We thank the Anonymous Reviewer 2 (AR2) for taking the time to review our manuscript and provide helpful comments. In this document, the black text is ours, the blue text is that of AR2. In the 'line-by-line' section, our response is indented.

> General comments:
> The study defines a new snow metric, snow water storage (SwS), which is the integrated area under the snow water equivalent (SWE) curve and analyzed the SwS change in America during 1982-2020. It is a good idea to define a new metric (SwS) to express amount of snow water over a time period (water year, a given month, etc.) of interest, and the manuscript is well organized.

Thank you. The need for this new metric was indeed what motivated us to undertake this work.

> Specific comments:
> (1) The SwS is from SWE integrated over time and SWE itself is the amount of snow accumulated rather than an increase at the corresponding time. The physical meaning of this metric (SwS) doesn't seem to be clear. It seems easier to understand if the SWS is divided by the corresponding time, that is, the average SWE over a period. Moreover, some studies have analyzed the change of mean SWE in some regions over corresponding time periods e.g., Pulliainen et al (2020). Why did you define new metric of SwS instead of average SWE?

This is a fair question, so let us clarify. Things like maximum SWE or 1 April SWE are simple 'snap-shots' that do not give any information about the presence of snow over time. To give an extreme example, imagine a watershed where there was no snow for the entire season except for one brief storm that left 1m of snow that then immediately melted. The idea that 1m of snow (the max SWE) is a good representation of the overall snow season is poor. That is precisely why we integrated the snow over the season. Snow being held back for a long time has ecological benefits (denning of animals; insulation of the ground; etc.) and we wished to create a holistic metric that considers this.

You raise the option of simply using the average SWE as a measure. Again, let's use a hypothetical to make a point. Imagine we have three watersheds. The first has 1m SWE for one week of the year, and zero SWE at other times. The second has 1m SWE for one month of the year, and zero for all other times. The third has 1m SWE for 6 months, and zero for all other times. All three watersheds would report the same average SWE…however, the role that snow is playing in those three watersheds is very different. So, we continue to believe that the integrated (over time) metric plays an important role that is not currently being played by the other useful snow metrics out there.

> (2) The snow water storage (SwS) indicated snow mass or average SWE in some studies like Pulliainen et al (2020), Kwon et al 2016,2017, Hale et al 2023, which indicated different meaning in your study. Perhaps you should make a distinction, such as highlighting the meaning in the introduction, or changing the name of your metric.

This is a good comment. First, the two articles by Kwon refer to 'snow water storage' in the title, but there is no 'metric' associated with that phrasing. Instead they use 'snow water storage' to simply refer to snow on the landscape. Second, in the Pulliainen article, which we were aware of, they don't use that phrasing at all. That paper is indeed focused on quantifying snow mass on the landscape, but all of their figures simply give values for Hs or SWE, and they are not integrated quantities over time. Now, Hale's paper makes abundant use of the term 'snow water storage,' but again just as an idea…there is no metric that they define called 'snow water storage.' They do introduce the Snow Storage Index (SSI), but it is a very different concept from ours. A more thorough discussion of the SwS metric and other metrics associated with storage has been added to the introduction and the 'Snow Water Storage' section of the paper.

Technical corrections:

- Line 11: 'snow snow season' might be 'snow season'.

    - Thank you for catching this; deleted.
- Line3.1: Might ‘SwS trend’ be ‘SwS change trend’? as well as in Line 176, 204 and other places in the manuscript.
    - Thank you for this suggestion. The language has been updated.
- Line 257: ‘The was an 18%’?
    - Changed to ‘There was an 18%...’
- Line 257-259: This sentence does not correspond to Table 3.
    - The sentence was updated to reflect the table. ‘There was a range of 18 in the percent of stations with negative trends and a range of 14 in the number of stations with positive trends across all metrics.’
- Line 259: Why do not picture?
    - We have chosen to present our results as a combination of figures, tables and statements in order to communicate our results as clearly as possible. Since we cannot include a figure for everything, this is an example of where we decided to use a statement to communicate our results.
- Line 278: There are double ‘that’.
    - Fixed.
- Line 280: ‘are know known’ might be ‘are known’.
    - Yes - thank you, this has been fixed.
- Line 311: Harpold et al. (2012) might be (Harpold et al., 2012).
    - Corrected as suggested.
- It might be better to understand if Figure 4 has same extent and scale with Figure 5 and 6.
    - We thank the reviewer for this suggestion, but because we had to balance suggestions from the first reviewer, we decided to modify this figure to show raw SwS change alongside the percent change in SwS. In order to preserve space, we did not change the figure extent.
- Line 182 and 183: There are Northern and Middle Rockies、Southern Rockies and in the Cascades. Can you show their locations in Figure2 although I saw there are mountain names in Table 2 in the later section. The mountains names indicated by numbers should be noted in Figure2 or front of the manuscript.
    - Good suggestion. We updated figure 2 to include ecoregion names.