

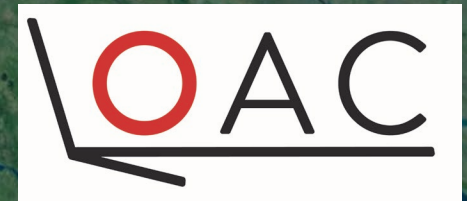


ESA-JAXA Pre-Launch EarthCARE Science and Validation Workshop

13 – 17 November 2023 | ESA-ESRIN, Frascati (Rome), Italy

EVID09: Strategy of measurements with the light balloon aerosols counter
LOAC for the validation of EarthCare (BAIVEC project)

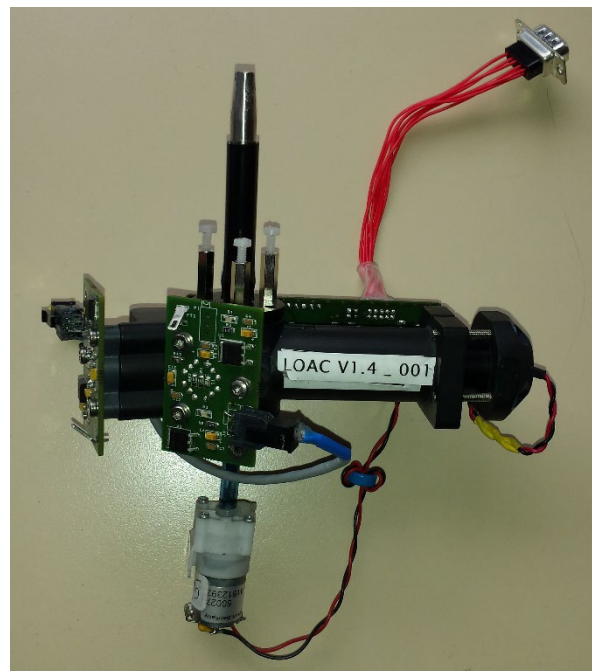
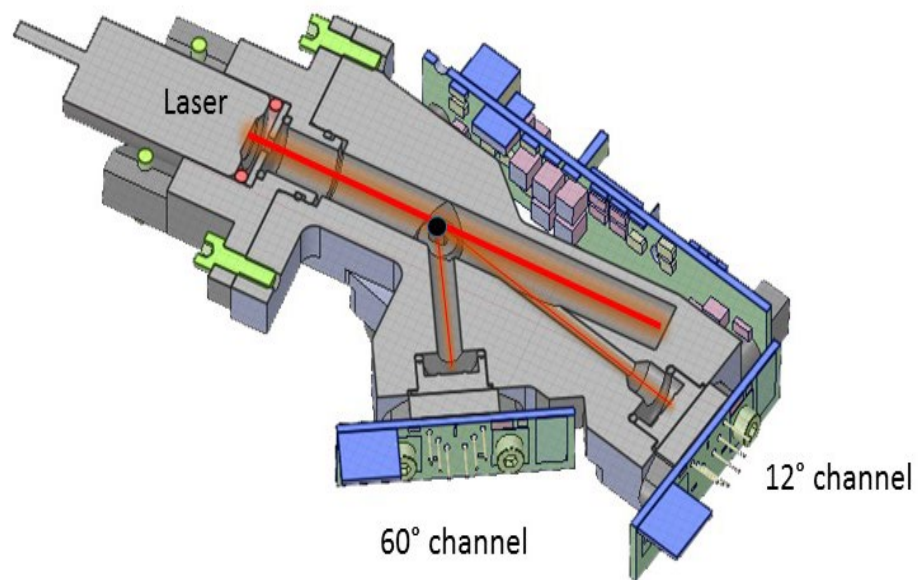
*Jean-Baptiste RENARD, Gwenaël BERTHET
LPC2E-CNRS, Orléans, France*





Balloon-borne measurements of aerosols with the LOAC aerosols counter:

- Concentrations of aerosols for 19 size classes from 200 nm to 50 μm
- Previous version of LOAC: Measurements at 2 scattering angles to retrieve the size distribution (first channel) and an estimate of the aerosol typology (from the ratio of the 2 channels measurements)

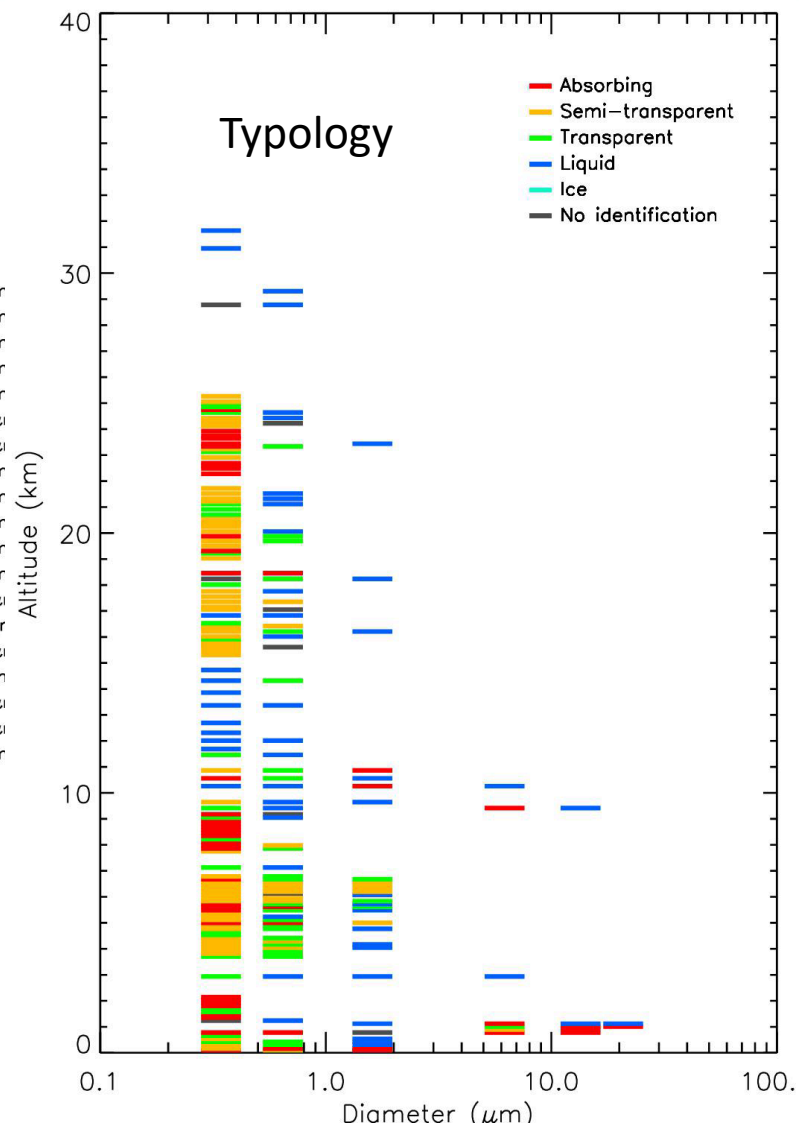
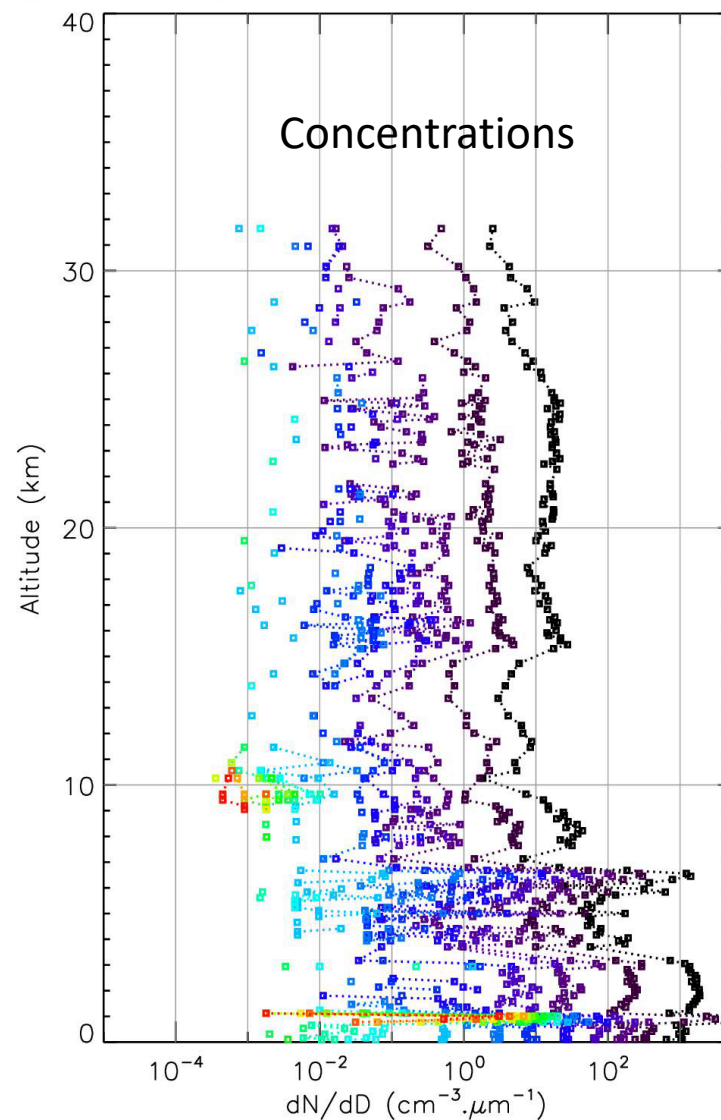




Measurements from ground up to ~30 km

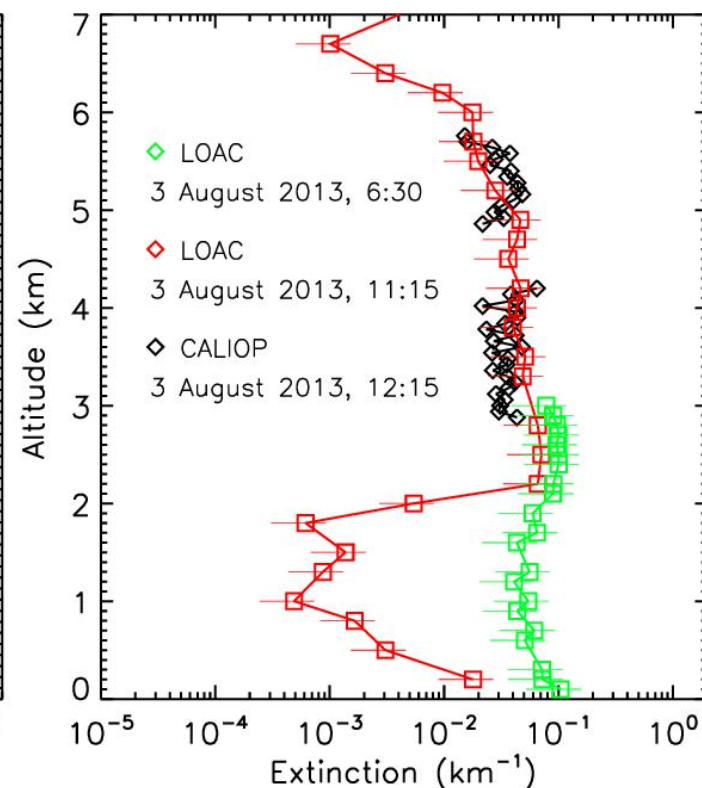
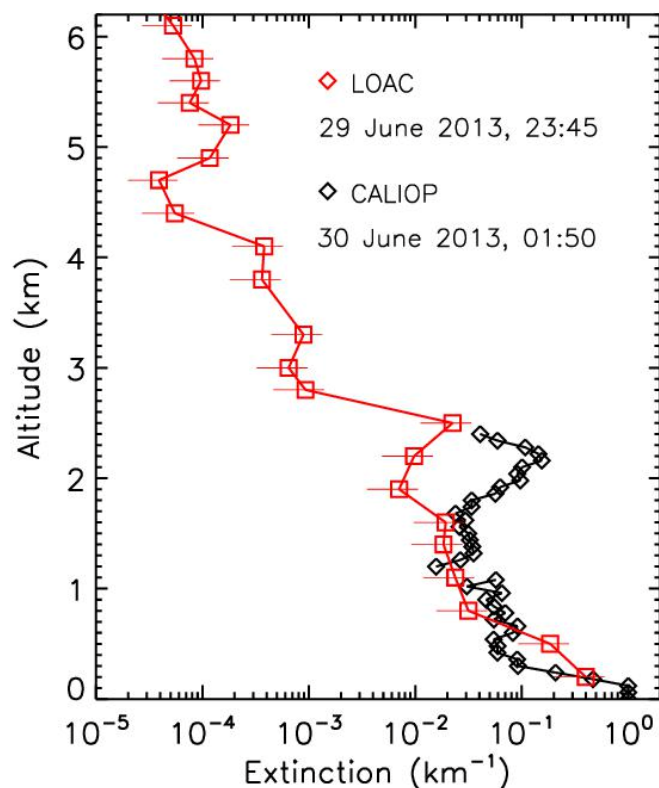
Resolution of ~100 m in the lower troposphere

29 Sept. 2023
Ury (France)





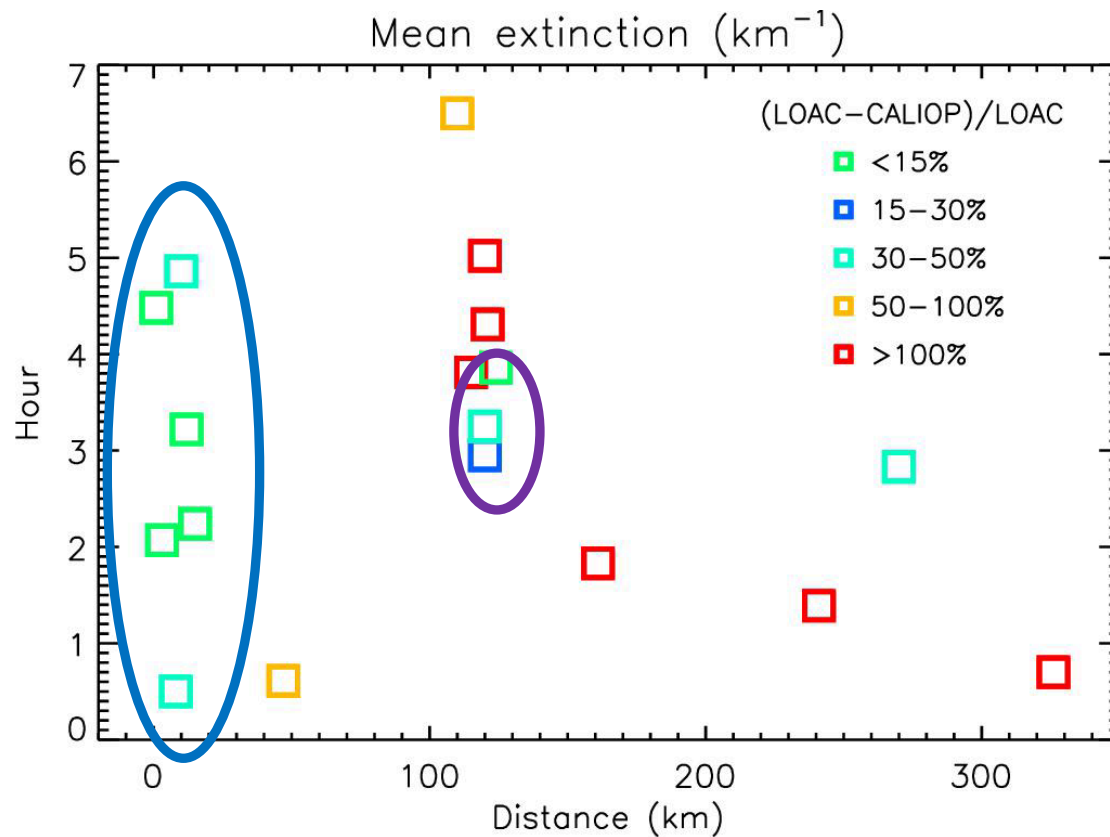
- Conversion of counting measurements to extinction (considering the typology of the aerosols and thus their refractive index)
- Validated during intercomparison with Caliop/Calipso measurements





Criteria to perform good validation studies (established from previous works with LOAC and Caliop):

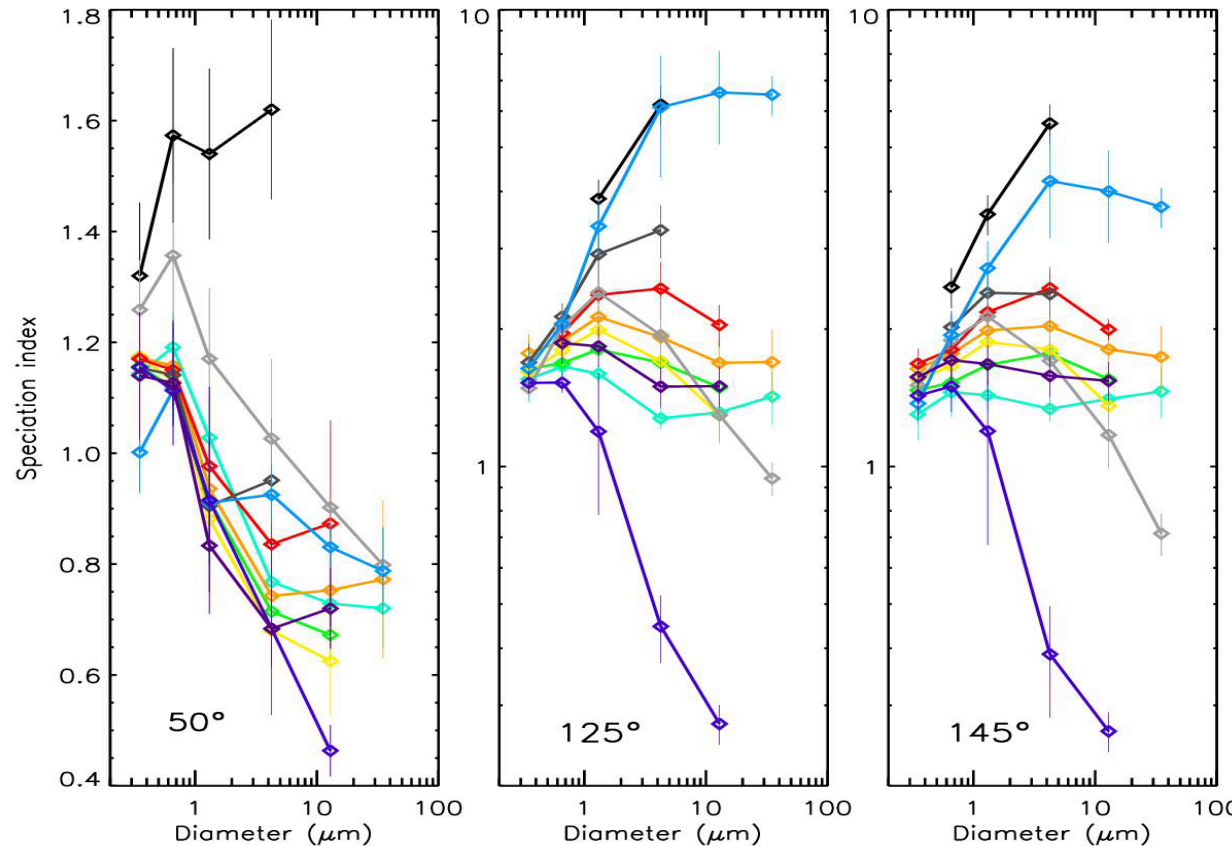
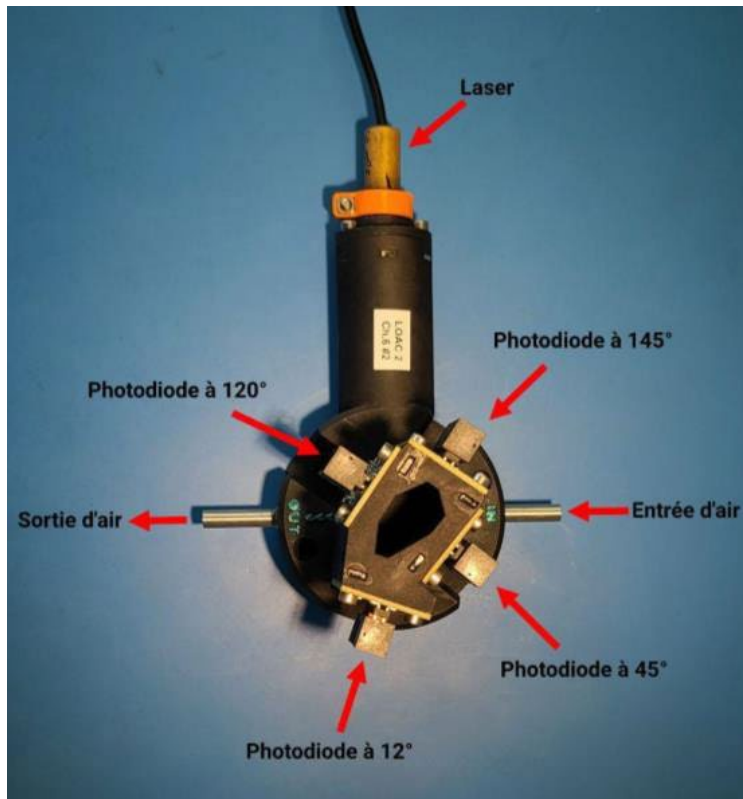
- Coincidence between the EarthCARE and LOAC measurements less than 1 hour and less than 50 km
- In case of low winds and unperturbed conditions, coincidences up to 3 hours and 100 km





New version LOAC available in 2024 (first test flights in December 2023):

- Measurement at 4 scattering angles to better estimate the typology of the aerosols
- Improved electronics to better determine the submicron particles (in particular for low concentrations)



Typology reference curves obtained in laboratory, to identify the aerosols from the 3 angles channels dedicated to typology



Flight strategy :

- 4 locations in France to increase the probability of good coincidences

- Aire sur l'Adour, CNES balloon base)
- Orléans (LPC2E-CNRS)
- Ury (MeteoModem company)
- Reims (Reims University)

- Instruments ready to be launched “under alert” from the 4 locations





1-year campaign, total of ~45 flights

2 flights per month for 10 months (“background” monitoring)

12 or 13 flights per month for 2 x 1 month (intensive monitoring)

Main constraint: weather conditions and balloon trajectory (lower probability of flights during winter)





- LOAC also onboard 4 Strateole2 gondolas in 2025 for long duration flights (several months) around the world in the tropical region at an altitude of 20 km.
- Possibility of validation in case of fortuitous good coincidences

