This paper presents a snow depth map methodology for a UAV and LIDAR combination to measure thin snowpack of ephemeral snow. The study site contains a low vegetated field with a mixed forest which is useful to evaluate vegetation interaction. The main question focuses on the capability of LIDAR for snow depth mapping mounted on UAV because the sensor combination of LIDAR and UAV had not been extensively published yet. Most of the paper evaluates the accuracy of the map with respect to point cloud density (link to DTM resolution and LIDAR returns), vegetation cover and slope. A substantial amount of methodology and flight experience makes this paper focus on technical and methodological issues rather than informing us on snow processes of thin and ephemeral snow with vegetation interaction.

I do not think another methodological paper on snow depth mapping would be beneficial to the Cryosphere community. Differential snow depth mapping from LIDAR dates to the beginning of the century (Deems et al., 2006; Hopkinson et al., 2004) with airborne data from plane quickly became a more efficient tool to map large areas. A numerous numbers of article have used airborne LIDAR data for snow depth mapping (Currier et al., 2019; Grünewald et al., 2013; Hopkinson et al., 2012, 2004; Mazzotti et al., 2019; Nolan et al., 2015; Painter et al., 2016) with development on data processing (see review from Deems et al., 2013) and topographic and vegetation induced errors on LIDAR DEM (Spaete et al., 2011). Since the UAV platform only change the altitude and the coverage area, I do not see the point of having another methodological article. Regarding flight experience with UAV, a substantial amount of paper regarding snow mapping has already been published for smaller area with multi-rotor systems (Buhler et al., 2016; Cimoli et al., 2017; Fernandes et al., 2018) and larger area with fixed wing systems (De Michele et al., 2016; Harder et al., 2016; Redpath et al., 2018).

The high error in forested environment clearly need to be more investigated. It is stated that the magnaprobe measurements overestimate the snow depth in forested environment by penetrating low lying vegetation and soil. So, is the LIDAR mean depth of 6cm in more representative than magnaprobe (15 cm) and federal sampling tube (13 cm) which both showed larger depth for forested than field? Some forested areas can have deeper snowpack (Trujillo et al., 2009) due to wind reduction but snow interception by canopy will decrease snow accumulation on the ground as forest cover increases (Varhola et al., 2010). This needs to be sorted out especially when it is know that differential snow depth mapping underestimate snow for small vegetation as the snow off DEM is higher than the bare ground but when snow is measured for truth scene, the same vegetation is compressed by the weight of the snow (Buhler et al., 2016; Nolan et al., 2015).

The paper lacks a novel or in depth analysis of relations or processes regarding snow derived from a snow map that would be beneficial to the community like for e.g. a comparison with SfM photogrammetry in forested environments (Harder et al., 2020), statistical analysis of snow depth (Grünewald et al., 2013; Wainwright et al., 2017) or spatial analysis with variogram or fractal analysis between open field and forested environments (Deems et al., 2006; Redpath et al., 2018; Trujillo et al., 2009). To do this, I would suggest trying to improve with additional dataset over wider areas, only one site is not enough or perhaps different seasons to explore temporality and resubmit to this journal after next field season or go with this version towards a technical journal regarding UAV.

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