

Andrew Whitham CASP Fieldwork Awards 2026 - Winner

Applicant: Joe Jennings

Project title: Igneous layering permeability and REE enriched fluid migration in the Ilímaussaq layered igneous complex, South- West Greenland

Award: £3,000

Scientific question and rationale:

How was the migration of late stage and post- magmatic (REE and HFSE enriched) fluids structurally controlled in the Ilímaussaq intrusive complex?

The Ilímaussaq intrusive complex in the Qaqortoq region contains some of the world's largest REE deposits, elements which underpin the clean energy transition. Several recent studies have suggested that the layered alkaline complex has undergone REE and HFSE enrichment due to the trapping of enriched fluids under impermeable layers (Jones, McCarthy, Magee, et al., 2025). I will look to investigate igneous layer permeability and other structural features, to understand REE enrichment.

Alkaline layered igneous complexes like Ilímaussaq are crucial reserves of REE enriched minerals and hence vital for supplying the energy transition. Despite this, processes that go into HFSE and REE enrichment, and even the processes that produce magmatic layering, remain in academic contention. As such, this work will contribute to ongoing research into the structural controls and spatial distribution of REE enrichment, with notable applications for improved mining efficiency.

Specific objectives and deliverables:

I will produce maps, structural logs, and cross sections to better understand the extent and variability of lower permeability horizons that could act as structural controls on late stage magmatic and post-magmatic fluid accumulation. These deliverables will be digitised and form the basis of my MGeol independent mapping project report. I will also support my team, who are all planning foundational fieldwork for their BSc/MRes geology dissertations. Undergraduate work on similar trips in previous years has been developed into full publications (e.g., Koopmans et al., 2022).

Proposed work plan:

Present – 15th July: research review, prepare basemaps, complete first aid training, ship provisions and equipment.

16th July: travel to site.

17th July – 21st August: conduct fieldwork, create field maps and structural logs.

23rd August – 27th November: complete office maps and cross-sections, deliver in-person presentation of project at the University of St Andrews, submit mapping report.

Proposed expenditure, including details of any other sources of funding :

Total estimated shared cost, covered by five team members : £13168.51 (including 10% contingency)

Travel to area: £9081.37 (flights and ferries), freight (provisional quote): £2040, safety equipment: £850 (rental of foghorns and flares, purchase of EMS blankets, emergency shelters, etc.), tents and other camping equipment: reused from previous expeditions. Contingency (10%): £1197.14.

Proposed expenditure of the Andrew Whitham Award is 1/5th of the shared expedition costs (£2633.70). Funds accepted: IoM3 Grants to Support Knowledge Exchange (£500).