EGUsphere, referee comment RC1
https://doi.org/10.5194/egusphere-2022-851-RC1, 2022

Comment on egusphere-2022-851

Anonymous Referee #1

Referee comment on "Snow sensitivity to temperature and precipitation change during compound cold–hot and wet–dry seasons in the Pyrenees" by Josep Bonsoms et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-851-RC1, 2022

The submitted manuscript investigates the sensitivity of climatological snow indicators on compound temperature and precipitation changes. The analysis is based on the snow model FSM, which is forced by daily reanalysis data between 1980 and 2019 and assimilated in-situ data. The results focus on seasonal data and three elevation levels.

The topic is definitely of interest for readers of TC. I liked reading the manuscript, which has a clear structure and illustrative figures. However, the language needs some proofreading by English native person. I suggest to accept the manuscript as soon as the following points, have been addressed:

- Chapter 3.1 is missing a common thread and therefor hard to understand. Please restructure the entire chapter. If I got it right then the data of the 4 AWS were used to correct the reanalysis data. But how? What do you mean with “by trial and error basis”?
- The reanalysis data set of Vernay (2021) covers 1958-2020. Why do you analyze 1980 until 2019 only?
- According to Fig. 4 the main (average) snow cover even at high elevation last from November to Mai. This implies that extreme temperature or precipitation in October and June have no or only very marginal impact on the snow cover. However, you define the compound extremes based on October to June values. This makes not much sense!
- I don’t understand the explanation why no change in the peak HS date can be detected (L242), which is also in contradiction to your statement (L582) in conclusions?

Minor points:

L: 46: please rephrase

L 47: snow offset dates! You use also ablation dates and snowmelt dates. Please decide.

L57: in regard to snow duration

L82: spatially highly diverse

L105: repetition of L57

L144: please rephrase

L168: Snow model and validation data

L190: wrong reference format

L191: What do you mean with were excluded? If there is no data, then there is nothing to evaluate!

L192: ultrasonic snow depth sensor

L193: Please provide a reference where to get the data

L196: I'm not able to access the pdf given in the reference

L198: units of the 5th and 6th column are missing.

L218: LWinc and temperature

L220: Meteorological data therein…

L260: What did you when the same peak HS was reached at several dates?

L281: two times “perdentiles”

L253: average compound temperature and precipitation seasons.

L262: This makes no sense. Please rephrase.

L274: the best performance …L278: the better performance?

L279: observations are usually black...

L288: non-linear (see also other occurrences)

L290: absolute or relative decreases

L293: not surprising

L306: please change temperature legend

L311: Average seasonal sensitivity of…

L313: I’d suggest to replace the table with a bar plot

L330: Please change the title of the y-axis to: average seasonal HS change (%)

L331: Anomalies of…

L345: with respect to..

L361: Sensitivity of..

L368: Snow climate sensitivity (expressed as mean HS)

L373: "lasts area" is no English!

L377: Where can I see that "Snow duration sensitivity clearly increases during WW seasons"?

L408: Add percentage to the legend and rephrase figure caption.

L419: "increases in the energy available for snow ablation". This in contradiction to what you wrote earlier, because the snow offset is moving to times with lower sun angles.

L432: the increase in winter precipitations was mainly based on low elevation data, which is usually rain and not snow.

L437: slightly faster

L438. This higher average …

L443: Therefore, slower snow ablation rate… (where is this shown?)

L448: The earlier peak HS date a low and mid elevation …

L449: starts earlier (i.e. in winter)

L452: any explanation?

L467: mountain range

L473L in this area

L486: no significant trend for maximum HS

L488: in high elevations

L493: Sensitivities of maximum seasonal HS…

L503: highly sensitive

L506: High elevation snowfall

L513: Add percentage to the legend and rephrase figure caption.

L521: disappearance of the typical sequence…

L522: triggers the simultaneous occurrence of several periods of…

L524: on the ecosystem

L525: please rephrase

L533. The earlier snowmelt onset

L547: please rephrase

L551 is dependent on a regular deep enough snow cover, which has been…

L553: The expected increase in snow scarce seasons pointed out in this work, is consistent with snow prejections…

L571: core month of the winter season

L575: Repetition of L565

L581: show slightly larger sensitivities

L582: increases about… and the peak HS date occurs about …

L584: unclear, please rephrase