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Hydrology and Earth System Sciences
Discussions

Interactive comment on "A snow cover climatology for the Pyrenees from MODIS snow products" *by* S. Gascoin et al.

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General comments

The study evaluates the accuracy of daily MODIS snow cover products and estimates mean monthly snow cover duration in Pyrenees region. The MODIS snow cover maps are compared with in situ snow depth measurements at 19 stations and Landsat snow images in the period 2002-2010. The results show good snow cover mapping accuracy of MODIS and indicate snow cover duration anomalies which are likely responsible for decreasing hydropower production.

Overall, the study is interesting and within the scope of HESS. The novel scientific contribution is, however, not clearly presented. What is the main research question here?

There are many studies evaluating accuracy of MODIS snow products (as already indicated in the manuscript),but it is not clear what is going to be novel here, how this study contributes to some new scientific knowledge and/or improved understanding of spatial and temporal snow cover variability. Although authors indicate the importance of the role of topography, land cover and climate on snow cover variability (i.e. p. 12536, l.24-25), the results do not show a clear message to this question. In order to more clearly demonstrate the scientific contribution, more in depth analyses are needed in the results section as well as a comprehensive discussion section need to be added to the manuscript (i.e. in a separate section). This will allow to compare the results with other studies and more clearly demonstrate the added value of the findings. The climate setting in the Pyrenees is likely quite different as compared e.g. to the Alps, so this aspect could be highlighted more as well. I would suggest to compare not only the overall mapping accuracy, but also seasonal differences, potential spatial and temporal variability in the detection threshold, as well as seasonal variability in the cloud coverage. The comprehensive Landsat dataset can be potentially also used to evaluate the factors controling MODIS sub-grid snow cover variability.

Specific comments

1) I would suggest to consider using consistent terminology with the other MODIS assessment papers. For example, the overall accuracy (index) instead of Kappa, MODIS over-, under- estimation errors. See e.g. a synthesis of MODIS studies in Parajka and Blöschl (2012).

2) Landsat processing. It is not clear why and how are the maps resampled to 240m spatial resolution? Why not to look at MODIS subgrid variability?

3) SD detection threshold: How it is estimated to 105mm, when the resolution of snow depth reading is 1 cm?

4) There are 13 Figures, however, text in the results section is rather short. Please consider to present more in depth analyses to balance the overall structure and story

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of the paper.

5) Figures: When looking on Figures, it is difficult to see some clear story and take home message of the paper. Please consider to show the main results more clearly (e.g. instead of all stations, present in more detail some typical or interesting, those which will support the message of the paper).

References

Parajka, J. and G. Blöschl (2012) MODIS-based Snow Cover Products, Validation, and Hydrologic Applications, In: Eds (Ni-Bin Chang) Multiscale Hydrologic Remote Sensing: Perspectives and Applications, Chapter 9, CRC Press, 550 pp

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 12531, 2014.