MASSIVE-ICE DETECTION USING GRAVIMETRY

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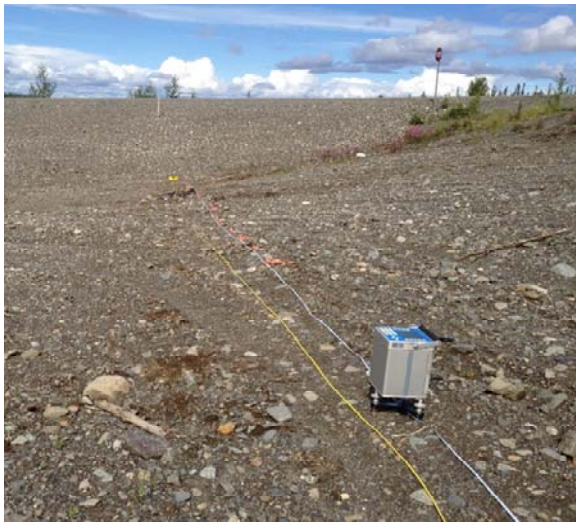
Theme 2 - M.Sc. project

OBJECTIVE

Demonstrate the feasibility of using high-precision gravimetry for massive-ice detection in permafrost areas.

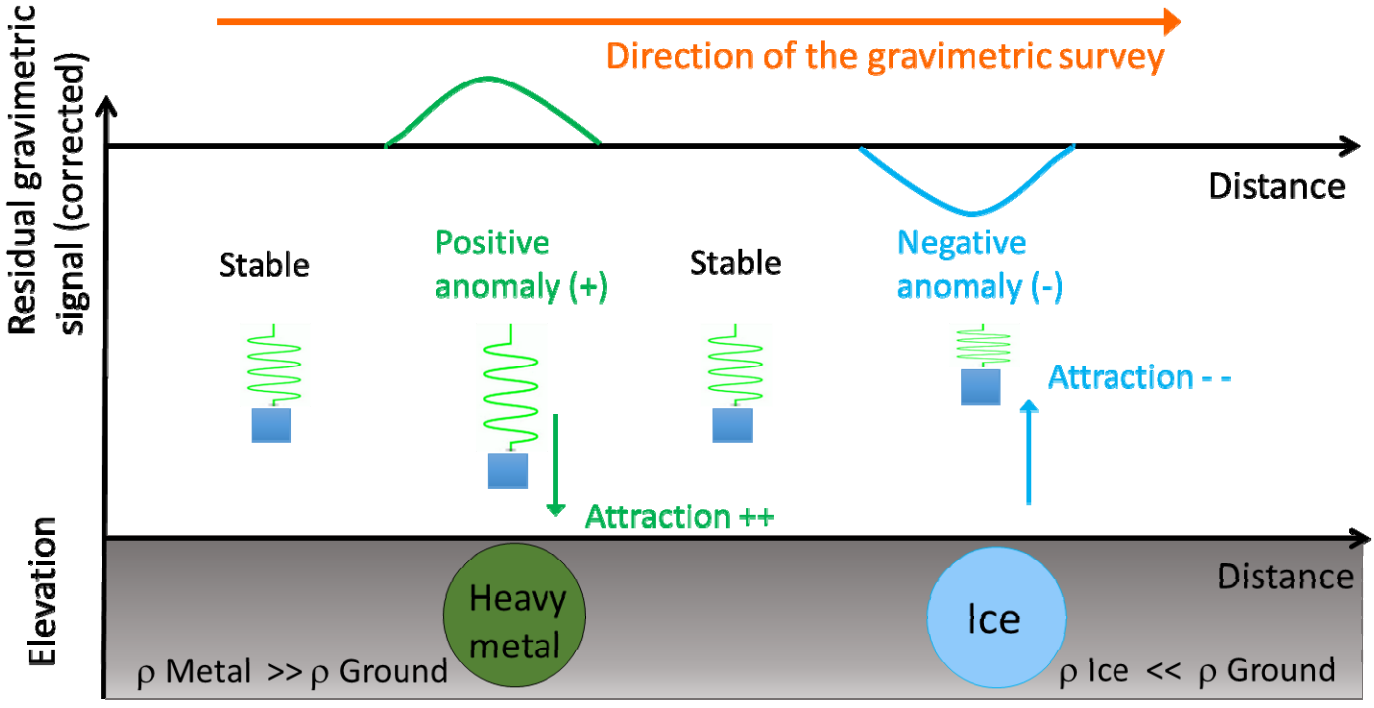
Develop a simple model for 2D interpretation of gravimetric data.

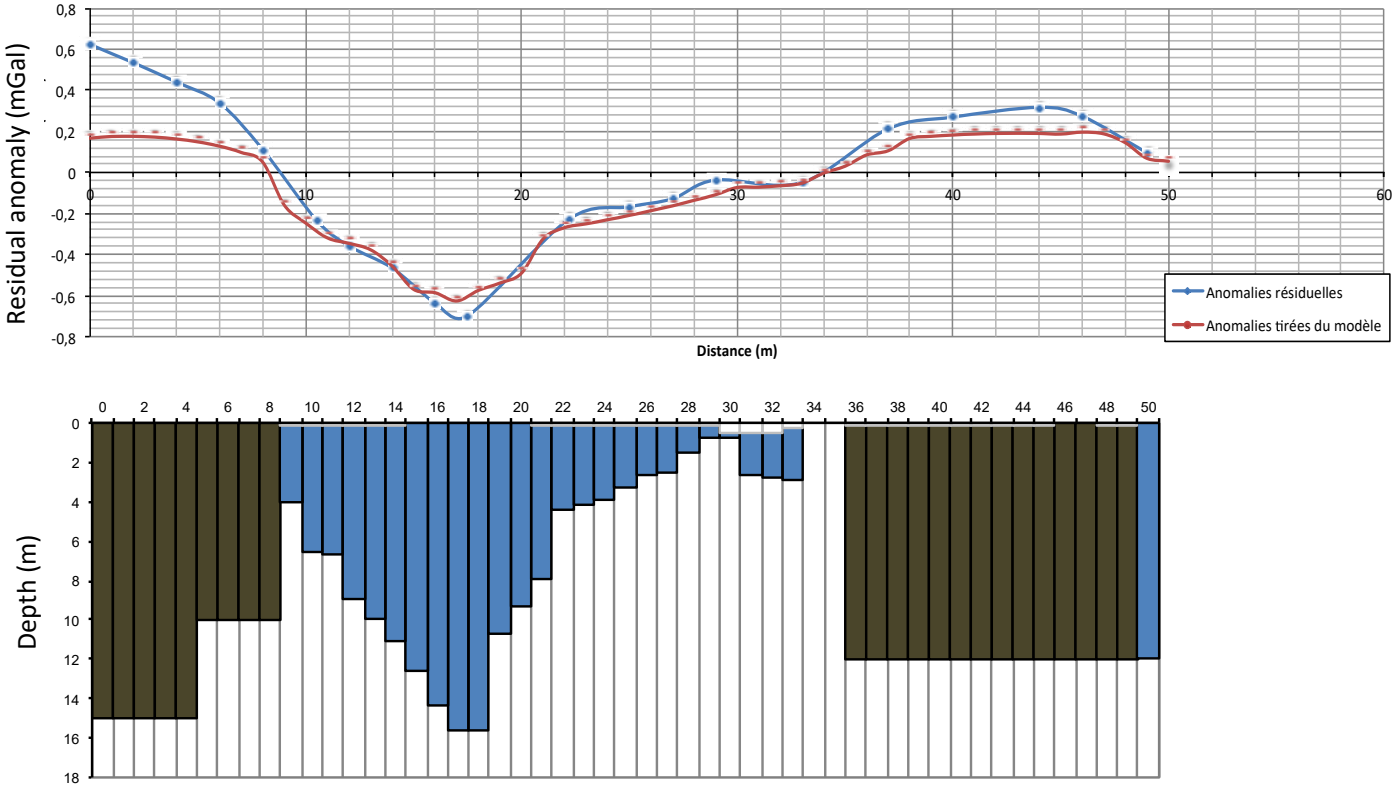


Scintrex CG-3+ Gravimeter, Dry Creek, Yukon

METHODOLOGY

Study sites: - Yukon (Dry Creek, Beaver Creek)
- Greenland





Comparison between the residual anomaly (blue line)
and the anomaly calculated using the elongated vertical columns model (red line), Dry Creek.

RESULTS

A model has been developed and validated using borehole information. The model is consistent with the gravimetric anomalies measured.

The detection limit of the anomalies' bodies is a function of:

- Volume and depth of the anomaly body
- Density difference between the anomaly body and surrounding soils

BENEFITS

- Micro-gravimetry has been adapted and has proven to work for the detection of massive-ice. The geophysical technique should help identifying thaw-sensitive permafrost under existing infrastructure or in natural ground.