
**********Reply to comments from Simon Gascoin**********

In Sect 3.6 the authors correctly mentioned that different thresholds were used to convert snow depth into binary snow cover in the literature. In particular they referred to our studies (Gascoin et al. 2015; Gascoin et al. 2019) where we reported different optimal threshold values (15 cm and 2 cm). However, it is important to note that these thresholds are not contradictory since they were obtained from products with different spatial resolutions. In the first case, we optimized the snow detection threshold with MODIS snow products (500 m) while in the second case we used the Sentinel-2 Theia snow collection (20 m). This threshold difference is consistent with the heterogeneous spatial distribution of the snow cover on the land surface. In other words, the larger the pixel, the deeper the snowpack needs to be, to be detected as "snow-covered" by remote sensing.

Response: Thanks for your constructive suggestion and comment. We revised and clarified the description about the snow depth threshold for converting snow depth into binary snow cover in Section 3.6 (page 15, lines 10-18).
"*Many different depth thresholds have been suggested in previous studies, for instance 2 cm for 20 m spatial resolution (Gascoin et al., 2019); 0 cm (Parajka et al., 2012), 1 cm (Zhang et al., 2019), 3 cm (Hao et al., 2018), 4 cm (Huang et al., 2018; Wang et al., 2008) and, 15 cm (Gascoin et al., 2015) for 500 m spatial resolution; 2.5 cm for 5 km spatial resolution (Hori et al., 2017); 3 cm (Xu et al., 2016) and 5 cm for 25 km spatial resolution (Liu et al., 2018); and 2 cm for 0.75˚ grid resolution (Brown and Derksen, 2013). Due to these significant disagreements in the depth thresholds, Gascoin et al. (2019) conducted a sensitivity experiment that tested the agreement between in-situ measurements and optical snow cover area products. The sensitivity of passive microwave snow cover identification results to snow depth at 6.25 km spatial resolution was also tested by computing the accuracy metrics with snow depth increasing from 0 to 10 cm.*"