Author responses to the RC1 comments on Manuscript: ESSD-2016-42, entitled " Weather, snow, and streamflow data from four western juniper-dominated experimental catchments in southwestern Idaho, USA" – Earth System Science Data

- Reviewer comments are in bold font and author responses are in normal font.
- Line number references are to the original manuscript unless otherwise noted.
- Quotes from the text are italicized and proposed revisions are underlined.

RC1 General Comments:

Authors are to be commended for submitting a polished manuscript. The data set is comprehensive and can be used to study mountain hydrology in semi-arid catchments. The data may be used to drive physics-based snow or/and hydrology models. However, before the manuscript can be accepted in as is form, authors are encouraged to address the following comments:

We thank the reviewer for a thorough review and have addressed the comments below.

RC1 Specific Comments:

1. **The https link in abstract does not take me to the data. One has to search for the relevant data on nal.usda.gov. I wonder if this can corrected. However, the doi link worked just fine.**

   The link works for me if copied and pasted into my browser on my desktop, but had some problems doing the same thing on my laptop. I double-checked that it is the correct address. I don't quite know how to fix this problem. I will ask the editor and the people that type set the article to try to address this issue. Thank you for bringing this up.

2. **My experiences with accessing the data set: * When i clicked "readme" file, it showed "The requested URL "/system/files/readme_2.txt" was not found on this server.". Please correct it. * The "measurement location coordinates" link showed me 10 locations. Are these for the snow course observations. Explanation of the data is missing.**

   Thanks for pointing this out. I have worked with the National Ag. Library to fix this issue.

The measurement location coordinates file has the locations of where the weather stations and weirs are located. I have modified the file description as follows in both the readme.txt file and the link to the station_coords.csv file: "*Station coordinates and elevations of weirs (sme, smf, smg, smm) and weather stations (sme2, smf1, smg1, smg2, smm1, smm2) in meters. Coordinates were measured using a Garmin hand held GPS with approximately 3 m accuracy. Elevations are obtained from a 1 meter Liar-derived digital elevation model corresponding to the coordinates. See above for spatial reference information.*"

3. **In the "Introduction" section, it is noted that western Juniper is encroaching into the sagebrush-dominated landscape in the interior Great Basin region, and the presented data will facilitate the study of the impacts of Juniper encroachment on ecohydrology. It is not clear if any of the discussed catchments present a base case with zero to minimal encroachment. If there is such a watershed, please identify it. If not, authors are encouraged to highlight sites that are "juniper influenced" vs. "sage influenced" that may allow understanding the effects of juniper encroachment. Alternatively, sufficient explanations should be provided on how the data sets may be used to study the impacts of juniper encroachment.**

    All catchments are in phase III encroachment (fully encroached). Impact study may occur after treatment of catchments. We have included a description of that plan on page 2, line 3 as follows: "*Catchment M was burned in the fall of 2015 and catchment G is scheduled to burn in the spring of 2017. The long term treatment plan includes burning catchments F and then E.*" In addition, we have removed the sentence on page 2, line 10 that also described the treatment plan in less detail.

    We have indicated that this dataset includes pretreatment data on page 2, line 4 as follows: "*In this paper we present hourly pretreatment weather, precipitation…*".

    We have also restructured the last paragraph of the introduction to include an explanation/example of how the dataset can be used now to study the impact of juniper encroachment (Page 2, line 7): "*These data represent a relatively complete background hydrologic dataset that has been collected from 1 October 2007 through 30 September 2013 (six water years, WY2008 to WY2013). This time period is sufficient to provide a range of precipitation and temperature conditions typical for this region. These data and are appropriate to force and evaluate models that investigate the hydrologic function and change in these systems. For example, Kormos et al., (in press) utilized this dataset to evaluate the changes in ecosystem water availability between juniper-dominated and*

sagebrush-dominated landscapes by simulating snow dynamics with and without juniper trees."

4. **P3, L31 and P4,L1: "Precipitation phase was computed using methods described by Marks et al., (2013)". Marks et al. compared 4 methods for estimating precipitation phase. I did not see the phase data from all four methods. If evaluation of the phase was done based on a certain method (e.g. dew-point temperature method) only, clearly state so.**

   We have changed this sentence to "*Precipitation phase was computed using the dew point temperature methods as described by Marks et al. (2013)."*

5. **P3, L21 (P4, L22): It is noted that wind direction time series was not filled, while other data sets were. Please add a short statement explaining why wind direction wasn't/can't be filled.**

   We have included additional verbiage describing wind direction data on page 4, line 22 as follows: "*We did not attempt to gap fill missing or bad data from the wind direction time series, as correlations between wind measurement stations are low. However, there is sufficient wind direction data to obtain average wind directions during water years and individual storms.*"

6. **P3, L29: The WMO protocol used in Dingman's book should be properly referenced by providing the page number. Otherwise, it is difficult to cross-check.**

   We have included the page number on page 3, line 29 as suggested.

7. **P5, L7: Please provide more information on the thresholds or methods used to determine "excessively noisy data".**

   We have added a sentence on page 5, line 6 to explain excessively noisy data as follows: "*Excessively noisy data was identified as time periods that contained more erroneous measurements than reasonable measurements.*"

8. **P6, L7: The ftp://ftp.nwrc.ars.usda.gov/publicdatabase/ is very slow. Also, I did not see any "additional" data of south mountain on this website as has been claimed. If there is some, why has that been not added to the NAL website. The FTP site also does not appear to have the details of data. I suggest removing this link. It is also not clear why Reynolds Creek watershed is mentioned here.**

   We have removed the reference to Reynolds Creek as suggested. We have left the link to additional data as the ftp site has the level 1 data (obvious erroneous values flagged and removed) from earlier and later than this data

set. This data is "raw" data and has not gone through the quality control that WY2008 – WY2013 has been subjected to. In addition, this database will be updated in the future with more current weather station and streamflow data. The speed of our server is expected to improve soon, as well.

9. **While the presented data set is rich, considering that it is designed to be used for snow and hydrologic modeling, there are some important variables that are missing. For example, most radiation or snow interception/melt/accumulation models use LAI or shape of vegetation (e.g. cylindrical canopy with given minimum/maximum height and diameter at certain height) as inputs. Given the LiDAR data, can the aforementioned variables (LAI or canopy shape) be generated/provided. The would significantly improve the usability of this data by snow and hydrology modeling. Kormos et al. (2016, RE&M) have used the presented data sets for modeling, but it is not clear how the LAI was derived.**

   The Kormos et al. (2016) paper did not use LAI or canopy shape in the modeling of the South Mountain Watersheds. It used mean and maximum canopy height on a 10m grid. The raw lidar point cloud is available for those that need more specific data sets from: https://www.idaholidar.org/data/data-map/south-mountain/ We have included this link on page 3, line 11 as follows: "*The raw lidar point cloud is available through Idaho Lidar Consortium (https://www.idaholidar.org/data/data-map/south-mountain/) in the case that additional spatial data is required, such as LAI or vegetation shape parameters.*"

10. **Another important data that is often required by snow and hydrology modelers for validation is SWE. It appears that SWE is only available few times during the water year. A line or two highlighting this limitation and how the presented data set may still be used for validation, should be included in the text. If there is any data of soil properties from the catchments, authors are encouraged to include those in the data set.**

   We have included the following verbiage on page 5, line 9 pointing out this limitation as follows: "*Although significant resources were expended collecting SWE data, we recognize that this is a limited model validation dataset. The combination of continuous snow depth and SWE measurements should be sufficient to evaluate distributed snow model results.*"

   Although we agree that it would be great to have measured soil properties for this catchment, there is no quantitative soil property data from South Mountain, and users would have to rely on national soil databases.

11. **Some discussion of the juniper removal plan and which watersheds they are being implemented in, should be included in the summary. This will allow**

readers to identify watersheds of interests where one can study the impacts of juniper removal.

We have included the following sentences on page 6, line 12 to describe the treatment schedule as follows: "*This publication provides details on background data from catchments that are now juniper dominated. A treatment schedule to remove juniper is now being implemented so comparative studies can be conducted. Catchment M was burned in the fall of 2015 and catchment G is scheduled to burn in the spring of 2017. Catchments F and E are also to be treated.*"

RC1 Minor Concerns:

1. **P1,L19: Consider revising "which affect wildlife habitat" to "which in turn also affects the wildlife habitat". Provide a reference or two regarding the affects on wildlife habitat.**

   We have made the correction as suggested.

2. **P2,L1: "there are limited datasets available to quantify the impact on larger scales through modeling". Provide references for "limited datasets" if there are any. Also, it is not clear if the previously published data sets are at points or at plot scales. That will give the reader some idea of what is meant by "larger scales" here. Is it the watershed scale or an area larger than a certain threshold.**

   To our knowledge, there is no openly available datasets. We use the limited verbiage because we know those data exist, but you have to collaborate to get ahold of it. For example, SageSTEP has an extensive database of vegetation conditions and changes due to treatment that you might be able to use if you collaborate through the following process.

   SageSTEP: Opportunities for Additional Studies, c2005-2013, Union, Oregon: Sagebrush Steppe Treatment Evaluation Project; [accessed 2016 Oct 13]. http://www.sagestep.org/collaborative_projects/opportunities.html.

   In addition, Camp Creek in Oregon has collected juniper and hydrology data, but this data is not freely available or published as far as I can find.

3. **P2,L28: "A snow courses is" should be revised to "A snow course is"**

   We have made this change as suggested.