

Interactive comment on “Assessment of a multi-resolution snow reanalysis framework: a multi-decadal reanalysis case over the Upper Yampa River Basin, Colorado” by Elisabeth Baldo and Steven A. Margulis

Anonymous Referee #2

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In the manuscript “Assessment of a multi-resolution snow reanalysis framework: a multi-decadal reanalysis case over the Upper Yampa River Basin, Colorado”, the authors present a multi-resolution approach for a snow data assimilation application in the mountainous region of the Colorado River Basin. They assimilate fSCA estimates from different satellite-based remote sensing systems and LSM results to generate a SWE reanalysis dataset. They present a comparison of prior and posterior (to the assimilation of remote sensed data) SWE results with station measurements as a validation of the assimilation framework. In the results section, the performance of the MR approach

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is discussed in detail. Main aim of the MR approach is reducing the computing time for large scale applications and datasets.

General Comments

The authors present a comprehensive application of a data assimilation and MR framework. They present state-of-the-art data and approaches and apply their own data assimilation and MR framework to a large test case. The approach to compare the MR case with a baseline resolution case in the results section is well chosen and nicely elaborated. However, the authors could think of shortening the results section at some points, because the results are somehow quite obvious from the beginning of the results section on. The differences in posterior SWE when coarsening the resolution for less complex terrain in the MR method compared to the baseline case are very small or even negligible. This is an impressive result and underlines clearly the validity to use the MR approach when a reduction of CPU and storage resources is needed. However, as said, the results section could be much shorter, because the differences are so small that most of the figures present a more or less “perfect match”. Besides showing the performance of the MR method, the 31-year dataset gives very interesting insights in the snow climatology of the region. The manuscript is technically of very high quality and well written, and I recommend its publication after minor revisions.

Specific Comments

L. 15: Rephrase and remove “by the user”: e.g. “Factor 2 multiples ... are chosen in this study as specific set of resolutions.”

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