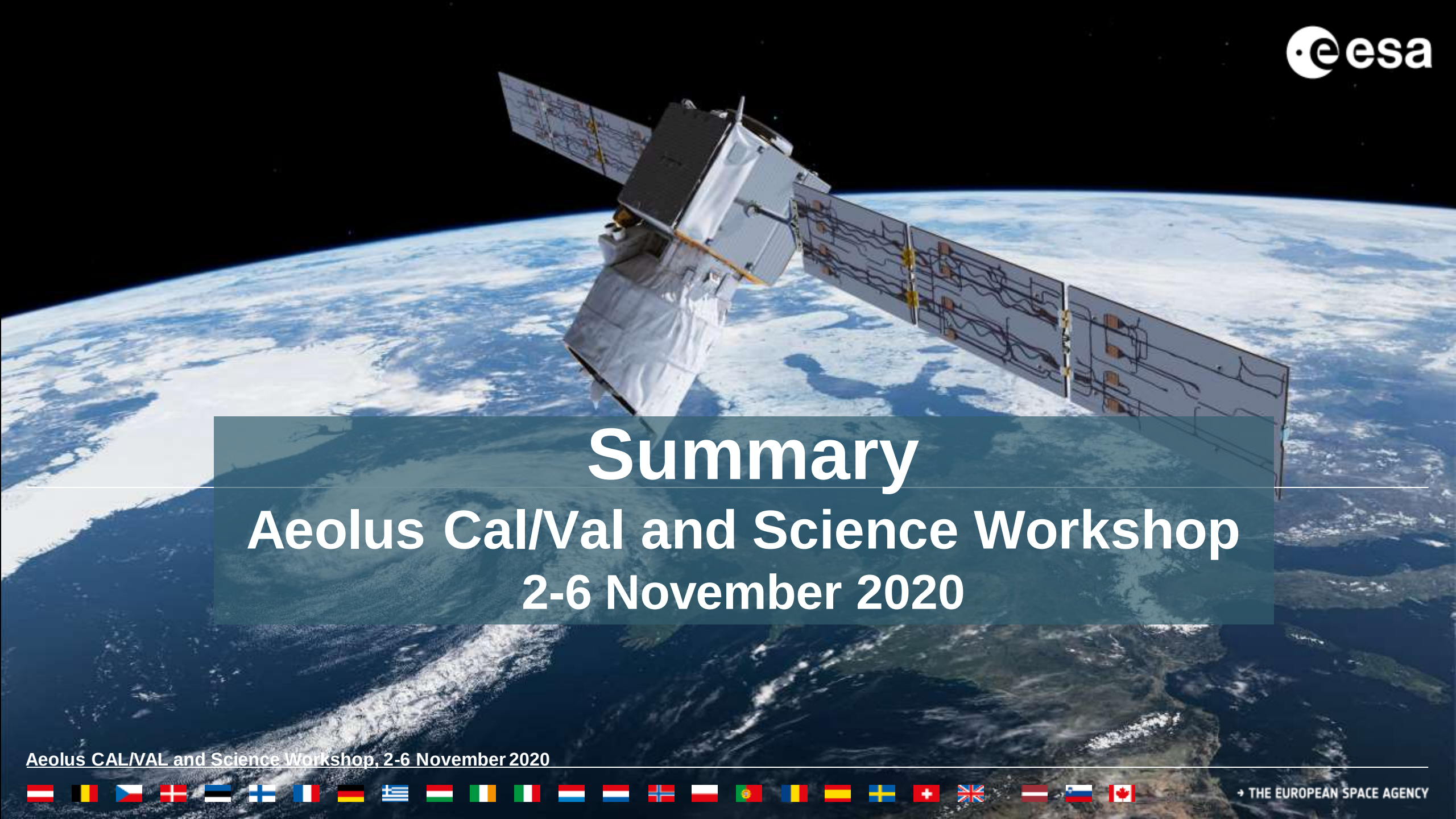


Summary

Aeolus Cal/Val and Science Workshop

2-6 November 2020

Workshop overview

The Aeolus Cal/Val and Science Workshop 2020, initially planned to take place in March 2020 at EUMETSAT, Germany, was shifted to November 2020 and held as virtual workshop due to COVID-19. More than 200 participants have joined the 5-day virtual event from all over the world, which demonstrates the great world-wide interest in the Aeolus mission. Detailed numbers of participants for each day are given below. The workshop was organized by ESA and kindly co-hosted by EUMETSAT and the German Aerospace Center (DLR).

- Monday: 240 participants
- Tuesday: 211 participants
- Wednesday: 193 participants
- Thursday: 180 participants
- Friday: 164 participants

Summaries from Sessions

1. **Opening:** A.G. Straume and J. von Bismarck
2. **Mission and Products:** L. Isaksen and T. Kanitz
3. **Cal/Val – Part I:** O. Reitebuch and J. von Bismarck
4. **Cal/Val - Part II:** D. Donovan and S. Bley
5. **Campaigns:** S. Tucker, T. Fehr and T. Parrinello
6. **NWP Impact:** G.J. Marseille and A.G. Straume
7. **Further scientific exploitation and new data products:** N. Zagar and C. Retscher
8. **Follow-on Studies:** A. Stoffelen and D. Wernham

Summary Opening Session, Conveners: A.G. Straume, J. von Bismarck

- ESA's Director of Earth Observation underlines that Aeolus is a very successful explorer mission, fulfilling it's objective to demonstrate the contribution of space-based Doppler Wind Lidars to improve operational weather forecasting. Currently, 3 forecast centers in Europe operationally assimilate Aeolus winds, and a 4th one will start soon

- EUMETSAT announced that Aeolus is part of the it's strategy for the global observing system space segment evolution in the coming decades. A joint study roadmap has been defined by ESA and EUMETSAT, starting with technology activities to make the Aeolus design robust based on lessons learnt. EUMETSAT are also starting preparations on the operations and ground segment side. It is up to the participants at this workshop, representing the user community, to build the case for operational space-based DWLs in the future. Given the current financial situation, the user needs must be well demonstrated.

- The mandate of WMO is to ensure that the world global observing system can support the needs of member states enabling high quality forecasts across the world. Conventional observing systems are key and complement the space-based systems. DWD and others have shown that Aeolus winds have statistically significant positive impact on forecasts, especially in times where conventional aircraft observations decreased (due to covid-19). ESA is thanked for its important contribution to the global observing system with the Aeolus satellite.

- Climate change has led to changes in the atmospheric circulation amongst others in the tropical lower stratosphere. This is noticed, e.g. by recent disruptions of the quasi biannual oscillation, occurring for the first time in 2016, and again in 2019. Aeolus has captured the most recent disruption, and scientists are using Aeolus data to understand the mechanisms behind better. An improved understanding of tropical dynamics and its variability benefit seasonal forecast and climate modelling.

- The tropics cover 40% of the globe, and a large part of the world's population live there. Forecast skills are negative in the tropics, especially for rainfall prediction. Rainfall predictions in Africa are expected to improve through improved representation of equatorial waves in the forecast models, which in turn help improve seasonal forecasting. A PhD student is looking into how assimilation of Aeolus zonal winds changes and improve forecast model representation of tropical waves.

- First results from the assimilation of Aeolus data in the NOAA Hurricane limited area model (HWRF) and the global GFS model show improvement of track prediction for badly predicted storms during the 2019 hurricane season. The data used were bias-corrected, based on the NOAA GFS model background, and the method is similar to the bias correction schemes applied at ECMWF for early mission data. Recently, the Aeolus DISC introduced a bias correction scheme in the on-ground processing based on temperature readings from the main telescope and anchored to the ECMWF model. The reprocessed data have very small biases, and these will now be used for the further hurricane prediction studies at NOAA.

Summary Aeolus Mission and Product Status, Conveners: L. Isaksen, T. Kanitz

- Aeolus achieved its goal to get assimilated (ECMWF, DWD, Météo-France) and improve weather forecast.
- The 2nd ALADIN laser continues to perform well in terms of UV output energy > 60mJ since March 2020. However, the Aeolus wind random error suffers from an ongoing critical decrease of return signal, being now in the range of FM-A swap in 2019. Investigations are ongoing and a detailed roadmap to recapture energy had been presented in the discussion, including laser parameter and telescope temperature changes.
- The two main issues for the Aeolus wind bias are treated with dedicated corrections, namely the hot pixel induced bias and the ALADIN telescope induced bias. The later is corrected since Feb 2020 in the NRT processing. Both corrections were applied for the 1st reprocessing campaign of FMB 2019 data. Next reprocessing is planned for early 2021.
- Comprehensive improvements are also on the way for the L2A product, including a correction based on Aladin telescope temperatures following the multiple regression as used for wind product, as well as a de-noising approach with heritage from ATLID. Work on the scene classification and cloud distinction is on its way in 2021, too. Public data release is planned for next year, as well.
- Cal/Val teams are requested to get into touch for special Range Bin Settings with the ESA team.
- As a great success the Mission has been extended until end 2022 by the PB-EO. Aeolus+ Innovation studies are under negotiation and scientific studies (e.g. prediction on extreme weather events are in preparation.

Summary Cal/Val Session Part I, Conveners: O. Reitebuch, J v. Bismarck

- **L2B wind product quality:** teams report about reduced wind bias for Ray/Mie since end April 2020 (baselines 09/10) for the NRT datasets, but with some remaining differences between ascending and descending orbits and temporal fluctuations. Increase of random error during FM-B period was observed and continues; comparison of Ray/Mie winds inside the PBL shows large differences and remains challenging ; some teams looked already into re-processed data products from July-Dec 2019 period (baseline10), which show good correspondence with low bias and even better random errors
- **Methodology:** several teams looked into use and sensitivity of statistics to the L2B estimated errors with different thresholds and sensitivities for Rayleigh and Mie; teams use different thresholds for estimated errors, but also look at different geographical location (regional, global) or different time periods (FM-A, FM-B), validation of the error quantifiers in the products should be looked at in the future.
- **Synergy:** comparison of Aeolus with AMVs from GEO and polar orbiting satellites show good correspondence and synergy of wind lidar with hyperspectral imager observations: water vapor and ozone tracers for AMVs compared to Rayleigh clear air winds; cloud winds for AMV´s compared to Mie cloudy.
- **Atmospheric science:** a smoke generated vortex from the Australian Bush fires (PyroCB) was investigated by means of ECMWF analysis, Aeolus and CALIPSO observations, where Aeolus is the only instrument to provide vertical cross sections of this vortex.
- **New instrument developments** (EVE mobile ground based lidar) were reported to sense in parallel linear and circular depolarization ratios, allowing to mimic Aeolus polarisation set-up plus verification of the theoretical conversion generally valid only for randomly oriented particles.
- **L2A scattering ratio climatology's from Aeolus compare well with CALIPSO**, but CALIPSO is significantly more sensitive for high-clouds in specific geographical regions (despite the much lower laser-aperture product); further averaging of the L2A products for respective altitude levels and scenes might resolve the issue

Summary Cal/Val Session Part 2, Conveners: D. Donovan, S. Bley

- With respect to the validation of the Aeolus aerosol/cloud products, the spectrum of contributions was impressive, ranging from model simulations to in-situ based work, ground-based photometer studies and dominated by ground-based lidar activities
- It is obvious that validating the current L2A aerosol/cloud products remains a challenge. Importantly, teams have demonstrated the "proof of principle", fundamentally that the technique works. However, the limited resolution, the low SNR of the SCA products, and the lack of cloud screening means that the products is difficult to validate. A finer horizontal grid resolution would support the quality of collocated measurements.
- Teams have emphasized that cloud screening is essential for aerosol studies with Aeolus, particularly in scenes with high horizontal variability.
- Mainly, single profile comparisons and case studies have been presented, longer term statistics still missing.
- Teams are using QC flags and error estimates, particular attention needs to be given to the validation of them.
- SCA backscatter coefficient is currently more reliable than extinction coefficient. The extinction product is expected to improve in the near future and hence also the lidar ratio.
- The MARS Range Bin Setting improves the quality of the aerosol comparisons.
- A new GEOMS tool helps users to upload collocated validation data set to the ESA atmospheric validation data centre (EVDC)
- Comparisons between Aeolus Mie-cloudy winds and AMVs show very good agreement. Future AMV studies should focus on the Aeolus data with optimized range bin settings, from 28.10.-10.11.2019
- Looking towards a follow-on mission, the ability to measure depolarization ratio would dramatically improve Aeolus's utility for studying aerosols.

Summary Aeolus Cal/Val campaigns, Conveners: S. Tucker, T. Parrinello, Thorsten Fehr

- The Tropical Campaign 2021 preparations are progressing, and the campaign will provide a unique dataset for science, Cal/Val of active and passive satellites and their products, in particular Aeolus, and the preparation of future missions.
- Stratospheric Balloon observations are providing unique validation opportunities for Aeolus in the Tropics and, if possible should be extended, e.g., Stratéole-2 in 2021/22, extension of Loon dataset or other opportunities.
- Airborne demonstrators and reference systems, such as the A2D, LNG, 2µDWL, HALO, DAWN, were confirming the Aeolus performance within months after launch, continue to be validation workhorses and, in addition, are fundamental in the preparation of future space-borne DWL and provide a critical test platform for understanding on-orbit performance and aiding in algorithm improvements
- International collaboration is key for efficient and successful implementation of combined validation and science campaigns, and agencies – like ESA and NASA - are encouraged to continue supporting these activities for Aeolus and future missions.
- The CPEX-AW Dry Run with virtual flights for the Tropical Campaign has shown the potential and benefit for campaign preparations and similar approaches should be considered for future complex campaigns
- The orbit change to ANX 2.0 supporting the Tropical Campaign was presented and well received. The science community is encouraged to identify Aeolus validation campaign gaps and opportunities to support current and new scientific questions

Annex Aeolus Cal/Val campaigns: Validation/comparisons Summary

- AVATAR(I,E,T) & WindVal-II: mixed comparison results with 2µm system
- Stratéole-2 (Nov. 2019 – Dec. 2020): bias ~ 1 m/s; std. dev. ~ 7.5 m/s
- Loon: mean bias -0.62 m/s, std dev. 5.21 m/s, slope 0.77, and r^2 0.58.
- 2019 NASA flights: DAWN-Aeolus Rayleigh (Mie) - Bias: 1.19 (1.98 m/s), RMSD: 5.14 (4.68 m/s)

Summary NWP impact , Conveners: G.J. Marseille and A.G. Straume

- All met. centers running global models show consistent positive impact on short and medium range
- Maximum impact found in tropical upper troposphere and lower stratosphere, convection & convergence zones
  - Differences in vertical diffusion schemes and assimilation methods -> subtle differences in impact Mie and Rayleigh winds. Improved tropical analysis, vertical shear and wave representation -> key to forecast improvement (Žagar)
- Improvements of Hurricane predictions seen in case studies by different teams, gravity wave detection studied
- Met. centers currently operationally assimilating Aeolus have their own bias correction schemes implemented
  - M1 bias corrected L2B winds should be used (available NRT since 20 April 2020 and reprocessed data)
  - Small biases still remain after M1 temperature bias correction, hence model-based bias correction is “kept on” by some
  - Range-dependent biases have not been identified, but may still exist -> under investigation by DISC
- Error standard characterization is needed for giving correct weight of Aeolus winds in data assimilation (DA)
  - Each met. center has its own technique for doing so
  - It is not recommended to apply data thinning, but rather error inflation (in particular for dense Mie winds)
- Error QC is important and is done differently by data centers
  - Important to remove low-quality data but not throw away too many winds –> see advice on Aeolus CAL/VAL site, which should also be made available for non-CALVAL teams on EO Gateway
- Positive impact in regional models is more challenging

Summary Further scientific exploitation and new data products
Conveners: N. Zagar and C. Retscher

- Diverse presentations: including 9 longer talks and 3 talks in the flash session:

Aerosols:

- Given the importance of aerosols for climate, a long term harmonization of satellite observations of aerosol is needed, as pointed out by Ulla Wandinger in her discussion of CALIPSO, Aeolus, and EarthCARE datasets.
- ECMWF is making a progress in its A3S study for ESA (Julie Letertre-Danczak)

Aeolus retrieval and validation:

- A more robust scheme for feature masking at measurement level developed and tested (Gert-Jan Marseille).
- A promising application of ATLID inspired techniques to Aeolus (David Donovan).
- Aeolus wind retrievals has been extended towards the ocean surface (Stephen Tjemkes).
- Aeolus has been validated with the Chinese radar wind profiler network (130 radars) for the period 20 April -20 Jul 2020 (Jianping Guo).
- New opportunities for Aeolus validation offered by high-power large-aperture radars (Jorge Chau).

Aeolus and Dynamical Processes:

- Expectations from Aeolus in resolving tropical variability such as the QBO reiterated (Peter Preusse).
- A new evidence of Aeolus capacity to observe gravity waves outside tropics, over Andes reported by Timothy Banyard.

New Products and Tools:

- A new exciting tool for Aeolus data users: VirES Virtual Research Environment (VRE) (Danile Santillan Pedrosa).
- Initially unexpected, highly valuable data products from CALIPSO (David Winker).
- A new space ocean lidar mission – Guanlan, was introduced (Songhua Wu).

Summary Aeolus Follow-on studies, Conveners: A. Stoffelen and D. Wernham

- This very lively session included 5 presentations on Aeolus follow-on configurations, two perspectives on concepts for a future DWL, an overview of lessons learned from Aeolus and current user requirements, and, finally preparations at ESA for an Aeolus follow-on
- The Aeolus concept can be useful in an operational configuration with 2 or 3 dawn-dusk satellites. Nevertheless, opportunity exists for complementary international collaboration on a virtual constellation of DWLs
- Confidence in a performance superior to current Aeolus may be crucial for the cost-benefit evaluation of Aeolus follow-on; the path of further Aeolus tests is important for this, but additional science studies will be useful too, e.g., OSSE type
- The preliminary requirements provide a trade-off space for the Aeolus FO
- Going from threshold to breakthrough requirements with the design options, is thought to bring much additional value for Aeolus FO, although perhaps challenging to achieve
- The ESA preparatory activities talk triggered out-of-the box questions, but also clearly presented the constraints met to converge to a reliable design, based on Aeolus in only a few years
- Particular questions emerged related to options to measure depolarization for aerosol classification or meridional wind components for improved tropical circulation

Summary – Instrument Panel Session

Oliver Reitebuch, Denny Werham and Tommaso Parrinello

Aeolus Cal/Val & Science Workshop

2–6 November 2020

Instrument and Operations

Proposed objectives until end of mission

- **Objective#1:** Support the Tropical Campaign in summer 2021 with best possible performance with Laser B
- **Objective#2:** Achieve the designed end of life-time (Dec 2021) with best possible performance on both channels RAY and MIE
- **Objective #3:** Achieve the extended life-time (Dec 2022) with the best possible performance on both channels or at least on one (e.g. MIE)
- **Objective #4:** Perform technological demonstration at end of life time. Target 4Q 2022 - 1Q 2023.

Facts and current recovery actions (4Q 2020 – 2Q 2021)

- FM-B laser very stable and it able to recover in case of unexpected signal drops. There are still margins to increase the energy, limited mainly by fluence figures (i.e. TVAC values). Energy increase (up to 80 mJ) + **15-20%** may be still be feasible
- INT, EMT and ATM signals are showing different degradation trends since swap of laser, not observed on FM-A. Beam misalignment + field stop clipping (TBC) + possible LIC in some clear optics aperture (TBC) are the effects but final route cause not confirmed by sensitivity tests. Not realistic to recover the full missing energy but optimization of the optical throughput efficiency and correction of misalignment could bring another **≈10%** into the system
- M1 thermal optimization should bring additional **10-20%** energy into the system. The recovery of the full 200-300% signal missing since start of mission unlikely to happen.
- Additional tests and optimization thermal environment: **0-10%**
- Estimated energy recovered with current configuration: **30-60%** (e.g. 6 - 12 months) TBC

Facts and further recovery actions (> 2Q 2021)

- **Back to FM-A.** Procedure known. Risks versus results need to be assed. Unclear what the laser A conditions are and how will be affected by the current degradation (e.g. emit path/internal). Unknown how much energy back. A time gap for observations of 2-4 weeks due to switch-over optimization procedure is expected
- **Orbit lowering.** It will bring maximum theoretical increase in energy of 40% and reduction of 20% random error *minus* any TBC degradation due to increase in the albedo and the thermal fluctuations. Evaluation of feasibility still on going. Procedure to be defined. Risks versus results need to be assed. A transition (i.e. natural decay) period **of 2-4 months**, affecting instrument performance is expected.

Open and seed questions (Performance vs. Lifetime)

- With FM-B + current recover actions, what are the consequences on performance? When will the RAY and MIE impact be neutral?
- Which overall scenario is preferable
  - A. **Lower risks with acceptable performance TBD and longer life-time (Target Q1 2023):** Stay with the currently planned measures (laser energy, M1 and slow transition FM-A or lower orbit) and potentially accept a strongly degraded RAY signal and continue with operation of mission with MIE only winds?
  - B. **Increased risks with higher performance and shorter life-time (Target 2022):** increase the performance to a maximum level (e.g. FM-B to maximum fluence levels, quicker transition to FM-A and Orbit lowering, etc.).
- What are the **CRITERIA** to switch to FM-A and orbit lowering (e.g. Rayleigh random error, NWP impact, etc.)?

Open and seed questions (Performance vs. Lifetime)

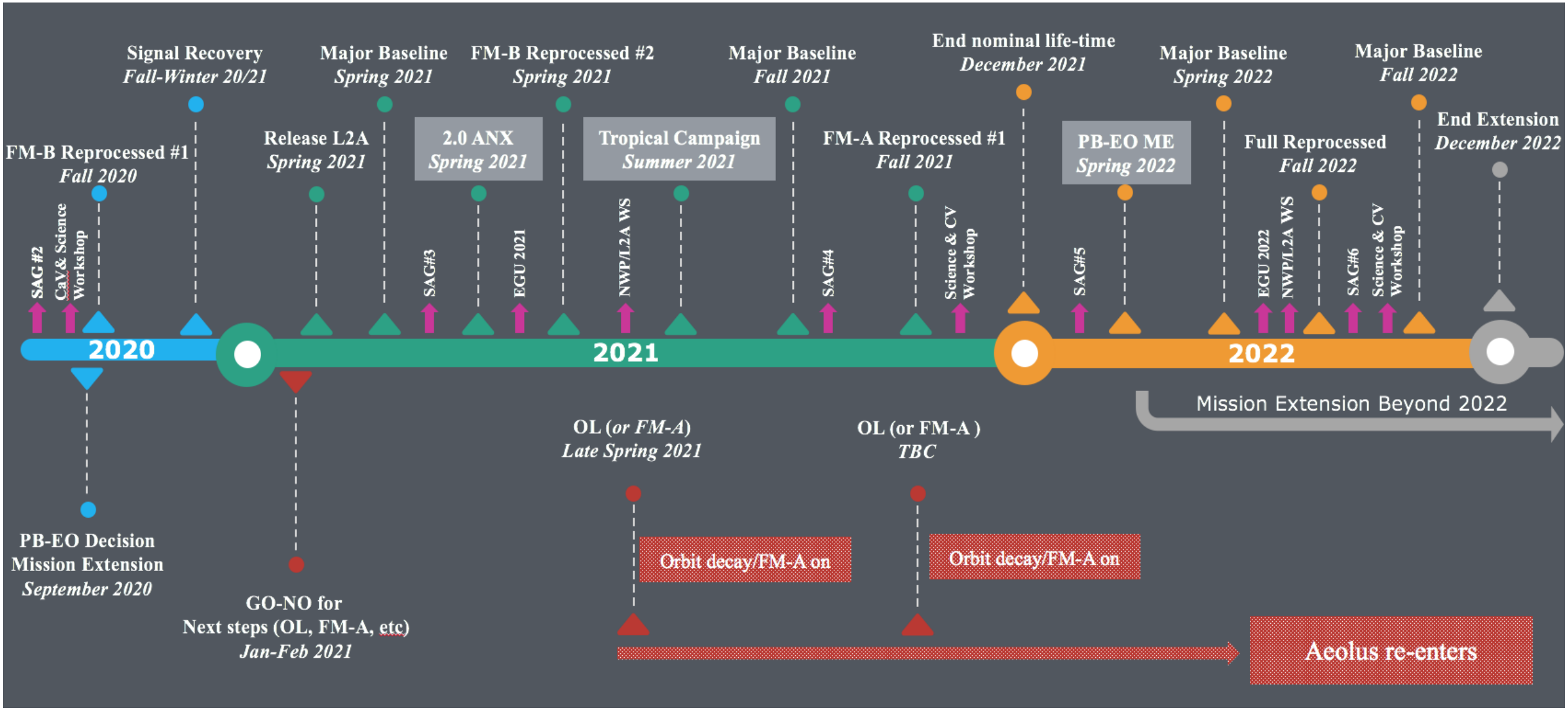
- What are the minimum performance conditions to support the Tropical Campaign?
- What are the conditions to perform technological experiments at the end of mission lifetime?
- Any other questions or topics?

Instrument and Operations

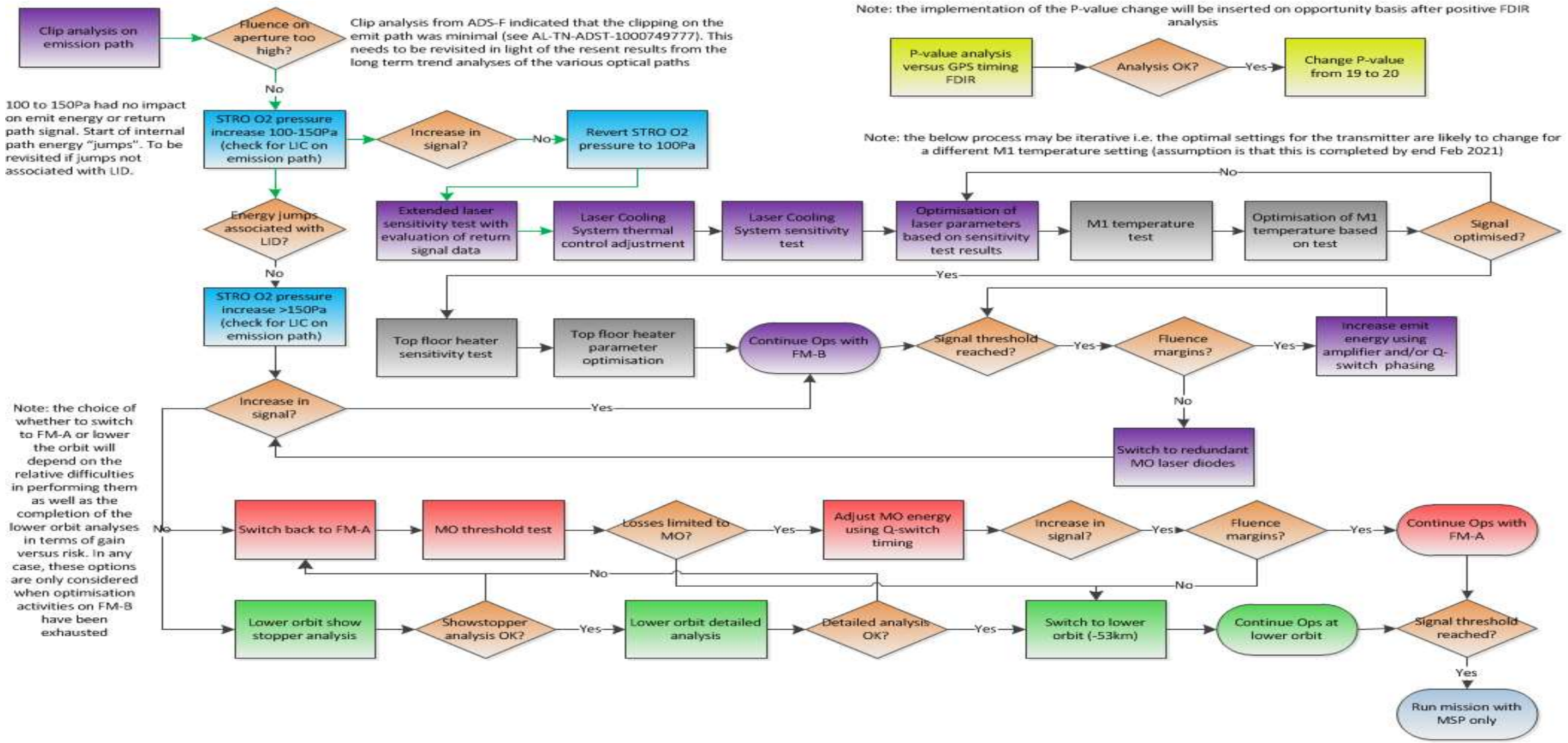
Revised Objectives until end of mission (2020-2023)

- **Objective#1:** Support the Tropical Campaign in summer 2021 with best possible performance with Laser B to support both the validation and the science aspect of the campaign
- **Objective#2:** Achieve the designed end of life-time (Dec 2021) with best possible performance on both channels RAY and MIE to complete the prime mission objectives.
- **Objective #3:** Achieve within the extended life-time (2022) the best possible performance on both channels or at least on one (e.g. MIE)
- **Objective #4:** Perform technological and science demonstration to support the FO implementation. Target 2Q 2022 - 1Q 2023.

Instrument and Operations (Annex I)



Instrument and Operations (Annex I)



Summary - Wind Panel Session

Gemma Halloran, Jonas von Bismarck, Anne Grete Straume

Aeolus Cal/Val & Science Workshop

2–6 November 2020

Wind CAL/VAL

Communication

- The participants are happy with the current communication via the CAL/VAL confluence site, EO Gateway, Twitter and workshops and working group meetings and dedicated conference sessions

M1 Bias Correction

- It was noted that more detailed information on the L2B M1 temperature based bias correction method would be useful to better understand how it is done and how the ECMWF model mean is used to anchor the correction
  - It was noted that a correction using the lidar zero-wind ground returns gives comparable harmonic bias corrections, but is not yet good enough to capture the long-term offset trends

Documentation

- It was recommended to post documentation on product quality and recommendations for the data assimilation also on the EO Gateway for teams with no CAL/VAL access
  - The Team from NCMRWF expressed an interest in submitting an Aeolus CAL/VAL proposal (https://earth.esa.int/aos/AeolusCalVal)

NWP Impact of Aeolus winds

L2B error estimates

- 6 met centers use the L2B error quantifiers directly in the data assimilation
  - The error quantifiers should be inflated according to the recommendations by ECMWF (on CAL/VAL confluence)
  - One participant wondered why the errors vary, which is because the wind error depends on the signal strength (SNR) within the fixed observation averaging window (Aeolus winds are mainly shot-noise limited)
  - It was asked whether the errors could be correlated. In the Aeolus Mission Requirements Document, possible error correlation contributors are discussed. So far, correlated errors are not detected (e.g. laser frequency stability is good)

Residual biases

- Some residual biases exist after the M1 temperature bias correction (0.3 – 0.5 m/s)
  - It is believed that further model-based bias correction is not needed for reprocessed data and data after 20 April 2020
  - 4 met centers have implemented model-based bias correction
  - Some large differences between Aeolus data and the GFS model is still seen, particularly in the stratosphere
  - Jos de Kloe commented that some altitude, orbit phase and speed dependent biases still exist, although small. He proposes to discuss access to the bias correction software
  - Bias corrected data should be used (data after 20 April 2020 and reprocessed data)

NWP Impact of Aeolus winds

Data quality warnings for operational NWP centers

- People are reminded that a data blacklisting flag is implemented in the L2B data version 3.4 (October 2020)
  - Emails are also sent by ESA EOHelp and information posted on EO Gateway
  - 3 centers would like to be added to the ESA distribution list for notifications on upcoming periods with special instrument operations, processor updates or parameter setting changes (NOAA, NCMRWF, JMA)
  - It was recommended to also blacklist reprocessed data for periods affected by processor or operations changes

Operational data assimilation

- 2 more centers plan to go operational during 2021 (NCMRWF, JMA)

Tropical cyclone case studies

- ESA has created a web page to share TC Hurricane cases and results, facilitating discussions:
  - https://www.aeolus.esa.int/confluence/display/CALVAL/Aeolus+NWP+impact+working+meeting+2
  - 10 participants showed interest to post and discuss TC research on the site

Change in reference orbit

- No concerns raised related to the planned shift of the Aeolus reference orbit for the 2021 Tropical campaign

Scientific exploitation and follow-on

Further study areas

- It was mentioned that it would be interesting to look at the impact of Aeolus on predicting moisture transportation from the Pacific ocean to the NA continent, and the Atlantic to the European continent (atmospheric rivers)

Vertical sampling

- It was enquired how the teams could suggest adjustments to the vertical sampling, and how the needs of modelers and scientists are handled:
  - A dedicated working group is established with DISC, Aeolus SAG and CAL/VAL PI participants, who weigh the needs by different groups and advise ESA for the final range bin operations. NWP impact has priority due to the operational NWP demonstration objective of Aeolus

Ongoing studies

- Scientific studies from ESA on Aeolus exploitation is announced on:
  - http://emits.esa.int (you can sign up for automatic notifications on the page)
  - Aeolus CAL/VAL Confluence page, latest news (you can sign up for automatic notifications on the page)
  - Recently announced studies focus on weather affecting Europe, but are not excluding other regions too, especially considering teleconnections

Summary – Aerosol and Cloud panel session

Alain Dabas, Holger Baars, Sebastian Bley, Frithjof Ehlers, Thomas Kanitz

Aeolus Cal/Val & Science Workshop

2–6 November 2020

Wrap Up – Aerosol and Clouds Splinter

Recall of the importance to use the latest baseline B10 products

- Clarify on the wiki how to ensure the use of the latest baseline (also after reprocessing) including clarification on the ADDF use and the file version numbering
- Re-processed L2A products for Jan-Apr 2020 will become available in spring 2021 (timeline will be published on confluence)

Wrap Up – Aerosol and Clouds Splinter

Quality flags and error estimates

- L2A user guide provides detailed information on the thresholds used for the quality flag
- Proposed to add a new flag to indicated the heterogeneity of the observation on measurement level.

  → Information for the expected comparability to collocated CalVal measurements

  → Information to indicate the presence of clouds with the observation crucial for comparison, but perhaps also an indicator for aerosol/cloud discrimination, which is important for product comparison to models
- Current error estimates are incorrect, this is known, the reason has been identified, it will be fixed but requires the definition of a new L1B product. In the meantime, a workaround should be possible for observation-level data (based on measurement-scale variability).
- Recalled that SCA extinction omits negative values

Wrap Up – Aerosol and Clouds Splinter

Minimum detectable particle backscatter level

- Critical point of calibration of the profile in case of stratospheric layers due to non-vanishing optical depth above Aeolus sampling. Also, assumptions made for ad-hoc calibration (clear sky bins) are potentially harmful.
- Aeolus RBS does not allow the measurement or resolution of potential layers. Ground-based measurements are required that can measure high up into the atmosphere for analysis.
- Need for cases of weak aerosol layers measured from ground, which Aeolus is not capable to capture

Wrap Up – Aerosol and Clouds Splinter

Product development

- De-noising approach will improve the extinction product. This will improve the use in models for comparison and monitoring. The extinction product is the most important.
- The aerosol/cloud classifier is required for the correct comparison as well. Apart from the presented approach of using AUX_MET information, the additional proposed flags (SNR, mean/median) could be used in combination, as well as Lidar ratio (after denoising).

- Has to be kept in mind that the MCA product is not too much explored and the analysis depends on the Lidar Ratio assumption.
- The validation of the Group Product shall be carried out after de-noising.

Wrap Up – Aerosol and Clouds Splinter

Data exchange between teams

- EVDC requires a solution to connect with the measurement networks (e.g. ACTRIS)
  - Affects also tropical campaign and other campaigns
  - More support is required in terms of data transformation to lower the overhead for upload
  - In order to mitigate the issue on short-term, the use of the Aeolus Cal/Val FTP is proposed for communication between the teams.

- Current Cal/Val presentations were mainly focused on the profile comparison, apart from a contribution on star photometer. Activities for additional AOD comparison are planned as AOD is relevant input for models, too.

- How can the community contribute/affect the user needs for the Aeolus Follow-On mission?

Announcements

Next Aeolus Cal/Val and Science Workshop Spring 2022

Group photos