

Project acronym: GLAC-REF

Project title: Climate change effects on glacial river ecosystem functioning

Project leader: Lee Brown, University of Leeds, UK

Discipline: Earth Sciences & Environment

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

Anthropogenic forcing is driving the accelerated thinning and retreat of many glaciers across the alpine zone (IPCC 2013). Subsequent reduction of melt-water inputs to mountain rivers is changing their physicochemical characteristics and biodiversity and in turn, is expected to alter functional process rates (e.g. organic matter and nutrient cycling) (Brown et al., 2007; Jacobsen et al., 2012). The implications for river decomposition and respiration rates remain poorly understood for glacier-fed river ecosystems, but are likely to be of critical importance for biodiversity given their role in energy provision to food webs, alongside carbon and nutrient cycles (Acuna et al., 2008).

Improving understanding of climate change effects on important cold environment ecosystem services is a key recommendation of ICARP-III. GLAC-REF examines the extent to which we can expect alteration to organic matter decomposition and respiration along gradients of glacial influence linked to current and future climate change driven glacier recession. These functional processes have yet to be considered along full gradients of glacial influence (i.e. >80% - 0% glacial influence) anywhere in the world.

Finse provides an excellent opportunity to work on a chronosequence of glacial influence, to inform predictions of river ecosystem functional responses to glacier retreat, for the first time. Findings will contribute to a multi-regional study led by the University of Leeds (via linked studies in the European Alps, New Zealand Southern Alps, Ecuador and Alaska) under a UK NERC funded PhD studentship led by Sarah Fell (GLAC-REF co-investigator). Work will also feed into a global meta-analysis of river ecosystem decomposition processes (Tiegs et al., 2015).