

Interactive comment on

**“Evaluation of various daily precipitation products for large-scale hydro-climatic applications over Canada”** by Jefferson S. Wong et al

December 1, 2016

### ***Paper Summary***

This paper sought to evaluate the performance and reliability of daily gridded precipitation products for Canada - based on seasonality and eco/hydro-zones. The aim of defining specific climatic/hydrological regions and factoring in seasonality was to relay more usability and relatability with the results. The authors identified a need for such a study as few had been done previously which looked at precipitation products for Canada – although they do make reference to a study being conducted previously for “North America”.

7 datasets were assessed which fell under 1 of 5 types of precipitation products: *Station-based*, *Station-based model-derived*, *Reanalysis-based multiple-source*, *GCM statistically downscaled* and *GCM-driven RCM dynamically downscaled*. These products were compared against direct precipitation-gauge data from an adjusted and homogenized dataset covering Canada, with the authors acknowledging the scarcity of gauges and lack of quantification of the uncertainty associated with this benchmark dataset. A Kolmogorov-Smirnov test was done to compare the probability distributions of the products and 4 performance measures were carried out: Percentage of Bias, Root-mean square error, Correlation coefficient and Standard Deviation. Ultimately, the results indicated a strong conclusion was not possible that would name one product superior to all others. Rather, 9 concluding points were presented which cover various regions, seasons and performance measures.

### ***Main points***

Overall this study does fall under the scope of HESS and has a meaningful aim in assessing the reliability of precipitation products as these same datasets are the ones which feed into hydrological models. This type of work appears to not have been carried out on such a large scale previously, but perhaps setting

out to analyze and summarize 7 datasets, over 15 regions and for all seasons is too grand for a single paper. It is apparent that widespread results exist, as evidenced by the conclusions that the performance of the products depended on both season and eco-zone. An alternative approach to add greater clarity to a project of this size could be to re-structure the format of the paper to present the results based on the zones assessed, perhaps in a tabular format. This would also help users of this study to efficiently compare, contrast and determine the best dataset for their needs (which was an objective of this study). Although the results, discussion and conclusion sections are presented in a convoluted manner, the outcome is still thorough and definitive conclusions are presented. As well, the performance measure methodology is clearly presented and would be easy to reproduce.

The precipitation data section is incredibly unclear. It would first be beneficial to break the section into further components, for example data sources, limitations and treatment. Secondly, the authors have presented a lengthy description on how data was gathered, compiled and corrected, although all of this work was carried out in previous research. What is lacking is a better description toward the end of the section to outline why exactly this reference dataset was selected despite it clearly having major deficiencies. Three studies are referenced with regards to this dataset being widely used yet no further information is presented. This reference dataset is an integral piece of the analysis, all of the datasets are being compared to it, therefore it is not enough to only state that it "has been recognized". It would make more sense to outline in detail why it is being used rather than how it came to be as that work has already been done.

This study was done for a large scale and included a number of variables. Textually the results are quite difficult to follow and there is an abundance of figures provided to illustrate these results, but they too are quite dense. A solution would be to either separate, enlarge or regroup the figures to add clarity and

meaning to the results, and by doing so much of the text can be condensed to include key references to the figures without spelling out each result.

### **Minor Points**

- Title: the word various does not add any meaning, it can be removed or the count of precipitation products can be used in its place
- Abstract: should list the precipitation products under review, as well, mentions a “systematic analysis framework” but the paper does not read as though any framework has been developed
- Structure and Content: needs reworking.
  - Pg.15 (Line 28) references Section 2.1 which does not exist. Should reference section 3.1 instead.
  - Study area includes a discussion of data collection
  - Introduction should be presented on its own. “*Precipitation measurements and their limitations*” and “*Objectives and Scope*” should not be in the introduction.
  - Most of section 3.2 can be removed and inserted as a summary table as it completely references the outcome of prior studies
- Language: an edit should be conducted to check for grammar and sentence structure. Examples: The results point on Pg.28, Line 15 contains 3 sets of parentheses in a single sentence. The sentence on Pg 7, Line 20 ends with “*along the southern Canada*”. Pg.8, Line 4 refers to the province of Alberta as Alberta province.
- References: ample amount of references but this is appropriate given the amount of datasets being analysed. Though several references appear dated, for example the Radar Reflectivity and Surface Rainfall paper likely had several further advances on the topic since 1987