General Comments

Thanks to the authors for their efforts in addressing my concerns as well as those raised by the other reviewer. The manuscript quality has improved following the authors' revisions, and many changes have been incorporated into the updated manuscript. However, there are still some remaining issues that need to be addressed.

1. I think the current Introduction is quite scattered and lacks focus. The topic of this paper is the impact of heatwaves and wildfires on VOC concentrations. Because the measurement site is a rural temperate mixed forest, one focus of the paper is biogenic VOCs, and the other is wildfires. However, the authors did not clearly present what has already been investigated or identify the specific knowledge gaps their paper could address. For instance, BVOCs are temperature-dependent, which is why understanding the impact of high temperatures on BVOCs is important. Additionally, two field campaigns focusing on BVOCs have previously been conducted at the MOFLUX site (Potosnak et al., 2014, and Seco et al., 2015). However, the authors did not include this background information in their Introduction. The same issue applies to their discussion of wildfires.

2. I don't think the definition of an extreme temperature threshold as 32 °C is appropriate. A temperature of 32 °C is quite common. I understand that temperature conditions can vary significantly by region. Typically, heatwave studies define thresholds using the 95th or 99th percentile of historical temperature records. Therefore, I suggest the authors use the 95th percentile of hourly July temperatures over the past 10 years as the threshold for defining heatwaves.

3. The authors insisted that "Regions dominated by emissions of α-pinene, β-pinene, and limonene typically have a nighttime peak, whereas daytime enhancements are observed for areas with sabinene and ocimene." I cannot agree with this statement. The diurnal cycles of monoterpenes largely depend on whether their emissions are light-dependent. *De novo* monoterpenes typically peak during the day because their emissions are driven by light emissions (Jardine et al., 2015). Only temperature-dependent monoterpenes consistently show nighttime peaks due to the lower boundary layer height at night. The monoterpenes mentioned by the authors can be either light-dependent or only temperature-dependent. For example, α-pinene emissions from Scots pine is light-dependent (Tarvainen et al., 2005). Furthermore, the paper (Borsdorf et al., 2023), which the authors cited in response to my comment, also mentioned that "The atmospheric concentrations of monoterpenes, which are emitted in a temperature-dependent manner, are often greatest during nighttime hours due to the shrinking of the planetary boundary layer," and also noted that "Sabinene is obviously emitted in a light-dependent manner comparable with isoprene, while all the other monoterpenes are emitted by volatilization." Therefore, assigning diurnal emission patterns based on monoterpene isomer type is not appropriate, as each isomer may exhibit either emission pathway.

4. Figures 2 and 3 contain obvious errors. Figure 2 lacks a label for the first panel and has no axis labels for panel (C). In Figure 3, the standard deviations shown in the histogram plots appear too small compared to the actual distribution of data points displayed on the right side of the figure.

5. According to the NNMF results, does this imply that there is always a fire plume near the site? Lines 501–503 state: "oxygenated hydrocarbons (CxHyOw) and CxHyNz compounds were persistent in the early hours of the combustion plume." However, as the second reviewer mentioned, "VOCs become more oxygenated as they age away from the biomass burning source," which does not support the statement made here.

Specific comments:

Figure 1. The term "Global solar radiation" used here is incorrect; the authors should use "Downward solar radiation" instead. In addition, UV refers sto ultraviolet radiation, which is a portion of the whole solar radiation spectrum. Based on the values provided (around 1000 W m^{-2}), I believe the authors are referring to total solar radiation rather than UV radiation, as such a high UV radiation level would not be survivable for any life forms. In addition, did author consider the smoke impact on BVOC emission during by affecting the solar radiation?

Line 252: The word "global budget" is not accurate. Guenther et al. (2012) calculated the emission, which is just part of the "global budget".

Line 322: What kind of vegetation's physiological functions?

Line 354: I think that biogenic VOCs are temperature dependent.

Reference

Borsdorf, H., Bentele, M., Müller, M., Rebmann, C., and Mayer, T.: Comparison of Seasonal and Diurnal Concentration Profiles of BVOCs in Coniferous and Deciduous Forests, Atmosphere, 14, 1347, 2023.

Jardine, A. B., Jardine, K. J., Fuentes, J. D., Martin, S. T., Martins, G., Durgante, F., Carneiro, V., Higuchi, N., Manzi, A. O., and Chambers, J. Q.: Highly reactive light-dependent monoterpenes in the Amazon, Geophysical Research Letters, 42, 1576-1583, https://doi.org/10.1002/2014GL062573, 2015.

Tarvainen, V., Hakola, H., Hellén, H., Bäck, J., Hari, P., and Kulmala, M.: Temperature and light dependence of the VOC emissions of Scots pine, Atmos. Chem. Phys., 5, 989-998, 10.5194/acp-5-989-2005, 2005.