Project acronym: GLRETA

Project title: Glacier and Lake Response to Extreme Temperature Anomalies in the Arctic

Project leader: Joseph Mallalieu, York St John University, United Kingdom

Discipline: Earth Sciences & Environment: Global change & Climate observation

Station(s): Tarfala Research Station (Sweden)

Our project investigates terrestrial- and lake-terminating glacier response to recent extreme temperature anomalies in Arctic Sweden. Research was conducted over two field seasons at both Tarfala Research Station and a remote camp established at Norra Kaskasapakte Glaciär, approximately 5 km north of Tarfala. To assess terrestrial- and lake-terminating glacier responses to recent warm events we used Structure-from-Motion (SfM) surveying to create topographic point clouds of the contemporary terrestrial glacier termini in Tarfala valley (Storglaciären, Isfallsglaciären and Kebnepakteglaciären respectively) and the lacustrine terminus of Norra Kaskasapakte Glaciär. Glacier behaviour will be determined by comparing the 2022 point clouds to similar datasets acquired in 2014 and 2015. We also extended an existing monitoring programme of glacier dynamics and lake thermal regime at Norra Kaskasapakte Glaciär, and supplemented this with sonar surveys of lake bathymetry and repeat sonar surveys of sub-aqueous terminus geometry. In addition to providing the first direct comparative analyses of terminus dynamics and mass loss at adjacent terrestrial- and lake-terminating glacier margins in the Arctic, our research will also be one of the first to capture subaqueous mass loss and quantify thermal undercutting at the lake-ice interface over a melt season.