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Basal ice-groundwater interactions, Skeiðarárjökull, south east Iceland.

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Interaction between groundwater and ice sheets plays a major role in glacier dynamics, ice formation at the glacier bed, and glacial/interglacial hydrological reorganisations. However, there are substantial gaps in the evidence defining this interaction. In particular, we currently lack the diagnostic criteria required to recognise impacts of groundwater on basal ice formation at the glacier bed. This poster describes field investigations into groundwater-basal ice interactions at the Skeiðarárjökull glacier margin in south east Iceland.

Skeiðarárjökull is a temperate glacier that exhibits thick basal ice sequences in ice-marginal exposures. The processes responsible for the generation of thick basal ice sequences at temperate glacier margins are the subject of ongoing debate. In the context of Icelandic glaciers, some workers have suggested thatglacio-hydraulic supercooling is the dominant process of basal ice formation. However, other researchers have either failed to find evidence for this process or have argued that additional processes such as regelation are also influential. Observations at Skeiðarárjökull in January 2008 indicate that low winter temperatures can result in the downward migration of the freezing front into subglacial sediments and the accretion of frozen debris onto the glacier bed and that subsequent ice flow can result in the shearing of debris from the debris-rich layer into the overlying ice. These observations support the potential for groundwater to play a role in basal ice formation in this environment.

A spatially-restricted plume of geochemically-distinct geothermal shallow groundwater has previously been identified close to the Skeiðarárjökull margin. This geothermally-influenced groundwater has higher and distinct solute concentrations compared with that attained from weathering experiments of the sandur material incorporated within the basal ice layer. Therefore, ice influenced by this geothermally-influenced groundwater should be distinct and the chemical signature able to be separated from that of weathering reactions. This setting therefore provides an ideal opportunity for investigation into the presence and distribution of groundwater-influenced basal ice within a temperate glacial environment.