Cal/Val synthesis

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Time series of L2B bias and random error for FMB

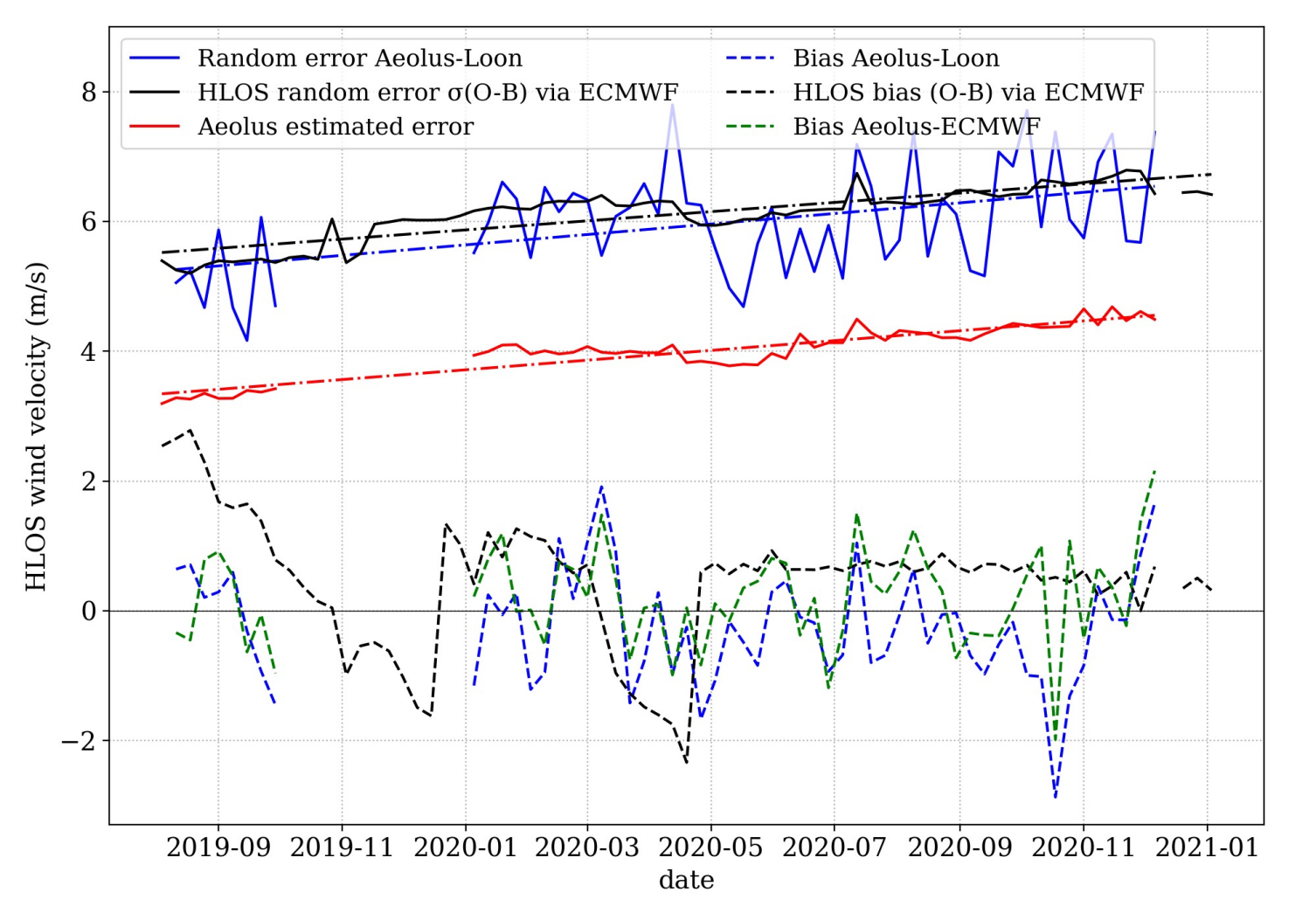
ECMWF O-B
Aeolus-Loon
LMU: Radiosonde
LATMOS: SAFIRE
DTU: Wind profiler Australia
TROPOS: Radiosonde
SMHI: Antarctica Radar
USA-Uni Maryland: GOES-16 AMVs

Applied QC: abs(O-B)<15 m/s

Time series of L2B bias and random error for FMB

- QC: abs(O-B)<15 m/s
- Corrected applied to the Aeolus-Loon and Aeolus-Radiosonde time series, using estimates of radiosonde/balloon bias and representativeness error

Time series of L2B bias and random error for FMB



- QC: abs(O-B)<15 m/s
- ECMWF O-B for 30S-30N and 60-120 hPa, to be consistent with the Aeolus-Loon dataset

Recommendations from last synthesis report

1. Trigger EVDC to pull first data from the ACTRIS DB. (EARLINET)
2. Provide a new overpass table for the time after the orbit shift already now so that stations can prepare. It would be good to showcase that ESA/EVDC can provide times for the overpasses at the cal/val stations. (EARLINET)

   Status: Overpass table after orbit shift on 17 June 2021 available on confluence
3. Vertical bin changes for the gravity wave campaign and QBO observations have been greatly appreciated. Recommendation to keep the QBO range bin settings for as long as possible

   Status: QBO setting will remain
4. Rapidly changing RBS settings hinder analysis of longer time period. We recommend keeping the same vertical grid throughout the whole mission
5. It would be helpful to have more details on the purpose of the instrument tests as much as possible (e.g. Are they necessary to try and preserve the life of the laser), since the blocklisted periods have become very regular.

   Status: There are regular blocklisting periods (every two weeks) due to moon blinding. Furthermore, more instrument tests are to be expected starting from October 2021 due to the reach of Aeolus' nominal lifetime (39 months) and to mitigate ongoing signal loss in the atmospheric path.

Recommendations for next reporting period

- Assessment of the quality of the re-processed datasets for the period June 2019 until October 2020 (available in October 2021)
- Quality of L2B winds and NWP impact experiments since baseline 10 (April 20, 2020) with M1 bias correction activated
- If long-term references measurements are available for the full Aeolus mission lifetime, the evolution of biases, particularly the random errors (scaled MAD) shall be analysed to assess the impact of the decreasing signal levels
- Investigations on possible remaining biases in re-processed L2B or NRT wind products from baseline 10, e.g. temporal varying bias, altitude or range-dependent bias, harmonic bias along the orbit, bias as a function of scattering ratio, bias for specific atmospheric scenes or altitudes (e.g. PBL)
- Comparison of Aeolus to AMV for those teams working with AMV´s using the specific period from 20191028 – 20191110 with special AMV range-bin settings.

Plenary discussion on L2B product quality

I. Krisch, A. Geiss, S. Kheykin, S. Bley

Questions related to L2B product quality

1. Did you recognize differences in the L2B data quality (systematic and random errors) throughout the mission lifetime (FM-A, FM-B)?

2. Does your analysis indicates improvements after M1 bias correction (all datasets after B09, including reprocessed)?

3. Did you assess the quality of the reprocessed dataset B11 from June 2019 – October 2020?

4. Have you noticed range-bin dependent, orbital phase, geographical, temporal wind biases?

5. Enhanced orbital dependent biases found in March & October (likely due to increased solar background noise)
   → Evidence also found in comparison to measurements?

Questions related to L2B product quality

6. What is the spatial representativness of Aeolus Rayleigh/Mie winds?

7. Which QC filters have you used and did you change them during the mission?

8. Have you compared the HLOS estimated error, provided in the product, to random errors (scaled MAD) found in your cal/val comparisons?

9. Comparison to AMVs: Did you compare L2B Mie cloudy winds to AMVs for the special RBS period (November 2019)?

Recommendations for the future

1. Do you have recommendations for future operations (for upcoming reprocessing campaigns, scene classification in clear, cloudy)?

2. Do you have recommendations for special range bin settings?

3. Are there any ideas/needs/potential for L3 products (different grids, global maps/statistics)?

4. Recommendations for Aeolus follow-on mission?