

# Investigating the subsurface hydrology of the debris-covered Khumbu Glacier, Nepal, using dye tracing

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## Project Summary

Meltwater from Himalayan glaciers provides a vital resource (drinking water, irrigation, and hydroelectric power) for millions of people across the Hindu-Kush Himalaya foothills. Debris-covered glaciers make up a substantial number of Himalayan glaciers, and their relatively well-studied supraglacial hydrological systems are known to differ from that of clean-ice glaciers. However, almost nothing is known about how water is transported beneath the surface of debris-covered glaciers. The aim of this project was to use fluorescent dye tracing in order to study the subsurface hydrology of a debris-covered glacier: Khumbu Glacier, Nepal.

## Fieldwork & Methods

The generous BSG Postgraduate Research Grant of £1,000 was used in combination with several other grants to allow me to carry out the fieldwork necessary for this study. In April-May 2018, I travelled to Khumbu Glacier and spent over three weeks carrying out fieldwork, including dye tracing experiments. Dye was injected into supraglacial streams and ponds in the upper glacier and detected by fluorimeters installed at multiple locations near the glacier's terminus. In total, 16 experiments were carried out over the lowermost 7 km of the glacier.



Figure 1: Images of the grant holder carrying out dye tracing experiments on Khumbu Glacier, Nepal.

## Outputs

The results of the dye tracing experiments have revealed previously unknown features of the hydrological system of a debris-covered glacier. Preliminary results were presented at the BSG Annual Meeting 2018 in Aberystwyth and at the International Glaciological Society British Branch Meeting 2018 in Exeter. The results have been written into a paper, and the authors are currently considering suitable journals to which the work could be submitted, including ESPL.