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ABSTRACT

Salix polaris growth responses to active layer detachment and solifluction processes in High Arctic.

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The aim of this work is to demonstrate the potential of *Salix polaris* grow properties in the dendrogemorphologic image, analyzing periglacially induced slope processes in the high Arctic.. Observed anatomical and morphological plants responses to solifluction and active layer detachment processes are presented qualitatively and quantitatively as a summary of presented features frequency. The results are discussed against the background of the other research results in this field. The investigations was performed in Ebba valley, in the vicinity of Petunia Bay, northernmost part of Billefjorden in central Spitsbergen (Svalbard). Environmental conditions are characterized by annual precipitation sum lower than 200 mm (Hagen et al.,1993) and average summer temperature of about 5°C, with maximum daily temperatures rarely exceeding 10°C (Rachlewicz, 2009).

Analyzed plants revealed extremely harsh environmental conditions of their growth. Buchwał et al. (2013) provided quantitative data concerning missing rings and partially missing rings in shrubs growing on Ebba valley floor. Mean ring width at the level of 79µm represents one of the smallest values of yearly growth ever noted. The share of missing rings and partially missing rings was 11,2% and 13,6% respectively. Plants growing on Ebba valley slope indicate almost twice smaller values of ring width (41µm), and higher participation of missing and partially missing rings. Share of missing rings in shrubs growing within an active layer detachment on the valley slope reached 16,22% and 15,36%. Even higher variation is observed in partially missing rings which account for 31,07% within detachment and 23,39% on surrounding slope. Those values are more than twice higher comparing to the valley floor. There is also noticeable difference between detachment and surrounding slope indicating that wedging rings are an effect of mechanical stress that is higher within the detachment. Comparing growth patterns in aboveground and belowground plant parts different growth allocation is noticed. Years of detachment event growth rings were present only in aboveground parts. It is supposed that mechanical stress delays the onset of the growing season similarly to low temperatures (Buchwał et al., 2013), resulting in not enough time to fully allocate resources for growth in the belowground parts.

Growth pattern is extremely irregular, indicating that the slope is in constant movement, which disrupts growth conditions. Analyzed shrubs showed two possible

event years: 2006 and 2008, with the highest participation of missing and partially missing rings. Air and ground temperature data were also analyzed and confirmed that active layer detachment happened in 2006.

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