Validation Recommendations: Aerosols

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ESA Aerosol Products – Validation Status

ATLID-only products

- A-AER and A-EBD
  - Widely investigated, very detailed and helpful analysis (e.g. T223/Hemminga, T224/Baars, T225/Stachlewska, P022/Groß, P023/Poutli, P024/Basharova, P026/Meloni, P027/Palikaridou, P029/Ciocan, P031/Rodriguez-Rivas, P032/Wang, P036/P038/Navas Guzmán, P047/Flügge);
  - Includes also in-situ/balloon (P021/Renard) and model comparisons (P081/Lange, P087/Wang)
  - Shortcomings in baselines BA…BD clearly identified, proto-CA shows improvemens, but not all issues are solved yet
  - Depolarization issues (mainly) solved (T217/Haarig)
  - Validation of product errors started (P022/Groß)
- A-TC
  - Investigations by several groups show the need of improvements (e.g. T222/Krüger, T223/Hemminga, P023/Poutli, P031/Rodriguez-Rivas, P037/Voudouri); including also model comparison (P081/Lange)
- A-ALD
  - Validation results are limited and more investigations are needed (T323/Marinou, P037/Voudouri, P026/Meloni, P028/Meloni, P038/ Navas Guzmán, P047/Flügge)

ESA Aerosol Products – Validation Status

MSI-only products

- M-AOT
    - Investigations by several groups (e.g. T214/Sogacheva, T321/Papachristopoulou, P026/Meloni, P027/Palikaridou, P028/Meloni, P035/Sensi) showed satisfying behaviour

Synergistic products

- AM-ACD
    - Only few attempts to validate e.g. 355/670 Angstroem exponents (T214/Sogacheva, P026/Meloni)
- ACM-CAP
    - Only few attempts to validate aerosol products so far (T214/Sogacheva)
- ACM-RT, ACM-COM
    - First attempts to validate surface irradiance with BSRN and perform spectral radiative closure at BOA (T321/Papachristopoulou, P70/Gschwind)

JAXA Aerosol Products

ATLID-only products

- A_CLA:
  - There has been more research on the evaluation of JAXA L2a (A_CLA) products since last Tokyo workshop using ground-based, mobile, and airborne lidars (T221/Jin, T224/Baars, T225/Stachlewska)
    - overall good agreement (including cirrus after multiple scattering correction)
    - issues on aerosol/cloud misclassification should be investigated
    - less data points available than the ESA products

Aerosol Products – Validation Status

ESA/JAXA product comparisons

- A-EBD and A_CLA (T224/Baars, T225/Stachlewska)

Auxiliary products

- X-MET validation of temperature, humidity, trace gases… (T301/Mariani)

Aerosol Products – Validation Gaps

- Specific products/features with known issues, e.g.
    - Extinction of marine boundary layer with embedded scattered cumulus clouds
    - Optical properties of dust/smoke layers with embedded cirrus clouds
- Aerosol microphysical properties/aerosol classification/aerosol chemical components/aerosol radiative properties with in-situ measurements (airborne in situ observations – aircraft, drones, balloones; P021/Renard)
- Aerosol classification (troposphere and stratosphere)
- Error products / product errors
- Synergistic products
- Radiative effects, impact of aerosol classification on radiative closure
- General consistency of the aerosol products (single instrument/synergy, ESA/JAXA, …)

Aerosol Products – Validation recommendations

- Validate not only the products but also their errors
- Investigate the full aerosol product chain, including radiation closure for cloud-free scenes (TOA and BOA) and auxiliary data
    - Aerosol classification
    - Assigned microphysical/radiative properties (HETEAC)
    - Influence on TOA and BOA radiative closure
- Use golden data set for early processor validation (prototype versions) before reprocessing campaigns
- Provide fast feedback through the monthly open ECVT/DISC meetings

Many teams lack funding (especially from national sources). How to proceed with validation?