



Reconstructing palaeo jökulhlaup magnitude and frequency on the western and north western flanks of Bárðarbunga volcano, Iceland.

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Iceland is a natural laboratory for jökulhlaup (glacier outburst flood) research, due to the high frequency of subglacial drainage from volcanic eruptions. Bárðarbunga is one of Iceland's largest subglacial volcanoes and has been in a state of unrest since September 2014 when a large-scale fissure eruption occurred in harmony with collapse (65m) of the 10 km diameter Bárðarbunga subglacial caldera. Previous fissure eruptions have preceded enormous subglacial eruptions within the main subglacial caldera generating massive jökulhlaups. Despite this knowledge there has been no systematic assessment of the occurrence and magnitude of jökulhlaups in the glacier-proximal sectors of the Þjórsá, Kaldakvísl and Skjálfandafhljót river systems draining the south-western to north-western flanks of Bárðarbunga. As such, there is an urgent need for knowledge of past jökulhlaup hazard processes which can be used to assess and mitigate risk in event of a future eruption. The aims of this project are therefore: (1) to identify the inundation areas of palaeo jökulhlaups within proglacial rivers draining the western and north-western flanks of Bárðarbunga; (2) provide a relative jökulhlaup chronology; (3) reconstruct palaeo-jökulhlaup magnitude; and (4) to evaluate the relationship between specific jökulhlaup route ways and the local glacial and volcanic history.

To achieve the above aims, geomorphological evidence of palaeo-jökulhlaup channels was mapped using aerial photography and DEM's (LiDAR and ArcticDEM). Fieldwork entailed identification of 'washed-surfaces'; systematic surveying of jökulhlaup channel extents and cross-sections using dGPS units; measurement of channel surface grain size; logging and sampling of available sedimentary sections; GPR surveys using an Utsi Groundvue GV7 system; and dGPS surveying of volcanic landform and glacier margin positions. The anticipated outcome of the research is a development of a new model assessing the controls in palaeo jökulhlaup characteristics and impacts for the proglacial river systems of Bárðarbunga volcano, and a production of a series of inundation maps based on knowledge of modern glacial margin positions, proglacial topography and possible drainage ways to the west and northwest into Skjálfandafhljót.