

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

Anonymous Referee #2

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The authors report measurements of ozone over Cotonou (Nigeria) in December 2005. On Dec 25 they observed 295 ppb in a layer between 500 m and 1500 m above ground. In an attempt to rationalize these extremely high values the authors conducted box model calculations with the MCM reaction mechanism. They concluded that the "normal" emissions from the city of Lagos and/or from biomass burning both upwind of Cotonou are not able to explain the high ozone level. Therefore an accident in the large petrochemical facilities (also upwind of Cotonou) with possibly huge emissions of volatile organic compounds were made responsible for formation of the ozone observed. Not unexpectedly, MCM produces the required amounts of ozone if initialized with VOC = 200-600 ppb. The hypothesis could be the correct interpretation of the measurements. However, there is no evidence (in the press or from other official or unofficial sources) for an accident in the petrochemical facilities at that time.

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To really proceed from this rather vague idea to a more sound interpretation, several issues should be addressed in the paper:

- 1) The mix of the extra VOC's needs more explanation than what is summarized in table 8. Does the mix assumed for the calculations fit to the release of hydrocarbon pattern from the petrochemical facility during normal operation or from a release accident with or without an explosion?
- 2) It would also be helpful to know more about the photolysis frequencies of O₃ and NO₂ as well as the OH concentrations.
- 3) Why are the high ozone values only encountered in a layer between 500 m and 1500 m? If release of ozone precursors occurs at the ground, I would expect also high concentrations near the ground. Is dry deposition efficient enough to explain the gradient of ozone?

Minor comments a) Use ppb or ppbv b) Figures should be numbered in the order as they are referenced in the paper. c) p21012,l1: measurements p21012,l6: came p21013,l6: Is Mexico city in the tropics? p21015,l21: The average reader of ACP needs an explanation of the Harmattan layer. p21018,l2: windspeed at the ground ? p21030,l30: " climatological" or "long-term average" ?. Reference necessary Table 2: COV=VOV? NH₃=ammonia

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