

Interactive comment on “A regional chemical transport modeling to identify the influences of biomass burning during 2006 BASE-ASIA” by J. S. Fu et al.

Anonymous Referee #2

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General comment:

This manuscript tries to show the influence of biomass burning in Southeast Asia on the air quality in both source and downwind regions by using regional chemical transport model for the spring in 2006. I agree with the importance to estimate the impact of Southeast Asian biomass burning on the air quality outside the source region. The authors calculate the biomass-burning-related contribution on CO, O₃, and PM_{2.5} by performing two model experiments with and without biomass burning emission in Southeast Asia and taking the difference of both experiments. The method is not novel but adequate for the purpose of this study. The purpose and the methodology of this

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study seem to be plausible, but I don't think the manuscript as it stands is suitable for the publication in ACP. My biggest concern is obscure descriptions found in many places in the manuscript, which seriously degrade the value of the manuscript. The authors should carefully clarify those descriptions.

Specific Comments:

Abstract (P3072 L7), Concentrations of which altitude? surface? please clarify.

Abstract (P3072 L8-13), Please clarify how those values are deduced. Are those values the monthly means or based on the analysis of either episode?

Abstract (P3072 L14), What is “an impact pattern”?

Abstract (P3072 L18), Is there “strong” upward tendency in the concentrations of CO, O₃ and PM in the source region? At P3090 L3-4, the manuscript described that the concentration gradient was very small or had an increasing trend from the surface to high altitude. For me, this description and “strong” upward tendency are inconsistent.

Abstract (P3072 L19-21), What is the contribution of subsidence? The values in this sentence can be found in section 4.4 (P3090 L15-17), but in this part, the values are contribution of long-range transport. Do you mean the same thing?

Abstract (P3072 L23-24), Why you can say this is lower limit? Show the reason.

P3074 L9, Where did those studies show the springtime high O₃ events?

P3075 L22 – P3076 L2, This sentence is quite difficult to understand for readers unfamiliar to WRF/CMAQ system. Remove it if unnecessary or at least rephrase it.

P3075 L3-4, Which domain does Figure 1 show? Please mention it in the caption of Fig1.

P3077 L13-15, Please explain in more detail how to interpolate GFED data by using FLAMBE data. In particular, how do you treat such case as there is GFED emission

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but is not FLAMBE emission?

Section 2.3.3, The title of this section seems no to fit. How about “Injection height of biomass burning emission”? The wording of “inject height” and “injection height” should be unified.

Section 3.2, Why do you pick up only Lulin site here? The data at Lulin is only shown in supplemental figures, and in those figures, the data at 4 sites in Hong Kong also shown. I recommend adding some descriptions on Hong Kong sites here or moving all this section to supplemental material.

P3082 L7, Underestimation of 450 ppbv seems to be overstated.

P3083, L5, In Section 2.3.3, there are no concrete descriptions about the two ways of emission allocation mentioned in the following sentence. In Section 2.3.3, the author mentioned SMOKE 2.6 was used in this study. Please clarify the relationship between SMOKE 2.6 and the SURFACE and INJECT methods.

P3083, L9-17, These sentences are too complicated to understand. First of all, the definitions of 4 statistics (MNB, MNE, MFB, and MFE) must be show somewhere in the manuscript. Please unify the wording for those statistics in the manuscript and in the Figures (Fig 2 and figures in the supplement). What is the meaning of “cutoff” here, and why the values of cutoff for MNB and MNE are in ppbv, since the unit for MNB and MNE must be %? The description about the threshold starting from L13 is incomprehensible. Why do MFB and MFE abruptly appear here? What is the difference in the role of MNB/MNE and MFB/MFE? If these statistics are important to evaluate the model performance, the author should explain them in more comprehensively.

P3083 L20-22, I cannot confirm this sentence, because the values of benchmark for O3 MNB and MNE only are given in the manuscript and the values of MFB and MFE, not of MNB and MNE, are shown in the supplemental figures. The author should provide sufficient information in order to say that most of parameters are within or close to the

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benchmark.

P3083 L24, NMB and NME should be explained.

P3083 L25, The overestimation of CO: when and where?

P3083 last sentence, when and where?

P3084 L3, What are the supplemental tables? I cannot find any tables in supplemental material.

P3084 L27, I don't think the hot spots are well simulated. They are apparently overestimated.

P3085 L1-2, Why don't you choose CO concentration or column by TES or MOPITT instead of NO2 column? If you consider the consistency with previous figures, model comparison with remote-sensed CO or/and O3 should be added.

P3085 L17-19, This statement is valid for the first episode, since both satellite and model data well captured the wide spread region of high AOT. However, for the second episode, you cannot say so, because no satellite data is available in most of China and Taiwan region.

P3085 L19-22, Which episode does this sentence describe?

P3086 L5, Is the phrase “such as depositions” here correct?

P3086 L21, Concentrations of which altitude? surface? please clarify.

Figure 6: Figures for both days are necessary? Only 13 April would be enough.

P3089 L28, Figure 8 shows the concentration. So, we can find the gradient of concentration, not that of emission. There are two other sentences using “emissions” which should be replaced by “concentrations”; P3090 L1 and L13

P3089 L28- P3090 L1, There is blank area around 103E where not over the ocean. Why?

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P3090 L3, Please clarify the direction of “gradient”. Do you mean vertical gradient, or zonal gradient? There are two other “gradient” that should be clarified; P3090 L9 and L15

P3090 L11-12, Which longitude and altitude should we look at to find these values of percentage contribution? Near surface? or around 1-5 km? Please clarify. The same for other sentence; P3090 L15-17.

P3090 L21, The center of plume layer exists higher than 5km.

P3090 L27, Which longitude and altitude should we look at to find 160 to 200 ppv of CO? Near surface? or around 1-5 km?

Conclusions (P3091 L10) Please give the specific year of examined.

Conclusions (P3091 L10) Comparisons of what?

Conclusions (P3091 L21), Please give the day of second episode.

Conclusion (P3091 L22), “to for” ?

Conclusions (P3091 L24-25), Please clarify the specific area which you mentioned in this sentence.

Conclusions (P3092 L11 and L13-15), As mentioned above (the 4th and 5th specific comments), please clarify these sentences.

Technical Comments:

P3037 L73, uncertain → uncertainty

P3075 L6, Is “could” necessary here?

Table1 (P3103), Reference style is wrong for Wesely (1989) and Walcek and Aleksic (1998)

Figure 1 (P3017), It is necessary to note that this figure show the domain of the model

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in the caption. Typo: Fiver → Five.

P3076 L23, MEGAN: Here is the first appearance of this acronym.

P3079 L4, Please show the place of Phimai in Figure 1. Also Lulin and 4 sites in Hong Kong, if necessary.

P3081 L3, Asian → Asia

Figure 2 (P3018), Please mention what this figure show in the caption. Only “Model Performance of ,,,” does not inform any proper things. The same can be said for the captions of Figure 5 to 9. The captions of Figure 2, 5, 6, 7, 8, and 9 must be rephrased to better explain the substances of each figure.

P3084 L3, typo: in fact

Figures 5,6,7,8, and 9: Red contours are indiscernible. Please use other color or other line type. As mentioned above, caption of each figure must be rephrased. Explanations for color contour and red contour should be included in the caption.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 3071, 2011.

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