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Reply on RC2

Xu-Ke Liu et al.

Author comment on "Detection of Stratospheric Air Intrusion Events From Ground-based High-resolution 10Be/7Be by Accelerator Mass Spectrometry" by Xu-Ke Liu et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-282-AC2, 2022

We would like to thank reviewer #2 for feedback on the interest and comments on our paper. First, thank the reviewers for acknowledging our work. As the reviewers put it: “The authors analyze the samples with accelerator mass spectrometry, which improves the sensitivity and reduces the sampling time to about 1 day, and use the Be-10/Be-7 ratio to decrease the impact of surface contamination. The technical aspects of the measurements appear to be thoroughly considered with considerable attention devoted to the difficult problem of correcting for the large background created by surface dust.”

We believe this work suitable for publication in the ACP. In this work, long-term observational record obtained by in **field measurements of radioisotopes** (7Be and 10Be) in the atmosphere and used to understand atmospheric behavior (stratospheric air intrusion). This is in line with the definition of the ACP's main subject area. At present, the acquisition of observational data for 7Be and 10Be is interfered by measurement methods and natural factors. Our work addresses this issue, as described in the manuscript abstract. The main attempt is to obtain high temporal resolution 7Be and 10Be data by accelerator mass spectrometry, and then remove the 10Be interference from resuspension dust. In this way, we obtain long-term 7Be and 10Be observational records and use them to track stratospheric air intrusion processes on the ground only, especially localized intrusion events (such as tropopause folding that occur on timescales ranging from a few hours to several days). For the findings based on this method, as we reported, stratospheric air intrusion events in the Chinese Loess Plateau are frequent and rapid throughout the year and are strongest in the spring (March-July), when 10Be/7Be values were observed to increase about a factor of 3. Even in winter, weaker stratospheric air intrusion events can be detected. Calculated Δ(10Be/7Be) values in winter suggest stratospheric ozone transport can lead to an ~25% cumulative increase the surface ozone in Xi'an on the Loess Plateau, China.