Comment on acp-2021-1021
Anonymous Referee #2

Referee comment on "OH and HO$_2$ radical chemistry at a suburban site during the EXPLORE-YRD campaign in 2018" by Xuefei Ma et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-1021-RC2, 2022

Ma et al. presented the OH and HO$_2$ radical measurement conducted at a rural site in Yangtze River Delta, China. A box model based on RACM2-LIM1 was used to simulate the radicals concentrations, which was underestimated the OH at low NO (<1ppb) conditions. The influence of monoterpene oxidation and heterogenous loss of HO$_2$ on aerosol surface were tested. The authors also summarized the HOx measurement in (sub)urban environments all over the world, which gave a very nice overview of the HOx studies. Overall, the manuscript is well-written, and the investigation is scientifically sound. I strongly recommend the publication with some minor modification.

Specific comment:

Line 189, Information on back trajectory analysis of air masses is better added in the SI for the demonstration.

Figure 2: Oxidation product of HCHO and Gly diurnal pattern show peaks in morning, which is not the common sense of their formation pathway in summertime. Even for the urban site in YRD, these two species also show comparable abundances but higher levels around noontime (Guo et al., 2021). Could the authors explain more about the anthropogenic emission-related origin?

The investigation of possible influence of monoterpene on radical chemistry and ozone production is interesting and of importance. I agree with Reviewer#1 that additional discussion on the monoterpene oxidation (most probably using alpha-pinene as a
representative) would benefit the manuscript. However, lacking the simultaneous measurement of RO2 concentration and OH reactivity, one could not really draw solid conclusion from this comparison. It’s unlikely to test the chemical mechanism with the current dataset. Therefore, I suggest to minimize the discussion on monoterpane and only show the potential impact. The same applies to the closure of OH reactivity.

I would like to suggest the authors can review other literatures reporting the precursors related species, e.g. HONO, HCHO etc to the ROx production in YRD areas to strengthen the discussion, and destruction also.

In addition, comparison with wintertime OH and HOx in YRD may benefit the discussion on measurements and simulation throughout the manuscript, which can help to give the full view of the year for YRD region, e.g. Zhang et al., 2022.

Technical corrections:

Line 42: 'a' slow radical propagation

Line 47: dramatic

Line 92: needs

Line 104: measurements

Line 113: emissions

Line 115: highways

Line 121: cancel for
were
the time resolution
were
was
time series or time-series
radicals
sources, conditions
reacts
compositions
focuses
other processes
conditions
a strong
a minor
influences
ranging in fivefold different by a factor of 5

the U.S.

because of

precursor

field

to decrease

Ref:
