Geophysical Research Abstracts
Vol. 20, EGU2018-18308, 2018
EGU General Assembly 2018

Analysing climatic influence on modern cirque equilibrium-line altitude, southern Scandinavia

Rachel Oien (1), Matteo Spagnolo (1), Brice Rea (1), Robert Bingham (2), and Iestyn Barr (3)

(1) School of Geoscience, University of Aberdeen, Aberdeen, UK (r.oien@abdn.ac.uk), (2) School of GeoSciences, University of Edinburgh, Edinburgh, UK (r.bingham@ed.ac.uk), (3) School of Science and Environment, Manchester Metropolitan University, Manchester, UK (I.Barr@mmu.ac.uk)

Glacial cirques are considered key indicators of palaeo-environmental conditions, especially climate. However, this concept has rarely been tested on modern cirque glaciers. Here, we look at cirque glacier metrics across the South Scandinavian Mountains and compare these to present-day climatic trends. In particular, we analyse data from 150 meteorological stations which indicate that climate in this region is characterized by annual high precipitation on the coast, which decreases by $\sim$17 mm/km inland, along with a decrease in temperature of 6-8°C into the mountains. One hundred cirque glaciers have been identified and mapped in a GIS environment. Their equilibrium line altitudes have been calculated using the Area-Altitude-Balance-Ratio and Area-Altitude Ratio methods (with recommended ratio values of 1.5 $\pm$0.4 and 0.58, respectively). Results show that modern-day cirque glacier ELAs vary according to climate. In particular, the lowest ELAs (1033-1190 m) are located to the west, towards the coast. This is the area that receives the highest annual precipitation, between 4000-6000 mm/yr. Additionally, this region's mean annual temperature is relatively low, ranging between -2 and 2°C. Whereas the glaciers farther into the continent and on the leeward side of the main mountain divide are characterized by an ELA between 1700 and 2000 m. The continental area is characterized by considerably lower precipitation (750 mm/yr) than the coastal regions (4000-6000mm/yr). The strong link between present-day ELA and climate that we demonstrate here suggests that using formerly glaciated cirques to reconstruct palaeo cirque glaciers and extracting their ELAs to be used as proxies for palaeoclimate is a valid approach.