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Biogeosciences Discussions

# *Interactive comment on* "Integration of remote sensing data and surface observations to estimate the impact of the russian wildfires over Europe and Asia during August 2010" *by* L. Mei et al.

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The authors are grateful to all reviewers for their constructive comments. Below are detailed answers to the comments.

Anonymous Referee #1 – C2635 General Comments: The authors have done a good effort to put together different satellite and ground measurements for a critical fire season in Russia last year. My main concern with the paper is that it is too descriptive. It dose not include quantitative relations between the different data sources, neither it explicitly defines the hypothesis and whether they are validated with the results. The discussion does not provide relevant information on how their results relate to other



studies in the field, neither how to improve the management of the health crisis that such a severe fire seasons imply elsewhere.

Response: Aerosol Optical Depth (AOD) is the most important parameter in this paper. The quantitative relations between AOD and Particular Matter 2.5 (PM2.5) are described by the GEOS-Chem model using Equation (14) and (15); the quantitative relations between AOD and visibility are described by Equation (16). The quantitative relations between CO2, SO2 and NO2 are not used to describe the chemical reactions but as proxies to separate anthropogenic and natural sources, and the time serial change of these parameters is enough. The behavior of different atmospheric parameters as described in the paper is consistent and the analysis using satellite atmospheric parameters is in line with synoptic charts. Hence the different data sources are complementary and the results support each other Because this paper focuses on satellite data for the monitoring of one forest fire event, we don't have enough data on the health crisis, which is not the subject of this paper.

Specific comments. Lines 5-6. The authors use hectares instead of km2 to refer to burned areas in the last quotation. They should unify for coherency with the previous references. Figure 1 is not very informative. I suggest the authors focused on the main area of interest and show the actual ignition points. Spelling error in page 7749 line6

Response: We have corrected the 431 million hectares with 4.31 million km2

Figure 1 shows the fire points in different seasons described in the introduction of this paper, which gives us an overview of biomass burning events in the study area. The coverage of figure 1 is the same as all the other maps.

Change "sate" to "state"

âĂČ Anonymous Referee #2 – C3127 This paper integrates different satellite and ground measurement data to analyze the effect of a critical fire event in Russian in year 2010. The most indicative atmospheric parameters such as aerosol optical depth,

particulate matter (PM2.5), concentration of CO2, NO2 and SO2 are chosen for analysis. The transportation of these atmospheric parameters is linked by the HYSPLIT model and the synoptic condition, which shows a powerful method for characterizing predicting plume transport. In addition, the paper attempt to get more reliable atmospheric parameters using optimal smoothing scheme and GEOS-Chem model. The paper gives a believable result of effect area of Russian fire in both local and other countries, which is useful to assess the effect of health crisis. I like to see the paper to be published in BG after some minor corrections. Following are my suggestions. 1> Are there any relationships between aerosol (e.g., ice particles) and other gas concentrations particularly Ozone? 2> Figure 11b shows the vertical profile of aerosol. It is better to give more explanations. 3> some pictures could be black/white such as Figures 7, 9 and 10. 4> Figure 2 is not really useful.

Response: (1)Aerosol impact on trace-gas budgets through photolysis. Taking Ozone as an example, some researches found that the impact of aerosols on photolysis alone is to increase troposphere Ozone by 0.63 DU. (Varotsos and Zellner, Atmos. Chem. Phys., 10, 3099–3105, 2010). (2)Figure 11 shows the aerosol extinction coefficient over Kyrgyzstan in August, 2010. We can see the vertical profile of aerosol in different levels. The aerosol extinction coefficient is much larger above 5km than near the surface, which means that the pollutants of the Russian wildfires have transported in vertical level, which agree with the properties of biomass burning aerosol (fine particles) as well as the meteorological condition. So the effect of biomass burning is serious at high altitudes. (3) We will provide Figures 7, 9 and 10 as black/white pictures. (4) We have deleted Figure 2 from the revised version.

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/8/C3647/2011/bgd-8-C3647-2011-supplement.pdf

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Interactive comment on Biogeosciences Discuss., 8, 7741, 2011.