Water@Leeds SPRING grant report

November 2015. C. Scott Watson

The water@leeds SPRING grant was used towards the purchase of a Solinst pressure transducer (Figure 1) which was deployed in a supraglacial pond at 5 m depth on the Khumbu Glacier in Nepal Oct 2015 (Figure 2). This was one of three pressure transducers deployed, in addition to an array of thermistors across nine other ponds. The data will reveal water level change and the thermal regime of these ponds from Oct 2015 – Oct 2016. A preliminary download of the data for one pond revealed ~1.4 m of water level drainage during our field campaign.

Supraglacial water storage is known to be increasing on the Khumbu Glacier and smaller ponds are becoming hydrologically connected, which is likely to result in a large glacial lake forming in coming decades. Surface water storage is of interest across the region since glacial runoff provides access to water in the dry season before the Indian Summer Monsoon. Climate change and increasing surface water storage will change the seasonality of these water flows. Supraglacial ponds promote further glacial melt by absorbing and transmitting solar radiation to the underlying ice and hence act as a positive feedback. Data on the thermal regime of these ponds and the spatial and temporal dynamics will therefore indicate where local 'hot spots' of high melt rates exist and how this is likely to contribute to increasing hydrological connectivity on the lower Khumbu Glacier.

During the field campaign we also discovered several ponds containing macroinvertebrates (Figure 3), which will provide information on the stability of the ponds and habitability. Eight ice cliffs (e.g. Figure 4) were also surveyed using Structure-from-Motion (SfM) to construct a 3d point cloud of terrain, which will allow quantification of the melt rate during the field campaign and once resurveyed in May 2016.

Figure 1. One of three pressure transducers deployed in supraglacial ponds.

Figure 2. Using an inflatable dingy to deploy a pressure transducer and thermistor string.

Figure 3. An example of pond life discovered on the Khumbu Glacier.

Figure 4. One of the ice cliffs surveyed using SfM to construct a 3d point cloud of the surface.