

## ***Interactive comment on “Total column water vapor retrieval for GOME-2 visible blue observations” by Ka Lok Chan et al.***

**Anonymous Referee #3**

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The manuscript presents a new total column water vapor retrieval algorithm in the visible blue spectral band for the GOME-2 satellite instruments. The blue band algorithm has an advantage over the traditional red band algorithm that allows retrieval of water vapor from sensors which do not cover longer wavelengths, such as OMI and TROPOMI. One of the new features of the algorithm is the dynamic optimization of the a priori water vapor profile, which make use of the fact that the vertical distribution of water vapor is strongly correlated with the total columns. So the retrieval does not depend on a priori information from model forecast and better suit for climate study. This paper presented a novel method to retrieve TCWV from satellite observations. Overall, the objective of the study is clear, and the results are validated properly. The presentation of the paper is well structured and easy to follow. Therefore, I suggest

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publishing the paper after clarifying the minor issues listed below.

1) Please add a summary of the evaluation strategy in section 2 describing why these data are used. 2) The Level 1 data issue is still not clear to me, usually satellite measurement quality is decaying over time, why the data after 2015 is fine but the data before 2015 is contaminated? Is there any recalibration done in 2015? If the recalibration improves the data quality, will there be any reprocessing? 3) The error due to surface albedo listed in table 3 is 3%, while the bias over vegetation, e.g., Amazon and Central Africa, seems to be much larger. Please clarify. 4) Why the absorption cross section of NO<sub>2</sub> is not ~290k 5) Some of the references are inconsistency in format.

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