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**Holocene Jökulhlaups along the Hvítá River, Iceland**

My term project complements my dissertation research, which focuses on reconstructing a Holocene timeline of paleofloods along the Hvítá River in Iceland. Roughly 9500 years ago over a span of 100-200 years, a series of floods drained the ice-dammed glacial lake Kjölur in the southwestern Icelandic highlands. The largest events reached an estimated maximum peak discharge of 3 x 105 m3 s-1, ranking them among the largest known floods in Iceland and on earth. These glacial lake outburst floods are also known as jökulhlaups (“glacier leap” in Icelandic) and occur in glaciated regions worldwide, particularly as proglacial lakes expand in response to climate change.

Geomorphologic evidence for catastrophic floods abounds along the estimated Kjölur drainage routes, including cataract networks, canyons, spillways, strath terraces, boulder bars, and scoured bedrock. These landforms reflect flow dynamics: for example, depositional features such as boulder bars occur where flow velocity decreased, whereas erosional features such as cataracts and scouring occur in zones of higher-energy flow. Tómasson (1993) mapped three estimated flood routes: one to the north along the Blanda River; one to the southwest along the western side of Bláfell Mountain; and the third—with the largest floods—to the southeast around the eastern flank of Bláfell along the modern course of the Hvítá River. My dissertation seeks to build upon this previous research by employing new methods to better constrain flood timing, magnitude, and routing.

My term project has three main goals:

1) Map the modern Hvítá River drainage basin (e.g. drainage area, stream discharge, watershed delineation)

2) Use HAND calculations to estimate flood routes and inundation area for various input peak discharges (based on modern topography)

3) Compare these modeled flood routes with geomorphologic features I observed in the field to see whether jökulhlaup features occur where we would expect them (e.g. depositional features in zones of flow expansion; erosional features in areas of flow constriction).

I am using data from the National Land Survey of Iceland ([Landmælingar Íslands](http://www.lmi.is/en/)): <http://www.lmi.is/en/stafraen-gogn/>. So far, I have three data layers: a DEM; a hydrologic dataset showing major rivers, ice caps, lakes, and ponds; and a hydrologic dataset showing smaller rivers and human-made drainage canals/ditches. This hydrologic data, however, only includes feature area and/or length, and I am still searching for datasets with more detailed hydrologic information, namely stream discharge, watershed boundaries, and gauging station measurements. I will focus on the area between the Hvítá’s outlet at glacial lake Hvítárvatn and the Hvítárgljúfur canyon downstream of Gullfoss waterfall, since this is where flood geomorphologic evidence is concentrated.

In future field seasons, I plan to carry out a topographic survey of the estimated flood drainage area to measure surface roughness and river channel morphometry. I will input this data into a hydraulic modeling program (possibly HEC-RAS) to map estimated inundation areas with varying peak flood discharges. I can check this map against locations of jökulhlaup landforms in the field, as well as use it to guide my search for additional geomorphologic evidence.

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Figure 1. Hvítá River drainage area. (Until I figure out how to change sub-category labels in ArcGIS, here is a translation of the legend key: yfirbordsvatn = water surfaces; skurður, veitugöng = canal/ditch, tunnel; jökull = glacier; stöðuvatn, tjörn = lake, pond; á ekki við = not applicable; á, lækur = brook).

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Figure 2. Upper Hvítá River from Hvítárvatn outlet to Gullfoss waterfall. Red dots are GPS points marking jökulhlaup geomorphologic features that I observed in the field.