

EGU2020-6435

<https://doi.org/10.5194/egusphere-egu2020-6435>

EGU General Assembly 2020

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



Land degradation in high latitude areas: the role of paraglacial land surface changes driven by global warming

Jasper Knight¹ and Mateusz Strzelecki²

¹School of Geography, Archaeology & Environmental Studies, University of the Witwatersrand, Johannesburg 2050, South Africa (jasper.knight@wits.ac.za)

²Institute of Geography and Regional Development, University of Wrocław, pl. Uniwersytecki 1, 50-137 Wrocław, Poland (mateusz.strzelecki@uwr.edu.pl)

Enhanced anthropogenic climate change (global warming) is already leading to significant changes in the properties, processes and dynamics of land surfaces of high latitude and high altitude areas. Rapid surface and subsurface warming, ice mass loss and ice margin retreat are now resulting in increased land surface instability. Evidence for this comes from increased sediment yield by mass movements on exposed slopes, and within river systems and along coasts. In turn, increased sediment yield results in geomorphic change in these areas. The concept of paraglacial response describes the nature of changes in sediment yield and land surface geomorphology during rapidly-warming deglacial periods. This concept is increasingly relevant in a global warming context to describe land surface changes in high latitude and high altitude areas. Hitherto, paraglacial land surface responses have not been considered as part of the wider topic of global land degradation, but increased slope sediment yield and changes in the sediment mass budgets of slopes, rivers and coasts have implications for the morphodynamics and geohazards of high latitude and high altitude areas, and are similar to land degradation processes found in other climatic and physical settings. This study highlights the similarities and differences in (i) processes, (ii) spatial and temporal scale of operation, (iii) geomorphic and sediment system responses, (iv) geomorphic and environmental hazards, both direct and indirect, and (v) societal or community impacts and responses. This comparison is undertaken between paraglacial relaxation in recently deglaciating terrain, and land degradation associated with desertification in Africa. Examples of deglaciating land surfaces in Spitsbergen and in mountain blocks worldwide are used to demonstrate the wide range of contemporary paraglacial (land degradation) processes affecting these high latitude and high altitude environments. It is notable that land degradation caused by paraglacialiation in these areas pose significant challenges to the sustainability of communities and to environmental monitoring and management.