Plan Overview

A Data Management Plan created using DMPonline

Title: DRIFT: Refining Ireland's glacial history to de-risk mineral exploration

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Template: Health Research Board DMP Template

Project abstract:

The purpose of my research is to create an accessible methodology for qualitatively assessing glacial landscape modification to de-risk mineral exploration in Ireland. As society moves towards a more sustainable future, new mineral deposits will be needed for a decarbonised future. Ireland has a rich history of mineral resource extractions, however, increased societal demand for said materials requires new exploration methodologies and techniques to find the next generation of Irish mineral deposits. Current exploration for lithium deposits in south-eastern Ireland has discovered spodumene pegmatites at depth with surface boulders of spodumene pegmatites found proximally at the surface. Locations where spodumene pegmatites have been found lack glacial sediment cover. However, along the East Carlow Deformation Zone, the structure associated with pegmatite occurrences, and glacial sediment cover corresponds to areas lacking known pegmatites. This raises the possibility of unknown buried deposits. To date, no exploration methods for buried spodumene pegmatites have proved successful. We hypothesise that the lack of understanding regarding the impact of ice sheets on the Irish landscape is a crucial data gap hindering mineral exploration efforts in Ireland. The objectives of my project are:

1. Create an accessible landscape evaluation methodology based on geochemical and geomorphic indices for assessing glacial landscape modification.
2. Develop our methodology by making a glacial geomorphological map of a study area in the Canadian Northwest Territories (in collaboration with the GSC) and using cosmogenic nuclides to assess glacial landscape modification quantitatively.
3. Test our methodology and the feasibility of drift prospecting in Ireland using our new knowledge about glacial landscape modification and by examining glacial dispersal from a known source using indicator minerals and pathfinder elements identified in the EU-H2020 GREENPEG project.

As mentioned in my previous bi-annual reports, the TOPDOWN project was added to the original project described above. TOPDOWN is a GSI-funded project that aims to constrain the thickness of the last Irish Ice Sheet and examine the role of former ice sheets in modifying the Irish landscape in three dimensions to provide quantitative constraints on the spatial pattern of landscape modification during the last glaciation. In order to do so, we collected

rock samples from the tops of Irish mountains for cosmogenic nuclide exposure dating. These additional research activities gave me the opportunity to learn the sampling and lab techniques I will be using later in my project. Results from this work will inform later parts of the project in SE Ireland. The rationale for this work is:

1. Create a dataset that can assess the ability of state-of-the-art numerical ice sheet models to reconstruct former ice sheet thickness and refine our understanding of ice sheet loading and isostatic uplift/relative sea-level change.
2. Examine the role of former ice sheets in modifying the Irish landscape in three dimensions.

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DRIFT: Refining Ireland's glacial history to de-risk mineral exploration

Data description and collection or re-use of existing data

How will new data be collected or produced and/or how will existing data be re-used?

Data from previously published cosmogenic/radiocarbon dating studies will be compiled into a database for reference. Rock samples for cosmogenic exposure dating will be collected using an angle grinder, hammer and chisel. Glacial landforms will be mapped from the ArcticDEM, Landsat and satellite photos using Arcpro.

What data (for example the kind, formats, and volumes), will be collected or produced?

Type of data	collection method	purpose	format	volume
Rock samples (location and sample specifics)	Location and geomorphic context will be recorded in the field. Sample specific information (mass, lithology, etc.) will be gathered in the laboratory. Data will first be collected using notebooks, then transcribed into digital databases.	Characterize and contextualize rock samples.	Paper notebooks and then data tables as csv. files.	It is anticipated ~30 samples will be collected for this part of the project
Previously published sample data	Location and geomorphic context will be collected from previously published papers along with sample specific information and geochemical data (nuclide concentration and ratios). Data will be stored in digital databases.	to characterize and contextualize previously collected samples for reference.	Digital data tables as csv. files.	>100 individual samples, 30-50 previously published papers
Geochemical information	This will be collected in the form of digital data tables from the institutions that make AMS measurements (Lawrence Livermore National Laboratory and Purdue Rare Isotope Measurement Laboratory)	to determine the geochemical composition of rock samples	Digital data tables (csv. files).	Will be collected for all rock samples.
Mapping	Landforms will be digitally mapped in Arc Pro using the ArcticDEM, Landsat and satellite imagery.	to map glacial glacial geomorphology and characterize glacial landsystems	Digital map (ArcGIS project file)	one digital map, >8000 individual landforms

Documentation and data quality

What metadata and documentation (for example the methodology of data collection and way of organising data) will accompany data?

A detailed description of the chemical lab procedures used will accompany the cosmogenic data in an open access publication. Mapping workflow and documentation will accompany the map in an open access publication.

What data quality control measures will be used?

Data quality for rock sample location will be ensured by duplicating measurement devices (ex., multiple GPS units) and data collection redundancies (location information is written on the sample bag, photographed, and written in the field notebook. Data quality for geochemical data will be ensured through the analysis of process blanks (generated by this project) and internal records of measurements of standard materials at the measurement facilities. Data quality for the digital mapping will be ensured by use of a standardized mapping template and will be reviewed by collaborators at the Geologic Survey of Canada.

Storage and backup during the research process

How will data and metadata be stored and backed up during the research process?

Data will be stored locally on work laptop owned by the project, as well as on a separate hard drive (with supervisor) and on a shared google drive. Data will be stored in secure locations that are password protected.

How will data security and protection of sensitive data be taken care of during the research?

Laptops where data is stored are kept in secure locations and all data is password protected using UCD security.

Legal and ethical requirements, codes of conduct

If personal data are processed, how will compliance with legislation on personal data and on security be ensured?

N/A

How will other legal issues, such as intellectual property rights and ownership, be managed? What legislation is applicable?

For all legal issues, we will consult with UCD Legal.

What ethical issues and codes of conduct are there, and how will they be taken into account?

n/a

Data sharing and long-term preservation

How and when will data be shared? Are there possible restrictions to data sharing or embargo reasons?

Data will be embargoed until the time of publication, or in the case of unpublished data generated by the PhD student, data will be embargoed until they complete their studies. Data will be made freely available via open access publication. Data will be retained in openly available databases, such as ICE-D database for cosmogenic nuclide data, and other suitable repositories will be identified with support from UCD Library's Data Manager. Data belonging to the Geologic Survey of Canada (mapping) will be embargoed until published as government reports, then will be freely available as open access publications.

How will data for preservation be selected, and where data will be preserved long-term (for example a data repository or archive)?

The project team will make use of training on Data Management and IT security and data protection that is freely available to UCD staff through the library. Data backups to both physical hard drives and secure cloud storage will occur fortnightly at a minimum, though more frequently during periods of high data generation.

What methods or software tools are needed to access and use data?

AcrGIS, Microsoft Excel

How will the application of a unique and persistent identifier (such as a Digital Object Identifier (DOI)) to each data set be ensured?

Through publication in an open access publication or via UCD library

Data management responsibilities and resources

Who (for example role, position, and institution) will be responsible for data management (i.e. the data steward)?

Cosmogenic data: Sam Kelley, PI, UCD School of Earth Sciences and Clara Crowell, PhD student, UCD school of Earth Sciences and SFI iCRAG

GSC Mapping: Etienne Brouard, Canadian Geological Survey

What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

Cosmogenic data will be retained in freely available repositories such as ICE-D. The mapping data will be retained and freely available by the Geological Survey of Canada through a government website. The cost of data curation have been built into the project/student stipend. There should be no additional charge for repositories or data storage.