Experimental Validation of ADM-Aeolus with the ALADIN Airborne Demonstrator EVA⁴D

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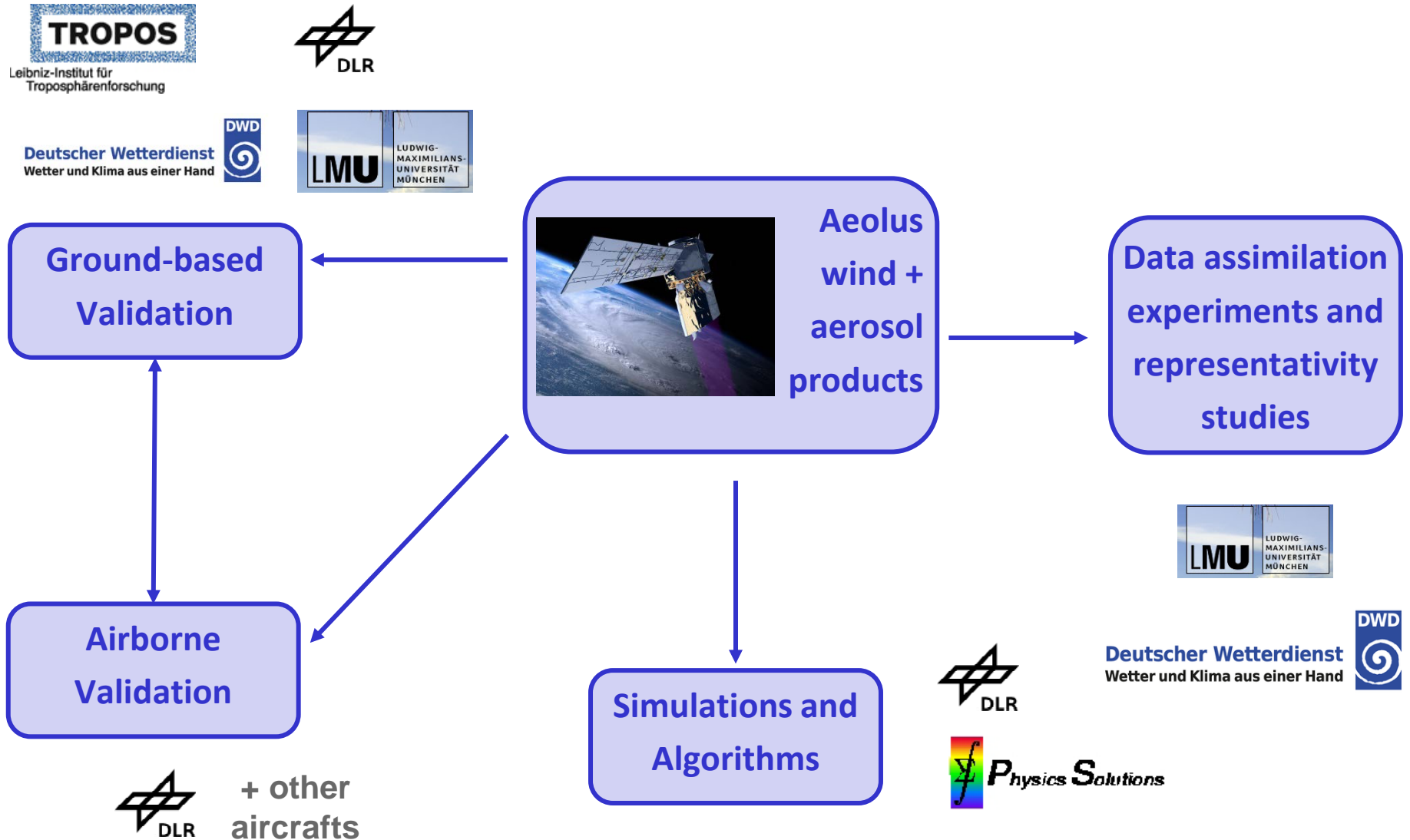
Proposal objectives

Validate the ADM-Aeolus L1B and L2B wind product and the related instrument calibration modes and algorithms and assess the benefit of the observation for numerical weather prediction (NWP)
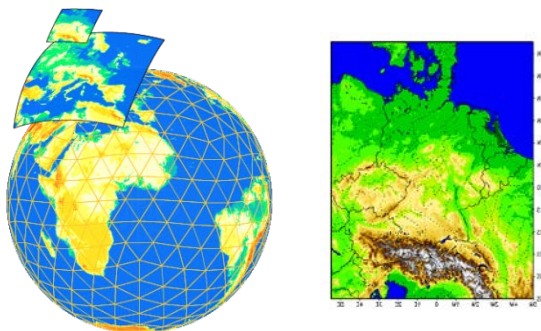
Proposal Team
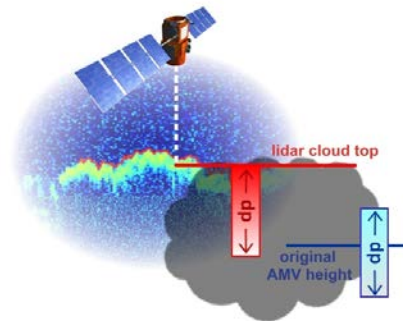
Description of CAL/VAL techniques

Validation and impact assessment of ADM-Aeolus observations in the DWD modelling system

*Martin Weissmann (LMU Munich), Alexander Cress (DWD), Roland Potthast (DWD)*

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Estimation of representativity errors for the assimilation/validation of ADM-Aeolus observations through high-resolution (500 / 1000 m) simulation	Error assessment in DWD modelling system and optimization of assimilation (assigned errors, volume operator)	Impact assessment through data denial experiments and ensemble-based estimates (FSO)

Ground-based validation in Germany
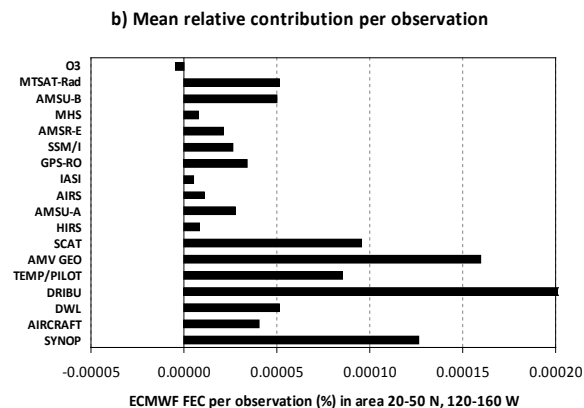
Campaigns of duration ≈3 months with about 2 overpasses per week

- DWD Observatory Lindenberg
- TROPOS Leipzig
- DLR Oberpfaffenhofen including POLIS lidar from LMU

Long-Term monitoring at to assess systematic errors of Aeolus

- DWD Observatory Lindenberg
- DWD windprofiler sites Bayreuth, Ziegendorf, Nordholz

CAL/VAL relevant instrumentation at Lindenberg
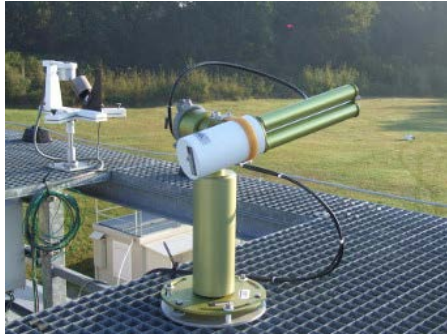
CIMEL sun photometer
(AERONET)

1.5 µm Doppler lidar

482 MHz radar wind profiler, 35 GHz cloud radar

RS 41 SGP Radiosonde: 4 launches/day

MW-Radiometer

Ceilometer (CLOUDNET)

355 nm Raman lidar

LACROS – Leipzig Aerosol and Cloud Remote Observations System
(35-GHz cloud radar, multi-wavelength Raman lidar PollyXT, Doppler lidar, passive sounders)

- currently deployed at Limassol, Cyprus (CyCARE, A-LIFE, MALVE)
- back to Leipzig in spring 2018 for ADM validation campaigns
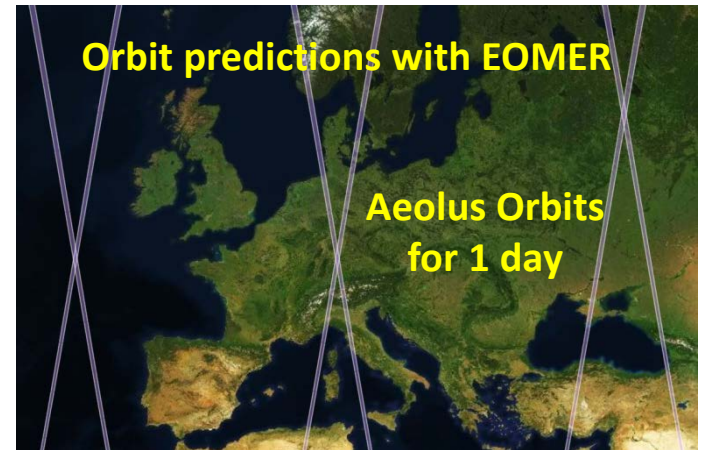- probably available for Southern Hemisphere observations for >1 year from end of 2018 onwards
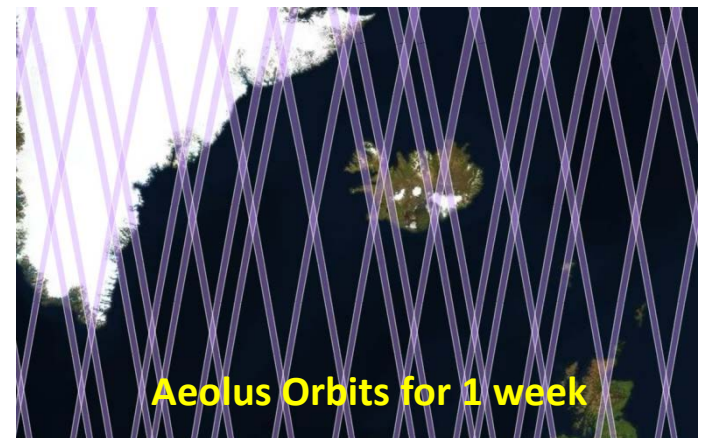
Airborne validation with DLR Falcon
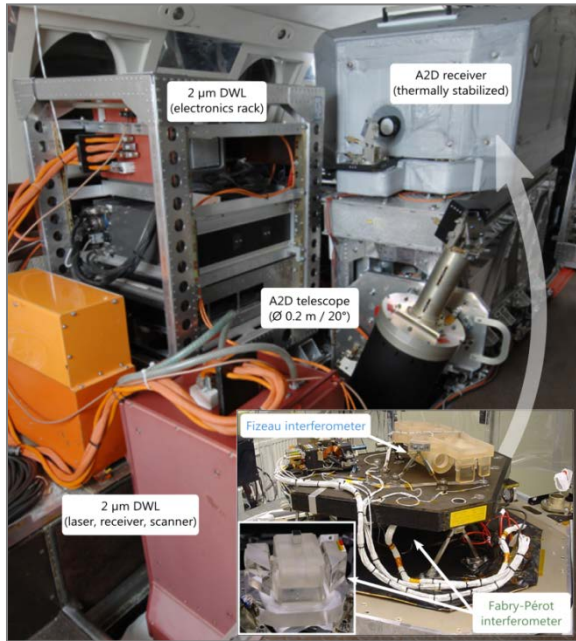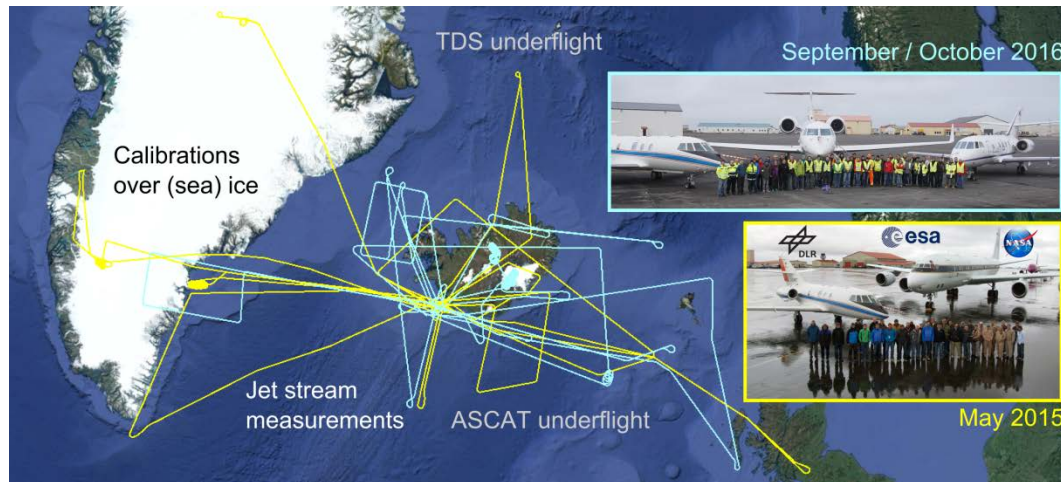

DLR Falcon with 2-µm DWL and A2D

- Iceland 2009
- WindVal 2015 with NASA DC-8 4 wind lidars on 2 aircrafts
- WindVal II 2016 and NAWDEX including HALO and French Falcon

Orbit predictions with EOMER

Aeolus Orbits for 1 day

1st airborne validation in June/July 2018 in Central Europe

Aeolus Orbits for 1 week

2nd airborne validation in Oct/Nov 2018 from Iceland

EUREC⁴A in 2020

Elucidating the role of clouds-circulation, coupling in climate by S. Bony and B. Stevens
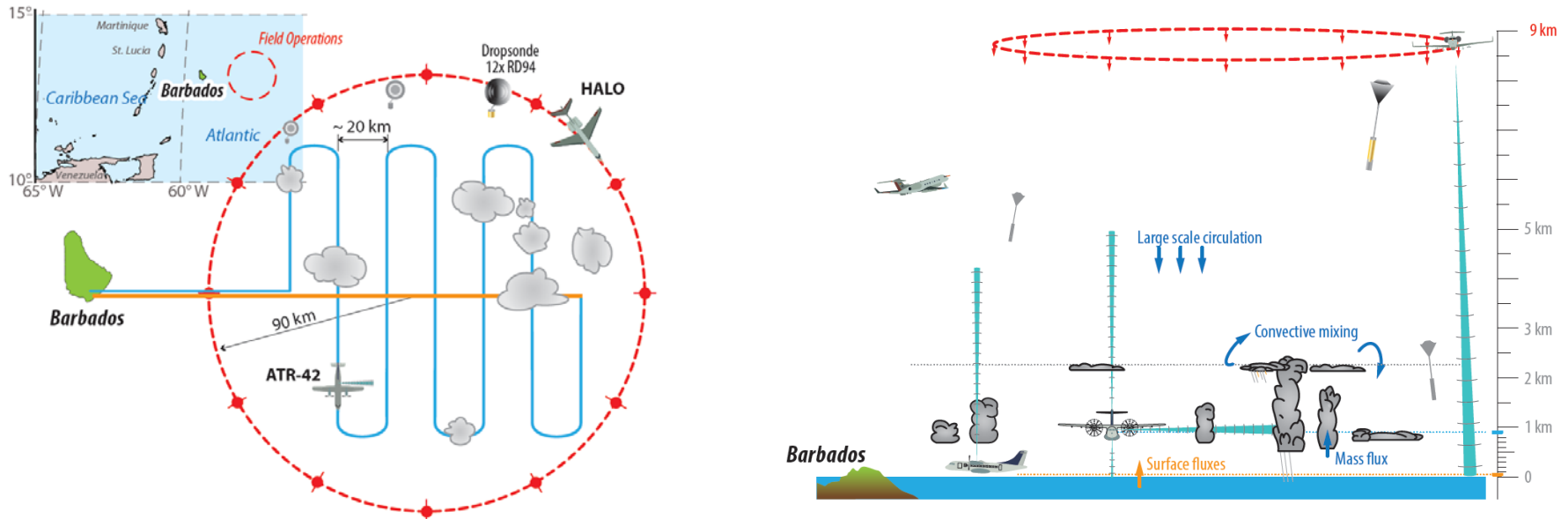

Fig. from Bony et al. (2017), Surveys Geophysics, submitted

- Tropical campaign from Barbados in early 2020
- Includes German HALO aircraft and French ATR aircraft with radar/lidar payload and dropsondes
- possible contribution of DLR Falcon aircraft with wind lidars for validation of ADM-Aeolus in Tropical regions

Status of manpower, tools and funding

- Scope of funding for activities under discussion with national funding agency

- Dedicated personal (Post-Doc, PhD) for Cal/Val activities could start by end 2017 / begin 2018

- Ground-based instruments at DWD, TROPOS, LMU and airborne instruments at DLR established and validated

Next steps

- Proposals to national funding agency

- Define implementation of airborne validation campaigns in 2018 wrt. period, region and coordination with other aircrafts and ground sites

DLR Poster for EVA4D and DWD/LMU poster

European Space Agency