**ESSDD**

Interactive
comment

# Interactive comment on "Hydrometeorological observations from the rain-to-snow transition zone: a dataset from the Johnston Draw catchment, Reynolds Creek Experimental Watershed, Idaho, USA" *by* Clarissa L. Enslin et al.

**Anonymous Referee #2**

Received and published: 18 October 2016

General comments:

The authors present a quality controlled, serially complete hydrometeorological dataset for a sub-watershed of the Reynolds Creek Experimental Watershed in Idaho. Such a dataset is valuable for multiple reasons, including: Improved process-based understanding of the hydrology of the rain-snow transition zone; forcing data for hydrologic, snow, and land surface models; and mass balance estimates of water storage and fluxes in a rain-snow transition basin. As stated within the manuscript, observations in this critically important zone are scarce and may be limiting our understanding of

climate-driven changes to hydrology in the mountainous western United States and other similar regions of the world.

The manuscript is typically clear and easy to understand, except for the points detailed below. The dataset, as outlined in the paper, is easily and freely accessible through the included DOI along with comprehensive metadata on the station histories and locations, as well as sensor types and their performance metrics. These points, in addition to the data's utility, make the paper relevant and worthy of publication. However, there are some technical issues with the manuscript and the associated data that should be addressed before publication.

Specific comments:

My main concern is the lack of QC and infilling flagging in the provided datasets. Such information is essential to outside researchers effectively using the data. It may be there are few deleted and/or infilled observations, but little mention is made of this in the text past the listed dates in the snow depth supplemental material and the note on direct imputation of incoming solar radiation values. Additionally, the authors are inconsistent in their application of variable abbreviations. If they choose to use abbreviations for their meteorological observations, they should be clearly introduced and then used in the same manner throughout the paper with the appropriate subscripting applied. Most of my suggestions are technical in nature and can be found in the line-by-line notes below.

Technical corrections:

Page 2:

Line 3: Change "down slope" to "downslope"

Line 6: Superscript "km2"

Line 10: Clarify incoming or net shortwave radiation

Line 11: Change "selected stations" to "select stations"

Line 18: Stewart (2009) would be a useful citation here (http://onlinelibrary.wiley.com/doi/10.1002/hyp.7128/full)

Line 19: This may be a stylistic preference, but "very dynamic" seems subjective and unclear. It would be useful to elucidate some of the processes for those researchers unfamiliar with hydrologic processes in the rain-to-snow transition zone.

Line 21: Datasets like this one can be useful to water resource managers, but only through rigorous analysis. Please elaborate on how these data can be applied.

Line 24: Please note the elevation range is approximate and varies in space and time.

Page 3:

Lines 5-16: The HJ Andrews LTER also spans the rain-snow transition zone (not in the elevation range provided in this paper, but the upper elevation sites develop seasonal snowpacks with up to ~1500 mm of SWE and the lower met stations are rain-dominated), and their data are freely accessible at: http://andrewsforest.oregonstate.edu/lter/data.cfm?frameURL=173. Col de Porte data are available at: https://doi.pangaea.de/10.1594/PANGAEA.774249 and ftp://ftp-cnrm.meteo.fr/pub-cencdp/.

Line 7: Remove space between 6.3 and % (remove space in all subsequent percentages)

Lines 16-19: Hydrologic modeling can be performed with the other datasets, but the Johnston Draw dataset is unique in that it allows for streamflow and soil moisture validation

Line 20: Note that a water year runs from Oct. 1 of the prior calendar year to Sep. 30 of the year listed.

Line 27: Long-term datasets are invaluable for trend analysis, but 11 years is too short

for studying "long-term climatic trends." Will these observations be continued? There is a note later in the paper, but it should be noted in this sentence.

Line 31: Define USDA acronym

Lines 33 to 1 on page 4: Provide statistics on rain and snow proportion

Page 4:

Line 1: Remove space between 8.1 and °C (remove space in all subsequent mentions of temperature values)

Lines 1-2: Because the range and transition are important, it would be useful to add summary statistics for the high and low elevations in addition to basin averages (or at least cite Table 1).

Lines: 2-4: Include common names for all vegetation.

Lines 12-21: Although jdt1 and jdt1b might be the nomenclature used at RCEW, it would make more sense for readers if they were denoted as north/south (i.e. change the acronyms to JDT1N and JDT1S)

Line 15: provide measurements of "air" temperature

Lines 15-16: Variables should be subscripted where appropriate. Additionally, the abbreviations should be noted in the first introduction of their associated variable if they are to be used throughout paper (as they seem to be here, albeit inconsistently).

Line 21: What are the regular depths?

Lines 29-30: Given this is a data paper, more information on the QC procedures should be given, either in text or in a table.

Line 31: What does "surrounding stations" mean in this context? Is there a conceptual model as to how the infilling is performed (for example, "We use the three closest stations in a multiple linear regression.")?

Page 5:

Line 7: Define IPW acronym (workbench becomes redundant here)

Line 11: "the dominance of winter events" is unclear. Many readers may be unfamiliar with the seasonality of precipitation in the NW USA.

Lines 15-16: The Nayak et al. (2015) citation would be useful here

Line 19: Change "night-time" to "nighttime"

Lines 21-23: This is unclear. Wouldn't peak solar typically occur at solar noon, with exceptions due to clouds, vegetation, and terrain?

Lines 25-31: Longwave radiation is not included in the provided datasets. The authors should note where the listed longwave radiation observations can be accessed and clarify that researchers can estimate atmospheric longwave radiation using the provided measurements.

Line 26: Longwave radiation "errors" can limit model performance.

Line 30: The first three citations do not explicitly use elevation. Additionally, Flerchinger (2009) noted the Marks and Dozier correction underpredicted longwave radiation.

Page 6:

Lines 2-4: The wind speed range for the high site is nearly identical to the range given for all sites. The doubling of wind speed comparison would be clearer if averages were given.

Lines 11-12: Clarify that the Marks method relies on dew point temperature and note the ranges for rain, snow, and mixed precipitation.

Line 15: Change "dual gage" to "dual-gage"

Line 27-28: This needs clarification as many streams in the western US see reduced flow when snow cover becomes continuous.

Page 7:

General: The type of snow depth sensor should be noted before the processing procedure. See Ryan et al. (2008) for more information on depth-processing algorithms (http://journals.ametsoc.org/doi/abs/10.1175/2007JTECHA947.1)

Line 6: The signal is typically ultrasonic, not sonic.

Lines 15-17: You can also note some snow models (e.g., SNOWPACK) can be forced with snow depth observations in order to simulate SWE.

Line 17: Change "snow melt" to "snowmelt"

Line 21: Use soil temperature abbreviation consistently (this applies to all other variable abbreviations throughout paper)

Lines 29-30: It would be useful to inform the reader these values were chosen due to depth-to-bedrock differences noted earlier in paper.

Page 8:

Line 5: Is this the arithmetic mean of the sensors or is it weighted by the terrain they represent?

Lines 6-8: How were these errors calculated? Explanation in lines 8-9 is unclear.

Line 9: State the mass balance equation for clarity (I'm assuming ET = P – Q)

Line 31: precipitation magnitude and "air" temperature

Figure 1:

Labels for the contour intervals and met stations are difficult to read.

The contour line color is nearly the same as two of the elevation bands.

Figure 2:

Comparisons between storm and non-storm meteorologic characteristics could be improved by combining sub-figures i. and ii. for the individual water years (i.e., monthly storm and non-storm Ta and Td are plotted adjacent to each other, once for WY2011 and once for WY2014).

Figure 3:

The temperature hash marks extend past the numbers.

3ii and v show data from the south-facing slopes, and 3iii and vi show north-facing (the text says the opposite).

Figure 4:

No data "were" (not "was") collected.

The water years for each plot should be noted in the first line of figure caption or on the plot itself (preferred).

Table 1:

Station should be first column

Readability is hindered by the line break in the Station Data column. All stop dates are 9/30/2014. These can be removed and the Station Data column can be replaced by a Start Date column.

The date follows the US format, but should be made international (YYYY-MM-DD)

It is difficult to tell which variable applies to which columns (separating them with a line would be useful)

Relative humidity is the only column with asterisks, and it is measured at all non-stream stations

Data from all stations "continue", not "continues"

The third sentence includes information about station names not mentioned elsewhere and may be unnecessary

Superscript where appropriate in the variable units

Uppercase Q used for streamflow in Table 1, but lowercase q used in Figure 3 and it is not given an abbreviation in the text

Supplemental Information:

This table seems unnecessary. The gaps can be noted in the relevant data files and snow depth information could possibly be included in Figure 3.

Data:

None of the data files include a QC or infilling flag column. This information should be included so other researchers know which data are observed, which are suspect, and which were replaced.

Some files use -9999 and others used NaN to represent missing data

Change date-time format to a more universal standard (e.g. YYYY-MM-DD HH:mm)

The Download All button doesn't work (2016-10-18)

In some cases dew point temperature is greater than air temperature (noted specifically in rc.tg_.dc_.jd.125_met, but may be in other files). Please recheck the met data and the calculations to remedy this issue.

Interactive comment on Earth Syst. Sci. Data Discuss., doi:10.5194/essd-2016-44, 2016.