

## ***Interactive comment on “Impact of Urban Emissions on a Biogenic Environment during the wet season: Explicit Modeling of the Manaus Plume Organic Chemistry with GECKO-A” by Camille Mouchel-Vallon et al.***

**Anonymous Referee #1**

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This manuscript describes box model simulations of secondary organic aerosol formation in Amazonia. SOA formation is simulated using the explicit mechanism generator GECKO-A. Results from GECKO-A are compared to SOA predicted using a volatility basis set (VBS) parameterization.

The title of the article includes "Impact of Urban Emissions on a Biogenic Environment," however I feel like those urban impacts are not articulated very well in the current manuscript. The impacts of the urban plume on SOA formation are buried a bit under model details and do not seem to be discussed in great enough detail for readers

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to walk away knowing what these urban impacts are. For example, the key figures outlining urban impacts seem to be Figures 7 and 9; neither of these figures is discussed in great detail. In particular, Fig 9 does not receive much attention at all.

Figure 1 - some readers with colorblindness may not be able to distinguish the shades of red, pink, and green used in the maps.

Section 3.1.1 and Figure 2 - Line 112-113 state "The top box extends from the top of the planetary boundary layer to 1.5 km and represents the residual layer (RL)." However the black dashed line in Fig 2 makes it look like the top of the second box is at ~900 m.

First paragraph of 3.2.2 - the vehicle patterns and emissions in Manaus are assumed to be similar as in Sao Paolo. However, as noted in line 163-164, the fuel used in Manaus is very different than in Sao Paolo. There are many papers on how ethanol blends impact vehicle emissions; the authors should at least acknowledge this literature and comment on how their assumptions about vehicle emissions might impact their results.

Fig 5 - the biogenics in panel a and b show 5 hours where the box is over T3, but the anthropogenic panels c and d only show 4 hours over T3. Why is there this difference?

Figure 9 should be discussed more. The compositional differences between the clean and polluted cases seem very small. Is this consistent with AMS data?

I'm unclear on what is plotted in Fig 12b. Is this the overall species diversity from the model? Or is it the number of species needed in the reduced model to reproduce 90% of the diversity from the full GECKO model run?

I'm also confused about Fig 12a. Was the number of species determined by adding up the number of species needed to capture 90% of the SOA mass (i.e., simply doing a mass balance)? Or was the model run in some sort of reduced form?

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