This manuscript presents the results of two measurements campaigns, during summer and winter 2019 at eight measurements sites that span across a large range of latitudes of China, measuring ambient concentrations of isoprene, monoterpenes, and sesquiterpenes. These measurement sites are representative of the diverse ecosystems and vegetation types found in China. The results were compared to terpene concentrations measured at sites with comparable vegetation elsewhere around the globe. The novelty of this work is the characterization of terpenes during the same time periods at different sampling sites in China with different conditions and vegetation and addresses the scarcity of ambient measurements in China. This manuscript also provides the data for further analysis in which one may be able to demonstrate how the variation in terpene speciation and quantification may impact regional atmospheric chemistry models, however this is not provided here. If so, then that would certainly increase the significance and interest of this manuscript. There are a few issues outlined below which need to be addressed before the work could be published.

Specific comments:

- Line 101 – 60 L is a very high sampling volume, especially for a compound like isoprene which is susceptible to breakthrough on sorbent cartridges at high sampling volumes. In Line 238, it is also stated the measured isoprene mixing ratios were lower compared to other tropical Asian and Amazonian studies. This could also potentially be due to breakthrough. Has the breakthrough volume for isoprene and monoterpenes on these cartridges been tested? I would actually expect breakthrough to already occur for isoprene between 5 and 6 L on Tenax TA and carbograph 5TD cartridges.

- The methods section is lacking a description of the sampling inlet and where it was placed. It is mentioned in the discussion on line 299 that samples were collected near the canopy. More detail needs to be included about this to aid in the interpretation of the results and the comparability of the measurements. A long inlet line may also impact the transmission of sesquiterpenes onto the sampling cartridges. Please could you include this detail?

- It is surprising to see such consistent speciation of the sesquiterpenes across the different measurement sites when past studies have shown that the speciation of sesquiterpenes in tropical and boreal forests can be quite different. For example, Hellén et al. found beta-farnasene and beta-caryophyllene in a boreal forest in Finland. This was very different to the Amazon rainforest as shown by Byron et al. which found alpha-copaene amongst other sesquiterpenes to be abundant. Furthermore, the speciation you have shown for the different measurements sites in China is quite different to what has been shown in those studies. Can you comment on why this could be?

- In Figure 3, there is “Other MTs” written. Please could you include in the figure caption which compounds this includes?

- Trans- and cis-beta-ocimene emissions have been shown to be seasonally dependent in China and also in the Amazon rainforest, with emissions increasing during periods of high temperatures(Byron et al. 2026; Jardine et al. 2017; Zeng et al. 2026). Did you also measure these compounds? Can you comment on this? Are the temperatures provided in Table S1 the average temperatures at each measurement site?

Byron, Joseph, Giovanni Pugliese, Carolina de A. Monteiro, Johanna Schuettler, Achim Edtbauer, Eliane Gomes Alves, S. Christoph Hartmann, Anywhere Tsokankunku, Denisi Holanda Hall, Cléo Q. Dias-Junior, Hartwig Harder, Jos Lelieveld, and Jonathan Williams. 2026. 'Intense El Niño provokes production of new reactive volatiles as stress defences in Amazon rainforest', *Communications Earth & Environment*, 7: 419.

Hellén, H., A. P. Praplan, T. Tykkä, I. Ylivinkka, V. Vakkari, J. Bäck, T. Petäjä, M. Kulmala, and H. Hakola. 2018. 'Long-term measurements of volatile organic compounds highlight the importance of sesquiterpenes for the atmospheric chemistry of a boreal forest', *Atmos. Chem. Phys.*, 18: 13839-63.

Jardine, K. J., A. B. Jardine, J. A. Holm, D. L. Lombardozzi, R. I. Negron-Juarez, S. T. Martin, H. R. Beller, B. O. Gimenez, N. Higuchi, and J. Q. Chambers. 2017. 'Monoterpene 'thermometer' of tropical forest-atmosphere response to climate warming', *Plant Cell Environ*, 40: 441-52.

Zeng, Jianqiang, Xiaoyang Wang, Yuting Lu, Weihua Pang, Wei Song, Yanli Zhang, Ping'an Peng, and Xinming Wang. 2026. 'Heatwaves favour acyclic monoterpene emissions in tropical forests', *Nature communications*, 17: 9977.