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Atmospheric Measurement Techniques Discussions



# *Interactive comment on* "Detection of non-linear effects in satellite UV/Vis reflectance spectra: Application to the Ozone Monitoring Instrument" *by* Nick Gorkavyi et al.

**Anonymous Referee #2**

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General comments

The paper "Detection of non-linear effects in satellite UV/Vis reflectance spectra: Application to the Ozone Monitoring Instrument" by Nick Gorkavyi et al addresses the satellite radiance measurements and effects which may degrade the accuracy of these measurements. The authors propose a new method for detection of suspect or erroneous data, which is based on a correlation coefficient between the observed Earthshine radiance and sollar irradiance spectra.

The paper is structured as follows. After Introduction, in Section 2 the authors describe data and methods. This includes description of the Ozone Monitoring Instrument (OMI)



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Discussion paper

in subsection 2.1 and the definition of the new parameter – the Decorrelation Index (DI) which is zero in case of the perfect correlation between the Earth radiance and the irradiance spectra and increases with with increasing deviations between the two. In Section 3 the authors compare detected values of DI with the number of SPW flags for various "problematic areas" like cloud-covered regions, lakes and oceans. Further, orbital and global distribution of the number of affected spectra are reported. The effect of the so-called row anomaly connected to instrumental issues is discussed in Section 3.4. In the discussion Section potential usefulness of the DI method is discussed and possible perspective studies utilizing DI for other space-borne sensors is mentioned.

The paper is clearly written and the subject of the manuscript is of relevance for atmospheric studies, as inaccurate measurements impact retrieval of atmospheric constituents including trace gases (like ozone) or aerosols. The method proposed in the manuscript should be advantageous over existing error detectors (Saturation_Possibility_Warning - SPW Flags) as it is sensitive to any distorsions of the reflectance spectrum, regardless of its cause and provides a range of deviations, not just a binary output. In my opinion the manuscript is suitable for publication in AMT after some issues are clarified.

Specific comments

1. It is not clear to me how in practice the DI coefficient was calculated and how the threshold values for different wavenumber ranges given in Table 1 were established.

2. In figure 1 authors compare DI with the number of SPW flags for a very restricted range in the spectral space (414-424nm). It is not clear why such range was chosen – it is different in Figs. 2 and 3.

3. According to table 1 on page 5, DI thresholds for damaged spectra depend on the spectral region and vary considerably (by two orders of magnitude). On the other hand, in figures 2,3,5,6 only the actual value of DI is plotted. It is therefore difficult to say how much DI exceeds the threshold. I suppose it would be better to divide the actual value





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of DI by the threshold value for the particular spectral range to better illustrate the degree of deviations.

4. In the introduction the authors address two different effects which may deteriorate measurement data: saturation and blooming. After reading description on page 2 it is not clear to me how to differentiate in practice between the effect of the two. In both cases, as the authors write, flow of excessive electrons to neighboring pixels occurs.

Technical corrections:

R1: the shortcut OMI is first used in line 20 but introduced later in line 22

R2: Shortcut CCD is first used in line 46 but introduced later in line 66

R3: line 94 “orbit orbit...13:45..” the word is written twice and there is a double dot at the end of the sentence

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