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Interactive comment on “What caused extreme ozone concentrations over Cotonou in December 2005?” by A. Minga et al.

Anonymous Referee #3

Received and published: 20 November 2009

In this paper, the authors reported a very interesting episode with a maximum ozone concentration up to 300 ppbv in Africa. By using a chemical box model with different hypothetical scenarios, they tried to explore the possible causes for the extremely high ozone episode. In general, this paper is well written and is of sufficient scientific value to be shared with the community. This referee will recommend the publication of this paper on ACP if the authors could appropriately address following minor points:

1) Regarding to the initial condition used in the Master Mechanism, the authors used field measured ratios of biomass burning and urban plumes from Lagos. They should note that those measured concentrations cannot represent freshly emitted biomass/urban plumes but probably aged air masses which had already experienced a certain photochemical reactions. This referee suggested that the authors, probably,

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could try another method to get a better estimation. For example, the weak-diluted fresh urban plumes could be estimated by assuming that 8-10 hrs continuously emitted pollutants filled within the nocturnal boundary layer with a mixing height about 100 or 200 m.

2)In section 2.2, the authors used a title as "Synoptic situation". In the field of atmospheric science, "synoptic situation" generally means the overall weather condition. However, in that section there were no any discussions of weather but a general description about the site. It would be better that if the authors add one or two paragraphs to give a brief description of the general weather situation before and during this episode. The ozone data in Djougou suggests that a multi-day ozone episode occurred after 15 December, 2005, and large scale weather could favor ozone formation during that period.

3)Since the episode mainly occurred below 2 km, the author should try to give some analysis of vertical structure of the boundary layer. For example, the vertical profile of air temperature/water vapor could probably give some new insights into the sources/processes related to the ozone elevated layers. In addition, because petrochemical explosion can only have a local impact, it would be helpful if they use satellite retrievals to give a regional picture of the tropospheric ozone or precursors. These analyses may support/reject their hypothesis.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 9, 21011, 2009.

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