



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

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

**EVID03: GIVE – German Initiative for the Validation of EarthCARE**

*Ulla Wandinger and the GIVE Team*

# The GIVE Team



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<b>UoC</b>	University of Cologne	<b>Pavlos Kollias, Ulrich Löhnert, Lukas Pfitzenmaier</b>
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<b>FZJ</b>	Forschungszentrum Jülich	<b>Anne Caroline Lange</b>
<b>UHH</b>	University of Hamburg	<b>Stefan Bühler, Manfred Brath</b>
<b>LMU</b>	Ludwig-Maximilians-Universität Munich	<b>Bernhard Mayer, Stefan Kneifel</b>
<b>DLR</b>	German Aerospace Centre	<b>Silke Groß, Luca Bugliaro, Johanna Mayer, Milenko Rubin-Zuzic, Ziming Wang</b>
<b>MPI-M</b>	Max Planck Institute for Meteorology	<b>Bjorn Stevens, Lutz Hirsch, Julia Windmiller</b>
<b>LIM</b>	Leipzig University	<b>Manfred Wendisch, André Ehrlich, Evelyn Jäkel, Anna Luebke, Heike Kalesse-Los, Michael Schäfer</b>

# Holistic validation approach



Cross-satellite validation

Mobile platforms



Airborne observations



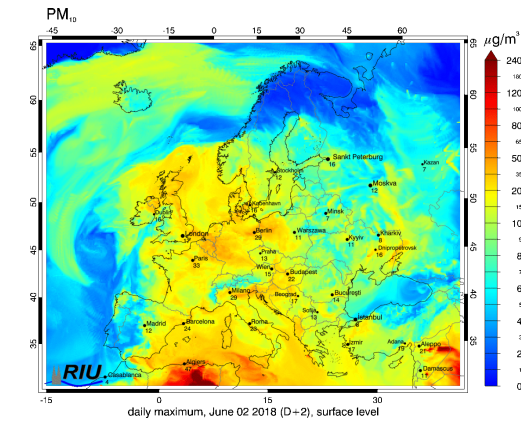
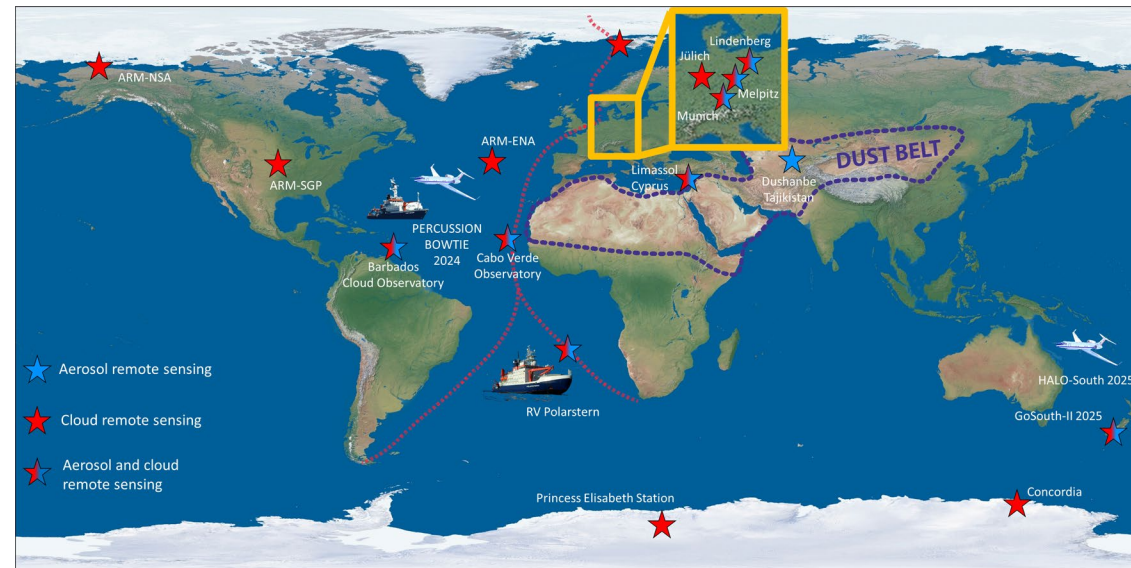
Closure experiments



Global network observations



Stationary observations



4D-var assimilation

Campaign opportunities

# New and upgraded stations



- Mindelo/Cabo Verde: ACTRIS aerosol and cloud remote sensing, fully operational since October 2023 in collaboration with EVID05
- Melpitz/Germany: ACTRIS aerosol and cloud remote sensing, will be moved from Leipzig in spring 2024 in collaboration with EVID05
- Limassol/Cyprus: ACTRIS aerosol and cloud remote sensing, upgrade planned for spring 2024 in collaboration with Eratosthenes Center of Excellence (EVID39) and EVID05



*President Frank Walter Steinmeier transfers the first radar data from Mindelo (Bundesregierung / Bergmann)*



*Green laser beam above the Ocean Science Center Mindelo, Cabo Verde (Rico Hengst, TROPOS)*



*Aerosol, cloud and radiation station on the roof of the Ocean Science Center Mindelo, Cabo Verde (Rico Hengst, TROPOS)*



## Standardized quality-assured measurements and automatic data transfer to EVDC

**ATMO-ACCESS pilot project:** access for international stakeholders

- EarthCARE validation with ACTRIS aerosol and cloud remote sensing stations (→ **H. Baars, Friday, 10:08**)

## Campaign opportunities for EarthCARE validation

**PERCUSSION & BOWTIE 2024:** *EarthCARE Validation; Tropical Oceans and Organized Convection*

- HALO with EarthCARE-like payload + Meteor with LIMMACO + Barbados and Cabo Verde Observatories (→ **S. Groß, Thursday, 11:48; J. Windmiller, Thursday, 12:00**)

**HALO-South & GoSouth-II 2025:** *The Interplay of Clouds, Aerosols and Radiation above the Southern Ocean*

- HALO with in-situ payload + LACROS and LIMMACO (tbd) ground-based mobile facilities in New Zealand
- in collaboration with Horizon Europe CleanCloud project (→ **A. Nenes, Monday, 13:15**)



- GIVE Cal/Val proposal submitted to DLR Raumfahrtagentur in September 2023
  - includes 7 partner institutions
  - covers about 40% of the planned activities for ground-based, modelling, and cross-satellite validation
  - start of the project planned for February 2024
- Further funding opportunities are under discussion
- Airborne campaigns with the HALO research aircraft and related ground-based activities are funded separately (DFG and institutional funds)

# Summary of validation efforts and funding



GIVE validation matrix: EarthCARE Level 1 and Level 2 products will be validated by means of airborne (A) and ground-based observations (G), 4D-var modelling (M), and cross-satellite comparisons (S)  
 Funding status: A G M S - funding available, A G M S - funding not (yet) available \*

		TROPOS	FUB	UoC	DWD	FZJ	UHH	LMU	DLR & MPI-M	LIM
<b>Level 1</b>										
	MSI	S	S	-	-	M	-	-	S	A
	BBR	-	S	-	-	-	-	-	S	-
	ATLID	G	-	-	-	M	-	G	A	-
	CPR	G	-	G	-	-	-	G	A	G
<b>Level 2 - Cloud-top, vertically integrated and layer-wise retrieval products</b>										
Target classification	Cloud-top height	G, S	-	G	G	-	-	G	A, S	G
	Cloud-top phase	G, S	-	G	G	-	-	-	A, S	G
	Aerosol layer height/depth	G	-	-	-	M	-	G	A	-
	Aerosol layer classification	G	-	-	-	M	-	G	A	-
	Cloud detection, cloud-aerosol discrimination	S	-	G	-	-	-	G	-	-
Ice cloud & snow	Optical thickness	G, S	-	-	-	-	-	G	A, S	-
	Effective radius	G, S	-	-	-	-	S	-	A, S	-
	Water path	G, S	-	G	G	-	S	G	A, S	G
	Surface snow rate	-	-	G	-	-	-	G	-	-
Liquid cloud	Optical thickness	S	-	-	-	-	-	-	S	-
	Effective radius	S	-	G	-	-	-	-	S	-
	Water path	G, S	-	G	G	-	-	G	A, S	G
Rain	Surface rain rate	G	-	G	G	-	-	G	-	G
	Rain water path	-	-	G	-	-	-	-	-	-
Aerosol (per species)	Aerosol optical thickness	G	S	-	-	M	-	G	A	-
	Ångström exponent	G	S	-	-	-	-	G	A	-
<b>Level 2 - Vertical profiles at nadir</b>										
Target classification	Cloud/precipitation fraction	G	-	G	G	-	-	G	A	G
	Cloud/precipitation phase	G	-	G	G	-	-	G	A	G
	Aerosol fraction	G	-	-	-	-	-	-	-	-
	Aerosol species	G	-	-	-	M	-	-	A	-
Ice cloud & snow	Extinction	G	-	-	G	-	S	G	A	G
	Effective radius	G	-	-	-	-	S	-	A	G
	Water content	G	-	-	G	-	S	G	A	G
	Snow rate	-	-	G	-	-	S	-	-	-
	Snow median diameter	-	-	G	-	-	S	G	-	G
	Extinction-to-backscatter ratio	G	-	-	G	-	-	-	A	-
Liquid cloud	Extinction	G	-	-	G	-	-	-	-	-
	Effective radius	G	-	-	-	-	-	-	-	G
	Water content	G	-	-	G	-	-	-	-	G
Rain	Rain rate	G	-	G	G	-	-	G	-	G
	Rain water content	G	-	G	-	-	-	-	-	-
	Median drop size	G	-	G	-	-	-	G	-	G
Aerosol (per species)	Aerosol extinction	G	-	-	G	M	-	G	A	-
	Extinction-to-backscatter ratio	G	-	-	G	M	-	G	A	-
	Particle linear depolarization ratio	G	-	-	G	M	-	G	A	-
<b>Level 2 - Radiation products</b>										
Radiation	BBR-SW unfiltered radiances	-	S	-	-	-	-	-	-	A
	Solar top-of-atmosphere flux	-	S	-	-	-	-	-	-	A
	SW and LW fluxes at surface	G	-	-	-	-	-	-	-	-
	Terrestrial top-of-atmosphere flux	-	-	-	-	-	-	-	-	A

(→ Poster no. 16)

\* funding is assured for about 40% of the planned activities for ground-based, modelling, and cross-satellite validation, further funding opportunities are under discussion  
 airborne campaigns with the HALO research aircraft and related ground-based activities are funded separately (DFG and institutional funds)

Thank you!



Universität Hamburg



Max-Planck-Institut  
für Meteorologie



**JÜLICH**  
Forschungszentrum



UNIVERSITÄT  
LEIPZIG

**TROPOS**

Freie Universität  Berlin

**Deutscher Wetterdienst**  
Wetter und Klima aus einer Hand

