Plan Overview

A Data Management Plan created using DMPonline

Title: An improved characterization of subsurface using geophysical inversion incorporated with subsurface structure and physical properties of rocks to support mineral exploration

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Template: Health Research Board DMP Template

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Project abstract:

This research aims to enhance the subsurface characterization of the Limerick Basin, Ireland, using geophysics as the primary tool, integrated with drill hole data and petrophysical constraints. An initial petrophysical characterization was conducted to estimate the expected geophysical responses of various geological units. A more detailed characterization has been done for the volcanics rocks in this area to explore variations in rock type and alteration, emphasizing their critical role in energy and resource prospecting, including geothermal potential and mineralization.

A central focus of the study is to advance the understanding of bedrock geology hidden beneath thick glacial overburden by integrating multi-geophysical datasets using machine learning (clustering) techniques guided by outcrop and drill hole information. The research further utilizes generative model-based 2D individual and joint inversion of gravity and magnetic data, incorporating detailed drill hole and petrophysical constraints to uncover new subsurface features. This inversion framework serves as a hypothesis-testing tool, enabling the evaluation of multiple geological structure scenarios and refining interpretations of the basin's structure.

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imply that the creator(s) endorse, or have any relationship to, your project or proposal

An improved characterization of subsurface using geophysical inversion incorporated with subsurface structure and physical properties of rocks to support 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?

The project aims to produce new data. The data will be collected using specialized instruments for petrophysical property measurements such as density, magnetic susceptibility, chargeability, gamma, resistivity, inductive conductivity, and geochemistry data using pXRF. In addition, high resolution photos of core samples will be captured. The raw data acquired in this project will be processed using python scripts to create a petrophysics database.
A meta data will accompany the database that will contain all necessary information about the data.

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

It is anticipated that the project will generate the following types of data:

Type of data	How will data be collected? (If re-using data indicate source)	Purpose of data collection?	File format(s)	Volume
Numerical data, image	The data will be collected using specialized instruments for petrophysical property measurements. The images of each sample used for the data acquisition will be using high resolution camera.	Petrophysical characterization	*.jpg, .xlsx,.csv*	*10 GB*

Documentation and data quality

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

The metadata accompanying the data will contain the information as listed below-

1. TITLE
2. KEYWORDS
3. PUBLICATION DATE
4. AUTHOR(S)
5. DATA COLLECTION
6. CUSTODIAN
7. JURISDICTION
8. ABSTRACT
9. GEOGRAPHIC INFORMATION
10. TOTAL NUMBER OF SAMPLES
11. DESCRIPTION
12. CHANGES SINCE THE PREVIOUS VERSION
13. FORMATS
14. LICENSE FOR THE REPORT AND ASSOCIATED DATABASE
15. CONTACT ORGANIZATION
16. REFERENCES
17. ACKNOWLEDGEMENT

The data will be organized in folder structure and will be uploaded to Zenodo with the metadata file accompanying the database.
The additional documentation needed for re-use of the data will be provided in the metadata file. The information needed to enable the re-use of the data are primarily the geographic description of the drill hole from where the samples will be acquired and list physical properties and their units of measurement.

What data quality control measures will be used?

All physical property measurements contain calibration measurements that are acquired by measuring the response from a standard with known physical property. For every 10 measurements a standard measurement is done to ensure the proper functioning of the equipment.
To avoid over or under estimation, a set of readings will be taken and a statistical analysis will be done to ensure minimum deviation in the data and proper filtering of outliers.

Storage and backup during the research process

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

The data will be stored in a dedicated google drive with access to the contributors only. The data will be backed up in a hard drive time to time to prevent data loss.

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

The data acquired in this project does not involve any risk to confidentiality and security related to human participants.

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?

No personal data will be processed.

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

The ownership of the data and the rights to control access will be assigned to the Principal Investigator of the project.
The resulting data are licensed under the Creative Commons Attribution-ShareAlike (CC BY-SA) license. This means others are free to share and adapt the data, provided that proper attribution is given and any derivative works are distributed under the same license.

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

No ethical issues are involved.

Data sharing and long-term preservation

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

The data will be uploaded to Zenodo and will be open-source 3 years following the completion of the project.
The embargo is implemented to ensure that the project's objectives and expected outcomes are fully realized both within the project timeframe and for a period following its completion

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

The samples collected in this project come from mining companies and the Geological Survey of Ireland. Any data that conflicts with the interests of the respective organizations will be excluded.
The data will be preserved in Zenodo.

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

The database consists of an excel workbook (.xlsx format) with multiple tabs. The user need to have a valid MS office license in order to access and use the data.

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

The data will be stored in a Zenodo repository which provides a Digital Object Identifier (DOI).

Data management responsibilities and resources

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

Dr Aline Melo, Assistant Professor, University College Dublin, will be responsible for data management.

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)?

The data will be temporarily stored in Google drive and will be permanently preserved in Zenodo which does not require any financial resource.