The Cryosphere Discussions

The Cryosphere Discuss., author comment AC2
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Reply on RC2

Feiteng Wang et al.

Author comment on "Air pollutants in Xinjiang during the COVID-19 pandemic and glaciochemical records of a Tien-Shan glacier" by Feiteng Wang et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2021-133-AC2, 2021

Interactive responses to the comments of Referee 2 in Phase 1

The reply to the general view:

We thank the referee for the encouraging general view of our work and raising the concerns of how to improve the paper significantly. We will address our replies to the comments below. These replies will only be limited to our plans of revision according to the advice of the referee, but not extended to specific technical changes in this phase.

Major

- The authors seem to assume that air pollutants at the surface sites and species in Tian-Shan glacier are from local sources in Xinjiang, so emission changes in surrounding regions are not discussed. This is likely not the case, especially for the long-lived ones such as CO. The authors should review relevant studies in the literature on source attribution and/or run airmass back-trajectories to track the sources of pollutants reaching the measurement sites. This would help better understand the observed changes, spatial variation and their relationship with emissions.

Re: Yes, we will review more literatures regarding regional airmass trajectories in Xinjiang and present a general picture of the source, transport and deposition of air pollutants. The observed changes, spatial variation and their relationship with emissions will be better showed in the revision.

- The observed changes are attributed to mobility and emission changes. How about the roles of atmospheric dynamical, physical and chemical processes? Atmospheric transport, dry/wet deposition and chemical reactions should affect the concentrations of the air pollutants. It could be more complicated for the concentrations of ions, BC and OC in snow that involve precipitation and snow melting processes. The direct year-to-year comparisons may be biased due to large interannual variability in these processes. Comparison of 2020 results to longer-term mean might be helpful. More analyses and discussions in this regard are necessary.

Re: Yes, we will extend the air-pollution data back to 2015. The new dataset will be included in the revision.

- How accurate is the snow dating for the recent past back to 2018? The different results of 2019 between the two snow pit profiles need more clarification. What are the possible reasons for the differences? Please clarify.

Re: We substantially comply with the seasonality of stable isotopes to date the snow-pit profiles, while also consider the dust layer and precipitation. We will re-look into these profiles and present more discussion in the later phase.

Minor technical comments: will be checked throughout the paper.