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Atmospheric Measurement Techniques Discussions

Interactive comment on "Airborne Lidar Observations of Wind, Water Vapor, and Aerosol Profiles During The NASA Aeolus Cal/Val Test Flight Campaign" *by* Kristopher M. Bedka et al.

Anonymous Referee #2

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The paper presents the data acquired by two lidars, a Doppler wind lidar DAWN and a WV wind lidar HALO, during a two-week period in April 2019 in an effort to contribute to the Cal/Val activity of the space-borne wind lidar Aeolus of the European Space Agency. The paper aims at highlighting the DAWN and HALO measurement capabilities across a range of atmospheric conditions, and providing a comparison of DAWN measurements with Aeolus. During the camapign, HALO demonstrated the first new airborne WV DIAL capability within NASA in over 25 years. Finally, it is worth noting that the paper uses preliminary data (not fully calibrated/validated and not yet publicly released) of the Aeolus mission.

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Discussion paper

The paper is well written and provides the reader with a description of the HALO and DAWN systems. It demonstrates the importance of tbeing able to observe simulatneously WV, wind, aeorosol and cloud data from a single platform and a combination of remote sensing instruments.

I recommend that the paper be accepted for publication in AMT provided that a few minor comments and suggestions are accounted for.

P35 (here and in the Introduction): This would be my major comment here: I do not think that you provide any comparison of HALO measurements with Aeolus since you are not comparing aerosol/cloud related products (and you provide the reader with a good reason for that). You discuss comparison between DAWN, sondes and Aeolus, and comparison between HALO and DHL, but not comparison between HALO and Aeolus. P152: Figures 3 and 10 are the first to be mentioned in the paper..? Figure 14 is also presented before Figure (L289). The figures are not presented in the order they are numbered until Section 3. Please fix that issue. P157: GRIP acronym used before being defined here L206 Does HALO provide range-resolved CH4 measurements along the line of sight or integrated columns? At what wavelength? L226-227: what us the expected penetration depth in clouds and in the water? L232-236: are the HALO data visualized in real time in the aircraft? What do you use then to compute the dry air number density necessary for mixing ratio retrievals? L239 Can you explain how DOAD is optimized through wavelength tuning for the viewing scene? By tuning the wavelength to the side of the absorption line? Dou you use an a priori knowledge of the water content in the atmosphere to proceed with the adjustment? Is this automatized somehow? Or used induced/controlled? L264: can the use of the echo over land still be considered valid over flat terrain? Regarding the use over the ocean, is there a threshold on the wave heights beyond which the echo cannot be used to extend the WV profile? P330 do you mean error on winds > 8 m/s (5 m/s)? L341 remove one of the Aeolus L348: an -> and

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