

Snow cover reconstruction methodology based on historic in situ observations and recent remote sensing data

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This manuscript discusses a methodology to reconstruct historical snow coverage using recently available remote sensing data and long-term point observations of snow depth from existing meteorological stations for the Zerafshan River basin in Central Asia. Information on snow cover and snow depth is crucial for seasonal forecasts of water availability and for calibration and validation of hydrological models.

The outcome of this paper is important to better understand the possibility of reconstruct historical snow data. The paper is mathematically rigorous.

While the results of this paper should be interesting, the paper should be in my opinion published but it should be thoroughly revised and extended according to quality requirements imposed by the journal and referees.

General Comments:

1. This methodology is useful to reconstruct historical snow coverage certain region (Zerafshan River basin), but the title of the paper suggests a generic methodology without caveats on the area location.
2. I think, much more care is required in presenting information related to the limits of this method for transition seasons and at edges of the snow field.
3. And I agree with comment 5 by R. Fernandes :“If snow cover is ephemeral I figure you will have a lower MR since the station and MODIS maps may be seeing different snow cover. Can you provide an image of the range of MR across the annual period (and more importantly when step 5 is being used to map a region for the worst/best case dates) since when $MR < 1$ the method is far less accurate”