

Interactive comment on “Review of snow phenology in the Northern Hemisphere and its relationship with climate and vegetation” by Guo et al. Editor

Both reviews indicate that there may be some interest in your paper, however, they both note significant weaknesses. One important comment by Referee 2 is that you present a thorough analysis of data from the Tibetan plateau but that the data on other parts of the world is less convincing. Please improve your description and validation of general Northern hemisphere data, or perhaps, as suggested by the Referee, refocus your work on the Tibetan plateau only. That may also be a valuable contribution.

Response: As mentioned in our response to Referee 2, throughout the article, the data and analysis of snow phenology we presented are based on the Northern Hemisphere, not the Tibetan Plateau. In section 3, we display the distribution of snow phenology over the Northern Hemisphere from 1972 to 2020 based on NHSCE snow cover data, interannual variations over NA/EU/NH and the corresponding contributions to NH from EU and NA (NA, EU and NH represent Eurasia, North America and the Northern Hemisphere, respectively) (revised version). In section 4, we also focused on analyzing the interrelationships between snow phenology and temperature, atmospheric circulation, and vegetation at the scale of the Northern Hemisphere. For example, we mentioned in section 4.1 (revised version) that ‘Studies have found that anomalous changes in winter snow cover may cause an anomaly in East Asian monsoon circulation over Eurasia (Chen and Sun, 2003; Chen et al., 2003), and spring Eurasian snow will affect the Indian summer monsoon through land–sea thermal differences and atmospheric circulation (Halder and Dirmeyer, 2017)’.

I agree with the Referees that the English is not satisfactory. Major improvements on this aspect are absolutely required.

Response: Thank you for your comments. We will have the paper polished by a native English speaking professional editor.

Referee 1 is fairly critical of your work. The paper may need significant restructuring. Sections that do not reach a useful and clear conclusion may have to be deleted. I am not convinced about the usefulness of Figures 3 and 4. In summary, very major changes to your paper are required before

serious consideration for publication can be made. The paper definitely needs to be condensed and focused on solid data. Unnecessary speculation or considerations should be deleted. I let you decide whether you can strengthen the paper and keep presenting data for the whole northern hemisphere or just focus on the Tibetan plateau. If you choose to consider the entire northern hemisphere, please explain in your response to Referee 2 how you have improved your analysis of northern hemisphere data in general.

Response: For section 4, we have restructured and supplemented it. Specific modifications have been shown in the response to Referee 1.

After sorting out section 4, we found that Fig. 4 is not completely suitable for the content of each paragraph in section 4.1, so we deleted it. Fig. 3 is a brief description of the interaction of snow phenology, vegetation phenology and climate factors. The purpose of this figure is to visually illustrate that there is a certain interaction between snow phenology, vegetation phenology and climate. Then, we separately introduce the relationship between snow phenology and climate and the relationship between snow phenology and vegetation phenology through two subsections.

Throughout this article, we have been devoted to the relevant analysis of snow phenology in the Northern Hemisphere. We have mentioned this in detail in our response to Referee 2.

Lastly, I think a few clarifications pertaining to Figure 1 are required. Please define clearly D1 and D2 in text, not as a Table footnote.

Response: Based on your opinion, we have added an explanation for D1 and D2 in the text rather than in the footnote.

Figure 1. How about having dates instead of weeks from 1 August? This would facilitate visualization. For Fig 1a, the scale would then be 1 September to 16 March. By the way, does a SCOD on 16 March make much sense? In Figure 1b, it is not clear to me what the dates are. Is week 27 from 1 August February 6th? This does not read very well. Reader should be able to figure out dates without having to compute them. Perhaps also add an intermediate date in the color scales for improved legibility.

Response: According to your opinion, we changed the legend to the form of date and added intermediate date, as shown in the figure below.

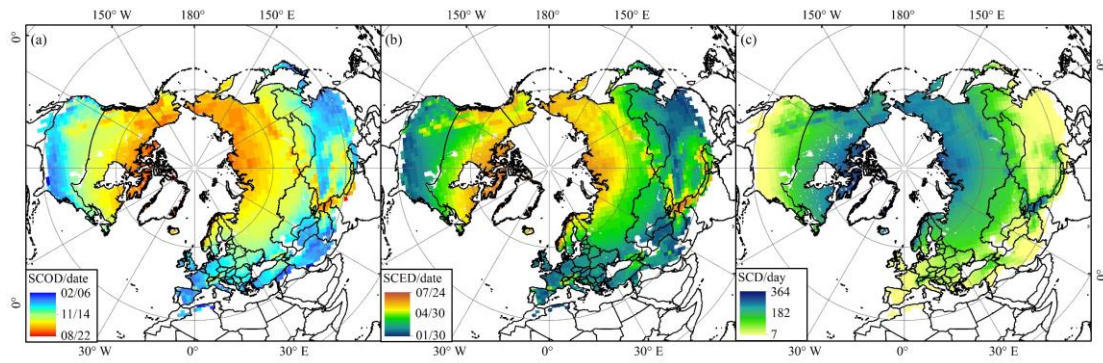


Figure 1: Distribution of snow phenology over the Northern Hemisphere from 1972 to 2020 based on NHSCE snow cover data. Averaged over 48 snow years: (a) SCOD, (b) SCED, and (c) SCD (the study area excludes Greenland).