

Comments

Overall comment: The authors have improved the MS significantly, especially the monitoring data analysis and interpretation. The major uncertainty however still remains with the modeling part and it was, as pointed out by the authors, mainly due to the emission input data.

Major comments:

- It is not clear how authors extracted/projected the emission provided by EDGAR-HTAP_v2 for the simulation period and how the emissions were segregated temporally (hourly, daily etc.) for the simulation.
- One of the reason of the discrepancy between the modeled and monitored levels is the point-based monitoring as compared to model produced grid average values. However, the model significantly underestimated all species, especially PM. Even CO levels were not reasonably produced as shown in Figure 6, the two events were not reproduced that well (as stated in line 509) as the modeling results appear to be fluctuating continuously during the period.
- Why modeled PM levels are not presented in Figure 6? It is suggested that authors include scatter plots to show the relationship between the monitoring and modeling results for each species in Figure 6. Due to the uncertainty in the model output, all the results and discussion based on the model results may be questionable, i.e. those discussed in Section 3.3.2 (line 524).
- Section 2.3: provide the reasons why this particular model was selected, i.e. if it performs better than other models for the region etc., and how the emission input data was prepared for the modeling period.
- Section 3.1: WRF overestimated temperature and wind speed, underestimated precipitation and RH. Common statistical measures should be used to assess the model performance. For wind direction, because of the circular scale of the measurements (near 0 and near 360 degrees are almost the same) the interpretation of the time series should be made with caution or should be avoided. The comparison should be made for different wind sectors or simply by comparing the modelled windroses with the observed windroses to be presented along in Figure 4.

Suggestion: Since the purpose of using WRF-STEM model was "...to understand pollution source region as well as the contribution of open biomass burning to air quality in Lumbini..." as stated in lines 126-127, it is suggested that authors can use alternative ways of the data analysis to achieve the same aims. For example, analysis of wind field (such as Figure 5) or HYSPLIT trajectories and source locations (hotspots, urban etc.) to show the potential of regional transport of the biomass smoke to the site.

Minor comments:

- Line 180: remove word "dust" because not only dust particles but all the particles
- Line 387: the air pollution levels may not be the right/only criteria to classify an area into semi-urban or rural etc. Please rephrase.
- Line 449: too long a sentence. Please improve the written language.
- Line 617: the content above shows important influence from open burning but the discussion in this section seems to be biased toward residential cooking.