Geophysical Research Abstracts
Vol. 19, EGU2017-12069, 2017
EGU General Assembly 2017

Sudden disintegration of ice in the glacial-proglacial transition zone of the largest glacier in Austria

Andreas Kellerer-Pirklbauer (1), Michael Avian (2), Simon Hirschmann (1), Gerhard Karl Lieb (1), Gernot Seier (1), Wolfgang Sulzer (1), and Herwig Wakonigg (1)

(1) University of Graz, Department of Geography and Regional Science, Graz, Austria (andreas.kellerer@uni-graz.at), (2) Energy Department, AIT - Austrian Institute of Technology, Tulln an der Donau, Austria

Rapid deglaciation does not only reveal a landscape which is prone to rapid geomorphic changes and sediment reworking but also the glacier ice itself might be in a state of disintegration by ice melting, pressure relief, crevasse formation, ice collapse or changes in the glacier's hydrology. In this study we considered the sudden disintegration of glacier ice in the glacial-proglacial transition zone of Pasterze Glacier. Pasterze Glacier is a typical alpine valley glacier and covers currently some 16.5 km^2 making it to the largest glacier in Austria. This glacier is an important site for alpine mass tourism in Austria related to a public high alpine road and a cable car which enable access to the glacier rather easily also for unexperienced mountaineers. Spatial focus in our research is given on two particular study areas where several ice-mass movement events occurred during the 2015- and 2016-melting seasons. The first study area is a crevasse field at the lower third of the glacier tongue. This lateral crevasse field has been substantially modified during the last two melting seasons particularly because of thermo-erosional effects of a glacial stream which changed at this site from subglacial (until 2015) to glacier-lateral revealing a several tens of meters high unstable ice cliff prone to ice falls of different magnitudes. The second study area is located at the proglacial area. At Pasterze Glacier the proglacial area is widely influenced by dead-ice bodies of various dimensions making this area prone to slow to sudden geomorphic changes caused by ice mass changes. A particular ice-mass movement event took place on 20.09.2016. Within less than one hour the surface of the proglacial area changed substantially by tilting, lateral shifting, and subsidence of the ground accompanied by complete ice disintegration of once-debris covered ice. To understand acting processes at both areas of interest and to quantify mass changes we used field observations, terrain analysis (based on multi-temporal DEM generation derived from terrestrial laser scanning/TLS and unmanned aerial systems/UAS), electrical resistivity tomography (ERT), ground climate monitoring, and data from an automatic remote camera (RDC) system. Results for both areas of interest are presented and discussed regarding its relevance for the glacier itself but also the potential risks for mountaineers.