

## E5 NERC Summer Research Experience Placements 2026

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<b>A. Supervisor (s) - Name, email and affiliation</b>
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<b>B. Student Mentor (current PhD student) Name, email and affiliation</b>
<p>Donny Wahyudi, <a href="mailto:donny.wahyudi@ed.ac.uk">donny.wahyudi@ed.ac.uk</a>, School of GeoSciences, University of Edinburgh</p>
<b>C. Department/School</b>
<p>School of GeoSciences</p>
<b>D. Placement Project Title</b>
<p><i>Role of headwater ephemeral channels in postglacial landscape evolution and associated fluvial hazards in the Grampian Mountains'</i></p>
<b>E. Job purpose</b>
<p>The researcher will examine the role of headwater ephemeral channels in the postglacial landscape evolution of the Grampian Mountains. By integrating topographic analysis with field, remote sensing, and secondary data, they will analyse ephemeral channel structure, morphologies and sediment characteristics to assess their influence on sediment transport and erosion across multiple catchments. This project will advance understanding of sediment storage and transfer in postglacial landscapes, which is essential for evaluating fluvial hazards under a changing climate.</p>
<b>F. Host and project outline</b>
<p><b>Project overview:</b> Catastrophic flooding and debris flow events in mountain environments have shown that sediment mobilisation, transport and deposition can become dominant drivers of fluvial hazard and risk<sup>1,2</sup>. The efficacy of hillslope-to-fluvial channel sediment transport (through landsliding and rockfalls) has a direct bearing on these hazards, as it regulates mountain erosion and affects the timing and magnitude of landscape response to external perturbations<sup>3</sup>.</p> <p>The role of headwater ephemeral channels in mountain sediment routing is often overlooked, despite recent research highlighting their importance in storing and transporting sediment from hillslopes to the fluvial network<sup>5-8</sup>. Ephemeral channels flow only briefly during or following precipitation events. These channels are likely to play a crucial role in the evolution of postglacial mountain landscapes. A critical re-evaluation of the function and dynamics of the mountain sediment routing system is therefore needed<sup>8</sup>.</p>

The Grampian Mountains in Scotland feature impressive postglacial landscapes which are increasingly susceptible to fluvial hazards and their cascading impacts under a changing climate<sup>9</sup>. This region provides an excellent natural laboratory for the project, where several catchments within and beyond the Loch Lomond Stadial ice limits can be investigated.

**Research questions:** With support from the supervisory team, the researcher will design an 8-week research project which will address the following questions:

- 1) How and why does ephemeral channel structure, morphology and sedimentology vary across postglacial landscapes of the Grampian Mountains?
- 2) What role do ephemeral channels play in mountain catchment erosion?

**Research approach:** The project will involve a combination of topographic analysis (e.g., channel network characteristics), secondary data analysis (e.g., CRN erosion data) and field data collection (e.g., channel dimensions, grain size/shape/lithology analysis). Suitable field locations include Glen Nevis, Loch Laggan, Glen Shiel, Glen Feshie and Moy<sup>9</sup>. A field component may be excluded if the researcher is unavailable.

**Potential outputs:** The researcher will be encouraged to present their work (oral presentation or poster) at a Land Surface Dynamics research group meeting in the School of GeoSciences upon completion. This project would be part of a wider research project, so there may be other outputs that the researcher could contribute to in the future.

**Placement timeline:**

Week	Key activities*
1	Clarify research aims and objectives; fieldwork planning; literature review
2	Topographic and channel analysis of catchments, GIS/LSD TopoTools training; field campaign planning
3	Topographic and channel analysis of catchments; fieldwork planning
4	Fieldwork: collect channel field data for one or more catchments.
5	Analysis of field data
6	Integration and analysis of research data, literature review
7	Integration and analysis of research data, literature review
8	Presentation of research outcomes

\*These activities serve as a guideline and allow for flexibility.

**References:**

1: Cook et al. (2022), 10.5194/egusphere-egu22-12197 ; 2: Harries et al. (2021), 10.1002/esp.5075; 3: Egholm et al. (2013), 10.1038/nature12218, 4: Brardinoni et al. (2009), <https://doi.org/10.1016/j.epsl.2009.05.002>; 5: DiBiase et al. (2012), 10.1002/esp.3205; 6: Hippe (2017), 10.1016/j.quascirev.2017.07.020; 7: Neely and DiBiase, (2023), 10.1002/esp.5553; 8: Orr and Fame (2023), 10.5194/egusphere-egu23-14365 ; 9: Fame et al., (2018), 10.1016/j.quascirev.2017.12.017.

**G. Main responsibilities**

- **Project management:** Develop and manage research project with supervisory team support. This will involve defining the project aims, objectives and research methods. Hold regular supervisory meetings, led by the researcher, to update the team on progress, challenges, and support needs. Time allocation: ~15%
- **Data analysis:** Build upon analytical research skills to analyse and interpret research data (topographic, remotely sensed, field and other secondary). Seek training as needed. Time allocation: ~ 40%

- **Fieldwork:** Plan and conduct fieldwork in the Grampian Mountains with supervisory team support. Assist in organising the logistics and equipment procurement. Channel morphometrics and sediment characteristics will be recorded for select ephemeral channels in the headwaters of one of more catchments. Time allocation: ~ 15%
- **Theme-specific knowledge:** Develop or enhance familiarity with recent, relevant, and state-of-the-art literature on the topic and methodologies. Time allocation: ~10%
- **Research dissemination:** Prepare a presentation to share project results at the Land Surface Dynamics seminar at Edinburgh and/or the British Society of Geomorphology annual conference. Time allocation: ~15%.
- **Research community:** Attend and participate in the Land Surface Dynamics seminar throughout the project. Time allocation: ~5%

### Key contacts and relationships

**Michelle Fame** (Amherst College, MA, USA). Michelle has published research on the potential field sites for this project and closely collaborates with Elizabeth.

### H. Knowledge, skills and experience required for the role

Attribute	Essential	Desirable
<b>Education, Qualifications &amp; Training</b>	<ul style="list-style-type: none"> <li>▪ Working on undergraduate degree in a relevant scientific discipline (e., geography, environmental science, geology).</li> <li>▪ Basic research skills including data collection, analysis and presentation.</li> <li>▪ Proficient in relevant software (e.g., Excel, basic GIS, R/SPSS)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Experience of, or willingness to learn data analysis tools like advanced GIS, LSD TopoTools, Python.</li> <li>▪ Research experience/training as part of previous research projects (inc. taught modules), internships or placements.</li> </ul>
<b>Knowledge &amp; Experience</b>	<ul style="list-style-type: none"> <li>▪ Knowledge and training related to research topic (e.g., geomorphology, landscape evolution, sedimentology).</li> <li>▪ Academic/technical writing for research reports, dissertations or poster presentations.</li> <li>▪ Strong organisation and time management skills.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Relevant field experience (e.g., surveying, sediment descriptions).</li> <li>▪ Knowledge of data analysis techniques including statistical methods, modelling or data visualisation.</li> <li>▪ Presentation skills for disseminating results at seminars or conferences.</li> <li>▪ Experience of working in collaborative research environments (e.g., with supervisors, colleagues).</li> </ul>

### I. Planning and organising

With the support of the supervisory team, the researcher will be responsible for the following\*:

- **Project management:** Confirm the project aims and milestones and develop schedule of activities for the 8-week project. This includes organising and setting the agenda of supervisory meetings.
- **Fieldwork:** Plan and organise 5-day fieldwork to the Grampian Mountains. This will include helping to arrange the logistics of the trip, including travel and accommodation.
- **Research dissemination:** Arrange seminar to present project results.

\*This is not an exhaustive list.

### J. Problem solving

The researcher will have several opportunities to develop their problem-solving skills:

- **Fieldwork:** Whether due to logistical challenges, poor weather, or uncertainties in field data collection (such as sampling conditions or equipment malfunctions), the researcher must adapt and collaborate with the supervisory team to ensure data is collected safely and efficiently.

- **New software:** The researcher may need to learn or build confidence in using new software or packages. While the supervisory team will provide support, the researcher will be expected to troubleshoot some challenges independently.
- **Data availability, processing and analysis:** The researcher will hopefully compile a comprehensive dataset on ephemeral channels in the Grampian Mountains. However, potential challenges related to data availability and resolution may require creative approaches to data processing and interpretation. A further challenge will be to determine the most effective and efficient methods for data analysis and visualisation.

### K. Decision making

One key objective is to provide the researcher with an opportunity to develop their independent research skills. To support this, the researcher will lead the project and have multiple opportunities to make decisions, including but not limited to:

- **Project focus and approach:** The researcher will be encouraged to shape the direction of their project, by identifying the themes they wish to focus on and the research skills or experience they wish to gain during the project. In consultation with the supervisory team, they will identify the most appropriate methodologies for their project.
- **Study areas:** The project offers built-in flexibility regarding potential study areas, allowing the researcher to select locations that best align with their research objectives. In the field, they will also have the responsibility of choosing which channels to collect data from.
- **Data analysis:** The researcher will have many opportunities to make decisions about the most appropriate data processing and analysis throughout the project.

### L. Length and timing of placement

8 weeks. Start date to be agreed.

### M. Budget

Requested funds would be used to cover a 5-day field campaign to the Grampian Mountains.

#### **Subsistence (x 5 days): £225**

£45/day in accordance with the University of Edinburgh's Expense Policy.

#### **Accommodation (x 4 nights): £150**

£30/night to cover cost of hostel, camping or similar.

#### **Transportation: £125**

Contribution to vehicle hire from the School of GeoSciences. Total cost: £300 (500-mile trip at 60p/mile).

#### **Total requested: £500**

Any additional research costs will be covered by Elizabeth Orr's start-up funds in the School of GeoSciences. Elizabeth will pay for their own subsistence and accommodation.

### N. Location and Equipment

**Placement location:**

School of GeoSciences, University of Edinburgh, Drummond Street, Edinburgh, EH8 9XP

**Resources:**

The researcher will be allocated a desk space within the school. If they do not have a personal laptop, one can be borrowed from the school for both on-site and remote work. All necessary field equipment will be provided, and access to laboratories will be available as required.

**O. Health & Safety requirements**

The researcher will be required to complete all research (field and laboratory as applicable) and health and safety training mandated by the University of Edinburgh (through People and Money) for student researchers. A comprehensive risk assessment will be devised by the research team.

**P. Job hazards specific to the role**

**Steep terrain fieldwork:** The research team will be working in the headwaters of the Grampian Mountains catchments, which will likely involve traversing steep and uneven terrain. Fieldwork may require safely crossing river/gully channels, navigating highly vegetated areas, and collecting sediment samples from dry channels. A comprehensive risk assessment will be devised by the research team.

**Q. Alternative/adjusted placement (remote placement only).**

The project is designed with flexibility, allowing the researcher to work remotely and/or opt out of fieldwork if needed. Research meetings can be conducted online, and while the research approach may need to be adjusted in the absence of fieldwork, the project's aims can still be addressed as a desk-based study.