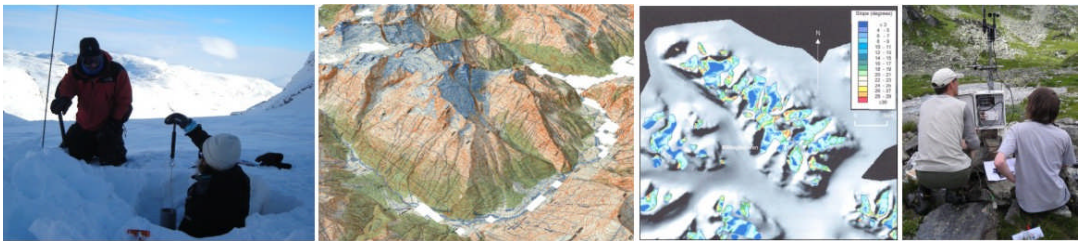
Climate change impacts on alpine river dynamics.

Supervisors: Dr Jonathan Carrivick and Dr Lee Brown



Project outline

A PhD student is sought to work on a cutting-edge investigation into the dynamic response of an alpine river (central Austria) to present and future climate change.

The successful applicant will be encouraged to utilise world-class data recently acquired by the supervisors including high-resolution LiDAR-derived mountain topography, meteorological data and proglacial runoff. These will be combined to develop, run and fully validate a numerical model to analyse the frequency and magnitude of inundation, flow depth and velocity regimes, thermal dynamics and channel stability of natural river channels and floodplains.

[The model already exists and has a graphical user interface. Programming skills are not necessary].

Overall, the model will firstly be used to assess how well we can simulate floodplain dynamics in comparison to direct measurements. Secondly, a real strength of the model will be for interpolating between these disparate at-a-point field measurements. The resultant analyses will promote novel developments for utilising this spatial and temporal data to answer key questions such as i) the impact of changing water source (ice, snow and groundwater) contributions, and ii) the impact of the Spring melt.

There will be opportunities for overseas fieldwork for smaller-scale elements of the project, and collaborations with UK and overseas researchers will be essential.

Project rationale

Earth surface systems are known to be highly sensitive to climate change, although precise details are not fully understood. In particular, the alpine cryosphere has responded dramatically to recent climate change through enhanced melt rates, earlier melt onset, and higher magnitude spring melt rates.

Predicting the reach-scale response of alpine rivers to future climate variability and change is particularly important. These types of rivers provide water for drinking, irrigation and power generation, for example. Additional concerns of water, sediment and water temperature regime changes are effects on aquatic biodiversity.

Key skills: Full training in research skills and discipline specific skills will be given. However, it is desirable that the student has previous glacial, hydraulics, GIS, computer modelling and/or fieldwork experience.

The successful candidate will benefit from inter-disciplinary training in hydrology and geomorphology as part of the River Basin Processes and Management research clusters in the School of Geography. Training at Leeds deals fully with the elements described in the Joint Research Centre statement on skills training for research students. PhD students take modules provided by the staff development unit (e.g. starting your PhD, small group teaching) and a 15-week faculty-training course (covering elements such as planning, critical reading and writing, oral presentations, writing research papers). Students present results and receive constructive feedback from peers in a Research Support Group, from colleagues in the River Basins research group, and at a university postgraduate research day.

The nature of the project means that the student will be trained in project specific research methods including stream hydrological analysis, numerical modelling, and applied statistics both internally and at external workshops. An additional important part of the training will be to attend national and international conferences to present results and gain feedback. The student will be encouraged to write and submit papers for publication during the project.

Applications

The prospective student should have, or expect to receive, a first class BSc degree, or a distinction at Masters level, in an appropriate discipline. They should have interests and experience in most, if not all, of the following topics: spatial analysis, cold environments and glaciers, and surface water hydrology. Successful applicants will be considered for full-time funding from a range of sources including NERC, departmental and university sources. Self funded students are also welcome to apply for the project. Informal enquiries should be directed to Jonathan Carrivick at j.l.carrivick@leeds.ac.uk. Further details about postgraduate research degrees at the School of Geography, University of Leeds can be found at http://www.geog.leeds.ac.uk/study/phd/apply