

Response to the comments on the paper by Referee 1

**Greenhouse gas effects on the solar cycle response of water vapour and noctilucent clouds**

By Ashique Vellalassery<sup>1</sup>, Gerd Baumgarten<sup>1</sup>, Mykhaylo Grygalashvyly<sup>1</sup>, and Franz-Josef Lübken<sup>1</sup>

Dear Referee.

We appreciate the constructive comments and positive judgment on our paper. Your comments have been carefully considered and taken into account in the preparation of the revised version of our manuscript.

In the following, we address the reviewer's comments point by point.

1. p. 2, lines 27-28: This sentence partially duplicates the sentence on lines 22-24.

We deleted the sentence

2. p. 2, lines 32-34: This sentence partially duplicates the statements on lines 17-20.

We deleted the sentence

3. p. 6, line 135: Are these data taken from the LASP Interactive Solar Irradiance Data Center (LISIRD)?

Yes, this data comes from LASP. We have now added brief information about this source in lines 136-137 (revised version)

*“LIMA and MIMAS use daily Ly $\alpha$  fluxes taken from the LASP Interactive Solar Irradiance Data Center (LISIRD) as a proxy for solar activity from 1961 to 2019 (Machol et al. 2019).”*

4. p. 14, lines 335-338: The current solar cycle (Cycle 25) has already reached higher Lyman alpha irradiance values than the peak of Cycle 24, and is not expected to reach its maximum until 2025. You may wish to comment briefly on possible NLC and H<sub>2</sub>O behavior during the next few years compared to previous solar cycles, since greenhouse gas concentrations continue to increase.

Now we add a brief explanation about the possible behavior of NLC and H<sub>2</sub>O in the next few years compared to previous solar cycles (lines 353-355 of the revised version)

*“Due to the increased solar Ly $\alpha$  flux and greenhouse gases, the NLC and water vapour response is expected to increase during the current solar cycle 25, as the Ly $\alpha$  radiance has already exceeded the peak value of the previous solar cycle 24”.*

5. p. 17, line 435: There are no locations listed for data availability.

Now we have added the location of the presented data in lines 476-477 (revised version)

All typos have been corrected according to your suggestions.

Other changes relate to the recommendations and requests of the other reviewers.

Thank you for taking the time to review our manuscript.

With respect.

Ashique Vellalassery, Gerd Baumgarten, Mykhaylo Grygalashvyly, and Franz-Josef Lübken