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Atmospheric Measurement Techniques Discussions

Interactive comment on "Retrieval of vertical profiles of atmospheric refraction angles by inversion of optical dilution measurements" *by* D. Fussen et al.

D. Fussen et al.

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[a4paper,10pt]report

Anonymous Referee (2) Received and published: 27 April 2015 General comments The topic of this paper is of interest to atmospheric research community and fits well to the scope of Atmospheric Measurement Techniques. Authors show how the measurement of intensity in occultation measurements can be used to derive refraction angles. The paper is lucidly written, but in some cases there are "easy to see"-phrases that I have learned to hate (during my graduate school years). Please, use some more words

to help a reader to see easier how your results have been derived. Anyhow, I would like to recommend this paper for publication in AMT after the following comments are successfully taken into account. Specific comments 1. You should enhance abstract by saying why this new method is better than the measurement of instrument pointing angles.

Two sentences were added in the abstract (see supplement)

2. Sec. 2, line 59: The reference Born and Wolf: year 1950 does not agree the one in references.

Corrected

3. Sec.2: Perhaps you should emphasize more clearly that you assume spherically symmetric situation.

Lines 67-68 were modified

4. Sec. 2, lines 86-87: You assume isothermal exponential atmosphere. How crucial is this assumption to the real life examples later in the article?

This is only an approximation leading to useful analytical results. Numerical integration is performed in the actual data processing.Lines 93-94 and 99-101 were changed

5. Fig. 1: Increase the size of symbols.

Figure and symbol look much better with online AMTD

6. Fig 2: Increase the size of symbols and figure. And show all the symbols you are referring in text!

Figure and symbol look much better with online AMTD

7. Derivation of Eq. (18). Do not be so sparing with words. Tell, for example, that: by calculating the beta angles for upper and lower edges of the Sun we get or something

similar.

Lines 154-156 were added

8. Eq. (19): Provide an estimate of the size of this shift a in realistic case.

This is explicitily given in Table 1

9. Sec. 4.2, lines 237-239: So what is the underlying reason for these oscillations?

Probable instrumental effect (inter-pixel sensitivity). Mentioned in the text.

10. Eq. (34): I do not really understand this result. You must first have optical depth for Rayleigh scattering =(cross s.) x integral (LOS) of the local neutral density. How do you get your result?

Explanation added (lines 264-265).

11. Fig. 5: Can you comment about the large difference between the photometer and the angle measurement results at high altitudes?

I read in the GOMOS requirements that pointing stability/calibration has to be better than 40 microradians peak-to-peak. Biases/offset are certainly possible below 1 microrad.

12. Derivation of Eq. (39). I give up. Please explain again with more words. Improve again the quality of your figure.

OK. Re-worded.

13. Eq. (42). You introduce the sld-function without any formula connecting to G. Do we really need it? Perhaps for a reader it would be more useful to explain physically the limb darkening effect than showing these formulas?

Triangular relation between beta (Eq 13) and theta.Done

14. Sec. 5.2, line 349: Explain what is your empirical straylight removal method.

Done