Atmospheric
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comment

# *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.

**Nick Gorkavyi et al.**

nick.gorkavyi@ssaihq.com

We thank the reviewer for their time and effort reviewing this manuscript and for providing helpful and constructive comments that have helped to improve the manuscript.

RC1: "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."

AC1: The equation for the Decorrelation Index (DI) is written in 2.2. The DI is a mathematically strictly calculated parameter, and the threshold is only a rough estimate. We have added relevant clarifications to the text of the article:

"The provisional (the user may redefine the values using the auxiliary data provided in the OMI DI product) DI thresholds were determined as follows. We used all available, mission-long OMI UV2 and Vis radiances. For each orbit and for every spectral window we constructed DI histograms. Then we selected numerous cases sampling the tails of the DI histograms. On a case-by-case basis, for different scenes and spectral windows, we found empirically the lowest-DI values that repeatedly separate the scenes with apparently normal (spectrally smooth, with the fine-structure, low-amplitude Raman-scattering features) and distorted reflectances. These DI thresholds approximately correspond to 99.995-99.998 percentiles in the DI distributions. We plan to provide a statistically rigorous threshold definition in the improved DI version".

RC2: "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."

AC2: DI for 14 spectral intervals of ∼10 nm are calculated in the Vis range of 350-498 nanometers. The behavior of the DI in each interval has its own characteristics. In Fig. 1, we showed the spatial dependence of the DI for one interval, which has a significant sensitivity to changes in the spectrum, in Fig. 2 - spectral dependence of the DI for several intervals, in Fig. 3 - spectral dependence of the DI for the entire Vis area.

RC3: "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 of DI by the threshold value for the particular spectral range to better illustrate the degree of deviations."

AC3: Figures 2,3,5,6 show real DI, which mathematically strictly show the correlation between the terrestrial and solar spectrum. The thresholds that are set in Table 2 are very rough estimates. If we divide the exact result by an approximate factor, which

C2

varies greatly from interval to interval, we make it difficult to quantitatively interpret the picture.

RC4: "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."

AC4: An improved version of the explanation for both effects is now as follows:

"Saturation occurs when bright light causes the number of electrons in a sensor pixel to exceed either the maximum charge capacity of an individual charge-coupled device (CCD) photodiode, or the maximum charge transfer capacity of the sensor. A blooming effect occurs when electrons from a highly illuminated pixel of the CCD matrix jump to a neighboring pixel, causing distortion of its signal."

Technical corrections: RC5: "the shortcut OMI is first used in line 20 but introduced later in line 22"

AC5: The introducing the shortcut OMI has been moved to where it was first mentioned.

RC6: "Shortcut CCD is first used in line 46 but introduced later in line 66"

AC6: The introducing the shortcut CCD has been moved to where it was first mentioned.

RC7: "line 94 "orbit orbit...13:45.." the word is written twice and there is a double dot at the end of the sentence"

AC7: All typos have been corrected.

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