

## ***Interactive comment on “In situ observations of meteorological variables and snowpack distribution at the Izas Experimental Catchment (Spanish Pyrenees): The importance of high quality data in sub-alpine ambients” by Jesús Revuelto et al.***

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Dear editor, dear reviewers,

We are pleased to submit a revised version of the manuscript. First of all we would like to thank you for your effort in improving the work. Your comments and recommendations have been very helpful and we think that they allowed us to come up with a revised manuscript. Below, we provide a point by point answer to all comments raised

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in the reviews, and references to all changes that we have introduced in the revised manuscript. We provide the same document to both reviewers to facilitate their assessment of all our revisions.

Looking forward to your reply,

Jesús Revuelto and co-authors.

Author's comments:

First of all, and following reviewer's recommendation the manuscript has been edited by a language professional. The manuscript with all changes marked can be found in this discussion. Moreover major comments of reviewer 2 have been addressed as follows.

a) The database now includes data from WY2017 (until 31st July 2017) in which two more TLS acquisitions were performed and are also included in the data set. Thereby a new zenodo DOI is provided in the text for the download of the database (check supplementary material with the revised manuscript including this new reference).

b) Data quality has been reviewed. For instance the SR50 record now only presents snow depth values and vegetation growth has been removed.

c) Data files are now complete, with file headers without errors and the acronyms described in the metadata file included in the data set.

d) All TLS snow depth maps are now provided as ASCII files with a 1x1 m regular grid cell size. Also a snow free DEM of the study area with same grid cell size is available in the data set.

e) Unfortunately runoff data is not available in Izas experimental catchment.

f) The reviewer is right and we have changed "ALBEDO\_avg" by "Reflected Solar radiation". Similarly, former "PYRA\_Avg" column has been renamed as "Incoming Global solar radiation". The name of these two variables is now the same provided by the CMA

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6 Kipp&Konen albedometer user manual. Regarding WS\_Max (gust wind speed), our wind processing and recording systems comply with WMO requirements, establishing the gust duration in 3 seconds for each 10-minute time interval. There was no observation of long wave solar radiation so we have removed any reference to it in the text.

g) The database now includes all available 1x1 m grid snow depth maps from the TLS and melt out date distribution maps generated from time-lapse photography. Besides all good quality time-lapse images with snow presence within the study area are included in the dataset.

Specific comments/ suggestions:

Reviewer 1 (R1): In the title and abstract, sub-alpine environments are referred to as “ambients” and the area of the site is referred to as its “extension”. These are not the appropriate or best choice of words.

Author’s answer (A): “Ambient” has been changed by “environment” and “extension” by “area” in the manuscript.

R1: Page 1, line 21. There is no description of long-wave radiation measurements in the manuscript and no such data provided, other than the IR100 infrared surface temperature measurements.

A: References to long wave radiation have been removed from the text since these have not been obtained in the study area.

R1: Page 1, line 32-33. The phrase “till the date” is an example of a grammatical mistake that requires correction by a language professional.

A: This sentence has been removed.

R1: Page 2, line6. I am confused by what is meant by “controlled by the timing of snow distribution”. Perhaps this is something that could be clarified.

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A: This sentence now states: “directly controlled by the evolution of snow cover over time”

R1: Page 2, line 28. The work “spam” is a typographical error.

A: This typographical error has been corrected.

R1: Page 5, section 3. Perhaps the authors could include some more detail on the specific conditions in the immediate vicinity of the meteorological station. For example, is the vegetation sparse and the site relatively open? Is the nearby terrain flat?

A: More information is now included in the text: “located in a flat open area with sparse vegetation (mountain pastures)”.

R1: Page 5, line 28. Do the authors mean to say the gauge is located 15 m away from the AWS tower?

A: Yes. The gauge is located 15 m away from the AWS.

R1: Page 6, line 1. I am confused by the expression “average the evolution”. Does this mean that the conditions are representative? The temperature measurements are not the spatial average. This is likely a phrase that could be clarified with proper language editing.

A: This sentence has been corrected and now states: “the AWS records serve to describe the evolution of atmospheric variables occurring at the Izas Experimental Catchment.”

R1: Page 7, line 28. “significant smooth” is a grammatical error.

A: This error has been corrected. Now this sentence states: “Therefore, the daily variability in ground temperatures is significantly lower”

R1 Page 8, section 3.5. What is the sensor height of the radiometer?

A: Sensor height is 3.4 m and now it is stated in the text.

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R1: Page 8, line 30-31. The phrase “from the ground being obtained snow depth subtracting to his value the observed distance” does not make sense as written. The word “his” is a typo.

A: This error has been corrected.

R1: Page 9, line 5-10. What is the orifice height of the Geonor gauge?

A: The orifice height is 3.25 m. This information is now included in the text.

R1: Page 9-10, section 4.1. Is there any information on error assessment of the snow depths obtained by the terrestrial laser scanner for any (but ideally multiple, or all) of the acquisitions? This is quite important to be able have confidence across the range of measured depths, and at different distances from the scanner position. As it stands, this is an omission and there should be some description of how well this approach performed in the manuscript.

A1: This information was already included in the text as follows: “The final products are snow depth distribution maps with grid size of 1x1 m, with a mean absolute error of 0.07 m in the obtained snow depth values (Revuelto et al., 2014a).”

R1: Page 10-11, section 4.2. Similar as for the TLS snow depth, it is important to include some type of error assessment for the positional accuracy of the re-projected photos for snow covered area measurement. Were there any independent ground control points (i.e. that were not used in the correction procedure of Corripio) that could be used to verify how well the imagery fit to the true locations over the landscape? This would be useful toward placing some error bounds around the snow covered area derived from this imagery

A: Some information concerning this issue has been included in the text. However, since all ground control points have been used for projecting the pictures in the DEM, could not be used for assessing accuracy. The software provides the calibration performance of the transformation, which was of 3.3 pixels of the webcam images.

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R1: Page 11, line 14. Discarding due to “snow presence” is due to snow obscuring the camera as I understand it. Is this correct?

A: Yes, it is correct and this information and it has been included in the text.

R1: Page 12, line 25. “thought” is a typo; this should be “through”.

A: This typo error has been corrected.

R1: Page 12, line 26. There is a period in front of the J for the first authors name.

A: The period has been removed.

R1: Page 12, line 27. I think that “found” is a typo. Should this be “fund”?

A: Yes, it is a typo and it has been corrected.

R1: Page 17, figure 1. The font on the figure inset map is illegibly small. Could this be made clearer by using larger font?

A: Following reviewer’s recommendation, the font of this figure has been increased.

Reviewer 2 (R2): Title: Remove the second part of the title. This paper is not on the “importance of high quality data in sub-alpine ambients”. And what are sub-alpine ambients?

A: Manuscript title has been changed to: “Meteorological and snow distribution data in the Izas Experimental Catchment (Spanish Pyrenees) from 2011 to 2017.”

R2: Abstract: P3/L4-8 presents a nice summary of the datasets. A similar description should be given in the abstract too, starting P1/L19.

A: The abstract now includes this description: The climatic dataset consists of (i) continuous meteorological variables acquired from an Automatic Weather Station (AWS), (ii) detailed information on snow depth distribution collected with a Terrestrial Laser Scanner (TLS, LiDAR technology) for certain dates across the snow season (between 3 and 6 TLS surveys per snow season) and (iii) time-lapse images showing the evolu-

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tion of the Snow Covered Area (SCA).

R2: P1/L30: I would, somewhere in the introduction, expect a short overview about those studies to demonstrate what these datasets have already been used for.)

A: A short overview of this works is now included in the introduction.

R2: P2/L17: I don't think the term "boreal" applies here.

A: Boreal has been removed from the text.

R2: P3/32: What exactly reaches 40%, a single front, the fronts in autumn, or the highest monthly averages?

A: All fronts in autumn together reach a 40% of total annual precipitation. This has been specified in the text.

R2: P6/L6: Since this is a data paper you should describe your "automatic quality-control checks for removing outliers". Why are SR50 readings limited to values  $\geq 0$ , while this is not the case for shortwave radiation data?

A: This quality-check has now also been applied for shortwave radiation data.

R2: P9/L5 "consistent data" seems to imply that at least some data also exist for before July 2014. Please clarify.

A: "Consistent" has been removed from the text to avoid misunderstandings.

R2: P12/L17: You may want to mention INARCH here.

A: INARCH is now mentioned in this section.

R2: Links to webpages: Note that these links may become unavailable in a few years' time. Consider a more permanent way to provide respective information.

A: References to user's manuals have been changed and now are included in the reference section.

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Please also note the supplement to this comment:

<https://www.earth-syst-sci-data-discuss.net/essd-2017-43/essd-2017-43-AC1-supplement.pdf>

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Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2017-43>, 2017.

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