Annapurna South Glacier Scientific Expedition

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1. Introduction

Our recent expedition to Annapurna South Glacier in Nepal took place between 19th October and 23rd November. Mass loss from Himalayan glaciers has increased over the 30 years and is expected to continue over the next century due to climatic warming. Quantifying the controls on Himalayan ice loss is crucial for predicting changes in water resources, as they feed major river systems, with very densely populated downstream catchments. Furthermore, they are a major contributor to global sea level rise and can generate highly dangerous glacial lake outburst floods. Despite this, our knowledge of Himalayan glaciers is limited and patchy, due to their remote, high altitude locations.

2. Background

- Debris Cover

Debris cover on the glacier surface reduced melt rates as it acts as an insulating barrier between the ice surface and the armosphere.

- Ice Cliffs

Ice cliffs are areas of the glacier surface with debris free ice. These occur in areas of steep surface topography. Due to the lack of debris melt rates at ice cliffs are far higher than the rest of the glacier surface.

- Supraglacial Ponds

Recent work suggests that the development of supraglacial melt ponds can strongly accelerate melt, via rapid downwasting and low ice velocities The lower albedo of melt ponds in comparison to the surrounding ice allows more heat to be absorbed, accelerating local melt rates where surface ice is in contact with the relatively warmer meltwater

3. Aims

- Determine the process of ice cliff formation and their role in the melt rates of ASG.
- Examine the temporal and spatial patterns of pond evolution on Annapurna South Glacier
- Determine the debris characteristics and the controls of debris on ablation rates

4. Methods

- Structure from Motion
  - A technique to produce 3D models of the ice surface to assess melt rates over the 3 week field season
- Ground Penetrating Radar

Figure 1. The ground penetrating radar being pulled along the glacier surface. This allowed the ice thickness to be calculated

- Temperature Sensors

Figure 2. Tiny tag temperature sensors were installed in 7 supraglacial ponds. This gave an hourly temperature record for the 3 week field season

- Debris Characteristics

Figure 3. The glacier surface covered in debris. Characteristics such as size and shape were measured at sites across the surface

- UAV Survey

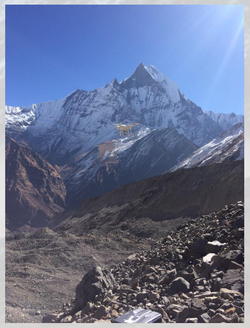

Figure 4. Drone survey of the glacier surface of Annapurna South Glacier. This produced a 3D model of the whole glacier surface with ~3cm accuracy

Social Media

Facebook – Annapurnaglaciers

Twitter – Annapurna_glac

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