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Interactive comment on "OH reactivity at a rural site (Wangdu) in the North China Plain: Contributions from OH reactants and experimental OH budget" *by* Hendrik Fuchs et al.

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We thank the reviewer for the helpful comments.

Comment: $305 - 310$: Most of uncertainty analysis that I have encountered uses at least 2 sigma uncertainty rather than 1 sigma. If you use 2 sigmas probably the calculated OH reactivity would be able to account measured OH reactivity.

Response: We fully agree with this statement. We rephrase the statement on p11 l305: "Even during times when measured reactivity was higher than calculations from OH reactants, the gap is within the combined $2\,\sigma$ uncertainties:"

Comment: Figure 7 and Figure 8: It has been highly controversial about the night-

time OH. As observed, the lifetime of OH is much shorter during the nighttime so it is rather surprising to see observed nighttime OH such a low OH production during the night. There is an obvious attempt to account the observation such as ozonolysis of terpenoids and dissociation of potential contributions from PANs but could not provide a quantitative assessment since there is no observation data. However, as it is so important issue, I think at least the authors should attempt to assess what kind of PANs or terpenoids levels you would need to account the night time OH. Otherwise, as the discrepancy between OH production rates and OH destruction rates are appeared almost identical except in the early morning, some may conclude that the discrepancy may be simply accounted by an instrument artifacts as described in the manuscript.

Response: There is no direct way to estimate PAN concentrations, because the impact on OH is indirect. PAN has to be transported and decomposes then to HO2/RO2, if the PAN that is transported disturbs the thermal equilibrium. An estimate would require a 1D model calculation that is beyond the scope of this paper. In the paper by Lu et al. 2014 it was shown that the impact of PAN decomposition alone made only a small HOx source of less than 0.01ppbv/h, which would not be sufficient to balance the OH loss rate. In order to balance the OH production rate by an ozonolysis reaction, the alkene concentration can be calculated. We add on p14 l431: "In order to balance the calculated OH destruction rate during nighttime, a rather large concentration of an alkene would be required. Assuming an ozone concentration of 30ppbv, a reaction rate constant for the ozonolysis reaction of 1.8×10^{-15} cm^{3}s^{-1} for δ-terpine and an OH yield of one (Atkinson and Arey 2003), the concentration would need to be around 600pptv."

Comment: (minor comment) Recently, Kim et al (2016) reported observed OH reactivity in the Seoul Metropolitan Area. The addition of this reference to the comparison could be useful.

Response: We include this reference on p12.

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