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Atmospheric Measurement Techniques Discussions

Interactive comment on "Rayleigh wind retrieval for the ALADIN airborne demonstrator of the Aeolus mission using simulated response calibration" *by* Xiaochun Zhai et al.

Anonymous Referee #1

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The paper shows how calibration curves for a direct-detection airborne Doppler lidar can be derived from the known pressure and temperature in the sensed atmospheric volume and a carful characterization of the transmission characteristics of the interferometers used in the receiver. The calibration procedure is copie from what is done for AEOLUS. It is shown that the procedure can be applied as well to the airborne demonstrator of AEOLUS, and achieves a better accuracy with a reduced bias and equivalent standard deviation with colocated drop-sonde wind measurements as with a measured response curve that does not take specifically into account the pressure and temperature conditions.

The practical significance of the method should be discussed. The paper suggests the transmission characteristics of the two FPs are very stable, except for a frequency shift caused by an incidence angle varying from one flight to the other. In Fig 10 or 13, the results are obtained with a frequency shift determined from data acquired during the same flight. Will the frequency shift be significantly modified during another flight? If yes, this should be stressed and a conclusion should be that response calibration should be done every flight.

The SRRC reduced the bias, but on the other hand lower the correlation coefficient with dropsonde vlos in Fig 10. This should be commented.

The paper mentions the presence of an internal reference channel without explaining exactly what it is. A simple graph showing the internal reference and the atmospheric path would improve the clarity of the paper.

Page 2, line 9: in the CDL, the backscattered light captured by the telescope is mixed with a frequency shifted emitter laser. The frequency shift enables the measurement of positive and negative winds. It is not mentioned.

Equations 3 and 4: there integrals should be between -\infty and +\infty. In practice S_a has a limited width so the limits -FSR/2 +FSR/2 can be enough if FSR is much larger, but +-\infty is better.

Page 11, lines 13-20: it is suggested the atmospheric and internal characteristics of FP transmissions are solely due to plate defects. This is wrong. The main reason is the beam étendue is different in the two channels due to a diaphragm.

Page 12, lines 19-23: the authors should write what \eplison_R is. It is the difference between the SRRC and the MRRC. Ideally it should be randomly fluctuations about 0 with no offset not slope.

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