L2A+

Enhanced Aeolus L2A for depolarizing targets and impact on aerosol research and NWP

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Progress Report 02 – PR02
[01/2023-02/2023]

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(Version 1.0)

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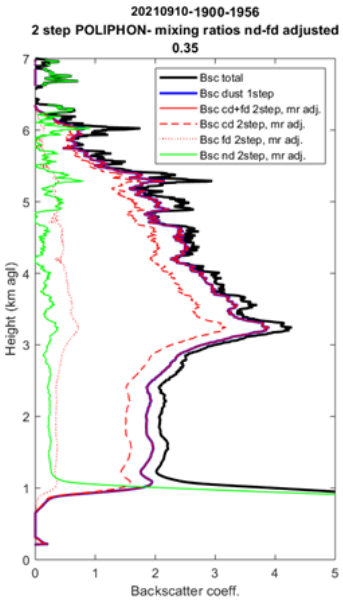
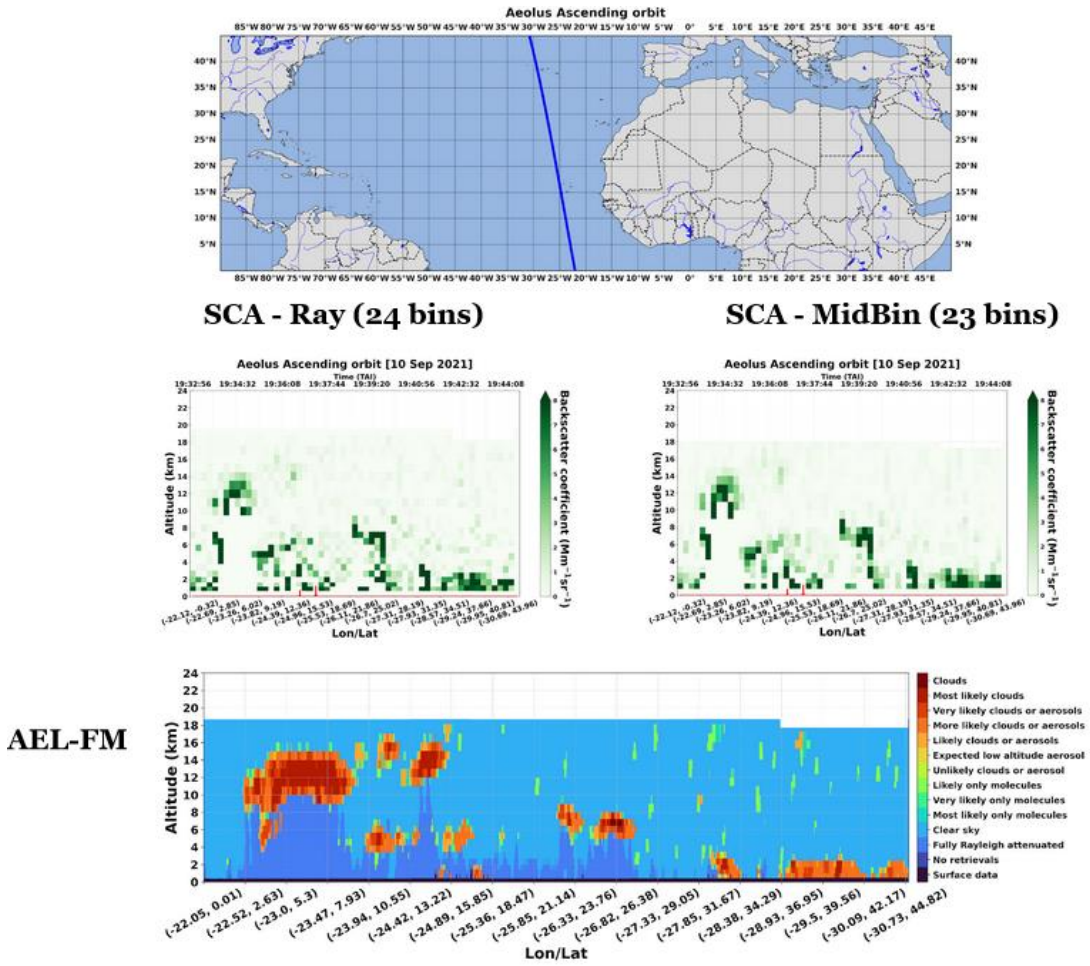
Executive Summary - Progress Report 02 (PR02)

This is the Progress Report 02 (PR02) documentation file of the European Space Agency (ESA) project entitled *L2A+* [Enhanced Aeolus L2A for depolarizing targets and impact on aerosol research and NWP]. PR02 reports on the activities performed during the period from between January 2023 and February 2023 (KO+3 - KO+4 months).

Work Package Status

WP1000	Management, reporting and promotion.
	Status: Ongoing. Schedule: KO – KO+24 months. Started on: November 2022. Objectives: Monitoring of the L2A+ project, ensuring the timely and efficient accomplishment of the planned activities and administrative tasks and promotion of the project to the scientific community. Furthermore, consolidating the scientific requirements for L2A+ study.
Status	Ongoing. Deliverable Item 01 (DI01) – "Requirement Baseline Document" (RBD) and Deliverable Item 07 (DI07) – "L2A+ project website" have been submitted to the Agency prior Progress Meeting 01 (PM01), held on February 7th, 2023, between ESA and the L2A+ consortium. Work-in-progress includes addressing the comments raised by the ESA-L2A+ officers on DI01, prior re-submission for re-evaluation as Deliverable Documents for L2A+ PM02 (KO+06 months). In addition, the following L2A+ abstract has been submitted for participation in "Aeolus Science Conference 2023", to be held between 22 and 26 of May 2023 at Rhodes Island: 1. K. Rizos, A. Gkikas, E. Proestakis, T. Georgiou, V. Amiridis, E. Marinou, D. Donovan, N. Benas, M. Stengel, C. Retscher, H. Baars, and A. A. Floutsi.: "Development and validation of an enhanced aerosol product for Aeolus", poster, Aeolus Science Conference 2023, 22-26/03/2023, Rhodes Island. 2. T. Georgiou, E. Proestakis, A. Gkikas, K. Rizos, E. Drakaki, A. Kampouri, A. Tsikerdekis, H. Baars, A. A. Floutsi, E. Marinou, A. Benedetti, W. McLean, C. Retscher, and V. Amiridis.: "Improvements in Numerical Weather Prediction and Dust Transport modelling through AEOLUS L2A assimilation", Oral, Aeolus Science Conference 2023, 22-26/03/2023, Rhodes Island.
WP2000	ASKOS ground-based datasets in support of L2A+.
	Status: Ongoing. Schedule: KO – KO+16 months. Started on: November 2022. Objectives: To provide ASKOS ground-based datasets for L2A+ product validation and model evaluation studies.
Status	Ongoing. Work conducted between KO+03 months and KO+04 months includes the shaping/configuring of the Quality-Assurance (QA) procedures applied on the ground-based data towards the overarching objective of establishing a data base to support the L2A+ product development (overall evaluation activities foreseen in the framework of WP3000 and WP5000). Work was also performed and progress was made with respect to D4.1 and D5.1. In particular, the optical properties for the Aeolus overpasses at Mindelo on the 03, 10, 17 and 24 of September 2021 have been derived (quality assured product – part of D4.1). For the same dates, work in-progress includes the retrieval of the height-resolved dust fraction (D5.1). An

	example is illustrated in the following Figure. The total particle backscatter coefficient (black line) as measured directly with the PollyXT Raman lidar for the 10/09/2021 between 19:00 and 19:56 UTC is shown. Based on the QA lidar profiles, the one- and two-step POLIPHON retrieval was applied leading to the dust-related backscatter coefficient (coherent red and blue overlapping lines - consistent for both applied methods). The non-dust contribution is depicted with a solid green line. Thus, it becomes evident that dust is dominating the aerosol layer above 1 km asl, while in the local boundary layer no dust particles were existent. Based on the two-step POLIPHON method, the separation of the dust to coarse (red dashed line) and fine (red dotted line) mode dust distribution has then been performed indicating the dominance of coarse mode dust particles. For the characterization of the non-dust contribution in the lofted aerosol layer, an EarthCARE-like typing scheme, HETEAC-Flex, has been applied and the non-dust contributions were attributed to an equal mix of fine spherical non-absorbing, coarse spherical and fine spherical strongly absorbing aerosol at low concentrations.  *Figure: Mixing ratio of dust and non-dust contribution to the total backscatter coefficient (PollyXT) as derived using the two-step POLIPHON methodology (Mamouri and Ansmann, 2014).* For the dust fluxes estimation through the synergistic implementation of measurements from the PollyXT lidar and the HALO Streamline-XR Doppler wind lidar, currently noise reduction procedures are applied/configured to the Doppler lidar for better wind retrievals).
WP3000	Development of the L2A+ aerosol product.
Status	Ongoing. Work in progress, conducted between KO+03 months and KO+04 months, includes, among others, the: 1. derivation and inspection of the raw Aeolus L2A retrievals for the study period of September 2021 and for the L2A+ domain. 2. provision of AEL-FM product test files (D. Donovan - KNMI) in order to assess the cloud-filtering methodology, related to the Feature Mask classification product for three identified Aeolus cases, and more specifically for the 10th, 17th, and 24th of September 2021 (Aeolus' overpasses in the Mindelo - Cabo Verde proximity).

	3. request submitted for the provision of the Aeolus retrievals processed with the latest L2A processor version (i.e., Baseline 15) - AEL-PRO and AEL-FM products are included in the latest L2A processor version and are available at the measurement scale (~3km). 4. provision of the SEVIRI CLAAS-3 clouds dataset (September 2021) for enhancing Aeolus L2A clouds filtering - (N. Benas - KNMI and S. Martin - DLR).  *Figure: Aeolus orbit on September 10th, 2021 in the Mindelo - Cabo Verde proximity (upper panel), SCA (mid panel-left) and SCA - MidBin (mid panel-right), and AEL-FM classification (lower panel).*
WP4000	Assimilation of L2A/L2A+ and application of WRF-L experiments.
	Status: Not started. Schedule: KO+6 – KO+24 months. Objectives: Assimilation of L2A and L2A+ dust products on WRF-L and pertinent simulations.
Status	-
WP5000	Impact Studies.
	Status: Not started. Schedule: KO+12 – KO+24 months. Objectives: Scientific Analysis and Impact Assessment.
Status	-
WP6000	Recommendations.

	Status: Not started. Schedule: KO+12 – KO+24 months. Objectives: Summary of the main scientific outcomes of the project and recommendations for expanding the performed research activities.
Status	-

Status of Deliverable Items

Code	Deliverable Item	Type	Delivery Date	Status
MoM	Minutes of Meeting – Kick-Off Meeting	Documentation	KO	Completed.
PR01	Progress Report 1	Documentation	KO+2 Months	Completed.
D01 – V1	Requirement Baseline Document (RB)	Documentation	KO+3 Months	Completed.
D07 – V1	L2A+ project website (WEB)	Webpage	KO+3 Months	Completed.
MoM-PM01	Minutes of Meeting – Progress Meeting 1	Documentation	KO+3 Months	Completed.
PR02	Progress Report 2	Documentation	KO+4 Months	Submitted.
D01 – V2	Requirement Baseline Document (RB)	Documentation	KO+6 Months	Pending.
D02	Data Pool (DP)	Dataset	KO+6 Months	Pending.
PR3	Progress Report 3	Documentation	KO+6 Months	Pending.
MoM-PM02	Minutes of Meeting – Progress Meeting 2	Documentation	KO+6 Months	Pending.
PR04	Progress Report 4	Documentation	KO+8 Months	Pending.
MoM-PM03	Minutes of Meeting – Progress Meeting 3	Documentation	KO+9 Months	Pending.
D03	Description of the Algorithm Developments (ALGO)	Documentation	KO+9 Months	Pending.
PR05	Progress Report 5	Documentation	KO+10 Months	Pending.
D05	Output data product (OP)	Dataset	KO+12 Months	Pending.
D08	Multi-media material (MM)	Documentation	KO+12 Months	Pending.
PR06	Progress Report 6	Documentation	KO+12 Months	Pending.
MoM-MTR	Minutes of Meeting – Mid Term Review Meeting	Documentation	KO+12 Months	Pending.
PR07	Progress Report 7	Documentation	KO+14 Months	Pending.
D02	Data Pool (DP)	Dataset	KO+15 Months	Pending.
D03	Description of the Algorithm	Documentation	KO+15 Months	Pending.

	Developments (ALGO)			
D04	Analysis of the Validation Activities carried out (VAL)	Documentation	KO+15 Months	Pending.
MoM - PM04	Minutes of Meeting – Progress Meeting 4	Documentation	KO+15 Months	Pending.
PR08	Progress Report 8	Documentation	KO+16 Months	Pending.
D05	Output data product (OP)	Documentation	KO+18 Months	Pending.
D07 – V2	L2A+ project website (WEB)	Webpage	KO+18 Months	Pending.
PR9	Progress Report 9	Documentation	KO+18 Months	Pending.
MoM - PM05	Minutes of Meeting – Progress Meeting 5	Documentation	KO+18 Months	Pending.
PR10	Progress Report 10	Documentation	KO+20 Months	Pending.
D02	Data Pool (DP)	Dataset	KO+21 Months	Pending.
D03	Description of the Algorithm Developments (ALGO)	Documentation	KO+21 Months	Pending.
D04	Analysis of the Validation Activities carried out (VAL)	Documentation	KO+21 Months	Pending.
D06	Scientific Analysis, Impact Assessment and Scientific Roadmap (SIR)	Documentation	KO+21 Months	Pending.
MoM - PM06	Minutes of Meeting – Progress Meeting 6	Documentation	KO+21 Months	Pending.
PR11	Progress Report 11	Documentation	KO+22 Months	Pending.
D04	Analysis of the Validation Activities carried out (VAL)	Documentation	KO+24 Months	Pending.
D05	Output data product (OP)	Documentation	KO+24 Months	Pending.
D06	Scientific Analysis, Impact Assessment and Scientific Roadmap (SIR)	Documentation	KO+24 Months	Pending.
D08	Multi-media material (MM)	Documentation	KO+24 Months	Pending.
D09	Final Report and Executive Summary Report (FR)	Documentation	KO+24 Months	Pending.
MoM - FR	Minutes of Meeting – Final Review Meeting	Documentation	KO+24 Months	Pending.

L2A+ Gantt Chart

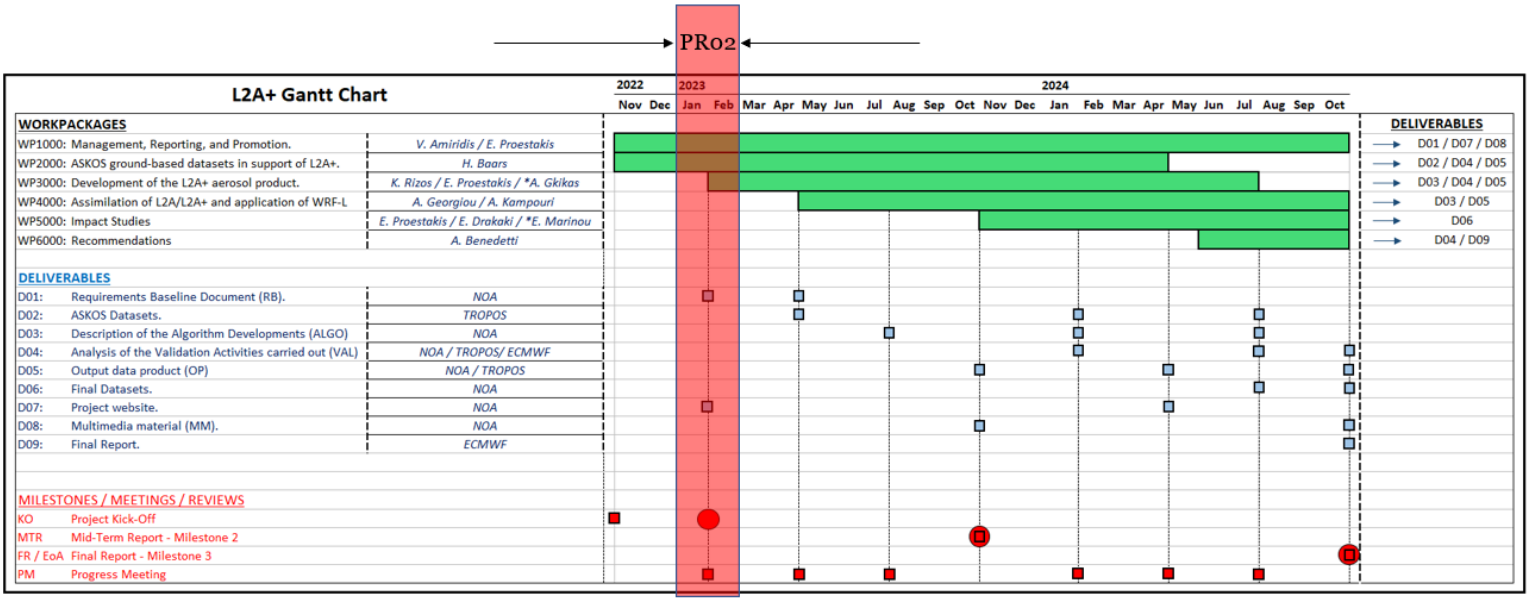


Figure: L2+ Gantt Chart and current PR02 temporal period.