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

## L2A+

Progress Meeting 03 [PM03]

Minutes of Meeting
[04/09/2023]
[10:30-12:00 CEST]

|  | Name | Function | Date |
|---|---|---|---|
| Prepared by: | E. Proestakis | Post-Doc researcher | 08/02/2022 |
| Approved by: | V. Amiridis | PI | 08/02/2022 |

## Meeting Attendance List

The participants who attended the L2A+ Progress Meeting 03 (PM03) from ESA, NOA, TROPOS, and ECMWF, encompassed by participants from KNMI are listed below, in "Table 1".

Table 1: List of Participants in L2A+ KO meeting.

| Nr. | Participant | Affiliation | Email |
|---|---|---|---|
| 1 | Vassilis Amiridis | NOA | vamoir@noa.gr |
| 2 | Emmanouil Proestakis | NOA | proestakis@noa.gr |
| 3 | Antonis Gkikas | NOA | agkikas@noa.gr |
| 4 | Athanasios Georgiou | NOA | ageorgiou@noa.gr |
| 5 | Anna Kampouri | NOA | akampouri@noa.gr |
| 6 | Kostas Rizos | NOA | k.rizos@noa.gr |
| 7 | Eleni Drakaki | NOA | eldrakaki@noa.gr |
| 8 | Holger Baars | TROPOS | baars@tropos.de |
| 9 | Athena Floutsi | TROPOS | floutsi@tropos.de |
| 10 | Angela Benedetti | ECMWF | Angela.Benedetti@ecmwf.int |
| 11 | Will McLean | ECMWF | Will.McLean@ecmwf.int |
| 12 | Athanasios Tsikerdekis | KNMI | thanos.tsikerdekis@knmi.nl |
| 13 | Christian Retscher | ESA | Christian.Retscher@esa.int |
| 14 | Daniele Gasbarra | ESA | Daniele.Gasbarra@esa.int |

## Brief Description

On September 4th, 2023, between 10:30 and 12:00 CEST, via videoconference a meeting between the European Space Agency (ESA) and the scientific groups of the "Enhanced Aeolus L2A for depolarizing targets and impact on aerosol research and NWP" (L2A+) was held, with the objective to provide information on the progress of the L2A+ ESA-activity. During the meeting, the agenda included an introduction by Christian Retscher (ESA) and Vassilis Amiridis (NOA), and an overview, recap of the science goals, methods and datasets to be used in L2A+, by Emmanouil Proestakis, and a detailed overview of (1) WP2000 – "ASKOS ground-based datasets in support of L2A+" by A. Floutsi – TROPOS, of (2) WP3000 – "Derivation of the L2A+ extinction and aerosol mass concentration product" by K. Rizos – NOA, and of (3) WP4000 – "Assimilation of L2A/L2A+ and application of WRF-L experiments" by A. Georgiou – NOA.

## Discussion and Outcomes

During Progress Meeting 03 (PM03) E. Proestakis provided an overview of activities held within the $T_o+6$ – $T_o+9$ months of L2A+ period, having as a starting point the general L2A+ project objectives and considerations. Accordingly, followed introduction of the working groups and members composing the L2A+ project was and presentation of L2A+ current status, with respect to the L2A+ Gantt Chart and the Work Packages (WPs) that have started within the PR013 period. The presentation and provided information on the status of L2A+ were considered by the Agency sufficient.

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| *WP1000 and "L2A+ Overview". Presenter: E. Proestakis* | E. Proestakis provided a generic overview of L2A+ and a specific overall description of the activities performed between T0+6 – T0+9 months of L2A+ period with respect to WP1000. The presentation provided introduction of the (1) background, scientific and technical overarching project objectives and considerations, (2) on the challenges behind the L2A product to be tackled in the 2-year period of the project, (3) presentation of L2A+ Gantt Chart and (4) an overview of the Work Packages. The presentation of the general overview was concluded by the status of the Deliverable Items (DIs) and information related to the participation of L2A+ WPs in the conference of COMECAP2023. |
| *WP2000 "ASKOS ground-based datasets in support of L2A+". Presenter: A. Floutsi.* | A. Floutsi provided an extensive overview of the activities related to L2A+ WP2000 – "ASKOS ground-based datasets in support of L2A+", with the objective to review the datasets acquired during ASKOS as part of the Joint Tropical Atlantic campaign (JATAC) and ASKOS Campaign, and of the datasets that have been collected, and the ongoing analysis and exploitation towards completion of L2A+ dataset pre-processing, during the period T0+6 – T0+9 months of L2A+. The presentation provided an overview of the processed datasets during 09/2021 and the lidar-based derived optical properties, including (1) PollyXT-derived aerosol optical properties and target classification, (2) CloudNet target classification, and (3) two-step POLIPHON results for June and September 2022 in addition to September 2021, to be included in DI02-V2. |
| *WP3000 "Derivation of the L2A+ extinction and aerosol mass* | K. Rizos provided an extensive overview of the activities related with L2A+ WP3000 – "Derivation of the L2A+ extinction and aerosol mass concentration product". |

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| *concentration product". Presenters: K. Rizos.* | On the basis of an indicative Aeolus overpass on 17th of September 2021, the raw Aeolus L2A retrievals were jointly processed with AEL-FM (Aeolus Feature Mask) and MSG SEVIRI CLAAS3 cloud datasets to identify and remove cloud-contaminated BRC bins. First, the cloud-filtering of the raw Aeolus L2A retrievals was based on the AEL-FM dataset the methodology was expanded to include the cloud-filtered SCA products at the middle-bin scale. Second, cloud-filtering based on MSG-SEVIRI cloud mask product eliminating all the BRC profiles with cloud-contaminated measurements exceeding a threshold percentage value was applied. For a more rigorous cloud-filtering, both filtering processes were combined, providing the total cloud-filtered SCA products at the regular (24 vertical bins) and middle-bin (23 vertical bins) vertical scale. The Cloud Filtering Quality Assurance approaches were extensively presented and discussed in the framework of PM03.<br><br>In addition, CAMS reanalysis numerical outputs were also used in order to identify BRC bins characterized by the presence of dust along Aeolus measurement track, and the outcomes were presented and discussed in the framework of PM03. The results for all the above-referenced methodologies were presented for the specific study case on 17th September 2021.<br><br>Finally, the presentation of WP3000 provided an overview of WP3000 next steps, including (1) identification of dust layers using CAMS, (2) derivation of L2A+ extinction coefficient profiles following assignment of appropriate lidar ratio for the dust-identified atmospheric layers, (3) derivation of dust mass concentration profiles, and (4) evaluation activities of the new L2A+ product using ground-based reference measurements (eVe, PollyXT). |
| *WP4000 "Assimilation of L2A/L2A+ and application of WRF-L experiments". Presenter: Athanasios Georgiou.* | A. Georgiou provided an extensive overview of the activities related with L2A+ WP4000 – "Assimilation of L2A/L2A+ and application of WRF-L experiments". More specifically, in the framework of WP4000 presentation an overview of Data Assimilation Research Testbed (DART) implementation with WRF was provided, including information on the ongoing development efforts on integrating Aeolus and DART. The next steps include studying the impact of assimilating Aeolus winds on dust transport, before moving onto assimilation of Aeolus aerosol information.<br><br>Finally, the presentation of WP4000 provided first results of assimilation experiments with synthetic observations, in order to demonstrate the feasibility and functionality of WRF/DART system. |

## Main Concluding Points

- The project is considered progressing properly.
- PM04 is scheduled for the beginning of November, 2023.