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Atmospheric Measurement Techniques Discussions

Interactive comment on "Combined wind measurements by two different lidar instruments in the Arctic middle atmosphere" *by* J. Hildebrand et al.

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page 4127, line 15: few words about use of an iodine cell

We include in the manuscript, that the cell is heated to ensure all I_2 is in the gas phase and refer to Baumgarten (2010).

page 4128, line 1 and line 16: information of accuracy and capabilities of the seeder

We will include some information in the manuscript: "Seed light for the pulsed dye

amplifier is generated by sum frequency generation. The beams of two diode-pumped Nd:YAG lasers, 1319 nm and 1064 nm, are combined and pass through a periodically poled lithium niobate (PPLN) crystal (Yue et al., 2009). In order to increase long-term stability, we lock the seeder to the Na D_2 line using Doppler-free spectroscopy. This introduces a frequency dither of 2.9 MHz, which, however, averages to approximately zero over the integration time used in the wind retrieval."

page 4128, line 26: details about the type of the Fabry-Pérot interferometer

We will include some information in the manuscript: "This Fabry-Pérot interferometer is a temperature-stabilized air-spaced etalon with 1 GHz free spectral range, 800 mm diameter, and 45 mm working aperture, the finesse is about 20."

page 4131, line 22 et seqq.: more explanations for "zero line" issue

We revised this section seriously.

The black line in Fig. 4 is a Doppler ratio profile calculated with regard of measured atmospheric temperature for zero wind speed. This line is not the mirror axis of both measured Doppler ratio profiles due to two reasons. First, there is an inhomogeneity in the wind field (see Sect. 4.2). Second, one telescopes measures positive line-of-sight wind while the other one measures negative line-of-sight-wind. And since Doppler ratio is not a symmetric function of wind speed (see Fig. 5) this results in different offsets of the actual Doppler ratios against the Doppler ratio for zero wind speed.

page 4133, line 28: fourth order polynomial

We tested various polynomials of different orders and found that fourth order represents the approximate background or undisturbed wind profile best. A fourth order polynomial as estimation for background wind profile was also used by Cot (1986) in a case study of wave-turbulence interaction in the stratosphere.

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We will add this to the manuscript.

page 4134, line 10: about the scale of gravity waves and 40 km give references

Atmospheric gravity waves of various wavelengths are shown in Alexander and Barnet (2006).

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