***Response for Reviwer#1***

*First, we want to thank the reviewer for his precious contribution and useful comments. Here, our point-by-point response.*

> This manuscript presents a new unique data set of snow height/density measurements in Italian Alps and discusses the recent changes with robust statistical methodologies. This paper fits well with HESS and deserves to be published. However, I have some remarks before publication:

> The average coordinates (lat, lon, elevation) as well as the elevation range of the 6 studied basins should be listed in a table. Adding the mean winter temperature as well as precipitation will be useful also.

*R: We thank you for your suggestion. Accordingly, we prepared a table with area, maximum, minimum and average elevation of the considered basins, together with the number of the measurement points per basin and elevation class. Average precipitation and temperature for each basin are represented in the MARTA triangles. Here the table we made:*

| | Area ($km^2$) | H min (m) | H max (m) | H med (m) | $N_{1000\text{-}1500}$ | $N_{1500\text{-}2000}$ | $N_{2000\text{-}2500}$ | $N_{2500\text{-}3000}$ |
|---|---|---|---|---|---|---|---|---|
| Piave+Brenta | 4857 | 106 | 3342 | 1315 | 18 | 23 | 7 | 2 |
| Adige | 3815 | 238 | 3899 | 1874 | 1 | 8 | 5 | 6 |
| Oglio-Chiese-Sarca | 3615 | 136 | 3556 | 1428 | 14 | 18 | 25 | 12 |
| Serio-Brembo | 2609 | 230 | 3052 | 1213 | 1 | 18 | 9 | 1 |
| Adda | 1225 | 213 | 4050 | 1844 | 0 | 11 | 18 | 2 |
| Toce | 1533 | 198 | 4633 | 1641 | 3 | 12 | 25 | 1 |

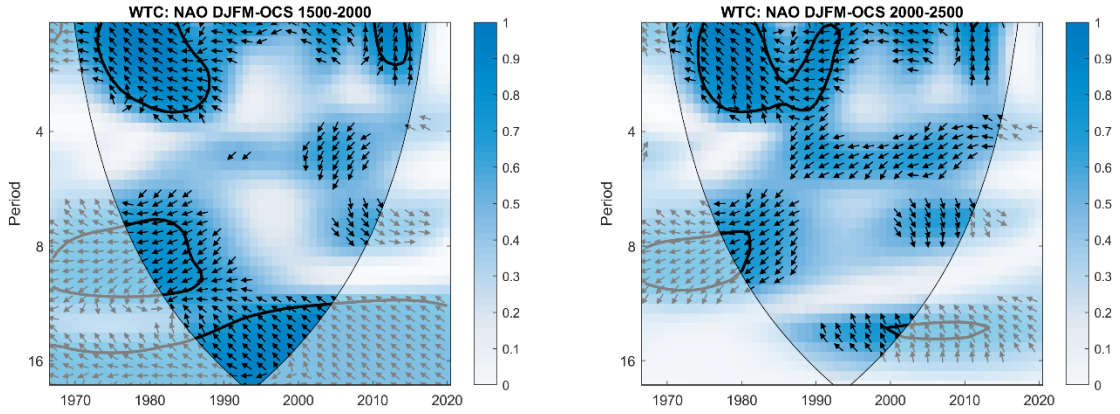
> To compute SWE, two separate periods are used to fit the parameters. How does using one of them over the whole time series or fitting the parameters over the whole time series impact on the presented results? Some figures using other estimates of SWE could be added in supplementary material. Or uncertainties should be added in estimates of SWE.

*R: If the reviewer refers to the climatological model presented in section 3.5, considering the non-stationarity of SWE observed in the timeseries analysis, we decided to separate the data used to fit the model in two sub-periods. The choice of the two periods has been done such that the two periods could have the maximum possible years in order to be sufficiently representative of the climatic conditions. Hence, we divided the entire period in two equal sub periods of 27 years. Moreover, this allows us to compare the results of the two periods. In this regard, we prepared a figure combining figures 13 and 14 together and adding a panel with the difference between the estimated SWE in the two periods.*

> The discussion and comparison with NAO and WeMO is not useful for me as correlations are listed only and discussed. But nothing is said on how changes in NAO or WeMO could have impacted the presented time series.

*R: We extended the discussion about NAO and WeMO, highlighting the similar correlation previously found by other authors with precipitation and the correlation found in our results. We actually performed a*

*wavelet coherence analysis but kept out of the manuscript for further analysis in a possible future work. Here two figures related to the wavelet coherence spectra analysis for Oglio-Chiese-Sarca basin in the 1500-2000 and 2000-2500 elevation classes. As pointed out by the reviewer, there are a lot of figures in the manuscript. We put our effort to reduce the number of those figures. For this reason, and because it is a preliminary analysis related to a single Basin, we prefer not to insert this figure into the manuscript. Perhaps, it could be inserted into the supplement. We added some final comments related to this figure in the text, furtherly expanding the discussion.*




Section 3.5 should be in Section 2.6 where the model of SWE is presented.

*R: Thank you, we moved the methodological part of this section to section 2.6 (basically the equation). We kept in section 3.5 the results concerning the model itself, starting from the calculation of the coefficients which follows the results obtained for snow depth and snow water equivalent.*

A table listing the correlation of each basin with the other ones by elevation classes will be very useful. Are the temporal changes correlated between the different basins ?

*R: The results presented, especially change points and correlations with teleconnection indexes, show similarities among the different basins. All the considered basins presented comparable change points and Pearson correlations with teleconnection indexes. Also the similar patterns of the running trends in the temperature of the MARTA triangles show that the investigated areas present correlated climatic conditions. We prefer not to include an additional table in the manuscript since there is a more than sufficient number of figures and tables (we tried to reduce the number actually, according to the reviews of the other reviewer's comments) and we believe that similarities and differences between the different basins are contained in the results presented.*

What is the reasons to have chosen 6 basins and not 5 or 7 ? or only 3 basins? For example, Basins 2, 3, 4, 5 could be aggregated together.

*R: Thank you for this question. The aggregation choice wade was driven by different reasons: hydrological direct connection aggregating tributaries to the main river branch, geographic location and climatic similarities, aggregating basins close to each other and having similar annual precipitation and temperature. Of course, basins 2, 3, 4 and 5 are close. However, they differ in orientation and present differences we wanted to preserve. For example, in the Oglio, Chiese and Sarca basins share the Adamello glacier and the measurements sites are located around the glacierized area. Grouping such basin with macro-basin 2 would be in our opinion a mistake as we could lose local information when averaging the data.*

Moreover, the red lines in Fig 1 are confusing as they concern the hydrological basins while numbers concern the area of measurements (which are mountain ranges in fact and not basins). I suggest to add circles surrounding the measurements sites chosen for the 6 basins in addition to the red lines.

*R: R: Thank you for this comment, it has been reported by other reviewers as well. Accordingly, we made some modifications in Figure 1 in order to be more representative and easier to read. We reported in the Figure the grouped basins only in order to avoid confusion related to an excessively fine basin disaggregation. The number of basin reported in the text was actually larger than the one in the figure because in the GIS we already grouped tributaries. With the new version of the figure there will be no confusion on the macro-basins as the only line present will be the boundary of each macrobasin.*