

Referee Report to “Solar occultation measurement of mesospheric ozone by SAGE III/ISS: Impact of variations along the line of sight caused by photochemistry” by Murali Natarajan et al.

The manuscript investigates the influence of the diurnal variation of the mesospheric ozone on the retrievals from SAGE III/ISS measurements and suggests a correction algorithm to account for the diurnal variation in the retrieval of the vertical profiles of the mesospheric ozone. The topic of the manuscript is certainly interesting and has a scientific importance. In general the manuscript is written clearly and concise. A great disappointment for me, however, is the fact that the authors did not make any attempt to compare their results to any independent measurements. A significant difference between the standard retrievals and those corrected for the diurnal variation of ozone is found but the reader is forced to believe that the new results are better and the implementation of the correction scheme is correct. In my opinion, some comparisons with independent measurements need to be added before the manuscript can be published.

Minor comments

- Line 39: “longer path length” - longer in comparison to what?
- Line 99: “in this altitude” - please specify the altitude more precise
- Lines 99–102: It is not quite clear how the discussion about the odd oxygen is related to ozone, please clarify.
- Lines 103–105: “At higher altitudes...” - this sentence provides no useful information. Please either delete this sentence or be more specific with respect to altitudes and diurnal behavior.
- Line 129: Please spell out “LaRC”
- Line 133: “positive direction ...” - please provide this information also in figure caption
- Line 134: here and below it is more appropriate to use the term “solar zenith angle” instead of “zenith angle”, although I agree it is the same for the occultation geometry.
- Lines 346–350: The discussion about dynamical issues is out of place here. It was not mentioned in the paper and thus should not occur in the summary.
- Figure 1: In the light of the discussion in the manuscript, the figure needs a second x-axis showing the solar zenith angle.

Technical corrections

- Lines 25-26: “...the impact of the twilight variations is to increase the optical depth...”
- maybe you meant “corrections” rather than “variations”.
- Line 138: “is readily seen” → “are readily seen”