Interactive comment on "Theia Snow collection: high resolution operational snow cover maps from Sentinel-2 and Landsat-8 data" *by* Simon Gascoin et al.

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General comments

The authors present a high quality snow product derived from satellite information that is of good use to a multitude of studies and applications related to snow. The fact that it is especially oriented to mountainous areas, where it is more difficult for this type of products to provide a high quality standard, is a good indicator of the validity of this product and the algorithms used.

The improvements introduced in the snow detection algorithm and the availability and

characteristics of the snow product seem very relevant and worthy of publication.

The manuscript is well and clearly written, with a careful editing, ordering and presentation of the concepts.

Specific comments

My main specific comment refers to the presentation of the Theia collection as a mixed product of Sentinel–2 and Landsat–8. It is true that it will be in the future, but currently, and in what is presented in this manuscript, for all intents and purposes, it is only Sentinel–2. Therefore, I would consider withdrawing references to Landsat–8, especially from the title.

Another comment arises on the fact that we do not understand that the validation with SPOT imagery was done for cloud-free data until page 16 (line 3). It is an important detail, which perhaps is not given due importance previously, because one of the presented strengths of the new algorithm is the treatment of the clouds. The validation for clouds discrimination lays on the visual verification, which is not as consistent as other methods. May be this can be addressed in future works, but it would be interesting at least that this issue became clearer throughout the manuscript.

The download of the Snow product through Theia portal (theia.cnes.fr) is a little bit messy in regard to the selection of tiles and dates (compared, for example, to Sentinel Hub portal). Nevertheless, I was able to download a particular image with a delay of only 1 day, and the accuracy of the snow mask was impressive (for a clear day with patchy snow over Sierra Nevada). Very few shaded or partially-covered snow pixels are lost (false negatives), while no false positives are apparently seen. The product is really high quality.

And a suggestion referred to the hard classification as snow/no snow pixels: obviously, the current resolution of Sentinel is superb. But maybe it would be worthwhile to generate some subpixel information, i.e. *fractional snow cover*. Probably with current

technology it is possible to generate this product that could be important in semi–arid areas where patchy snow prevails over large areas during snowmelt periods.

Technical corrections

- Page 4. Line 11. n_i and r_i are actually four parameters, not two.

- Page 4. Line 20. f_t is introduced without any definition or reference to Table 1. Perhaps a reference to the table would be pertinent in this paragraph, where most of the parameters that appear in it are presented.

- Page 7. Figure 3. Caption. Where is Table 2.6?

- Page 8. Table 1. r1 appears twice. The last one should be r2, I guess.

- Page 16. Table 3. Caption. Why the reference to Fig. 3?

- Page 16. Table 3. What is the criterion followed to order the rows?

- Page 18. Line 22. Where is Fig. B4?

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