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Interactive comment on "Snow cover dynamics in Andean watersheds of Chile (32.0–39.5° S) during the years 2000–2013" *by* Alejandra Stehr and Mauricio Aguayo

Anonymous Referee #1

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General comments

The main objective of this study is to evaluate the suitability of MODIS 8-day snow cover product (MOD10A2) to estimate snow cover area and duration in five watersheds in Chilean Andes. The MODIS dataset was validated against observed snow depth at a few ground base site observations and snow courses data from the period 2000–2013. The changes in snow cover area and duration were analysed by trend analysis. Results show that the overall Accuracy of MODIS10A2 ranges from 81 to 98%. Authors conclude that the evaluation of trends does not indicate significant changes in snow cover area and duration.

Overall I agree with the authors that the effects of snow accumulation and melt changes

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Discussion paper

in Chilean Andes can have significant impacts on allocation and using water resources. So the evaluation of spatial and temporal patterns of snow cover is important and interesting. On the other hand, however, I wonder to what extent the present manuscript contributes to some novel significant scientific contribution. The main research question here is not clearly formulated. The evaluation of suitability is rather vague and it is not clear in which respect it is novel. Why do the authors expect that the accuracy of MODIS snow cover products will be different in their region (Southern hemisphere)? There are plenty of studies performed in the past evaluating the accuracy of MODIS products, which show good agreement of satellite images with ground stations or other remote sensing data. The new validation presented in the manuscript is not very robust and not adding much value to these existing results. The number and elevation of ground observations is not representative (in terms of both- spatial and temporal resolution), so the conclusions drawn from these findings are rather over-interpreted and/or not justified well by presented results. The assessment of snow changes is an interesting topic, however the time period used here is rather short, so the interpretation is very challenging and not very robust. Some more deep analysis of the factors that control the variability of snow cover area and duration would be very interesting here. Overall the result section is very short (only 3 figures), so the significance of the results is not clearly demonstrated. The discussion is not linking the findings with existing literature, so the added value of results is not clear.

I would not recommend to publish this paper in the current form and suggest a very important revision of the paper.

Specific comments

1) Introduction, p.2, l.22-30: Please consider to revise this part. It is not clear how this is related to the main objective of the study. Maybe reduction of clouds in MODIS images is an important factor, which is worth to mention.

2) P.4: What is the meaning of snowline?

3) P.5, l.1: snowline around 850 is already presented before. Please consider to reduce duplication of information.

4) Is Fig.3 needed? I would suggest to use terminology used in previous literature (e.g. overall accuracy index, over-, underestimation errors, etc.)

5) P.7: How is SCD estimated?

6) Section 3.2: Please be more detailed what do we see in Fig.4, 5?

7) Why is the analysed period 2000-2013 and not 2015/6? Are the trends the same if the period would be longer? Is the 8-day product accurate enough to estimate the snow cover duration and its changes? Is the duration similar as would be estimated from daily product?

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