Hu et al. made PAN observations and investigated its summertime formation with the aid of box modelling and machine learning. The paper provides valuable insights into the summertime formation of PAN and its link to aerosol pollution, which has been an unsolved issue during recent years. The following issues should be addressed before it can be considered for publication.

Major issues:

1. L76-81: The authors should probably further emphasize that Xiamen is a coastal site and give a background understanding on pollution as well as climate characteristics in Xiamen. What differs Xiamen from the sites where PAN was previously already investigated? This might help emphasizing the importance of this study.

2. Sect. 2.1 VOCs measurements were not introduced in terms of instrumentation details and observed species. Figures present TVOCs concentrations, how was VOCs constrained within the MCM model if you did not have the individual VOCs species.

3. L190-192: Does it make sense to correlate daily maximum BC and PAN, when obviously they peaked at very different times of day? BC usually peaks during nighttime under low boundary layer conditions, while PAN peaks during noontime before O_3 due to strong thermal deposition losses. If there were any correlation between BC and PAN, you should at least prove it with a correlation analysis that uses data from the same time of day.

4. L213-214: In addition to O3 and PAN formation, a great part of TVOCs might have turned into SOA.

5. L231: It would be better if you added the standard deviations to the averaged values.

6. L239-245: If you corrected for thermal losses, would this change the slope of PAN vs. O3 production?

7. L258-259, Fig.2: The wind direction varied differently during clean and haze periods, are daytime northerly winds connected to pollution transport? There was a rise in PM2.5 during prenoon hours during haze days, was that connected to stronger secondary formation or transport processes?

8. L287-291: NH3 and HONO often reveal very high correlations in urban regions due to the influence of common vehicle emissions. Was that also the case for Xiamen? Since both were considered in the model, the model must have selected only one variable, would results be different if only HONO and no NH3 were included? The uptake of aqueous uptake of PAN was introduced to be very weak, what mechanisms do you believe led to strong uptake of PAN on ammoniumnitrate aersols?

9. L294-297: How does NO3- promote PAN formation? Might it be common enhanced formation of NO3- and PAN during atmospheric processes that led to these results?

10. L321-327: If I am understanding things correctly, constraining PAN within the model would lead to the following results: if constraints are larger than model estimates, the model would add to thermal degradation losses leading to lower net

production and vice versa. Since the model performed fairly well in simulating PAN production and could relatively accurately reflect its atmospheric level, why were there negative net production during haze conditions, when PAN was constrained? Since temperature and precursor constraints were the same, do you suggest that constrained concentrations were higher than those simulated by the model? However, simulated PAN was often higher than observed ones when there were no constraints. Isn't that in contradiction? Adjusting PAN constraints to 0.2 times that of actual values is far below those modelled without PAN constraints, why?

11. L379: I recommend a brief summary on which factors played the dominant role in boosting PA production rates on haze days.

Minor issues:

1. L22-24: Grammatically incorrect, please rephrase.
2. L27-28: The number of valid digits should be unified across the manuscript.
3. L76: "Ximen"→"Xiamen"
4. L85-86: Grammatically incorrect, please rephrase.
5. L161-162: Grammatically incorrect, please rephrase.
6. L177: by "daily maximum average" do you mean "maximum daily average"?
7. L218: Mt. Waliguan is a global background station.
8. Fig 8c: It is quite difficult to differentiate between clean and haze dots without enlarging the figure, please select colors with larger contrasts.
9. Figure labels are often too small and hard to read.