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***Interactive comment on* “Enhancement and depletion of lower/middle tropospheric ozone in Senegal during pre-monsoon and monsoon periods of summer 2008: observations and model results” by G. S. Jenkins et al.**

Anonymous Referee #2

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General comments:

The authors present ozone measurements from ozonesondes launched from Senegal during pre-monsoon and monsoon periods of summer 2008. Temperature and relative humidity data from corresponding radiosonde, rainfall data from Tropical Rainfall Measuring Mission, and aerosol observations from the Aerosol Robotic Network were also shown for ozone data interpretation. WRF-CHEM simulations were performed to simulate ozone concentrations and provide information on the causes of ozone variations from pre-monsoon to monsoon periods. This study is relevant to regional atmospheric

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chemistry and within the scope of ACP. However, the paper is poorly written. There are many grammar mistakes throughout the whole text and many sentences are neither concise nor clear. Lots of sentences should be replaced by more precise ones. The poor writing somehow obscures the scientific presentation of the paper. Also the paper missed one important part: discussions. Only brief discussions were given in the results section. There is no sufficient analysis on the observations or the model simulations, thus some of the conclusions of the paper are not very convincing. I thus recommend major revisions before publication in ACP.

Specific comments:

Page 7157, line 9: Does your model simulation indicate that elevated O₃ concentration is from stratospheric intrusion?

Page 7157, line 10: Are the “vertical profiles” here observations or model simulations?

Page 7157, line 1-15: Only lower tropospheric ozone concentrations are explained here. More information about the causes of observed ozone concentration (both temporal variation and vertical distribution) should be given in the abstract.

Page 7157, line 20-22: add reference for this sentence.

Page 7158, line 6-11: put the references after each pathway (a), (b), and (c)

Page 7159, line 5-6: Can you explain why TOC estimates are also used?

Page 7159, line 7: More descriptions about the model should be given or related references are needed.

Page 7159, line 12: Guenther et al., 1994 only estimates VOC emissions. Simpson et al., 1995 estimates biogenic NO emissions from European soils. Can this be used for tropical soil NO emissions?

Page 7159, line 20: You were talking about not only TCO but OMI A₁, AOT and TRMM rainfall, so the title is not precise. The whole section 3.1 seems too messy. It appears

that you show all the figures and described all the figures, but there is no clear scientific idea. I thus suggest you to rewrite and reorganize section 3.1.

Page 7159, line 23: You just talked about the “north-south gradient” in the previous sentence. What does “The TCO gradient” mean? I suggest you to delete “gradient”.

Page 7160, line 13-15: This sentence is confusing. Are you saying the highest column ozone in the 925-550hPa layer is 20.5 DU on 12 June? Then what does “with 14.2 DU on 2 July” mean?

Page 7160, line 16-19: You were talking about the observations in the pre-monsoon periods instead of pre-monsoon/monsoon transition. I thus suggest you to move these two sentences to section 3.2 or to discussion section which you are missing.

Page 7160, line 25: This sentence is confusing. What’s the “depleted layer”? What does “enhanced ozone concentrations” mean? Do you mean temporal increase or spatial increase? Can you add the figure number in this sentence?

Page 7161, line 11-13: I will suggest more discussion to reach such a conclusion and move it to the discussion section. Does the WRF-CHEM include heterogeneous reactions? Is this ozone concentration reduction consistent with model simulation? Could there be other possible reasons for this ozone concentration reduction? How can you rule out other possible reasons?

Page 7161, line 26-27: What is this gradient? Temporal gradient or spatial gradient? Horizontal gradient or vertical gradient? Which figure is for this sentence? How did you calculate the number of “1 ppb/h”? Change “were” to “was”. Add “,” after “found”.

Page 7162, line 7-9: I will suggest more discussion to reach such a conclusion and move it to the discussion section. Also is there any evidence that the ozone enhancement between July 2 and June 26 from surface to 600hPa is due to biogenic NO_x emissions? Is air transport also possible reason for this ozone enhancement? Does the model simulation support this?

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Page 7162, line 10: Similar as section 3.1, this section gives the descriptions for the figures but misses clear scientific idea. I will suggest you to rewrite and reorganize this section.

Page 7162, line 25: What is the use of this paragraph? How is this paragraph related to the monsoon ozone measurements?

Page 7163, line 12-13: How is this justified? Is the ozone increase in the boundary layer also due to stratospheric intrusion? How can you rule out other possibilities causing ozone increase?

Page 7163, line 23: What does “elevated levels” mean? Model simulated ozone concentration?

Page 7164, line 2: What is the explanation for the 400 ppbv ozone between 200-300hPa on June 12? Is figure 10 for observations or model simulations?

Page 7164, line 6: I suggest move this discussion to discussion section.

Page 7165, line 3: Why is simulation of August more than 800 hours? 31 days are only 744 hours.

Page 7165, line 9-10: It would be better to say “The lower simulated O3 concentrations are found with larger simulated relative humidity at 850hPa”.

Page 7165, line 10-11: Any reference for this sentence?

Page 7165, line 14: More details of discussion should be provided and this part should be moved to discussion section.

Page 7165, line 19-20: What is the point of this sentence? Any more evidence to support this sentence? Why do you mention AWEs on July 2 and August 27 here? Is it relevant to the previous sentences?

Page 7165, line 21: This section should be reorganized. Some contents are not con-

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clusions but discussions.

Page 7166, line 4: “The depletion is Fig. 12” to “The depletion in Fig .12”. Also what is this depletion? Ozone decreased in 900-750hPa on August 2?

Page 7166, line 5: Can the existence of heterogeneous reactions in this study be justified? Are heterogeneous reactions included in the WRF-CHEM?

Technical corrections:

Page 7157, line 8: add “are found” after “dust concentrations”

Page 7157, line 16-20: this sentence should be separated into two or more short sentences.

Page 7158, line 1: add “in” before “Mauritania”

Page 7158, line 3: “have shown reduced O3” to “have shown ozone reduced”

Page 7159, line 21-23: This sentence should be rewritten because of grammar mistake.

Page 7160, line 5: delete “there” after “August”

Page 7160, line 7: delete “there” before “were seven”

Page 7160, line 7: “positive” to “positively”

Page 7160, line 10: “shows” to “show”

Page 7160, line 11: delete “and” before “during July and August”

Page 7161, line 1: delete “very” before “strongest”.

Page 7161, line 21-22: delete “during the AMMA field campaign”

Page 7161, line 23: add “than over the dry soils” after “wet soil”

Page 7165, line 8: delete “relative to June”.

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Interactive Discussion

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 7155, 2011.

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