



Ref: ESA AO/1-11041/22/I-NS

Progress Report 04 – PR04

L2A+

L2A+

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

Progress Report 04 – PR04
[05/2023-06/2023]

(Version 1.0)

Submitted to: Christian Retscher (ESA)

	Name	Function	Date
Prepared by:	E. Proestakis	WP1000 – NOA	06/2023
	H. Baars	WP2000 – CoPI – TROPOS	06/2023
	A. Floutsi	WP2000 – TROPOS	06/2023
	A. Gkikas	WP3000 – NOA	06/2023
	K. Rizos	WP3000 – NOA	06/2023
	A. Georgiou	WP4000 – NOA	06/2023
	A. Kampouri	WP4000/5000 – NOA	06/2023
	E. Drakaki	WP4000/5000 – NOA	06/2023
	A. Benedetti	WP6000 – CoPI – ECMWF	06/2023
Approved by:	V. Amiridis	PI	06/2023

*National Observatory of Athens (NOA)
Institute for Astronomy, Astrophysics, Space Applications & Remote Sensing
(IAASARS)*

*Vas. Pavlou & I. Metaxa, 15236 Penteli, Greece
&*

*Leibniz Institute for Tropospheric Research (TROPOS), Leipzig, Germany
&*

*European Centre for Medium-Range Weather Forecasts
[ECMWF]
Reading, United Kingdom*

ESA-L2A+ Progress Report 04 [PR04]



L2A+

Ref: ESA AO/1-11041/22/I-NS

Progress Report 04 – PR04

Executive Summary - Progress Report 04 (PR04)

This is the Progress Report 04 (PR04) documentation file of the European Space Agency (ESA) project entitled L2A+ [Enhanced Aeolus L2A for depolarizing targets and impact on aerosol research and NWP]. PR04 reports on the activities performed during the period from between May 2023 and June 2023 (KO+7 - KO+8 months).

Work Package Status

WP1000	Management, reporting and promotion.
	<p>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.</p>
Status	<p>Ongoing.</p> <p>Activities related to WP1000 included the general management of the L2A+ project as well as the communication among all partners and with the Agency. Meetings were organised to ensure a smooth execution of all scientific and technical tasks. Moreover, activities related to WP1000 included addressing the comments raised by the ESA-L2A+ officers on Deliverable Item 01 (DI01) – “Requirement Baseline Document” (RBD).</p> <p>Towards enhancing communication of the ESA L2A+ activity and outputs, the following L2A+ abstracts have been presented to the “Aeolus Science Conference 2023” - 22 and 26 of May 2023 - Rhodes Island”:</p> <ol style="list-style-type: none"> 1) Rizos, K., Gkikas, A., Proestakis, E., Georgiou, T., Amiridis, V., Marinou, E., Donovan, D., Benas, N., Stengel, M., Retscher, C., Baars, H., and Floutsi, A. A.: “Development and validation of an enhanced aerosol product for Aeolus”, poster, Aeolus Science Conference 2023, 22-26/03/2023, Rhodes Island. 2) Georgiou, T., Proestakis, E., Gkikas, A., Rizos, K., Drakaki, E., Kampouri, A., Tsikerdekis, A., 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”, poster, Aeolus Science Conference 2023, 22-26/03/2023, Rhodes Island. 3) Gkikas, A., Proestakis, E., Dabas, A., Benedetti, A., McLean, W., Flament, T., Marinou, E, Tsikoudi, I., Baars, H., Floutsi, A., A., Amiridis, V., Borde, R.: “Upgrading Aeolus aerosol observational capabilities towards improving air quality and NWP models”, Oral, Aeolus Science Conference 2023, 22-26/03/2023, Rhodes Island. 4) Proestakis, E., Gkikas, A., Georgiou, A., Rizos, K., Paschou, P., Benedetti, A., McLean, W., and V. Amiridis, V.: “Aeolus aerosol observational capability based on CALIPSO”, poster, Aeolus Science Conference 2023, 22-26/03/2023, Rhodes Island.

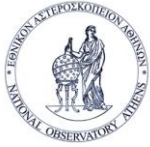


L2A+

Ref: ESA AO/1-11041/22/I-NS

Progress Report 04 – PR04

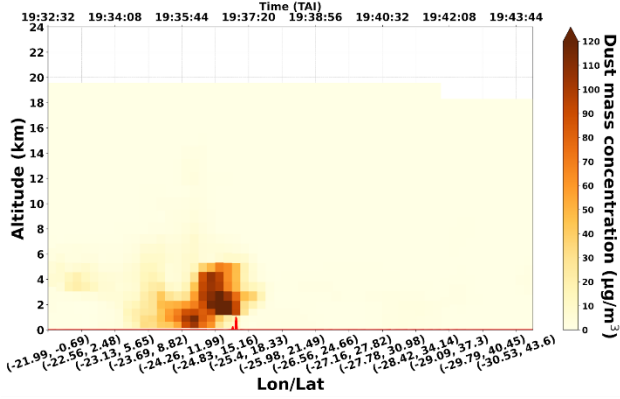
WP2000	ASKOS ground-based datasets in support of L2A+.
	<p>Status: Ongoing. Schedule: KO – KO+16 months. Started on: November 2022. Objectives: To provide ASKOS ground-based datasets for L2A+ product validation and model evaluation studies.</p>
Status	<p>Ongoing</p> <p>Activities conducted between KO+7 and KO+8 include, among others, included further developments toward combining the aerosol optical properties and target classification from the PollyXT lidar with the Cloudnet target classification product (for September 2021).</p>
WP3000	<p>Development of the L2A+ aerosol product. Schedule: KO+4 – KO+21 months. Started on: February 2023.</p>
Status	<p>Ongoing.</p> <p>Overarching technical Objective of L2A+ WP3000 consists the development of a refined Aeolus aerosol optical product (L2A+) over the North Atlantic Ocean, based on AEL-FM/AEL-PRO algorithms, and CAMS for the case of on non-spherical atmospheric particles (i.e., dust). Towards realization of the L2A+ product, the work-in-progress conducted between KO+07 months and KO+08 months, includes, among others, the:</p> <ol style="list-style-type: none"> 1) Processing of MSG-SEVIRI (Meteosat Second Generation - Spinning Enhanced Visible and Infrared Imager) CLAAS-3 cloud dataset as an additional cloud-filtering tool to assess the optimum removal of cloud contaminated profiles of the raw Aeolus L2A retrievals. Based on the synergy of the AEL-FM Feature Mask and MSG-SEVIRI retrievals, the challenge is related to minimization of the risk L2A+ WP3000 output of aerosol profiles - contaminated by clouds - to be implemented in WP4000 as input to the foreseen assimilation experiments. At PR04 period, the cloud-screening based on MSG-SEVIRI has been focused on an indicative study case on 17th, of September 2021, to be expanded to cover the entire L2A+ RoI in next steps of WP3000. 2) Processing of CAMS reanalysis dust outputs towards assignment of aerosol typing. Work-in-progress in PR04 focuses on the evaluation of CAMS dust product against the corresponding from LIVAS pure-dust database during the whole study period of September 2021 and for all the CALIPSO overpasses falling within the RoI. CAMS will be used for the identification of atmospheric dust cases which will be used in the following WP3000 steps, to account for the missing/non-detected cross polar component in the case of dust particles. The vertical distribution of the CAMS dust mass concentration for an Aeolus overpass on the 17th of September 2021 is presented in the figure below where the dust layers can be detected. <div style="text-align: center;"> <p>Aeolus Ascending orbit</p> <p>Start: 17 Sep 2021 19:32:32UTC Stop: 17 Sep 2021 19:44:07UTC</p> </div>



L2A+

Ref: ESA AO/1-11041/22/I-NS

Progress Report 04 – PR04

	<p style="text-align: center;">Aeolus Ascending orbit [17 Sep 2021]</p>  <p><i>Figure: Aeolus overpass on the 17th of September 2021 (top panel), and vertical profiles of CAMS dust mass concentration for the specific Aeolus overpass (lower panel).</i></p>
WP4000	Assimilation of L2A/L2A+ and application of WRF-L experiments.
	<p>Status: Not started. Schedule: KO+6 – KO+24 months. Objectives: Assimilation of L2A and L2A+ dust products on WRF-L and pertinent simulations.</p>
Status	<p>Ongoing</p> <p>WP4000 ongoing work has focused on producing (1) a baseline forecast to be used as a reference for comparison with the analyses (i.e., forecasts with assimilation) and (2) on developing the necessary code for the assimilation experiments. More specifically, under development are the required software components for interoperability of WRF and DART, as well as the HLOS forward observational operator. In addition, to support the ongoing forecasting experiments, WP4000 has acquired computational resources under the “L2Aplus” project on the ARIS HPC, operated by GRNET. S.A.</p>
WP5000	Impact Studies.
	<p>Status: Not started. Schedule: KO+12 – KO+24 months. Objectives: Scientific Analysis and Impact Assessment.</p>
Status	Not started.
WP6000	Recommendations.
	<p>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.</p>
Status	Not started.



L2A+

Ref: ESA AO/1-11041/22/I-NS

Progress Report 04 – PR04

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	Completed.
D01 – V2	Requirement Baseline Document (RB)	Documentation	KO+6 Months	Completed.
D02	Data Pool (DP)	Dataset	KO+6 Months	Completed.
PR3	Progress Report 3	Documentation	KO+6 Months	Completed.
MoM-PM02	Minutes of Meeting – Progress Meeting 2	Documentation	KO+6 Months	Completed.
PR04	Progress Report 4	Documentation	KO+8 Months	Submitted.
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 Developments (ALGO)	Documentation	KO+15 Months	Pending.
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	Documentation	KO+21 Months	Pending.



L2A+

Ref: ESA AO/1-11041/22/I-NS

Progress Report 04 – PR04

	Scientific Roadmap (SIR)			
MoM - PM06	Minutes of Meeting – Progress Meeting 6	Documentation	KO+21 Months	Pending.
PR11	Progress Report 11	Documentation	KO+22 Months	Pending.
Do4	Analysis of the Validation Activities carried out (VAL)	Documentation	KO+24 Months	Pending.
Do5	Output data product (OP)	Documentation	KO+24 Months	Pending.
Do6	Scientific Analysis, Impact Assessment and Scientific Roadmap (SIR)	Documentation	KO+24 Months	Pending.
Do8	Multi-media material (MM)	Documentation	KO+24 Months	Pending.
Do9	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

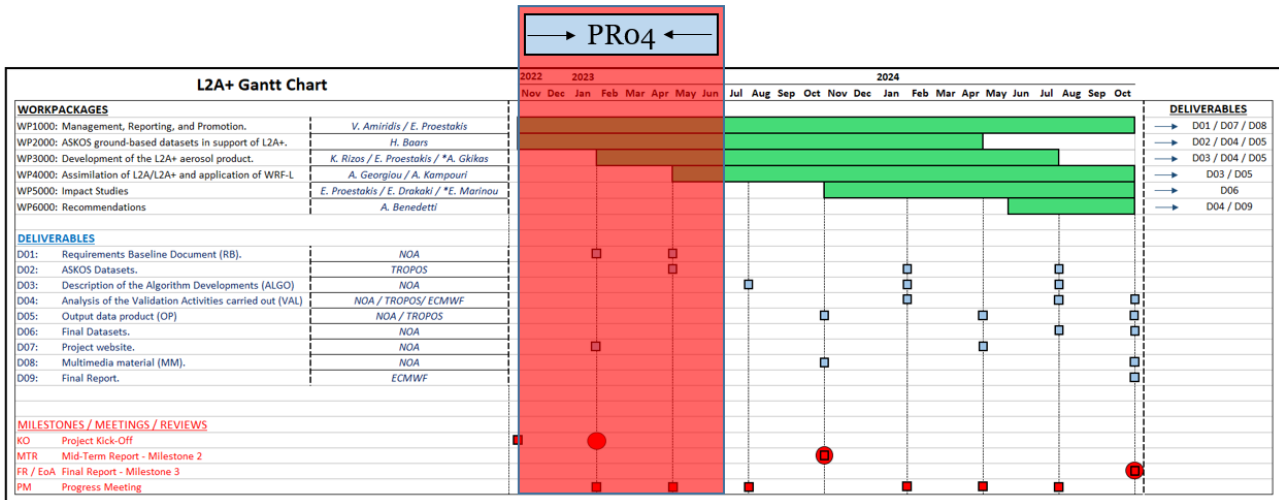


Figure: L2A+ Gantt Chart and current PR04 temporal period.