Geophysical Research Abstracts
Vol. 19, EGU2017-3575, 2017
EGU General Assembly 2017

Present morphoclimate and morphodynamics in the boreal Homla drainage basin system (Trøndelag, middle Norway)

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It is generally accepted that ongoing and future climate change will cause major changes in Earth surface systems and environments. From a geomorphological point of view, it is accordingly of increasing importance to obtain a better understanding of the relationships between contemporary geomorphological processes and present-day climatic conditions to come to more reliable assessments of the possible geomorphological effects of climate change.

Until recently, the present-day climate has often only been characterized by monthly and annual means or sum values of wind speed, air temperature and precipitation. As most geomorphological surface processes consist of discrete events which are only partly correlated to these meteorological means or sum values, there is an obvious need for an additional approach of statistical analysis of meteorological data.

In this study the "morphoclimate" of the Homla drainage basin situated in a boreal environment in Trøndelag in middle Norway is analyzed. "Morphoclimate" according to Ahnert (e.g., 1982) is specially related to geomorphological needs and, in this sense, is defined as the totality of those climatic characteristics of an area that influence the type, frequency, duration and intensity of the exogenic geomorphologic processes in this area. The statistical method primarily used in this context is the magnitude-frequency analysis. Particular emphasis is on (i) the frequencies or recurrence intervals of meteorological events of given magnitudes, and (ii) the frequencies of geomorphologically important thresholds. Aspects of the current wind, temperature and precipitation regimes which control the type, frequency, duration and intensity of the contemporary denudational surface processes as well as the sedimentary budget in the selected study area are presented.

Runoff in the boreal Homla drainage basin is occurring year-round and the contemporary morphodynamics are altogether characterized by a clear dominance of chemical denudation over mechanical fluvial denudation. The general intensity of the denudational surface processes operating under the present-day morphoclimate is low.