

We appreciate reviewer #2 for giving valuable comments. We respond to each specific comments below and indicate what changes we have made in the manuscript. The comments and questions from the referee are in blue and italic font.

*Page 11, Line 25: Temporal correlation coefficients in Tables 3 & 4 are similar to the spatial coefficients in Table 2? Do you mean the pattern is similar? In general, I think it would be good to add the number of points used in the correlation coefficients for the different tables. This would help interpret the r values and also clarify what they are based on.*

Thank you for pointing out the comparison. It is a typo here. We intend to show the temporal correlation coefficients in table 3 over urban area are comparable with the temporal correlation coefficients in table 1. The sentence should be that “The correlation coefficients are similar between the total emissions over land (Table 1) and over urban areas (Table 3).”

In table 3 and 4, for the temporal correlation coefficient, the calculations are based on the monthly emissions of the year 2008, which are only 12 numbers. In table 1, we use monthly emissions from 2008 to 2010, therefore, the correlation coefficients are calculated based on 36 numbers. The analysis of Table 3 and 4 is an example to show that the uncertainties are larger over rural areas, not only on the spatial distribution but also on the temporal changes. We included the number of points that the R-values are based on in the table caption.

*Table 3 & 4: If I understood correctly, these are based on 12 data points similar to those in Fig. 6? I think Fig. 6 could be expanded to show total emissions for Urban areas (panel b) and Rural areas (panel c), keeping panel a as it is.*

The seasonality showed in Figure 6 is averaged based on the time period of each inventories. This has been described on Page 9 Line 11. The temporal correlation coefficients in Table 3 and 4 calculated for urban and rural areas are based on year 2008. This analysis is an example to show that the uncertainties are larger over rural areas, not only on the spatial distribution but also on the temporal changes. The distinction between rural and urban grid cells is much later introduced in the paper than Figure 6. We would like to keep this sequence and add this discussion in section 3.2 on page 11 line 2:

“ The seasonal cycle of the urban grid cells are quite similar to the one shown in Figure 6 for all of mainland China. However, the seasonal cycle for the rural grid cells have a much stronger summer maximum for the inventories that include biogenic emissions.”

*The three bullet points in the conclusions seem a little disconnected from the body of the paper. It may be useful to add some discussion of how the present study relates to the expected products of the GEMS sensor on GEO-KOMPSAT-2B.*

We have added some discussion about how the future missions of satellite observations affect the present study at the end of the paper.

“The satellite-derived approach can be further improved following the development of satellite instruments, like TROPOMI on Sentinel 5p and later the GEMS sensor on the geostationary GEO-KOMPSAT-2B. With higher spatial resolution of observations, more accurate emission over different land use categories can be obtained. GEMS will provide observations with high temporal and spatial resolution, which enables the improvement of diurnal cycles for emission estimates.”

*Technical comments: Fig 5: The labels are not legible (remove lat/lon, increase font size for title and colorbar, label colorbar on right).*

We have changed it based on the suggestion.

*Table 2 caption: China should be capitalized.*

We have changed it.