

Interactive comment on “Meteorological observations collected during the Storms and Precipitation Across the continental Divide Experiment (SPADE), April–June 2019” by Julie M. Thériault et al.

Anonymous Referee #2

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Title: Meteorological observations collected during the Storms and Precipitation Across the continental Divide Experiment (SPADE), April-June 2019

Authors: Julie M. Thériault et al.

GENERAL COMMENTS

The main objective of this article is to present the Storms and Precipitation Across the continental Divide Experiment (SPADE), an experimental campaign to collect high temporal frequency meteorological (focused on precipitation) data on either side of the

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continental divide by automatic weather stations, Doppler LiDARs, micro rain radars, disdrometers and manual observations (precipitation types and photographs of solid particles) during a 2-month period. Lack of observations in mountain areas represents a big constraint and a challenge as complex topography play a key role in e.g. the development of isolated convective systems and heavy precipitation events. Moreover, it is highly valuable the huge effort made by the research team to conduct this experimental campaign. Lastly, free access to the dataset would be welcome by the scientific community.

The overall quality of the manuscript is good, however, some specific issues are raised:

MAJOR QUESTIONS

1. The SPADE was carried out by using existing weather instruments along with the setting up of new ones. As the focus of this experimental campaign is to monitor extreme precipitation events in areas of complex topography, I am particularly interested about why different types of rain gauges were chosen. I am wondering about this issue because it is well-known that tipping bucket rain gauges underestimate extreme rainfall intensities. Moreover, the response and uncertainty of both the HOBO and Davis is different, and also present biases when compared to e.g. Hellmann rain gauges. OTT and Geonor are more accurate as measure continuous precipitation quantity both in rain and ice form. Therefore, the authors should better discuss why different brands (HOBO vs. Davis; OTT vs. Geonor) are used, instead of only one for data consistency.
2. In relation to the first comment, did the authors apply a calibration of tipping bucket rain gauges in the lab? It is also well-known that the precision of these instruments is not 100% accurate when delivered from the factories; i.e., not always 0.2 mm tip-1. Therefore, it is mandatory to test the rain gauge calibrations before setting up them in the field. Moreover, data from the HOBO and Davis rain gauges was collected by means of dataloggers. However, this is not described in the manuscript.
3. Precipitation has a strong dependence to wind speed in mountain areas. In this

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experiment, the research team used them without single alter shields (tipping bucket rain gauges). This wind screen can strongly minimize the losses of precipitation due to wind, which is commonly moderate to strong (downburst, outflows, etc.) under deep convection or heavy orographic precipitation. The underestimation of precipitation due to wind can directly affect not only the monitoring of these events, but also the climatology / hydrology.

4. Figure 2 shows the instrumentation set up of the stations. I miss two things: (i) all instrument should be labelled in each picture; and (ii) a layout of the weather station(s) with the distance between instruments would be very informative. For instance, in (a) it looks like the weather mast is higher than the Geonor, so depending on the distance between both could be (or not) impact on the precipitation measurements.

5. Authors published the collected meteorological data freely. However, they should better discuss the quality control checks they applied.

6. The manuscript lacks of a discussion section about the “state-of-the-art”. They concluded that their dataset is “valuable and unique”, however, why? For instance, they do not compare their uniqueness against other field experimental campaigns conducted in other regions. This must be further improved in a revised version of the manuscript; it should be described in the Introduction, and discussed in a final discussion section.

7. The SCAPED monitored 13 storms over a two-month period, and authors concluded that these events occurred under varying atmospheric conditions. Even though this is a paper focused on a description of the data, a brief summary (maybe in a table) of the triggers and atmospheric circulation (upslope vs. downslope flows) of these events should be described.

8. Weather station was powered by a 12V battery; what is the AH of the battery?

9. Another concern is about the time intervals of the average, which was changed by the beginning of May from 15 to 5 min averages. However, the SPADE field campaign

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was initiated on April 24th. Moreover, there are inconsistencies in the measuring intervals among instruments. For instance, WXT520 collected data at 1 minute resolution. A better justification and a table with a summary of the sample and average intervals used should be included and discussed.

10. I am wondering about the use of the “improvised radiation shield attached to a wooden post”. How reliable these air temperature and relative humidity measurements are? In principal, they are not protected against long- and short-wave radiation, precipitation, etc., as it is mandatory following the guidelines to methods of observations of the World Meteorological Organization. Can you please discuss and include a picture of this radiation shield?

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