

Dear Editor,

Thank you for accepting our manuscript for final publication, and also for giving a chance to respond to Reviewer 2's comments. We have attempted to address the comments by the reviewer and incorporated associated modifications in the manuscript.

Reviewer comments (in black font) and Authors' responses (in blue regular font) are given below. Texts in the manuscript are given in *blue italic font*.

Response to Reviewer 2 comments

Reviewer: I thank the authors for revising the manuscript by taking in to account most of my comments and those from the other reviewer. The article has improved, but I am still not fully satisfied with the explanation that global model intercomparison should be here and attribution of the simulation differences basically to some sort of representation error, per se, as addressed in this study which arise from model grid resolution. Models differ due to prior fluxes (note that no inversion actually have used data over India), transport uncertainty and resolution representation error. You are still not able to compare your model simulations with the global model results. But I believe this paper could be published as it highlight one of persisting problem in atmospheric modelling studies.

All Authors: Thank you for reviewing our revised manuscript and appreciating the relevance of our study. We wish to keep the global model intercomparison results and discussion in the manuscript for the following reasons:

We agree that the mismatch among the existing global model simulations can be due to differences in prior fluxes, transport, model configuration, and resolution. The above reasoning sets our rationale to quantify the inter-model errors at a monthly or annual scale, indicating the current knowledge gap that impacts the inverse estimation of CO₂ fluxes over India. Since some of these inter-model mismatches can arise due to unaccounted representation errors, we further quantified and compared the mismatches with the possible representation error in global model simulations with 1° × 1° resolution over the Indian domain. The comparison shows that the estimated representation errors are significant, which need to be addressed (please see: L657-660: “*For instance, we find that the unresolved ... models (~1 ppm).*”). We also acknowledge that a mere agreement among the coarse models does not mean good models' performance due to the model errors in common and interdependency in terms of data sources (Please see: L392-394: “*Note that a mere ... data sources.*”).

We have modified the manuscript as follows for more clarity.

L135-138: “*These inter-model mismatches arise due to various reasons such as differences in input datasets (e.g. prior fluxes), transport and model configuration. A part of these mismatches can also arise due to the inability of coarse resolution global models to simulate the sub-grid scale processes that can lead to representation errors.*”