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Comment on essd-2021-191

Anonymous Referee #1

Referee comment on "The OH (3-1) nightglow volume emission rate retrieved from OSIRIS measurements: 2001 to 2015" by Anqi Li et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2021-191-RC1, 2021

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Title: The OH (3-1) nightglow volume emission rate retrieved from OSIRIS measurements: 2001 to 2015
by
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This work presents a valuable data set of the nighttime 1.53 µm OH(3-1) emission observations measured for more than 15 years (2001-2015) by the infrared imager (IRI) aboard the Odin satellite. Information about volume emission rate (VER) profile of the OH emission layer, peak height and peak intensity are retrieved from the limb radiances measured.
I am sure that this set of data will help to improve the knowledge of OH emission global behaviour.

On the other hand the paper is clear, well written, and the figures and tables help to clarify the paper.

General remarks:

Satellite measurements have a global spatial coverage and produce very important global information. In this sense this set of IRI measurements together the obtained in a similar temporal interval by SABER, will help to study globally OH emission behaviour.
In the paper there is a brief comment (lines 19-20) about ground-based

observations that reflects that they, certainly, do not have vertical resolution. However I would like the relevance of ground-based observations to be pointed out in the paper. Due to their high sampling frequency and temporal coverage at their locations, there are important long data sets of ground-based OH observations that are producing important information about the behaviour of OH emissions. This deserves be mentioned.
Reisin and Scheer (2017) have showed an interesting comparison between ground-based and satellite airglow measurements. The authors address a difference in SABER temperatures while the satellite overpasses at El Leoncito (from the East or from the West) by comparing SABER data to those they found in their Argentine Airglow Spectrometer (AAS) ground-based data, explaining these differences as result of both: the large amplitude of the semidiurnal tide and the differences in the temporal sampling of SABER. Hopefully, satellite and ground-based data sets used together will help to improve our knowledge about OH emission behaviour.

In the description of the Data products, the Figure 6 is the one that best explains the retrieved VER profiles from IRI data and the modelled OH airglow layer characteristics. This figure shows a typical VER profile retrieved from orbit 10122. Large uncertainties can be seen from 60-79 km that can reach values of 25-50 1e3 photons cm-3s-1 (50% of the peak emission value) and above 89 km can reach values of about 25 1e3 photons cm-3 s-1 (25% of the peak emission value).
On the other hand the IRI retrieved profile reaches the emission peak at height at least 2 points lower (in the figure) than the modelled Gaussian profile (that means 2-3 km lower). These errors in the retrieved and modelled VER profile should be quantified and discussed.

In data screening recommendations, I am afraid I am far from the field and I do not understand the general rule of values lower than 0.8 (of what? from peak values? from measurement response?). Could this be rewritten in more detail?

Section 4 provides a demonstration of the consistency of the IRI OH data. IRI OH seasonal variability is compared with the obtained in other studies (Shepherd et al., 2006; Gao et al-, 2010; Sheese et al-, 2014; Teiser and von Savigny (2017), however I notice that the work of Garcia-Comas et al., 2017 is missed. This work uses OH SABER data to analyse the variability of OH emission, OH rotational temperature and altitude of the OH layer at mid-latitudes. It would be interesting to compare the results obtained from IRI with those obtained from SABER at mid-latitudes.