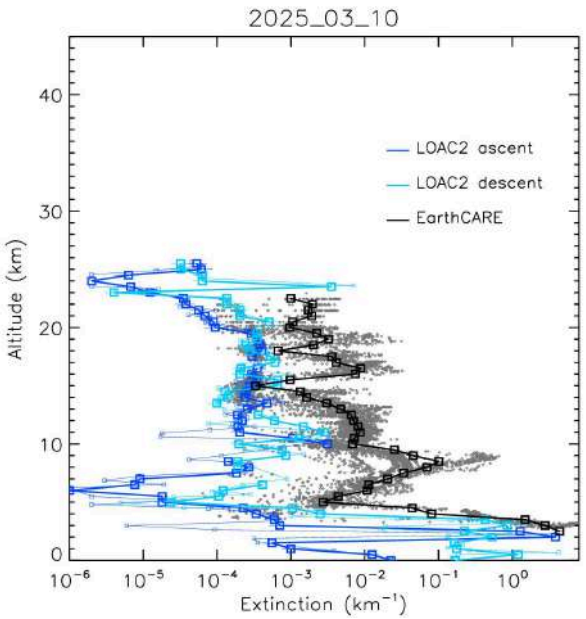


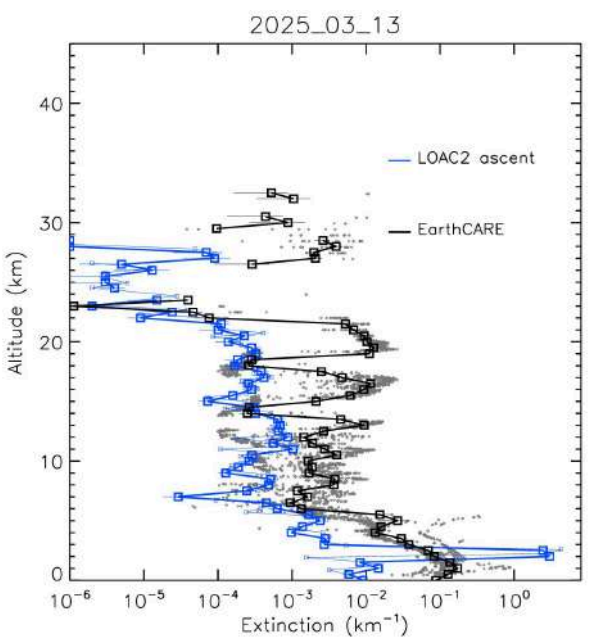




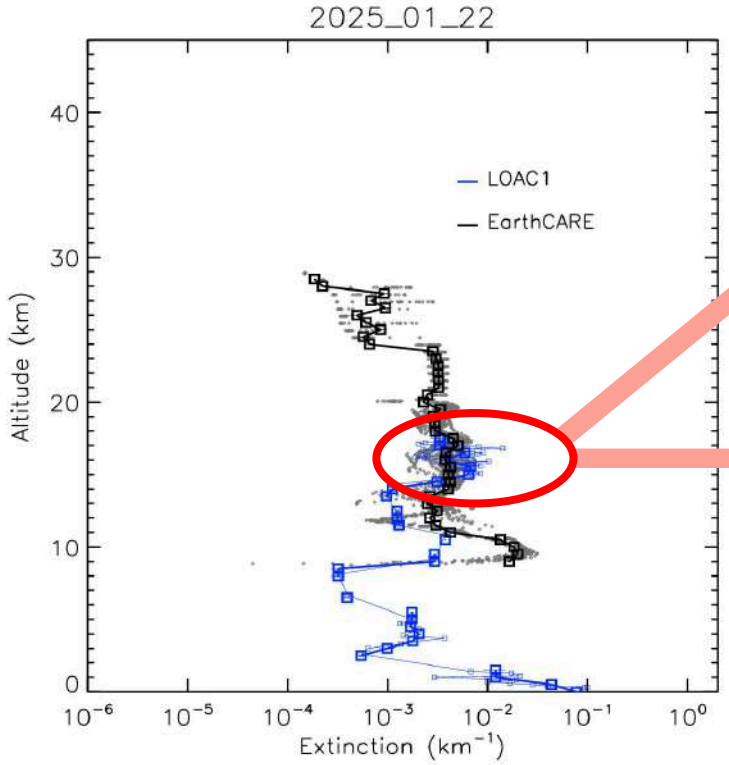


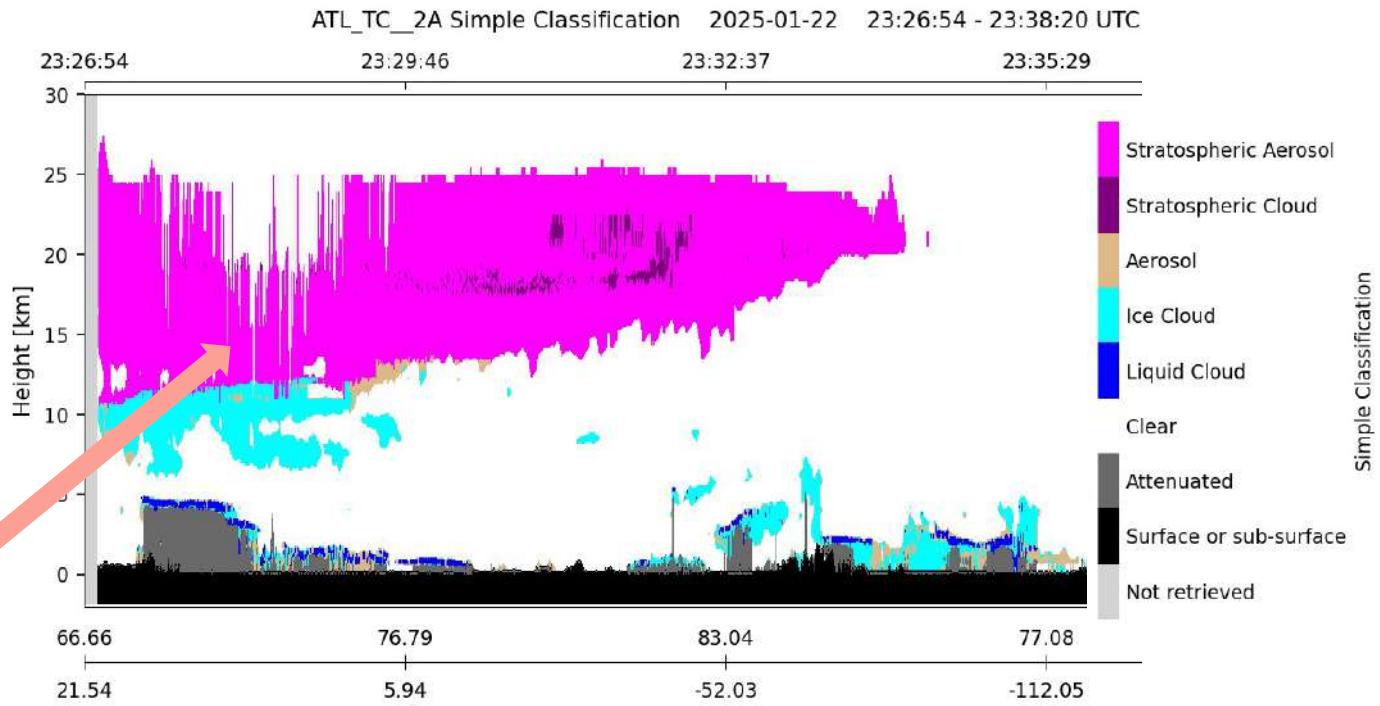


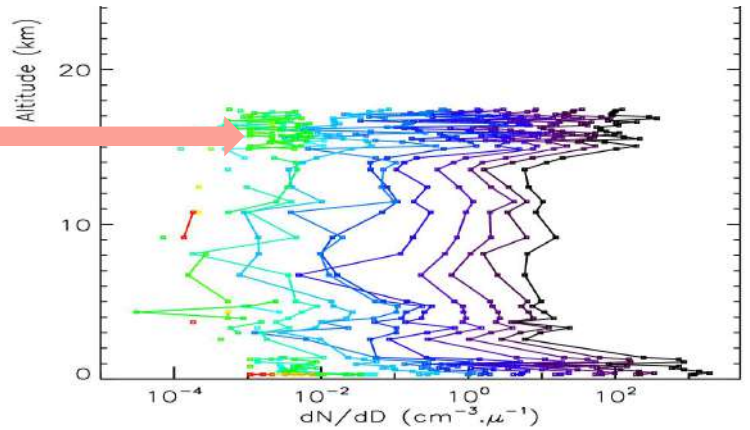




Extinction comparison (Sweden):
Presence of Polar Stratospheric Clouds above 14 km



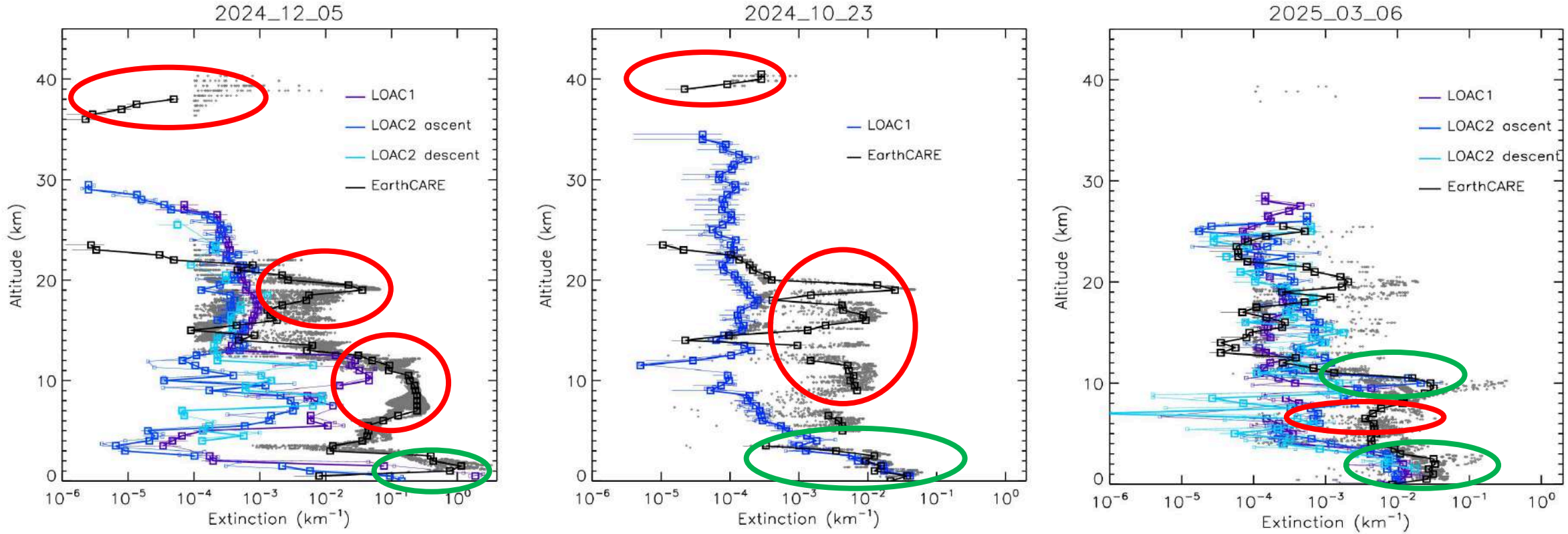




LOAC concentrations

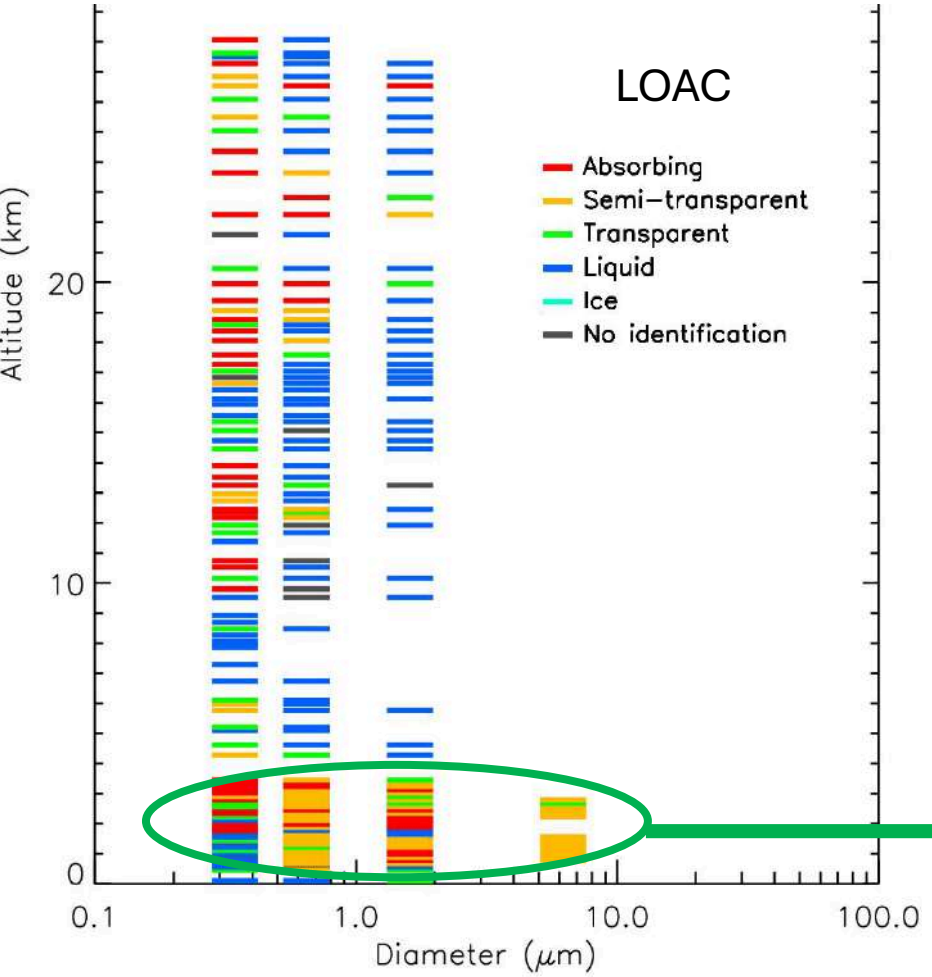
- 0.2–0.3 μm
- 0.3–0.4 μm
- 0.4–0.5 μm
- 0.5–0.6 μm
- 0.6–0.7 μm
- 0.7–0.85 μm
- 0.85–1.0 μm
- 1.0–2.0 μm
- 2.0–3.0 μm
- 3.0–5.0 μm
- 5.0–7.5 μm
- 7.5–10. μm
- 10.–12.5 μm
- 12.5.–15.μm
- 15.–17.5 μm
- 17.5–20 μm
- 20.–22.5 μm
- 22.5–25. μm
- 25.–30. μm

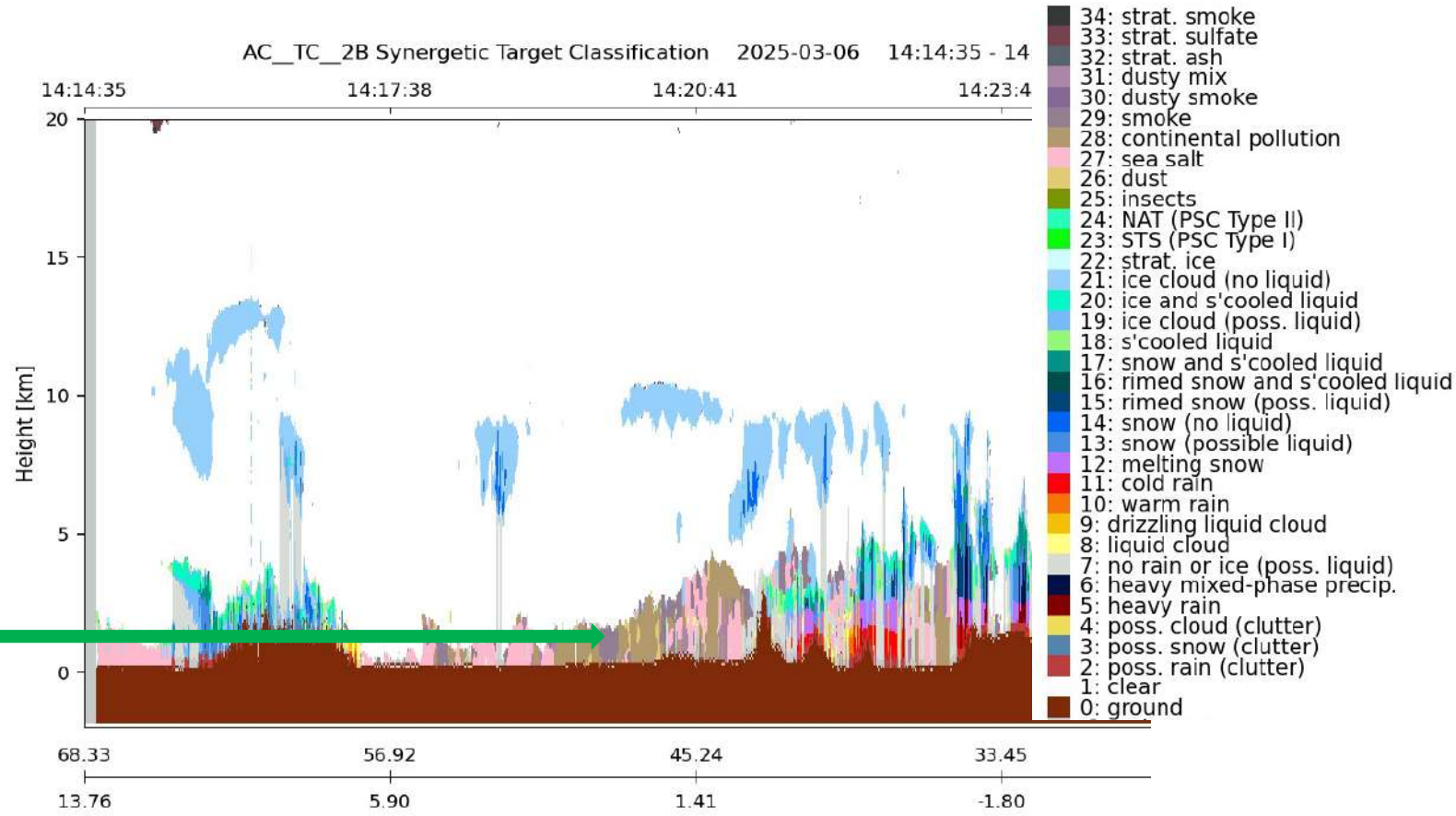
- LOAC and Atlid are often in good agreement during clouds, cirrus and PSC events
- Altlid extinctions are often overestimated in the upper troposphere and in the stratosphere
- Mean features are often in agreement, although large oscillations can remain
- An unrealistic extinction increase is often present at an altitude of about 40 km



Typology, preliminary results, 6 March 2025

Presence of a dust layer in the boundary layer, detected both by LOAC and Atlid





Still to be done:

- Comparison for the nature of clouds (water, ice), the cloud top height, the various typologies

Continuation of the project:

- More flights, up to several per months during the more favourable summer weather conditions
- More instruments included in the validation (other aerosol counter, backscatter sonde)

New partners in the consortium:

- GSMA/University of Reims -> Other launching sites (other aerosol counters, backscatter sonde)
- Lulea University (Kiruna) -> LOAC onboard the B-ICI gondola
- EPFL (Sion, Switzerland) -> LOAC flights under tethered balloon in the Artic region, boundary layer