

**Review of “Observations of iodine monoxide over three summers at the Indian Antarctic bases, Bharati and Maitri” by Mahajan et al.**

Mahajan et al present a revised version of their manuscript on IO observations at two Indian stations located in East Antarctica over three summers. The manuscript has improved with additional literature and clarifications of the data. I have remaining questions regarding my previous review and additional suggestions. The original reviewer comment is in italic grey and the new comments are in blue.

*Figure 8 seems to show one randomly chosen scan of IO vertical profile for each campaign. It is not very clear whether this one selected vertical profile or all the profiles for the whole campaign is what is being compared to previous observations at the Neumayer station and the Weddell sea. This should be clarified. Also, in Figure 8, it would be more helpful to show all the valid vertical profile scans for all four campaigns with a median (or mean) with standard deviations of both the vertical profiles and the surface.*

If possible, it is encouraged to include a campaign average and stdev of the valid scans in the supporting information. It would be helpful to include this to understand the general range of the profiles during the campaign. In Ln 309-311, you mention that maximum IO mixing ratios were observed near 400m with a decrease above this. Does 400m correspond to a typical boundary layer height in this region? If so, please include this in the discussion.

In Ln 315-317, you mention that most models predict a strong IO gradient as the main source is from the surface within the model. Also, in Ln 422-423, a conclusion of “The vertical profiles confirmed past hypothesis of a source from the ground considering a sharp gradient” is made. However, Figure 8 seems like the IO is actually decreasing below ~ 400m towards the surface. Was this trend also observed in other valid vertical profile measurements of IO? It would be interesting to include a discussion of the possible explanations of the decrease in observed IO levels below the boundary layer towards the surface. As it is difficult to see the vertical profiles of IO close to the surface, it is suggested to include a graph similar to Figure 8 but with altitude < 1km in the supporting information.

*Figure 1 Add Dumont d’urville station in the figure and include references for each of the locations that previously reported IO.*

The references for each of the locations are still not added. Please add these in the figure caption.

*Figure 2 is difficult to see since there are too many trajectories overlapping. A wider time resolution (e.g., 6 h or 12h) should be sufficient rather than trajectories every hour for the entire three summers.*

Based on the back trajectories in Figure 2, I'm surprised that there's very few airmasses (red dots in Fig. S10) that are categorized ‘ocean airmass’ as described in Ln 407-413. For example,

during ISEA-35 at Bharati, airmasses are coming from all directions including the ocean. Could you add more details on how the categorization was made based on the back trajectories? In Fig. S10, as it is difficult to see which observation profile corresponds to each type of airmass, it is suggested to just add the airmass category (red dots) for the valid profiles.

*Figure 3 Add frequency of each data (e.g., 5 min averaged?). It is difficult to interpret the wind directions and speeds during ISEA-35 and ISEA-36 since there are many days with two lines overlapping too much. One option might be smoothing it out by averaging and having one parameter as a marker (e.g., wind speed) and the other color coding (e.g., wind direction) the markers. Same with temperature and humidity, it might be easier to interpret the data if the y-axis scale is adjusted so that the two line (orange and black) don't overlap too much.*

Then as the graph is difficult to see, it is recommended to add another row of graphs and separate wind speed and wind direction. Also, please Include time zone in the x axis (or top of each graph) for all the figures including figures 3, 4,5,6,7,8, S2, S3, S4, S5,S6,S7.

**Additional Specific Comments:**

(Ln 70) Please specify what the measured iodocarbons weren't able to explain high levels of. Was it IO/I<sub>2</sub>?

(Ln 94) Please specify what measurement technique was used for the vertical profile of IO.

(Ln 96) Please specify what the detection limit and uncertainty of IO was for the cited study.

(Ln 164) suggested to use 'large' SZA rather than 'high' SZA throughout the manuscript.

(Ln 183) change to "...the estimated value ranged between.."

(Ln 198) "using the" is used twice

(Ln 279) Just to clarify, the range is for <30m? Please include the average and standard deviation.

(Ln 348) " .. shown to peak.."