Project acronym: RhoBOT

Project title: Material Density from Borehole Optical Televiewing

Project leader: Bryn Hubbard, Aberystwyth University, UK

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

Station(s): Finse Alpine Research Centre (Norway)

Surface meltwater may be retained as refrozen infiltration ice within underlying snow and firn. Such ice layers, which can be up to tens of metres thick, are common and important for several reasons:

- Infiltration ice represents a form of mass retention that may not otherwise be recognised in calculations of mass loss on the basis of surface elevation change. It is therefore important to account for mass retention as infiltration ice – requiring improved spatial modelling guided by empirical measurements.
- The presence of infiltration ice enhances ice mass density beyond that which would be calculated on the basis of accumulation-driven burial and densification. More generally, such 'hidden' density changes are important to, for example, the interpretation of satellite-derived gravity data and ice flow models.
- The presence of infiltration ice enhances ice mass temperature beyond that which would be calculated on the basis of surface temperatures and advective burial alone. This has implications for ice mass ecology, stability and parameterizing ice flow modelling.
- Near-surface infiltration ice presents an impermeable barrier to further vertical meltwater percolation, leading to surface ponding and eventually runoff. Such ponding and runoff are important in terms of stability on ice shelves and in terms of mass retention and water supply at all ice masses.

RhoBOT will (i) drill and (ii) log OPTV two boreholes at Hardangerjøkulen, Norway. The drill sites have been selected to present a strong contrast in surface accumulation and ablation, and also to complement existing and ongoing research by partner groups.