SPRING Grant Report: C. Scott Watson (School of Geography)

The water@leeds SPRING grant was used towards the purchase of components for the construction of an unmanned surface water vessel (USV) (Fig. 1), which was built by five Master's students for their final project in the School of Mechanical engineering. The USV was designed to measure spatially distributed depth and temperature of supraglacial ponds on the Khumbu Glacier and was deployed during a field campaign in May/June 2016.

Supraglacial ponds form on the surface of debris-covered glaciers as meltwater pools in hollows on the glacier surface. These ponds can absorb and transmit thermal energy to adjacent glacier ice, which promotes further pond expansion. A recent study as part of my PhD revealed an increasing trend of surface water storage on the Khumbu Glacier and in the Everest Region which is a precursor to large, potentially hazardous lake development. Changes in the area of supraglacial ponds can be quantified using satellite imagery, however, the water volume remains unknown. Bathymetric data for supraglacial ponds are scarce in the region, however, with the USV we were able to quantify the volume of 19 supraglacial ponds on the Khumbu Glacier. This bathymetric dataset (will be used to derive an area-volume relationship so that surface water storage can be estimated from satellite imagery alone. The data will also reveal how pond depth varies in relation to the presence of ice cliffs and position on the glacier, which will improve our understanding of their importance for glacier melt.

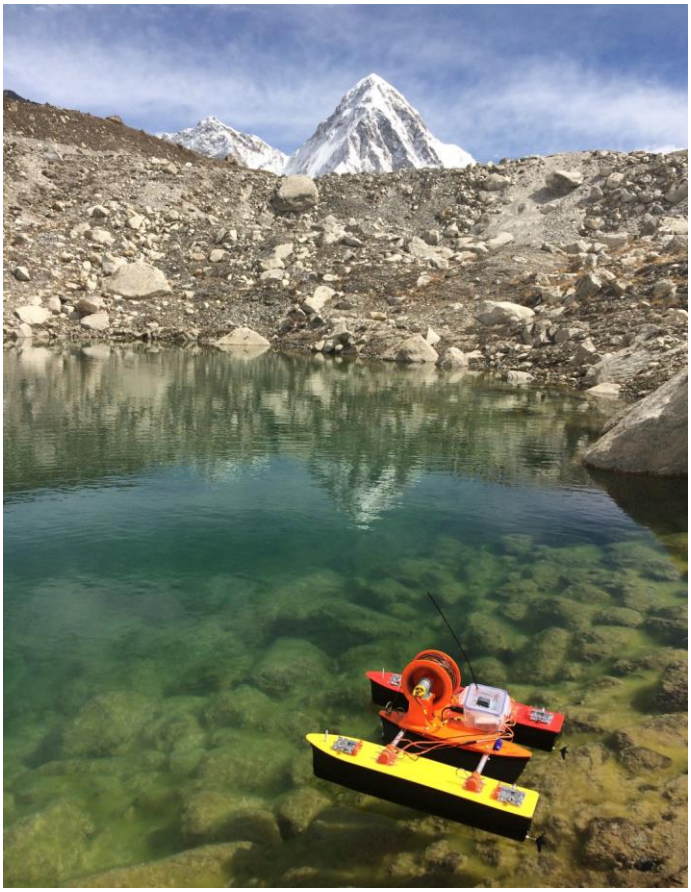

Figure 1. The USV surveying supraglacial ponds on the Khumbu Glacier