Geophysical Research Abstracts
Vol. 19, EGU2017-14937, 2017
EGU General Assembly 2017

Spatial variability of snow cover in the slopes of a small arctic glacier catchment using Lidar data

Sophie Schiavone (1), Florian Tolle (1), Alexander Prokop (2), Eric Bernard (1), Madeleine Griselin (1), Jean-Michel Friedt (3), Christelle Marlin (4), and Daniel Joly (1)

(1) ThéMA CNRS, Université de Franche-Comté, Besançon, France (sophie.schiavone@univ-fcomte.fr), (2) UNIS, University Center in Svalbard, Longyearbyen, Svalbard, (3) FEMTO-ST CNRS, Université de Franche-Comté, Besançon, France, (4) IDES CNRS, Université Paris-Sud Orsay, Paris, France

In the Arctic, because glaciers are subject to dramatic changes due to climate shift, a major concern is to estimate the contribution of glacier basins outflows to sea level rise. Snow on the Austre Lovénbreen (a small alpine type glacier in Spitsbergen – 4,6km^2) has been well studied since 2007 thanks to a good measurement network and numerous field campaigns. It has been possible to estimate the runoff coming from the glacier itself. However, the glacier covers only 43% of the Austre Lovén catchment. Of the remaining 57%, 23% are constituted by the moraine area, and 34 % are the surrounding slopes, which are also important snow storages. This paper focusing on slopes aims at better understanding snow cover dynamics in the slopes (sun exposition, aspect, altitude, roughness, steepness…) using Lidar data.

Terrestrial laser scanning data has been acquired over the Austre Lovén glacier basin twice a year, in April when the snow accumulation is supposedly at its maximum and in August (minimum) since 2013. The computation of snow volumes was made possible by differencing DEMs (DoD). Combining this data with density measurements in several sampling points in the slopes also gave the possibility of estimating the snow water equivalence (SWE) of the snow cover. The objective is here to qualify and quantify the spatial and temporal variabilities of snow cover in the slopes. Different slope configurations were investigated with the Lidar for that purpose. The main results show that most of the snow cover is located in the lowest, less steep, parts of the slopes. Moreover, snow cover densities are usually higher in the surrounding slopes than the ones recorded on the glacier. Looking at explanatory factors of snow spatial variability, aspect and roughness of slopes have a significant role to play.