Aeolus Campaign Planning

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Programmatic Background

ESA campaign activities started in 1981

- 130 campaigns so far
- Typically 6-10 campaigns/year

Strategic objectives:

- Support strategic goals of new EO Science Strategy
- Transnational access to airborne facilities in member states
- Foster partnerships with national and international organisations

Campaign activities address:

- Testing technology/Observing techniques
- Optimising requirements/design and reducing mission risk
- L1-L2 Algorithm prototyping/Product simulation
- Calibration/Validation

Campaign data archive supporting science and applications

Campaigns for different project phases

ESA campaigns are performed during full life cycle of a typical ESA space mission

Different types of campaigns are performed during specific phases of a space mission (concept, feasibility, development and operations)

	Pre-Phase A	Phase A Feasibility	Phase B Design	Phase C/D Development	Phase E1 Commissioning	Phase E2 Operation	Data Archive
Technology	X	X					
Mission Development (Geophysical)	X	X	X	X			
Mission Development (Simulation)	X	X	X	X			
Cal/Val				X	X	X	
Science/ Applications						X	X

Example from CryoSat: The issue of scale?

Polar Explorer or Polar Scientist

Speed: 20km/day

Measurements: Points or profiles along the way (cm resolution)

Endurance: 12h/day or approx 20km (depends on food, good health, holidays, equipment, weather conditions)

Twin Otter

Speed: 175km/hour

Coverage: Depends on instrument, generally swaths of 1m-1km with resolution from cm to meters

Endurance: 600 km or 5 flight hours before refueling (dependent on flight permissions, pilots, weather conditions)

CryoSat

Speed and coverage: 23000 km/hour with resolution at 100s of meters

Endurance: 6 years and counting, operates 24 hours/day, no flight permission, don't care about weather…

WindVal

Objectives

Fill data gaps on Rayleigh and Mie wind observations including highly variable wind conditions and heterogeneous conditions

Extend dataset on response calibrations over ice or land in nadir-pointing mode

Preparation for post-launch validation campaigns (i.e. rehearsal)

Campaign details

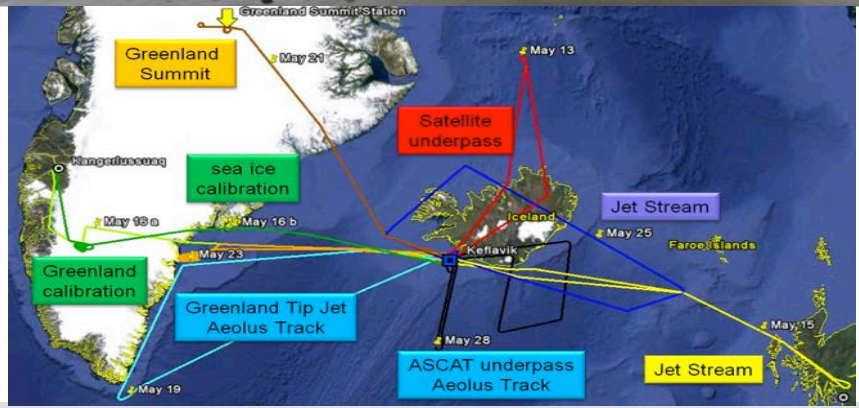
Campaign executed in collaboration with DLR, NASA and NSF in May 2015

First time with collocated 4 Wind Lidars on 2 aircraft

DLR Payload: The ALADIN airborne demonstrator + 2-µm reference wind lidar

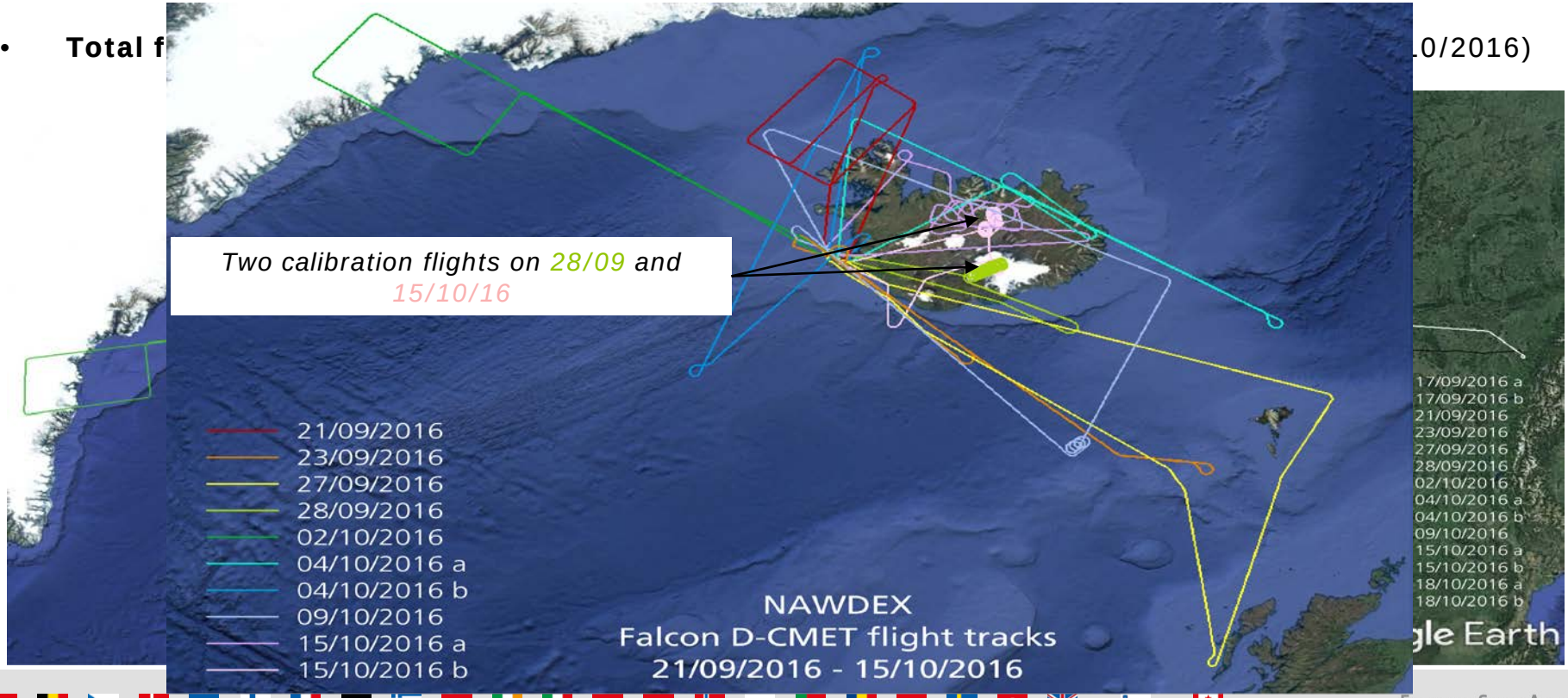
Data processing and analyses underway

WindVal campaign team



WindVal II & EPATAN 2016

- Larger number of research flights with **German & French Falcon** during NAWDEX campaign
- **Total f** 10/2016)

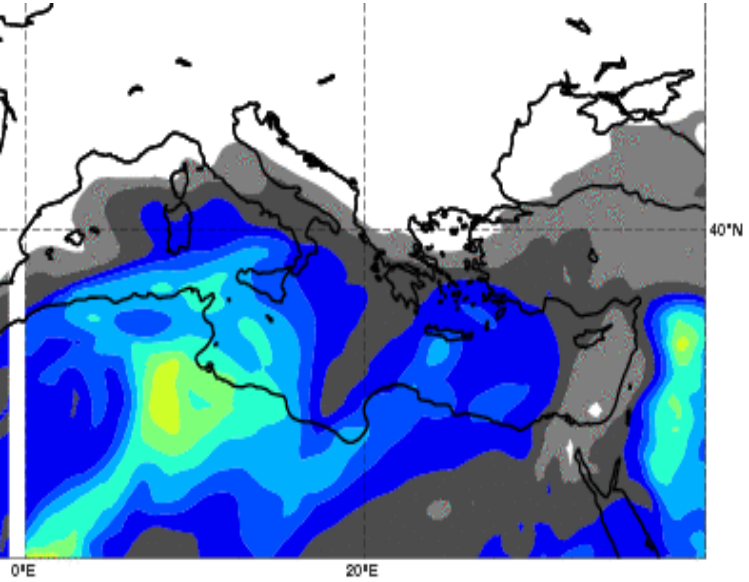


WINDVAL II Measurement from 22nd October 2016

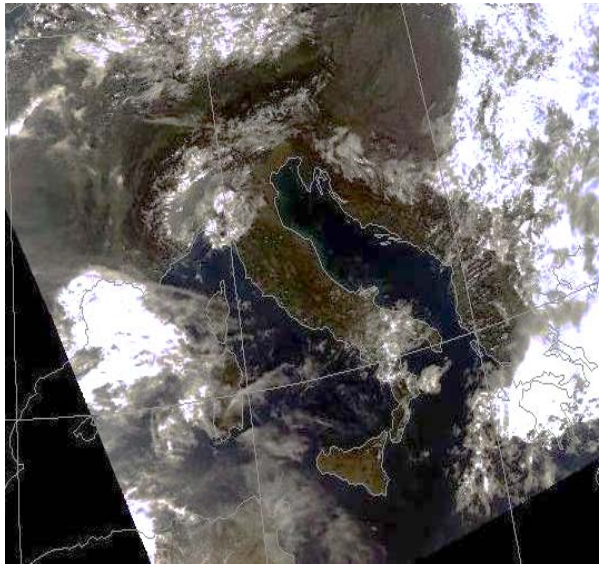
Aerosol flight from Oberpfaffenhofen (GER) to Lamezia Terme with German Falcon only (ITA) (08:02 – 12:08 UTC)

Measurement from 09:08 – 11:30 UTC

October 22nd, 2016, 12 UTC, MACC forecast – Dust AOD 550nm (FC 22 Oct, 0 UTC)

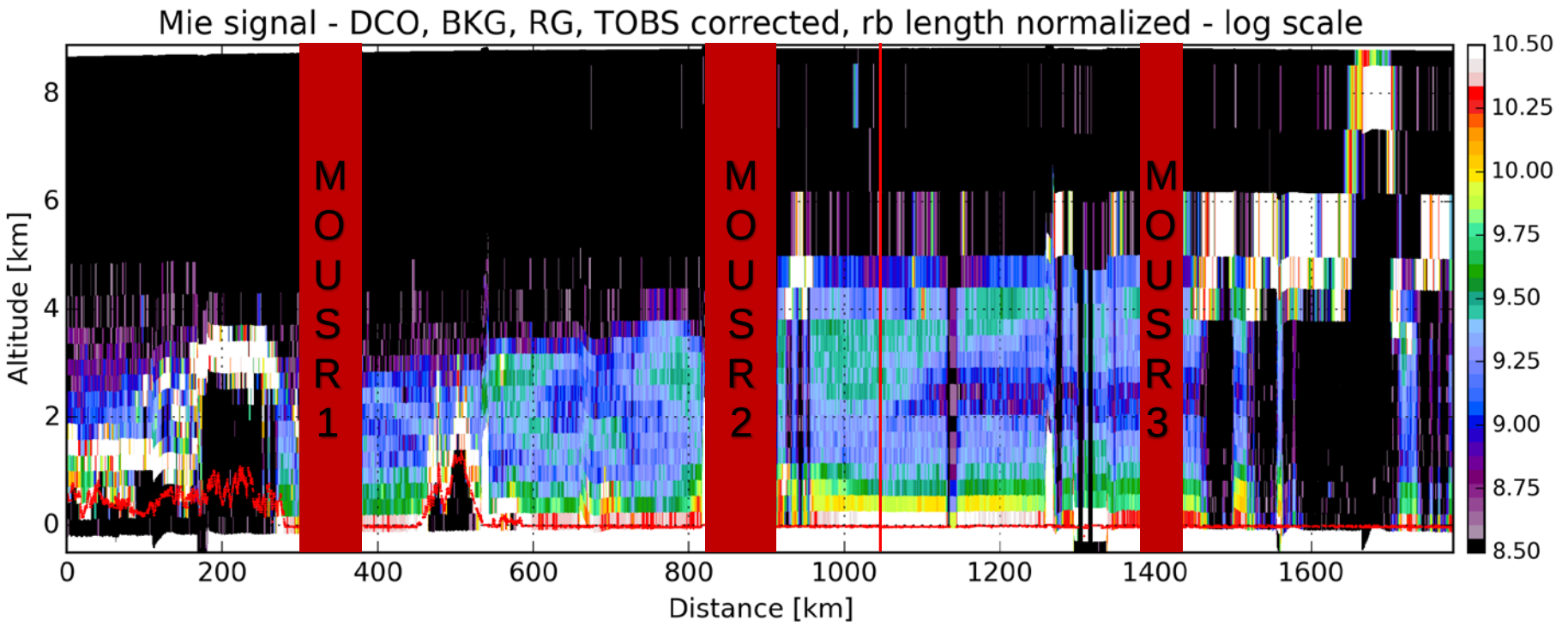


October 22nd, 2016, 12 UTC, satellite Aqua - RGB



October 22nd, 2016, Falcon flight path (Cmet data)

A2D data preprocessing



Recall AO Objectives and Setup

Specific areas in which the contribution of the participants is sought are:

- validation using other satellite, airborne or ground-based experiments providing independent measurements of wind profiles, clouds and aerosols;
- experiments to assess accuracy, resolution, and stability of the Aeolus instrument Aladin;
- assessment and validation of the Aeolus retrieval and processing

Setup:

- Terms of Reference are consistent with past EE and also future AOs (e.g. EarthCARE to come soon)
- Accepted CAL/VAL teams will have access to Aeolus data products starting at Level 1b up to Level 2b, including auxiliary data.
- During the satellite commissioning phase data access will be limited to these teams.
- Funding of the activities solicited through this AO shall be covered by national/institutional resources. There will be no funding available via the Agency.

AVET Objectives

- Integration of **your proposed work** within a **wider scientific and technical framework**, and the establishment of **collaboration between specialists**
- Participation in the **establishment of detailed validation planning** in advance of the launch
- Participation in **post-launch** data product and retrieval algorithm **validation**, and planned monitoring of satellite performance and data quality
- Support to the Agency in the planning and execution of **special satellite operations in conjunction with ground experiments**
- Support to the Agency in the definition, in the light of post launch experience, of **reprocessing algorithms** to be applied to the level 1b, level 2a, and 2b data
- Support to ESA in dedicated meetings and workshops
- Participation in pre-launch rehearsal activities

What does ESA envisage to fund?

- A limited number of exploitation studies issued as ITT
  - ⇒ knowledge about product quality is essential
  - ⇒ (link back to early uptake of data)

- A limited number of airborne infrastructure (missions)
  - ⇒ coordinate with related activities
  - ⇒ coordinate with ground-based systems
  - ⇒ coordinate with modelling activities

- A Limited number of data quality activities (Jonas)

Core Campaign Activities

Ongoing Activities related to ADM cal/val:

- WindVal Campaigns (co-funded by ESA)
- EPATAN Campaign (co-funded by ESA)
- Stratoele-2 Flight campaigns (co-funded by ESA)
- MULTIPLY, Romanian Special Initiative
- POLIMOS, Polish Special Initiative (Starting 2018 in Poland)

Foreseen Activities:

- 1st Calibration Campaign in Europe, OP has a home base
- 2nd Calibration campaign, Iceland
- 1st Scientific Validation Campaign, Tropics
- 2nd Scientific Validation Campaign, Polar

Conclusions

- Validation experiments from ongoing missions good example of collaboration between ESA and wider community to address mission validation needs

- Aeolus pre-launch cal./val. activities to prepare launch
  - ⇒ Overall experiment concept verified
  - ⇒ Address sources of error and calibration
  - ⇒ Instrumentation and data processing capacity (established)
  - ⇒ Data analysis by AVET PIs enabled soon
  - ⇒ Used for Ground segment development

- Detailed plan of validation activities for Aeolus currently under elaboration
  - ⇒ Cal/val plan complete with respect to error breakdown
  - ⇒ Major coordinated activities planned in 2018 and 2019

- Discussions between ESA and NASA to deepen collaboration on cal./val. activity program
  - ⇒ WindVal 2015 as a joint activity

Any questions?

Thank you!