Dear Editor,

We appreciate for your time reviewing this paper and all your comments and suggestions. Here are our responses point by point in blue.

Comments to the author:

Perhaps, you did not recognise the essence of my comment regarding Figure 5. I do understand that Figure 5 and 6 show different data. I, however, cannot accept showing 12 plots each of which presents 13 *identical* stacked bars, this is nonsensical. You may state in the manuscript text that results for different sensitivity simulations are negligibly different. And the remaining data for *orig* simulation can be grouped into three plots by species, each including all seasons.

We fully recognized the essence of the Editor's comment dated 11/10/2022 "Variations between data shown in each plot are impossible to judge and bear no useful information". No doubt Figure 5 shows pretty much 13 "identical" stacked bars in all 12 different sub-plots. In this work, we reduced the precision in the emission input (the A0n cases) as well as the output (the A0nFX0m cases). You might argue that this is very similar to emission reduction sensitivity study. However, nature is quite different. We manipulated the digits in the data not changing the values in the file explicitly by a giving percentage/value. I believe we are the first one to manipulate the data in this way in the air quality modeling study. Surely researchers, regulators particularly, are very concerned about the impact of this new way of changing emission data on model performance. We followed a traditional approach to analyze data by comparing model results with observations. Figure 4 showed the model performance (12 cases with the difference between the orig case) with all available observations. We then kind of zoom in different regions as well as seasons to examine the model performance (again with all 12 cases). Thirteen "identical" stacked bars were plotted. The results showed no significant difference when our approach of manipulating the data was used. That is the exact message we want to show to the readers and eliminate their concerns. By showing Figure 5, we believe it is more powerful and convincing than the sentence "results for different sensitivity simulations are negligibly different" since this is a brand-new way of manipulating data. In addition, we are not dealing with sensitivity in the traditional way.

Perhaps, there is a plotting error in Figure 5? Or please explain me which sensible information (except that sensitivity simulations insignificantly differ from *orig*) I receive by looking at 13 identical stacked bars in each plot.

In this research, we proposed a new technique to reduce the precision of data (input and/or output) which improved data compression with typical tools (gzip and bzip2) substantially. The rest of this article provided proofs that reduced-precision data did not affect model performance significantly. First, we followed the traditional method by comparing model output with observations (heavily been used in the model evaluation community). We chose to examine three different components: daily PM2.5, MDA8 O3, and two-week averaged NH3, with different statistical metrics for the entire 2016. We formed the difference between 12 reduced-precision cases and the orig case and represented in Figure 4. Next, we did one step further by comparing

model output against observation (all 12 cases and the orig case) from regional and seasonal perspective and again this technique is being wildly used in model evaluation process. The result was presented in Figure 5. All 13 stacked bars were “identical” provides a powerful and convincing message that these reduced-precision cases performed very much like the orig case. We prefer the current format in Figure 5 with actual model performance, rather than showing the difference with respect to the orig case (relative sense). Furthermore, in the simulation domain, there are over 137,000 spatial grid cells and observations stations reside in a fraction of those grid cells. We then expanded our analysis by comparing all the grid cells (model to model or grid-grid) between those 12 cases and the orig case. Figure 6 gives reader a boarder sense of the model performance with our new proposed technique. These three figures seemed to show the same thing, but they provided a powerful and convincing argument that the reduced-precision cases behavioured “identical” to the orig case from different perspectives. I hope you, the Editor, can appreciate our approach of providing evidence to convince readers that our new and unique reduced-precision technique does not affect model performance significantly.