Review of revised manuscript by S. R. Wilson: Characterisation of j(O1D) at Cape Grim 2000-2005

Main text

The paper should be published after minor revision. Specific comments are given below.

- Page 3, line 8: There is another long-term OH measurement recently reported by Berresheim et al., GEOPHYSICAL RESEARCH LETTERS, VOL. 40, 1659–1663, doi:10.1002/grl.50345, 2013.
- There is a factor μ missing in the right hand side of Eq. 5. The term in brackets should read "$(E-\mu E_0)$"
- Table 2: Replace "Eq. (8)" by "Eq. (7)"
- Caption Fig. 1: The factor of 1.96 is unexplained, 2.0 is mentioned in the text.
- Caption Fig. 5: Use "a.u." instead of "AU" consistently as an acronym.

Appendix

The (new) appendix should be revised. It is very confusing, also because of inconsistencies regarding the use of different symbols, many typos and errors. Specific comments are given below.

- Line 31 and Eq. (2): It is unclear why a lower index "dir" is used here. The lower index should be "0" in accordance with the symbol list in Table 1.
- Eq. (4)-Eq. (6): Again use lower index "0" instead of "dir" and consider using a different upper index indicating "extraterrestrial" to avoid double zero quantities.
- Eq. (5) and Eq. (6): In the denominator replace "λ_r" by "λ", otherwise the formula makes no sense. Moreover, it should be stated here that these extraterrestrial E-ratios are taken from the literature.
- In Eq. (6) -Eq. (8) it is assumed that $f(\theta)$ is no function of wavelength but there is no experimental proof that this is the case. That should be stated explicitly.
- In Eq. (7) and Eq. (8) the variable is not the solar zenith angle but the (viewing) polar angle (e.g. use φ instead of θ) with integration limits $0-\pi/2$ (upper hemisphere).
- Eq. (9) is wrong, it should read $E(\lambda)=E_0(\lambda)\times \cos(\theta) + E_\downarrow(\lambda)$... (see Eq. (4) in the main paper).
- Line 58: "... the uncertainty ... needs to be less than 1%..." I assume that means that it was less than 1%.
- Line 62: Shouldn't that be "$E_0(\lambda_r)$" instead of "S_0"? S_0 is the instrument signal (Table 1, Eq. (1)) while $E_0(\lambda_r)$ is the derived quantity the uncertainty of which is discussed in the following.
- Line 80, 82: Similarly, "E" and "$E_\downarrow$" of Eq. (9) should be discussed here instead of "S" and "$S_\downarrow$".
- Line 86: Again "E_0" instead of "S_0".
- Lines 72-87: Sorry, even after reading this twice I didn't understand how the final uncertainty of 5% for the irradiance measurement was derived. Because the estimate appears to be reasonable based on a 1% uncertainty of the reference sun-photometer, I assume it is correct but it should be explained more clearly.
- Line 90: Why the 5% uncertainty is also covering interpolation errors remains unclear. Certainly, changing cloud cover induced additional scatter.
- Line 91: The quantity $c^{rel}(\lambda)$ should be defined.
- Line 98: Use lower index "RL" as before and in the figure.

- Lines 105, 111, 118, 119, 121 and Table 2: How these error estimates are leading to a combined 12% total uncertainty for F is unclear. The extraterrestrial uncertainty in Table 2 is greater than stated in the text. The 5% in global and diffuse in Table 2 refer to the reference wavelength and are not absolute but with regard to the sun-photometer measurements.
- Line 117: "...the values used in the calculation are for clear skies." In the main paper it is noted that a factor of 1.73, i.e. for cloudy conditions, was used.