

## ***Interactive comment on “Simulations of Black Carbon Over Indian Region: Improvements and Implications of Diurnality in Emissions” by Gaurav Govardhan et al.***

### **Anonymous Referee #1**

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Review of the paper “ Simulations of Black Carbon over Indian Region: Improvements and implications of diurnality in Emissions’ by Gaurav Govardhan et al. In this paper, the authors examine the simulations of Black carbon over the Indian region using WRF-Chem model by additionally introducing diurnality in emissions from sources over the Indian region. The simulations thus made are better than the control runs. Since black carbon simulations and predictions are very important over the Indian region, this kind of sensitivity studies are very important. The previous studies have shown that the models underestimate the concentrations of black carbon over the Indian region. By introducing the diurnal variation of black carbon emissions, the authors find that the overall model simulations, especially the diurnal characteristics has improved. I rec-

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ommend the present paper to be considered for publication after the authors make a revision. My detailed comments are given below: 1) I am not convinced how the scaling factor for diurnal emissions has been arrived at, that too an average factor for the whole country. Is this factor based on real observations? Why the authors did not consider the regional variations to bring better results? 2) What is the purpose of additionally doing one more simulation by multiplying a factor of 3? It is obvious that such simulations will improve the black carbon concentrations. In the conclusions, those results are not mentioned. It is an academic interest and does not add to any new knowledge. I suggest those results may be excluded from this paper. 3) In Fig 3, the scales (X and Y) are not symmetric. Put the same intervals and range and then plot a 450 line to show that red dots have improved in slope. 4) The statistical analyses (correlations and differences) always should be tested for statistical significance. 5) The study clearly brings out that there are large uncertainties in the emission inventories over the Indian region. Therefore, the future efforts should be made to improve the emission inventories of black carbon over the region. This kind of studies only are of academic interest, that too by considering one average diurnal profile of scaling factor for the whole India.

Recommendations: Revision

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