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Interactive comment on "Testing and Development of Transfer Functions for Weighing Precipitation Gauges in WMO-SPICE" *by* John Kochendorfer et al.

Anonymous Referee #2

Received and published: 15 July 2017

The paper presents results from tests on the adequacy of (mostly already existing) transfer functions for precipitation gauges. It directly builds on the paper by Kochendorfer et al. 2017, recently published in HESS.

The topic discussed by the Authors is of scientific relevance and timely, and its scope is within the objectives of HESS. The manuscript presents novel findings that may be useful to inform the selection of proper instrumentation for measuring (solid) precipitation. Results and conclusions are clearly outlined; however, I believe the overall presentation should be substantially restructured to better convey the manuscript's findings. Specifically, I think that, in its current form, the manuscript lacks important pieces of

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Discussion paper

information and an overall picture that would enhance its comprehension.

In the following, I report a few suggestions for improvement.

General comments:

1. A short introduction should be provided on the reasons why new precipitation gauges are needed, what are the criticalities in measuring precipitation, what we expect the improvements from using alternative measurement systems would be. I understand that many of these aspects were already outlined by the Authors in Kochendorfer et al. 2017; herein, the Authors should focus on measurement equipment alternative to traditional systems. Alternative precipitation gauging systems are blossoming in the hydrological community, and their promise/limitations may be reported to better support the scope of the paper and expand the bibliography.

2. The role of wind in the underestimation of precipitation should be better highlighted through key citations.

3. Why were these specific gauging systems selected? I think that the description of gauges can be improved by providing further details on how they work, what their features contribute to, and what we should be expecting in terms of performance and limitations. I also suggest that Figure 2 is improved and key features are highlighted for each of the gauges.

4. The Discussion and Conclusions should clearly state what research findings are and recommend best practice for measuring solid precipitation. I suggest the Authors include a Table in the “Synthesis” section where each gauge is coupled with the recommended transfer functions and comments are provided on eventual limitations.

Specific comments:

1. Abstract: I think the Abstract should be simplified (it is not necessary to list the names of all gauges) and the paper objectives and results clearly outlined.

2. Introduction: I believe including a synthesis Table on previous experiments would help the reader to frame the work within previous studies. I also recommend the Authors expand the last paragraph by (i) justifying the selection of specific gauges; (ii) clearly stating hypotheses; (iii) and identifying key objectives.

3. Methods: Many parameters/terms were not properly defined. I believe the Authors should devote a paragraph to re-state what catch efficiency is, what are key variables influencing the response of the gauges, and to report previously developed transfer functions. Please also clarify the data structure (sentence on Page 4 line 31 is out of the blue).

4. Results and Discussion: Since many of the tested gauges had a similar behavior, I do not think separate sections and Figures 4 to 12 are necessary. I suggest the Authors consolidate results in a Table. I would also move the transfer function coefficients in the Supplementary Material.

5. I think the presentation quality of the paper is sufficient; however, the number of references could be extended. I also suggest the Authors double check the English for minor typos. I herein list some of them:

- Page 3 line 9: “consisted of a either a”

- Page 10 line 6: “This result are”

- Page 11 line 6: “measurements are attributed”

- Page 13 line 17: “3-dimensional” (please clarify what this means)

- Page 15 line 4: This sentence is unclear, please elaborate.

I also suggest the Authors pay special attention in defining all acronyms.

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