



Soil development as limiting factor for shrub expansion in southwestern Greenland

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Southern Greenland currently experiences an increase in summer temperatures and a prolonged growing season (Masson-Delmotte et al. 2012), resulting in an increased shrub cover at the boreal – tundra border ecotone (Normand et al. 2013). These findings suggest the beginning of a greener Greenland in which tundra vegetation is transformed to a boreal woody flora. However, vegetation at borderline ecotones is influenced by further ecologic factors than just temperature. In this study, the ecologic conditions at a selection of sites along an elevation gradient near Igaliku in southern Greenland were examined to identify potential factors limiting the expansion of woody vegetation apart from temperature. The sites differ in elevation, topography, shrub density and soil parent material. The three study sites comprise i) well established birch shrubs growing between 50 and 180 m a.s.l., where the parent material originates from the Julianehab granite (Brooks 2012); ii) extended shrub patches at about 250 m a.s.l., where the parent material consists of Gardar Sandstones and Lavas (Brooks 2012) and iii) restricted shrub patches at an elevation of 250 m a.s.l., where the soil parent material originates from the Gardar intrusions (Brooks 2012). The extent of the shrub areas, topography and soil moisture were mapped, additionally soil samples were analyzed for C- and N-content, texture including coarse fraction and pH and used as soil development indicators. Our results show that the topographic setting regulates the existence or absence of soil while the soil parent material is an important limiting factor for soil moisture. According to these findings, we suggest that a high proportion of areas where temperature increase would allow the increase of shrub cover is not suitable for a woody flora.

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