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Atmospheric Chemistry and Physics Discussions

Interactive comment on "High levels of ultraviolet radiation observed by ground-based instruments below the 2011 Arctic ozone hole" *by* G. Bernhard et al.

Anonymous Referee #1

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I found the objectivity and rigour of analysis in this paper to be very satisfactory and refreshing. Consequently, the paper gives a rather complete picture the UV effects of the Arctic ozone anomaly in 2011 compared with climatological values, as well as some useful background information on the causes of the ozone anomaly.

Ozone reductions were largest in the period near the vernal equinox, leading to large relative increases in UV. However, because of the large SZAs at this time of year, the absolute changes in UV were small, in contrast to the situation in Antarctic, where minimum ozone values are lower, and these low ozone amounts persist longer.

The careful analysis of the effects of sampling differences between the disparate instrument systems considered was excellent, and showed that were significant errors for some data products. It is interesting to note that the resultant errors were more systematic at some sites than at other sites.

The authors quote a random 2 sigma uncertainty of the single monochromator Brewers used at the Canadian and Finnish site as $\pm$6% (from Fioletov et al., 2004). But, in this application, where UVI values at the time of interest are very small, the most important error budget term is probably the systematic error from stray light. Errors in its determination may dominate the overall uncertainty, and should perhaps be discussed further. However, since the authors are focussing on differences in 2011 compared with other years for similar observing conditions, this is perhaps less important.

Minor Points

Fig 2. The blue points in the left panel of Fig 2 are not visible, probably because they are obscured by the other points. This should perhaps be explained, or the symbol sizes varied so they are not fully obscured.

Fig 2 and in associated text. I would suggest expressing the erythemal dose in SED (where 1 SED = 100 Jm-2 of erythemally weighted UV) rather than the non-standard "CED" that has been introduced.

Fig 3. I suggest changing the y-axis scale of the lowest panel from 150% to 50% (or as small as possible)

Intro, line 25. "Minimum total ozone". I think the word "minimum" should be omitted, or a verb like "occurred" should be added later in the sentence.

Intro, top of P5. I suggest re-ordering the sentence to focus on the ground-based measurements as the subject, and then explain why they are better in this case that satellite-derived values.

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