

Interactive comment on “A 18-yr long (1993–2011) snow and meteorological dataset from a mid-altitude mountain site (Col de Porte, France, 1325 m alt.) for driving and evaluating snowpack models” by S. Morin et al.

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We thank the Reviewer 2 for his/her detailed review and provide below our replies to his/her comments and suggestions.

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Interactive Discussion

Discussion Paper



1 General comments

The authors present an impressive dataset for hydrologic modeling with particular emphasis on the snow season. The manuscript needs to be cleaned up in several areas but overall is presented well. The paper should be returned to the authors for minor edits.

We thank the reviewer for his/her appreciation of our work. The paper was thoroughly read and polished prior to submission of a revised version.

Occasions where there is conflicting data or multiple sources for the same element must be clarified for the reader to understand the data source. A mixture of data sources is a common theme in the document. When this occurs, please clarify which sensor is used to generate the data provided. Snow surface temperature is an example of this.

This has been fixed, in particular for precipitation and snow surface temperature.

Consider using snowcover in place of snowpack

Interestingly, the Oxford dictionary recognizes the word *snowpack* but not *snowcover*. Anyway, in the literature the two words are used interchangeably and we preferred to stick to the term *snowpack* here.

There are a few sections that need more references to support claims (see below for specifics).

This has been improved in the text, mostly by providing more details on the methods ; in many cases at CDP it has been the experience of the people in charge of the instruments which provided knowledge and methods to circumvent measurement issues, rather than scientific literature. The current article, aiming at summarizing the current state of the experimental facility in terms of meteorological and snow-related measurements, attempts to share the methods developed and employed at CDP to the

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Discussion Paper



scientific community.

2 Specific comments

Define what is meant by evaluation data early in the manuscript for clarity.

The first sentence of the article now reads: *The development of complex geophysical models requires adequate data for driving and evaluating its performance, i.e. observations to be compared to the model output*

Page 33, line 1-3: Providing dates of gap-filled data for the in-situ data for each year would be beneficial.

Unfortunately this information has not been retained in a consistent manner throughout the entire record, mostly due to the fact that most of the gap-filling has been done manually. The gap-filling has been done in the best possible way using the data available. Future work may make it possible to address this issue more satisfyingly. If this were to be the case, updates to the present dataset would be done (note that this would only add metadata, not change the data themselves).

Page 33, line 16-19: More details on what is provided are needed. The reader is left wondering.

The following sentence was added: *In practice, to circumvent starting threshold issues, the reported wind speed corresponds to the maximum between the different types of sensors.*

Page 33, line 23: consists in should be consists of

According to the Oxford dictionary, the use of “consists in” is acceptable here and we do not change it.

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Interactive Discussion

Discussion Paper



Page 34, line 1: Need references to back up “countless experiments”

The sentence now reads: *This procedure arises from several years of testing various approaches to prevent significant frost build-up and the accumulation of snow on the sensors.* In fact, the present manuscript is the appropriate reference describing the approach employed.

Page 34, line 12: Add a reference to the uncertainty calculation.

We have added the following sentence here : *This value includes instrument uncertainties reported by the manufacturers as well as our own experience in running similar sensors in parallel for several days during the summer.*

Page 34, line 24-28: References needed here that support the use of air temperature versus dew point or wet bulb.

We are aware that relative humidity data can be used in addition to air temperature to refine the partitioning between snow and rain. In practice, *relative humidity data are used to rule out spurious precipitation events, i.e. small but non-zero hourly recordings of the GEONOR gauge occurring while RH is lower than 70 %.* This has been added to the text of the revised manuscript.

Page 36, line 20: clarify what is meant by “simultaneous snowfall” simultaneous with what?

data from simultaneous snowfall was replaced by *data obtained during snowfall*

Page 37: Clarify how these small lysimeters relate to contributing area of the melting snow cover that is characterized by all of this data. As a person unfamiliar with the site, this is not well explained in the manuscript and needs clarification.

The purpose of a lysimeter is not to estimate the total snow melt flux of the entire experimental site (this would be the purpose of a lymnimeter, provided that the whole

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catchment is studied), but to determine the amount of snowmelt at the point scale. We have rephrased the corresponding sentence as: *Snowmelt rate (also referred to as runoff here) is measured by weighting the water mass drained from each of the two lysimeters (1 and 5 m² surface area) through pipes bringing it to the scales located in the basement of the laboratory.*

3 Technical corrections:

Title: “An 18-year...” not “A 18-years...”

Done.

Page 32 Line 6 “consist in measurements” should be consist of measurements

Done.

Line 14: internal snowpack “ information are” information is singular

Done.

Line 18: “in developing snowpack model” should be plural

Done.

Line 24: Missing transition phrase from models to able to handle the inception ... Line 24-27: Reword this entire phrase. As it is written, doesn't make sense.

The sentence was rephrased to : *Meteorological conditions are the main driving data for land surface models, whose critical requirement, especially in high altitude or high latitude areas, is the ability to handle the inception, build-up and melt of the seasonal snowpack. In this case, evaluation data must include detailed information pertaining to the soil and the overlying snowpack*

Line 27: data-set or dataset- without the hyphen is preferred. Be consistent, the

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Discussion Paper



title uses dataset.

dataset is now used throughout.

Page 31 Line 3: precise estimate is an oxymoron and should be avoided.

Changed as requested.

Line 21: “at most” seems unnecessary.

Changed as requested.

Line 22: Give brief but more detail about this building ... location, height, to answer how it influences measured values.

The following sentence was added, in addition to the height (3 m) : *Because the building is located at the edge of the forest, it has a minimum impact per se on the measured snow and meteorological conditions.* We’ve also added a whole paragraph describing wind conditions at the site. Several sentences and two new figures illustrate unavoidable local heterogeneity in snowpack properties at the scale of the experimental site. We hope that this information will help data users to makes the best possible critical use of the data provided.

Reference figure 1 after the first sentence not the second.

Changed as requested.

Page 32 Line 17: I think you mean to use “assurance” not “ insurance”

Changed as requested.

Line 23: data are used

Changed as requested.

Page 34 Line 20: Consider using 1999-2000 snow season instead of snow season 1999-2000.

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Interactive Discussion

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Changed as requested.

Line 20: Expand on the correction factor ... this is unclear and has potential for changing driving data.

The sentence was rephrased : *the precipitation data were multiplied using a scaling factor adjusted for each year by minimizing the difference between the precipitation record and the observed SWE on the ground.* We have decided to provide *in extenso* the mathematical formulae used to compute for the correction factor. These are now included in the revised manuscript.

Page 35 Line 11: Write out approximately instead of using “ca.”

Changed as requested.

Line 19: “thus on” not “on thus”

Changed as requested.

Page 36 Line 11: consists in should be consist of

Changed as requested.

Line 14: terme should be termed

Changed as requested.

Line 25: “shades” should be “shading”

Changed as requested.

Page 37 Line 1: snow surface temperature should be the title of this section to consistency.

Changed as requested.

Line 5: “cleansing” should be “cleaning”

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Discussion Paper



Changed as requested.

Line 6: Consider using instantaneous instead of punctual.

Changed as requested.

Line 8: The period after 1 should be removed.

Changed as requested.

Page 38 Line 1: “below the ground surface” is more accurate than “below ground”

Changed as requested.

Line 12: Reword “lies within”

lies within was replaced by *is estimated to be*.

Line 16: Write out approximately instead of using “ca.”

Changed as requested.

Page 39 There are several long sentences in the conclusions section that should be broken up for ease of reading.

The first sentence of the conclusion was indeed too long and was cut in two.

Table 1. The ... used in the table is odd. Use the actual years for .. and “whole record”.

We prefer to keep the ... to indicate that the initial data for a given sensor is at or prior to the first year of the presented record ; conversely, it also applies to sensors which are still operating at the site following the end of the reported data set.

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