The Cryosphere

Discussions

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Interactive comment on "Snow depth mapping from stereo satellite imagery in mountainous terrain: evaluation using airborne lidar data" *by* César Deschamps-Berger et al.

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This is an important paper as it presents the implementation of relatively new technology, stereo satellite imagery, to map snow. It provides the first comprehensive evaluation of a snow depth dataset derived from stereo satellite imagery by comparing it to an extensive lidar dataset (ASO). Overall the paper is presents important step towards better snow mapping.

The science is good and meaningful. The writing is not easy to read in many places. Specifically, the text could be more concise, and I recommend that the authors revisit how the paragraphs are structured and how sentences are written. While the English

is not incorrect, the flow of the sentences makes it difficult to read. I acknowledge that the main authors are not native English speakers, but some of the 8 authors are native English speakers, and most of the authors have written extensively in English. I will use the Introduction as an example. It provides useful information, but is awkwardly written. The material reads partly like a stream of consciousness. There are new paragraphs that are a continuation of the previous paragraph. Please consider restructuring this section. For example, the text starting on lines 49-50 through line 73 presents the application of the stereoscopy using satellite imagery. Yet it starts in the middle of a paragraph with "The method was tested using two Pléiades stereo triplets over the Bassiès catchment in the Pyrenees (14.5 km^2)." Then the authors tell us about what was done there. The next paragraph begins with "However" and is a continuation of the first paragraph. The last paragraph does present additional steps that will be seen in the rest of the paper. In restructuring the Introduction, end with objectives addressed or research questions posed so the reader knows where this paper is going.

There are various terms used that, while not incorrect, are awkard, such as on line 24 "deepen" in the context of a limited evaluation or on line 42 "decametric scale" to talk about variability over 10s of meters. Similarly, some of the phrasing can be more succinct. For example, on lines 232-233 the authors state: "We evaluated the quality of the Pléiades HS maps over the area defined as the intersection of snow-covered terrain in Pléiades HS maps (snow mask) and ASO HS maps (HS greater than zero)." How about: "We evaluated the Pléiades HS maps for the area where both the Pléiades (snow mask) and ASO (HS greater than zero) HS maps had snow. This is stylistic, but some of the text is more complicated than it needs to be, and thus makes the paper more difficult to read.

Specific comments:

- Lines 77-78: "The snow-on Pléiades triplet was acquired 1st May 2017, the day before the ASO flight and close to the accumulation peak" How different is that snowpack over a day, i.e., how much does the snow depth vary between scene acquisitions?

- Line 84 and after: I assume that the word "stable terrain" means a location that is snow free? This should be explicitly stated.

- Lines 26 versus 103 and 118: the abstract says "a snow-covered area of 137 km^2" while the Study site section says "a 280 km^2 subzone." Which area is it? Line 141: what about the "excluded 25 km^2" Line 306 states 138 km2

- Lines 124-125 versus Table 1: The text states a resolution of 2 m, while Table 1 says 0.5 m, which is it?

- The Methods are thorough. I suggest making sections 4.2 and 4.3 sub-sections of 4.1, as they are part of the overall Pléiades work-flow.

- The authors evaluate snow covered (Pléiades snow mask HS maps versus ASO HS greater than zero HS maps), and stable terrain (snow free) areas. What about the omission and commission areas? At least provide the percent of the study area for each of these.

- Lines 240-260: it is unclear why these equations are presented here. The paragraph begins with "For hydrological applications, HS maps are often spatially aggregated, for example to calculate the amount of snow in a catchment or an elevation band." Either change this sentence or add a sentence so we know what these equations are used for.

- Lines 263-265: it is not necessary to foreshadow what is in the Results "We first present the results for the HS maps calculated with the SGM-binary option and different image geometries. Then, we focus on the impact of the configuration of ASP. The best set of options and geometry is then used to analyze the spatial distribution of the residuals and to evaluate a model of the HS error." State clear objectives or research questions at the end of the Introduction and the reader would know what is to come.

- Tables 2 and 3: What is STD?

- Figure 4: I'm not sure if you mean corniche or cornice?

- Line 287: it should be "Artifacts." Also, the phrase: "Artifacts of typically 20 m x 20 m . . ." is unclear

- Lines 306-307: what does "after erosion of the Pléiades snow mask" mean?

- Figure 9: it is unclear what the units in the y-axis are. The caption states: "h is the distance"

- This is also stylistic, but some sentence that tell what is upcoming and can be removed. For example, line 301-302 begins with "Figure 4 illustrates . . ." The authors can just tell us the key point(s) in the Figure as the caption tells the reader what the figure is.