

Earth Syst. Sci. Data Discuss., referee comment RC1
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Comment on essd-2021-160

Anonymous Referee #1

Referee comment on "Canadian historical Snow Water Equivalent dataset (CanSWE, 1928–2020)" by Vincent Vionnet et al., Earth Syst. Sci. Data Discuss.,
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General comments

This manuscript describes a pan-Canadian data set on snowpack water equivalent (SWE), along with snow depth and snow density for observations for which snow depth has been reported in addition to SWE. The data set is an updated version of the Canadian Historical Snow Survey Data (CHSSD) archive, which has been used in a number of research studies since its publication in 2019. The current version corrects a number of issues in the earlier version, incorporates additional data sets, and applies a consistent quality control protocol. The steps involved in the updating are all clearly described and logical.

Based on the usage of the earlier version by the international community, I anticipate that this updated version will be an important resource for a range of studies related to atmospheric and climate science, cryospheric science, hydrology and ecology. I have a few suggestions for some additional information and technical corrections, as outlined below.

Specific comments

The introduction seems to me a bit long, and I wonder if all of the information is necessary in the context of introducing the data set. I would suggest that the authors consider ways to shorten it. For example, perhaps some of the information on measurement approaches in the first two paragraphs could be summarized in a table. That table could also be referred to later in the manuscript in relation to the metadata.

To help set the motivation for producing the current data set, it may be useful to add a couple of sentences to the introduction about the use of the earlier CHSSD by the international community. For example, a Web of Science search on the article by Brown et al. (2019, Atmos. Ocean) showed that it has already been cited eight times.

Figures 4 to 7 provide a good overview of the spatial and temporal coverage that will be useful for potential users. The only suggestion I would have for additional figures would be one showing the elevational distribution of observations in relation to hypsometry, perhaps at a provincial or regional scale (e.g., based on the national level ecoregions; see <https://open.canada.ca/data/en/dataset/ade80d26-61f5-439e-8966-73b352811fe6>). As a researcher who focuses on the mountainous regions of western Canada, I believe that it is important for users of SWE data to appreciate that most of our observations represent mid-elevation locations below treeline.

It would be useful for potential users to have information about the different types of snow samplers used in the different regions of Canada, if such information is available. For example, Goodison et al (1987, <https://doi.org/10.4296/cwrj1202027>) reported that many samplers used in Canada overmeasure by varying amounts.

Another methodological point that may be useful to mention, if information is available, relates to the siting of snow courses and snow pillows. For example, some snow pillows I have seen in British Columbia are located in small forest openings, such that I suspect that they tend to accumulate snow more like an open site and melt at rates more like forested sites.

When comparing model output to SWE observations, it is important for users to understand the accuracy of the locational coordinates in order to extract simulated SWE from a model unit that is representative of the monitoring location. If possible, I suggest that the authors add some information about the typical horizontal and vertical accuracies of the coordinates.

Technical corrections

line 104. I suggest reorganizing the sentence to avoid beginning with "91."

line 192. Should "Northern America" be "North America" – i.e., Mexico, USA and Canada?

line 192. Change "expect" to "except."

line 207. Change "was" to "were" to be consistent with earlier usage of "data" as plural.

line 283. Insert "of" between "majority" and "the."