The authors describe a recent field campaign at an urban, suburban, and tower measurement site near Guangzhou, China. They use these observations to construct a box model for the production of nitrate aerosol, and demonstrate that the urban area is in a VOC-limited regime, while the suburban site is at a transition point. The tower measurements yield critical information about the contribution of different production mechanisms in the nocturnal boundary and residual layers.

Overall, this is a very good paper that provides new constraints on an important pollution issue, and I recommend publication. I have only a few minor comments.

General comments: Would the authors include more details about what (if any) biogenic VOCs are included in the model.

Line 82 – Previous work has emphasized the importance of particle pH in nitrate aerosol formation, so this should be discussed at some point. See Guo, H., Otjes, R., Schlag, P., Kiendler-Scharr, A., Nenes, A., and Weber, R. J.: Effectiveness of ammonia reduction on control of fine particle nitrate, Atmos. Chem. Phys., 18, 12241-12256, 2018 as an example.

Line 134 – What is meant by "different environments"? The authors should be a little more clear about what makes this paper different than other recent papers discussing NOx and VOC sensitivity in urban areas in China.

Line 155 – Change "upward" to "upwind"

Line 157 – It's not clear here whether the tower measurements were taken during the same timeframe as the GIG ground site.

Line 164 – Were the aethelometer and particle size distributions taken at the GIG site? If so, change line 157 to read "The chemical components of PM1, trace gases, NMHC, and particle BC content and size were measured…."

Line 196 – A reference detailing the MCM should be cited here.

Line 229 – State what the observed parameters were.

Line 373 – Where does the estimate of the nocturnal boundary layer and residual layer fractions as 0.4 / 0.6 come from? Is this an empirical observation during the study or an estimate based on theory?

Figure 4: I would suggest putting the modeled diurnal observations on the observation to make the comparison more clear.