

Research Experience Placement (REP) Scheme Project

Project Supervisors:

Dr. Fiona Clubb (fiona.j.clubb@durham.ac.uk)

Host Organization and Department (if applicable):

Department of Geography, Durham University

Project Title:

Exploring the morphology of debris flow gullies in the Cairngorms, Scottish Highlands

Project Description:

Debris flows are key drivers of erosion and sediment transport in mountainous areas, as well as significant hazards to both human populations and infrastructure. However, our ability to understand debris flow hazard is severely limited by our poor understanding of where they occur, and what controls that spatial domain. Debris flows are difficult to accurately identify on a landscape scale, and we currently lack a reliable topographic metric for identifying areas of the landscape which have been affected. This is a major issue for quantifying hazard and making reasonable estimates of debris-flow risk. It also makes it difficult to understand the role of debris flows in long-term landscape evolution.

The steep, mountainous regions of the Scottish Highlands are commonly affected by debris flows. However, little work has been done in quantifying the extent of debris flows in the region or assessing whether these processes contribute to shaping the modern Scottish landscape. This project will explore debris flow gullies in the Cairngorms region of the Scottish Highlands, using a combination of field work and topographic analysis. The aim of the project is to map the extent and characteristics (length, width, grain size) of debris flow gullies along Glen Feshie, near Aviemore. These data will be used to explore whether debris flow gullies have a topographic signature which is distinct from that of fluvial channels.

Skills and Career-Development Opportunities:

During this placement, the student will learn how to identify debris flows both from fieldwork in the Scottish Highlands and from topographic data. They will gain experience in quantitative skills in topographic analysis, including use of Python.

Wider context of research:

The student will gain experience of undertaking research in geomorphology through field mapping of debris flow gullies in Scotland. They will also get experience of working as part of a research group and the PhD process, by joining geomorphology reading groups and Physical Geography research meetings at Durham University.
If fieldwork is not possible, the project can be converted to computer based with additional remote sensing work.

Project Timeframe:

8 weeks placement (part-time/flexible working allowed).

July 2021: Topographic analysis of the Cairngorms, identification of potential debris flow gullies from digital elevation models and satellite data.

August 2021: 1 week fieldwork in Glen Feshie to field map debris flow gullies and deposits.

Analysis of field data and comparison with topographic metrics; exploration of debris flow gully morphology compared to fluvial channels.