Mapping a glacial path of destruction

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The dangerous power of glacial outburst floods - or jokulhlaups - will be easier to predict thanks to new models developed by a Leeds researcher and presented at the International Glaciological Society symposium in Iceland last Friday (June 23).

These spectacular outburst floods happen as dams of ice and earth give way or, as from Vatnajokull in Iceland in 1996, when a volcano erupts beneath a glacier. That outburst flood was 10km wide, swept away a bridge and left behind icebergs 10m high.

For the first time, scientists can model the impact of these floods, the damage they could cause and the changes they will make to the landscape. Improved computer power allows them to take digital maps of an area metre by metre and picture the impact of the water as well as the materials carried by the flood.

The power of jokulhlaups means that it's not possible to take conventional measurements of flow and the sediment load. Instead Leeds researcher and School of Geography lecturer Dr Jonathan Carrivick and colleagues have used geological detective work to examine the landscape created by a flood and calculate the energy and mechanisms needed to generate these shapes.

Outburst floods can pose a major hazard in mountainous areas. Dr Carrivick said: "It's the rocks, sediment and ice which do most damage and create the most impressive landforms not just the water, and it's only now that we can model the impact of the load of these floods."

"This is really important for hazard management and also because flood size and frequencies will alter with climate change. In particular, global warming will lead to changes in how fast glaciers melt, and the mode by which meltwater is released."

Dr Carrivick is waiting for a jokulhlaup in New Zealand this summer. The Mount Ruapehu area has been set-up for measurements by local researchers and the existing landscape mapped at very high resolution. It's hoped that the before and after maps - as well as some measurements of the flood - will support his model.

Source: University of Leeds