

Dear Editor,

We thank the reviewer for the time he/she has spent on our manuscript.

In reply to the reviewer's we have made the following changes, which helped improving the presentation of our results.

1. *about the extra more recent INP measurements*, we have now added the data from Welti et al 2020 including ACAPEX, NETCARE, CAPRICORN. Figure 10 and supplementary figures S7 and Figure S1 have been redrawn including these data. Table S1 has been also updated.

2. *Uncertainties in observations*: The differences of magnitude between the earlier and the most recent observations is now mentioned in the manuscript at the end of the first paragraph of section 3.2.3 where Figure 10 is discussed in lines 671-675 of the revised manuscript:

Note also that the climatological data by Bigg (1973, 1990), although very useful due to their geographic coverage, they are by about 2-3 orders of magnitude higher than recent observations made closer to the period simulated in our study (i.e. McCluskey et al. (2018), Tatzelt et al. (2022), Moore et al. (2024)). This difference has to be kept in mind when comparing model results with past observations.

3. *Statistics in Figure 10*: Figure 10 has been redrawn to include both the additional observations and the normalized mean bias. Similarly Figure S7 has been redrawn and the same statistics are provided. The statistics provided in section 3.2.3 have been updated accordingly and modified normalized mean bias (mnMB) values are now discussed.

4. *Duplications in section 2.3.2, last two paragraphs of that section in the earlier manuscript*: Lines 709-715 of the earlier manuscript, all this paragraph has been changed as follows and merged with the last paragraph of the section:

The discussion on the overprediction of INP by the PBAP parameterization has been moved earlier together with the reference to figure S7, which supports such conclusion. (lines 708-710 of the revised manuscript).

The next two sentences have been removed to avoid duplications and in the last paragraph a comment on the need for improved representation of INP of biological origin has been added.

Lines 732-734 of the revised version: Without improved representations of the sources and ice-nucleating activities of biological INP, models will struggle to simulate total INP concentrations at warmer temperatures and the resulting MPC.

The small typos in the supplement have been corrected.

All the above changes have improved the presentation of our results but did not alter the conclusions of the work.

Finally, we took note of the *recommendation of the reviewer* for a sensitivity study in a future article, which we will try to implement indeed in a future study.

Furthermore, Figure S3 haas been redrawn for clarity.

We hope that with these changes our manuscript is now suitable for publication in ACP.

Maria Kanakidou on the behalf of the co-authors