Towards the Aeolus L2A validation with eVe lidar

- Emission: linearly and circularly polarized light at 355 nm
- Detection: a linear analyzer (LR) with a circular analyzer (similar to Aeolus)
- Pointing geometry: off-zenith and azimuth rotation
- Products (355 nm):
  - $a$ (from linear and circular emission)
  - $\beta$ (from linear and circular emission)
  - lidar ratio (nighttime; from linear and circular emission)
  - linear depolarization ratios
  - circular depolarization ratios

Algorithms for retrieving Aeolus L2A:

1. Standard Correct Algorithm (SCA)
   - Main L2A processor
   - Two vertical resolution scales (Rayleigh bin / Mid bin)
2. Maximum Likelihood Estimation (MLE)
   - Integrated to L2A processors in Baseline 14
3. AEL – PRO
   - Algorithm from EarthCare developments
   - Available profiles from Baseline 12
   - Integrated to L2A processors in Baseline 13

Harmonize eVe products with Aeolus L2A:

- $\beta$aeolus like = $\frac{\beta_{eVe}}{\sigma_{\beta}}$
- LRaeolus like = LR(1 + PCDR)

The Campaign:

Joint Aeolus Tropical Atlantic Campaign (JATAC) for the validation of Aeolus products. Aeolus is the ground-based component of JATAC.

When:
- Phase I: July and September 2021
- Phase II: June and September 2022

Where:
- Ocean Science Centre Mindelo (OSCM), Mindelo, Cabo Verde
- eVe Dataset on ASKOS

14 collocated measurements with Aeolus during closest overpass from site (Friday 19:39 UTC)

Statistics

- Mean bias and root-mean-square error over Aeolus Bin for the 14 eVe-Aeolus collocations
  - Aeolus L2A profiles: B12 (8 overpasses); B14 (4 overpasses); and B15 (2 overpasses)
  - Aeolus algorithms: 14 SCA profiles; 12 AEL-PRO profiles; and 6 MLE profiles

Summary

- Better agreement above 2.5 km for $\beta$ (RMSE < 0.2 mm$^{-1}$) and for $\sigma$ (RMSE < 120 Mm$^{-1}$)
- Discrepancies below 2.5 km - cloud-screening only for eVe; PBL spatial homogeneity
- Large discrepancies for lidar ratio - noisy profiles from Aeolus

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