We thank Anonymous Referee #2 for his efforts in reading the manuscript and offering comments to help us improve it. We have made several corrections; a list of detailed answers to each comment is given below.

1 General comment

Comment: In this paper model the sensitivity of $P(O_3)$ to changes in NO and VOCs is analyzed using an indicator equal to the ratio of HC-OH reactivity to NOx-OH reactivity. This indicator has the same form as one proposed by Frank et al (2001), but differs in that CO and CH_4 contribute to HC reactivity.

I would like to call the authors attention to Fig. 16 of the paper that contains Fig. 14 included by S. Sillman in his review. That figure shows L_N/Q as a function of NO_x and VOC reactivity. Points with constant L_N/Q cut across lines with a constant NO_x to VOC reactivity ratio. The same would be true if NO_x reactivity instead of NO_x concentration were plotted. If L_N/Q is a valid indicator, then Fig. 16 shows that Φ alone can not explain $P(O_3)$ sensitivity. Radical production rates are important as shown by the dependence of Φ_{opt} on $J(O^1D)$ and H_2O in this manuscript. The absolute concentration of NO_x also has a strong effect on sensitivity. (Counter statement is on p 10562, line14-17) This has been shown in simplified calculations and has been used by S. Sillman to explain the time evolution of plumes advected in a shallow boundary layer over Lake Michigan.

While I am sympathetic to the difficulty of writing in a foreign language, this manuscript has to be edited for proper English usage. The title contains two errors. analysis should be capitalized and based should be substituted for basing. There are too many such errors for me to list.

Results on $P(O_3)$ sensitivity are of interest and I don’t dispute the importance of the NO_x to VOC reactivity ratio. However, there are many difficulties in the presentation which makes it difficult for me to judge the quality of the work. I also would like to see the authors address the points raised above about the dependence of $P(O_3)$ sensitivity on radical production rate and NO_x concentration. I believe that this article requires major revisions.

Response: It is right that Φ alone can not fully explain $P(O_3)$ sensitivity. The indicator Φ, as well as other present indicators, are usually sensitive to many other uninterested parameters and the correlations between sensitivity and indicators may shift significantly for the changing of the atmosphere conditions (Sillman, 1995). It is an innate defect of the indicator approach to determine $P(O_3)$ sensitivity. This is the reason why we must test the robustness of our indicator in this paper. However, the indicator approach is very convenient for ascertaining the sensitivity of $P(O_3)$ and is usually an effective method to find the limiting factor of ozone production.

We are very sorry for our troubled expressions. We have reorganized and revised our paper for clarity and consistency.

It is right that $P(O_3)$ greatly depend on radical production rate and NO_x concentrations (Thornton et al., 2002), and it is very necessary to study the dependence of $P(O_3)$ sensitivity on those factors. However, the parameter Φ is more suitable to be used as an indicator, because the value of Φ can be easily measured or calculated.

2. Specific comments

Comment: It would help the reader if average concentrations and some measure of their range were specified.

Response: Thanks very much for your advice. The details have been added accordingly (Table 1).

Comment: I would avoid terms such as obviously.

Response: The relevant contents have been corrected.

Comment: p.10554 The first figure mentioned in the text is Figure 4. This first figure should be first and should become Figure 1.

Response: We have reorganized and revised our paper for clarity and consistency. The relevant contents have been corrected.

Comment: p.10554 line 12 nitrous should be nitrous acid

Response: The word has been corrected.

Comment: p.10554 line 13 Implication is that alkenes are photolyzed.

Response: The relevant contents have been corrected.

Comment: p.10555 line 5 and R10. HONO is not a stable product.

Response: The relevant contents have been corrected. (R10) has been moved away from the text.

Comment: p.10562 I don't understand how the $P(O_3)$ sensitivities that are shown in Fig. 5 are calculated.

Response: The sensitivity of $P(O_3)$ to NO_x and HC is calculated using Kleinman's formulas. The concentrations of peroxy radicals used in the calculations are from the model results. The relevant contents have also been added accordingly.

Comment: p.10563 Effect of changing individual hydrocarbons by 50% is dependent on their fractional contribution to total reactivity, which is not given.

Response: The fractional contributions of each VOCs have been added accordingly. We are sorry for the inattention.

Comment: p.10563 line 28, MACR from the sea methacrolein is an oxidation product of isoprene.

Response: The relevant contents have been corrected.

Old version: "Thus, BVOCs (ISO and monoterpenes) emitted from local plants will increase the value of Φ_{opt}, but TOL from anthropogenic and MACR from the sea will reduce Φ_{opt}, implying that the local Φ_{opt} is higher than those in low BVOCs and more polluted environments."

New version: **"**Clearly, ISO and its oxidation product MACR show adverse effect on Φ_{opt}, which ensures a relatively constant value of Φ_{opt} under conditions with elevated ISO concentration on September 18. However, TOL from anthropogenic can greatly reduce Φ_{opt}, implying that local Φ_{opt} is higher than it in more polluted environments."

Comment: p.10558 Why is it important to information on aerosol instruments?

Response: We have found that there exists an important source of HO_2 radical which is positive correlation with the aerosol surface area. Considering that the relative dissuasions are not included in this paper, we have removed this part in our revised paper.

Comment: Fig 6 x-axis label I don't understand units for delta (phi) % and ppb. Values differ by 2 orders of magnitude. If panel a is calculated for a 50% change in an individual hydrocarbon and panel b is calculated for a 1 ppb increase, this means that concentrations are of order 10 ppt, which does not seem reasonable.

Response: The x-axis label in Fig. 6(a) is incorrect, we have corrected it.