

General comments:

The paper entitled “Saccharide composition in atmospheric fine particulate matter at the remote sites of Southwest China and estimates of source contributions” by Zhenzhen Wang and colleagues provide the characteristic of saccharides during spring 2019 at Lincang, a rural site in Southwest China. The authors reported molecule tracers including anhydrosugars, mono (di) saccharides and sugar alcohols, combined with statistical analysis and HYSPLIT model, they concluded that biofuel and open biomass burning (BB) activities could have a significant impact on ambient aerosol levels at Lincang. Overall, this paper is logically organized, and knowledge of this work is needed and helpful for better understanding air conditions in Southwest China. The topic of this paper is within the scope of the journal Atmospheric Physics and Chemistry. I would like to recommend this paper published after the following of my concerns be resolved.

Reply: We appreciate the positive comments and suggestions about the manuscript. We agree with the reviewer’s comments, and have updated the manuscript on the basis of these suggestions.

Major comments:

1. The surrounding environmental condition is crucial for understanding the results, I strongly suggest the authors added a figure to show the sampling sites as Figure 1. This figure should include some necessary information about the topography, vegetation, residential area nearby Lincang, and photos of three sampling sites are also crucially needed.

Reply: We’ve added Figure S1 for the location of the sampling sites in the Supporting Information. The number of all the Figures referring to the Supporting Information has been changed.

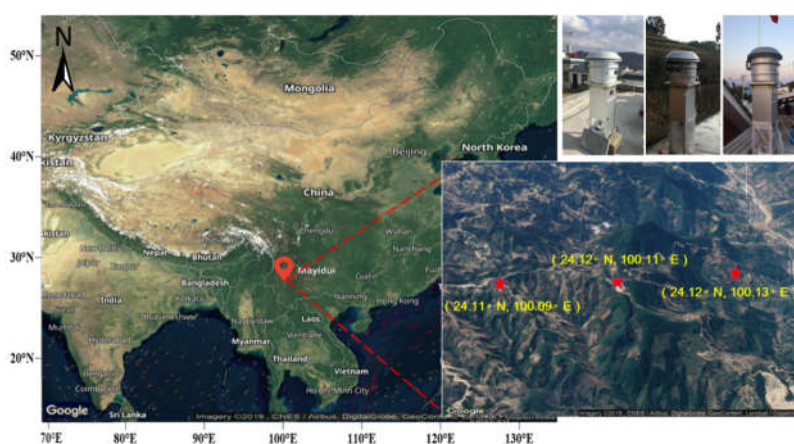


Figure S1. Map of sampling sites. The location of the sampling sites was marked with five-pointed star.

2. The source appointment is mainly based on the 72h backward trajectories of HYSPLIT model. However, high uncertainty existent for the application of HYSPLIT model at high elevation site because topographic relief. The frequencies of HYSPLIT or meteorological analysis should provide more creditable results.

Reply: Thank for the reviewer's suggestion. More detailed analyses on topography and meteorology, as well as the frequencies of HYSPLIT backward trajectories are stated in the section 3.2 Sources and transport.

Herein, this sentence has been rewritten. "46.7% of air mass backward trajectories were generally over 2000 meters, while 53.3% of them were below 2000 meters."

"The southwest wind from the Indian Ocean prevailed at Lincang all the year round. In spring, the southwest wind was often affected by the low temperature downhill wind blowing from the snow-covered Hengduan Mountains. The weather alternated between hot and cold frequently, with unstable air pressure and strong wind. Therefore, the lower air could be diluted by the relatively clean cold air over the plateau. The upper air mainly came from the westerlies."

Minor comments:

1. The samples of this work are mainly in spring, the title should be changed to "Saccharide composition in atmospheric fine particulate matter during spring at the remote sites of Southwest China and estimates of source contributions".

Reply: Thank for the reviewer's suggestion. The title have been changed to "Saccharide composition in atmospheric fine particulate matter during spring at the remote sites of Southwest China and estimates of source contributions".

2. Line 62, Wu et al., 2020 is not cited in references.

Reply: Wu et al., 2020 have been cited in Line 62 in the revised manuscript.

3. Line 71-72, "10.1-383.4 ng m⁻³ over the Tibetan Plateau (Li et al., 2019)", the reference Li et al., 2019, EP is glacier cryoconites not aerosol samples.

Reply: "10.1-383.4 ng m⁻³ over the Tibetan Plateau (Li et al., 2019)" have been changed to "10.1-383.4 ng g⁻¹ dry weight in cryoconites over the Tibetan Plateau (Li et al., 2019)".

4. Line 75, Sichuan Basin, not “Chengdu Basin”.

Reply: “Chengdu basin” have been changed to “Sichuan Basin”.

5. Line 79-81, Levoglucosan emission of China is estimated by BB activities by Wu et al., 2021, this sentence is not rigorous.

Reply: This sentence have been rewritten. “Recently study reported that total levoglucosan emission of China exhibited a clear decreasing trend from 2014 (145.7 Gg) to 2018 (80.9 Gg) (Wu et al., 2021), suggesting BB activities might reduce in China.

6. Line 109-112, you should better add some references.

Reply: “Referring to the official website of Lincang Municipal People's Government, the forest coverage rate of Lincang reaches to 65%.”

7. Line 116, do you have samples over other period?

Reply: We only sampled at the Lincang sites for a period of about a month.

8. Line 126-130, please add a figure for sample sites.

Reply: We've added Figure S1 for the location of the sampling sites in the Supporting Information.

9. Line 183, why do not use meteorological data at Lincang?

Reply: The satellite data and Lincang meteorological website data were not exactly the same, but were overall similar. In order to obtain more complete data of all indicators, satellite data were used uniformly.

10. Line 231-233, “no distinct variation”, has statistical significance?

Reply: Thank for the reviewer's correction. This sentence is not completely accurate. In the revised manuscript, this sentence was deleted.

11. Line 239-248, samples in those references are not collected at the same period.

Reply: Indeed, the samples in these studies were collected at different times. So we presented the specific sampling time of each research. Even if not all

samples were taken in the spring, it would be of great interest to report these information.

12. Line 276-277, how about the L/M for burned ghost money?

Reply: “It was worth noting that the peak days during 31 March-1 April (L/M = 11.52 ± 1.34) neared the Qingming Festival. Another possibility of BB events was that people burned ghost money to sacrifice ancestor according to Chinese tradition.”

13. Line 290-291, references for L/K⁺?

Reply: We’ve added the references “(Schkolnik et al., 2005; Lee et al., 2010)”.

14. Line 431-441, Figure 4, only one air mass from Hengduan Mountain region. Maybe frequency is better for understanding air sources.

Reply: Thank for the reviewer’s suggestion. Herein, this sentence has been rewritten. “46.7% of air mass backward trajectories were generally over 2000 meters, while 53.3% of them were below 2000 meters.”

15. Line 450-452, how about the atmospheric dynamics for aerosol transport from Southeast Asia to Lincang, especially for residential cooking and heating.

Reply: Some sentences were added. “The southwest wind from the Indian Ocean prevailed at Lincang all the year round. In spring, the southwest wind was often affected by the low temperature downhill wind blowing from the snow-covered Hengduan Mountains. The weather alternated between hot and cold frequently, with unstable air pressure and strong wind. Therefore, the lower air could be diluted by the relatively clean cold air over the plateau. The upper air mainly came from the westerlies.”

16. Line 512, ng m⁻³?

Reply: “μg m⁻³” has been replaced by “ng m⁻³”.

17. Line 521, only Myanmar.

Reply: “The sampling sites suffered from both local emissions and BB via long-range transport from Southeast Asia (Myanmar, Bangladesh) and the northern Indian Peninsula.”