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Spatial variability of the active layer thickness at the Limnopolar Lake CALM-S site (Byers Peninsula, Livingston Island, Antarctica) and the role of snow cover.

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Since its establishment in early 2009, thaw depth has been measured in late January - early February at the Limnopolar Lake CALM-S site (A25) in Byers Peninsula, Livingston Island, Antarctica (62º38'59.1"S, 61º06'16.9"W). Ground, surface, and air temperatures have been also measured, as well as snow cover deep, derived from an array of miniature temperature loggers mounted into a wood mast (iButton from Maxim) (Lewcovicz, 2008). Thermal characterization of the active layer has been already done based on this data (de Pablo et al., 2013), as well as the interannual variability (de Pablo et al., 2014) and the snow cover evolution analyses (de Pablo et al., submitted). The results show that permafrost could exist at 120 cm depth, although the active layer is reducing, probably caused by the elongation on the snow cover duration. While the snow cover thickness remains approximately similar each winter, the snow offset delays, reducing the period in which solar radiation could heat the ground. In fact, during the last years, thaw depth was not able to be measured (in spite we visited the area in the approximately the same dates) due to thick snow layer remained covering the CALM-S site.
However, we have not yet developed an analysis of the spatial variability of the thaw depth we measured each year, and how it could be conditioned by the ground properties (as slope or grain-size) or external factors, such as snow cover. In order to confirm the effect of the snow cover in the evolution of the active layer thickness, here we analyze the spatial variability of the thaw depth for the entire CALM-S site, and try to correlate it respect to the ground surface characteristics (grain-size, ground patterns, among others), the ground surface temperature and the snow cover thickness. Some of those data were acquired while the surface was visible during Antarctic field trips few years ago, and others (snow cover thickness) was measured by mechanical probing in each node. This research also required developing a qualitative grain-size analyses and geomorphological cartography of the ground at the CALM-S site. Here we show the first results of our analyses and how some factors correlate by the spatial evolution of the thaw depth in the Limnopolar Lake CALM-S site.

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