Helicopter-borne Transient Electromagnetic Characterization of Glacial Aquifer Systems for Improved Groundwater Management

Probe the ground from the air

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Light-weight technology allows instruments to be towed from a helicopter, i.e. non-intrusive.
An electric current is pulsed through a TRANSMITTER loop creating primary electromagnetic (EM) field.
In response, EDDY CURRENTS are induced in the ground. Flow of eddy currents in the ground produce secondary EM field.
Careful measurements of the secondary EM field by the RECEIVER loop, reveal differences in properties of earth materials.
1. Groundwater investigations and Environmental Applications
2. Geological Mapping
3. Mining Applications
4. Geotechnical Engineering
5. Oil and Gas
HTEM provides much DENSER DATA COVERAGE than traditional borehole surveys, resulting in greater resolution of mapped areas.
In HTEM surveys, flight lines can be very close resulting in HIGH RESOLUTION maps.
HTEM provide large ground coverage at relatively short time and low cost compared to traditional borehole surveys.

Phase 1: **Black lines**
- 100 m line spacing
- 1203 km ~ 13h 26m

Phase 2: **Orange lines**
- 100 m line spacing
- 465 km ~ 5h 06m

Phase 3: **Green lines**
- 50 m line spacing
- 178 km ~ 1h 59m

1846 km in 1 week
Detailed information can be extracted from HTEM data e.g. 2D cross-section from HTEM cube
1. Provide data to improve the resolution and accuracy of aquifer properties and models to support sustainable management of depleted groundwater resources.

2. Map and produce detailed 3-D models in aquifer geometry and distribution, which can be used to improve groundwater modeling and management decisions.

3. Map possible channels/valleys to improve understanding of aquifer recharge or groundwater - surface water interactions.

4. Map sediment distribution (sand and gravel deposits) for additional shallow aquifers to supplement groundwater from deeper bedrock aquifer.
Thank You!