

## **Project Proposal:** Investigating Faults and Tectonic Structures Using Magnetic Data in British Columbia

### **Introduction & Research Question:**

This project aims to analyze faults and tectonic structures in British Columbia using magnetic data inversion. Studying faults and tectonic structures using magnetic data not only enhances geophysical exploration techniques but also plays a crucial role in assessing geological stability, predicting seismic activity, and guiding infrastructure planning in seismic active regions. Fault zones often exhibit magnetic anomalies due to variations in rock composition, deformation, and fluid activity. By applying geophysical inversion techniques, this study will map subsurface magnetic variations to identify and characterize major fault structures, providing insights into their geological significance and potential environmental impact.

### **Methods:**

1. Process magnetic anomaly data to remove regional trends and highlight structural features.
2. Forward Model the Magnetic Data
3. Use SimPEG to perform magnetic inversion, estimating subsurface fault geometry.
4. Compare results with published geological maps and seismic data (if available).

### **Software:**

SimPEG for inversion modeling.  
Python for data processing and visualization.

### **Data Sets:**

Airborne magnetic survey data from Natural Resources Canada (NRCAN). Study Region: A Fault system in British Columbia, such as the Rocky Mountain Trench or the Fraser River Fault Zone.

### **Goals:**

- Acquire and process airborne magnetic data for a selected fault system.
- Perform magnetic inversion to map subsurface fault structures.

### **Stretch Goals:**

- Correlate magnetic anomalies with earthquake activity.
- Integrate seismic data for a multi-method approach.

Reference: [https://link.springer.com/article/10.1007/s11600-023-01184-4?utm\\_source=chatgpt.com](https://link.springer.com/article/10.1007/s11600-023-01184-4?utm_source=chatgpt.com)