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## ***Interactive comment on “Deriving polarization properties of desert-reflected solar spectra with PARASOL data” by W. Sun et al.***

**W. Sun et al.**

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This paper develops an algorithm for obtaining the spectral polarization state of solar light from desert with the PARASOL data. Through numerical experiments, concise but meaningful results are summarized. The reviewer recommends the publication to ACP, but the minor points below should be addressed before the publication.

Answer: The authors of this manuscript thank this reviewer for the helpful comments. The manuscript has been revised rigorously following these comments.

1) In Introduction, the importance of polarization correction should be emphasized quantitatively to let readers know the importance of this subject. How about adding some sentences around L15-17 in P8527.

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Answer: This is done. We add "For example, the PARASOL data show that the degree of polarization (DOP) of reflected light from clear-sky desert can be  $\sim 30\%$ . The broad-leaf trees also can reflect solar light with a DOP of  $\sim 70\%$ . For a sensor with a sensitivity-to-polarization factor of only  $\sim 1\%$ , its measurement for light with a DOP of  $\sim 30\%$  and  $\sim 70\%$  will have relative errors of  $\sim 0.3\%$  and  $\sim 0.7\%$ , respectively, solely due to the polarization (Sun and Lukashin, 2013)." in this section.

2) In Method of L17 in P8530, how is the sensitivity of the assumption for 0.02 of the refractive index?

Answer: We add "This assumption of sand's imaginary refractive index could have a small effect on the modeled total reflectance from the desert, but has little effect on the DOP and AOLP calculations." in the text.

3) For typographical point, L11 in P8535, 'Figures 20 to 15', 15 should be 25.

Answer: This is corrected.

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