Response to comments of Reviewer-1

Overall Comment: The paper presents new observations of ozone over the East Antarctic Bharati station and interprets them in terms of stratospheric-tropospheric transport using a chemistry-climate model and trajectories back from soundings. It will be of interest to readers who expect to see the data online.

Response: We thank the reviewer for constructive comments, which have helped us to improve the manuscript significantly. The manuscript has been revised by addressing all the comments. Point-by-point responses to the comments are given below in blue fonts. The discussion added/updated in the manuscript is presented by red text.

Main recommendation: post the ozonesonde data- have you sent this to woudc.org and registered the site with them? Your institutional link should be a primary location but the ozone profile user community will look for the data at woudc.org. Thank you.

Response: To place the data on woudc.org, GAW ID for the station need to be created after the activation of registration, which needs recommendation by the National Focal Point. We have applied but the registration could not be activated yet. We will send the ozonesonde data to woudc.org as soon as the registration gets active. Nevertheless, all data has been made available on our institutional website.

Minor Comments:

Comment 1: Although this reference is not new, it includes examples of chemical processes at the snow-ice interface that could be relevant to your study: Biogeochemical Cycles and Ice Cores, NATO ASI Series I-30, ed. R. J. Delmas. ISBN 3642511740; ISBN-13 978-3642511745. Did you consider gases interacting with ozone that may come from snow-pack during the summer?

Response 1: We have incorporated snow-air interaction in the simulation. We further improved the simulation with corrected background lighting NO_X and by including bromine emission through snow-air interactions, and therefore we revised all the figures. Since the results did not change significantly, there is no change in conclusions or discussions.

Comment 2: Lines 280-286 – Vague. How would blizzards, etc, affect the observations? You imply model improvements need to be made to give a more accurate simulation. Be more specific.

Response 2: We intend to say that global models have limitation in simulating extreme events like blizzards due to application of generalised global schemes of parameterisation and coarse grid resolution (in this case 1 ° ×1 °). Depletion of surface ozone is observed over Antarctica during blizzards because blowing snow is a source of sea salt aerosol and subsequently bromine (Jones et al., 2009; Ali et al., 2017). Therefore, if such events are not well captured, it is likely that model could show mismatch with observations. To clarify, following statement is included in the revised manuscript.

Lines 295–298: Note that depletion of surface ozone was observed over Antarctica during blizzards as blowing snow, which is a source of sea salt aerosols and subsequently bromine, could deplete ozone (Jones et al., 2009; Ali et al., 2017).

Comment 3: Lines 505-510. The R for Syowa disagreement suggests that the model is not doing well in winter at al. What does this mean? Reasons?

Response 3: Yes, model in its present configuration (section 2.2) shows limitation in capturing the observed variability at Syowa. The reasons for such discrepancies are not fully understood, and detailed study with more winter time observations and simulation would be needed to find the reasons for model's wintertime limitation and possible improvement in the model. This is mentioned explicitly in the revised manuscript.

Lines 528-530: Further studies are needed to understand and rectify the factors causing greater bias in the model during winter.