



# ESA-JAXA Pre-Launch EarthCARE Science and Validation Workshop

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

Potential Norwegian EarthCARE Cal/Val activities for cloud and aerosol products

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Airborne

INCAS King Air  
in-situ cloud probes

Validation of

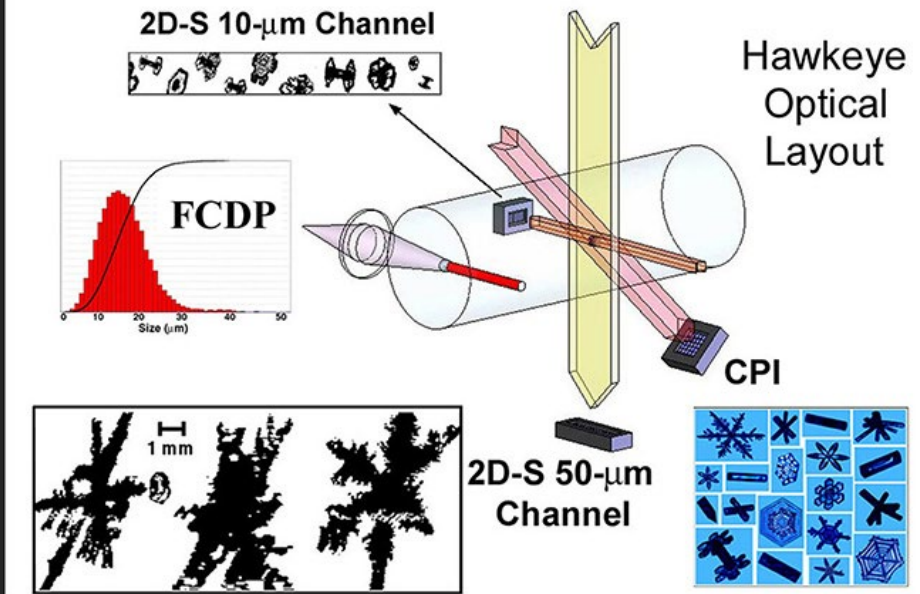
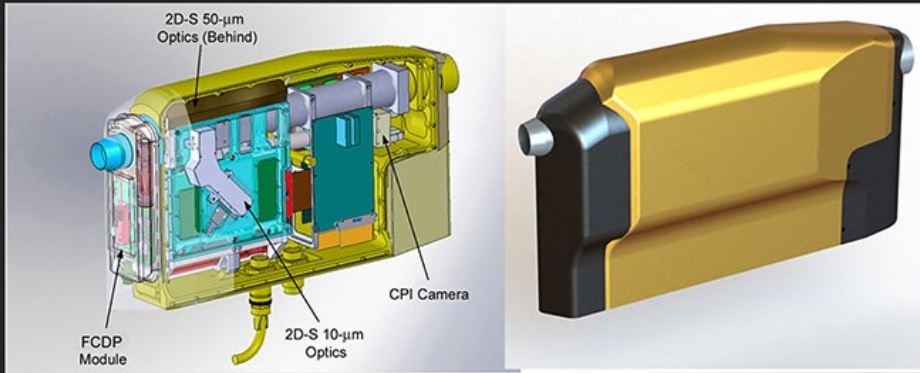
EarthCARE's cloud and aerosol products  
with airborne and ground-based  
observations

Ground-  
based

ALOMAR tropospheric  
lidar



# Aircraft: INCAS King Air C90 G



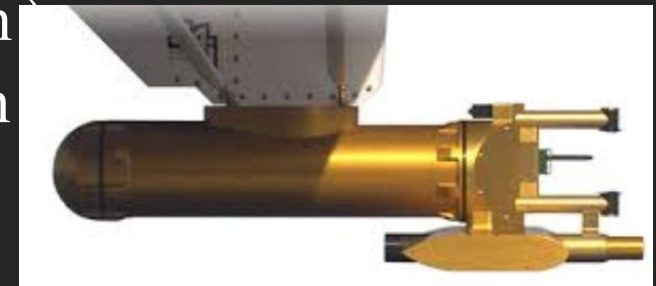
SPEC Inc

## Specifics

- Range: 2000 km (4-5 h)
- Science speed: 70 m/s
- Transit speed: 125 m/s

## In situ: SPEC Hawkeye, DMT CAPS

- Cloud droplets (2-50 µm)
- Ice crystals (up to 1.5 m)



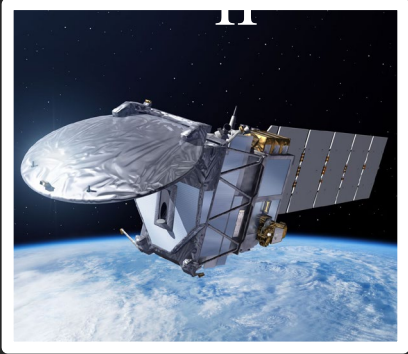
Uni Wien

P r e l i m i n a r y p r o j e c t  
t i m e l i n e



L a u n c

h



S T E P -  
C H A N G E

Jul-Aug  
2025

O R C E S T R  
A

Aug-Sep  
2024

N o r w e g i a n  
A r c t i c

May 2026





### Arctic Campaign

Norwegian Arctic  
Low-level Arctic mixed-phase clouds



### ORCESTRA Initiative

Cape Verde  
Deep convective clouds



### STEP-CHANGE Campaign

Palau  
Convective clouds and fair weather cumuli



Ground-based: ALOMAR

observatory

**Tropospheric lidar**

Pulsed Nd:YAG solid-state laser

Wavelength: 1064 nm, 532 nm and 355 nm

Depolarization: 532 nm, **upgrade for 355 nm**

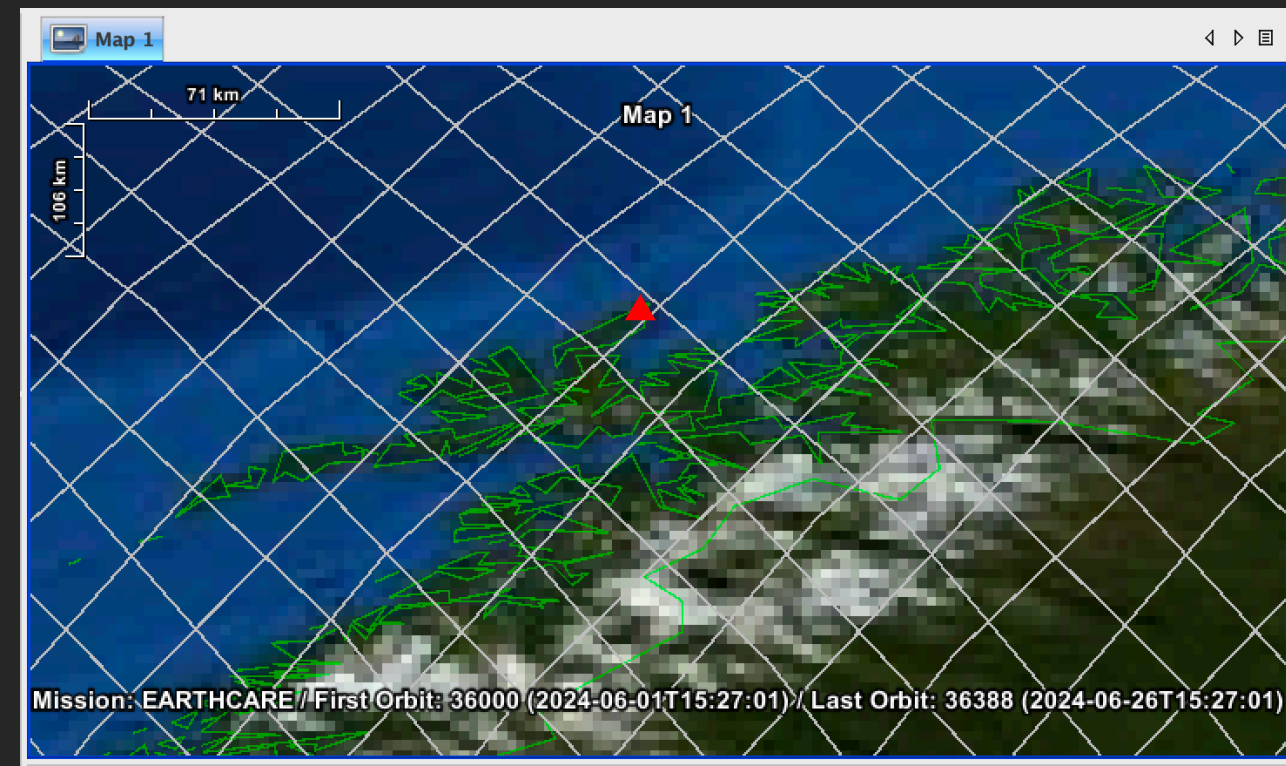


**CIMEL sun/lunar photometer**

ESOV Orbit tool:

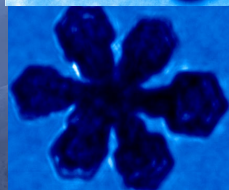
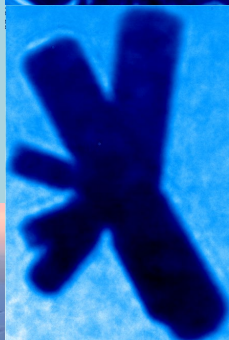
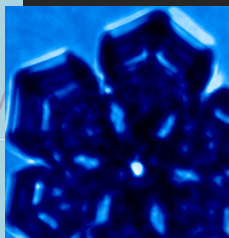
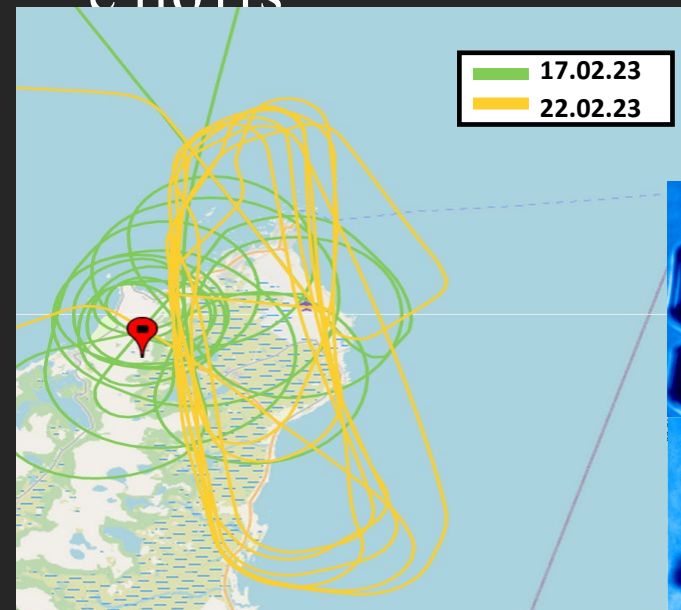
2 overpasses within 3 km in

25 days

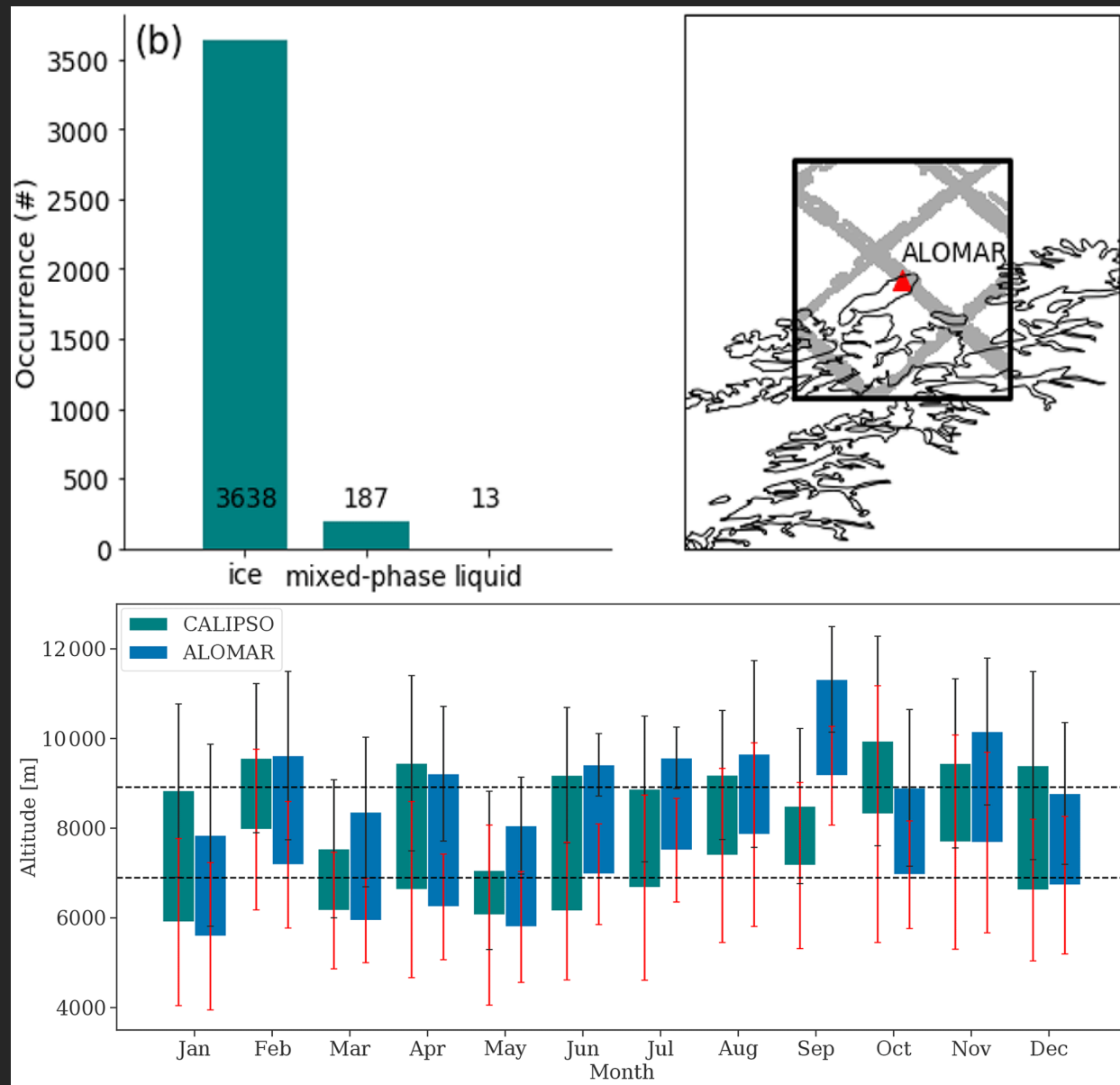




# Past validation efforts



Imperial College London



Schäfer et al. (2022)

## Airborne

### Cloud products L2

- Liquid and ice cloud properties
- Cloud top and base height

## Ground-based

### Aerosol products L2

- Backscatter profiles
- Depolarization profiles

### Cloud products L2

- Ice cloud properties

## Validation of

EarthCARE's cloud and aerosol products  
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