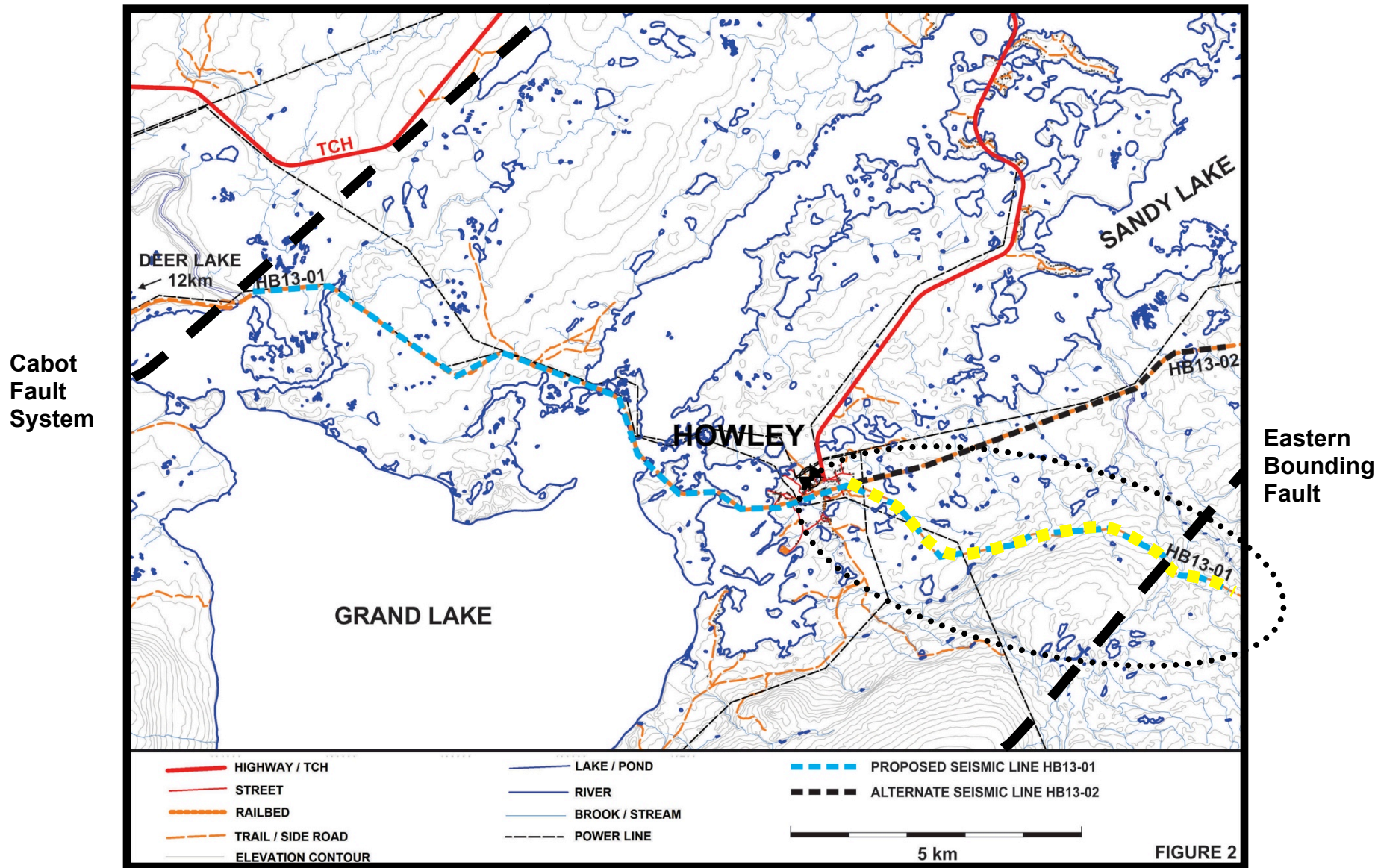


# Seismic and Magnetotelluric Fieldwork in the Howley Basin

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Tijana Livada, Charles Hurich,  
Colin Farquharson

# September 2013 Seismic Program – Eastern Howley Basin



# Survey Stats

## Recording Data

- MUN Aries Lite recording system
- 180 live channels
- 10 m group spacing
- 5 m notional CMP spacing
- 45 Fold
- Maximum offset – 1820 m
- Profile length – 7 km

## Source Data

- shot spacing – 20 m
- 4 sweeps/shot point
- sweep length – 15 s
- listen time – 5 s
- 420 shot points including shoot throughs at both ends

## Personnel/training

- C. Hurich and 5 graduate students

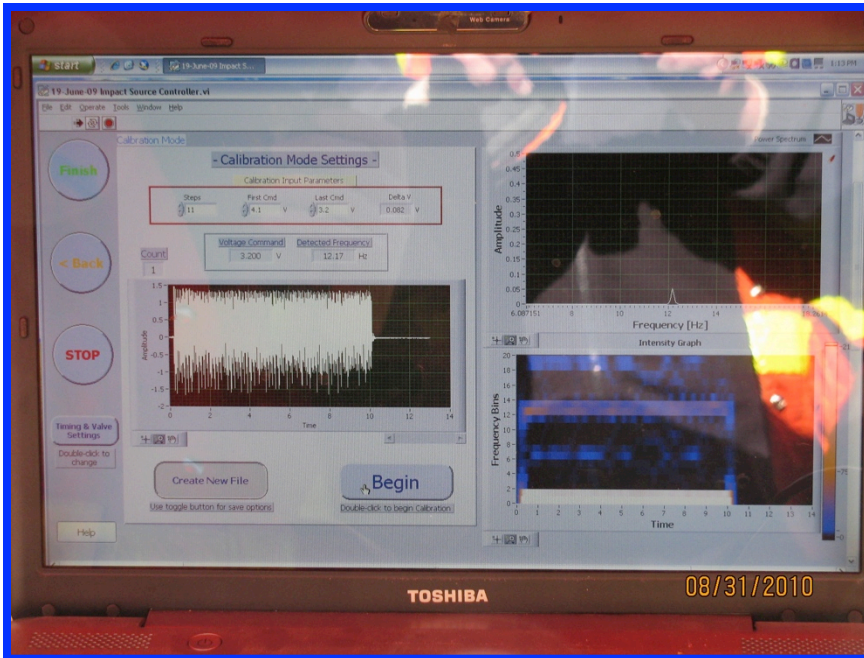
## Objectives/Preliminary Results of the Sept. 2013 Seismic Program

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- Acquisition of seismic data along the T' Railway not approved for exploration license so the acquisition was limited to road on crown land east of Howley
- Acquire data across the eastern bounding fault of the basin
- Test the level of source energy required for data acquisition  
2013 data acquired using the MUNSIST seismic source
- Data processing is ongoing
- Based on field records
  - Clear evidence of reflections in the first 1-1.5 km of the data
  - Likely unconformity at ~ 500-600 m

# MUNSIST

**Swept impact seismic source designed for environmentally friendly, high resolution imaging**



**MUN designed custom control software linked with a commercial hydraulic rock breaker**

**Successfully deployed for surveys in western Newfoundland (5 Mile Road and Flat Bay) and 2 surveys at Voisey's Bay**

# Data Acquisition

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**Brandon Reid - MUN MSc student – acquisition computer**



**Geophone placement**

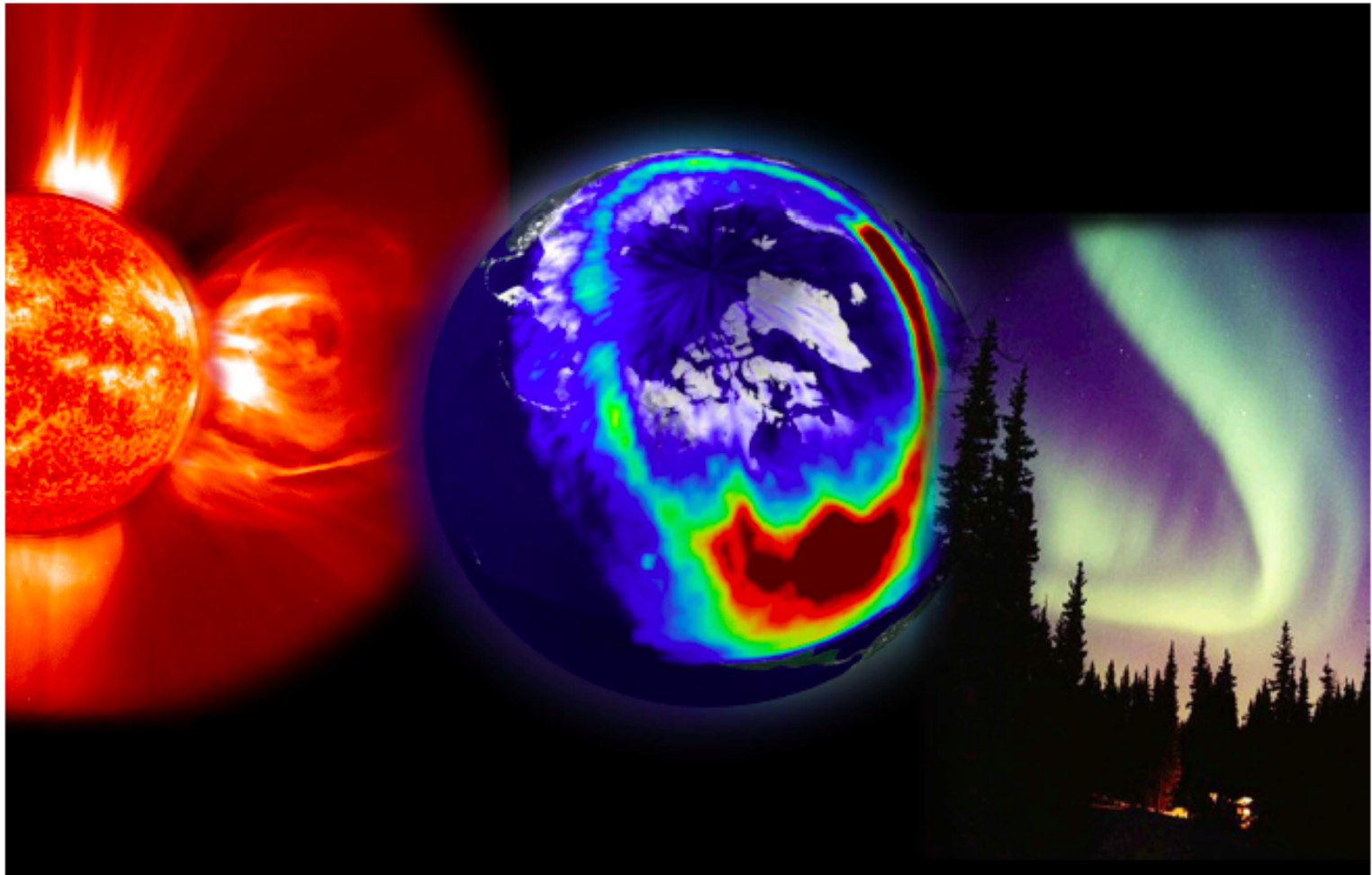


**Aries RAM and battery - each RAM handles 8 channels A/D**

# MUN Occupation of the Howley Tourist Lodge



# The Magnetotelluric Method



[www.nasaimages.org](http://www.nasaimages.org)

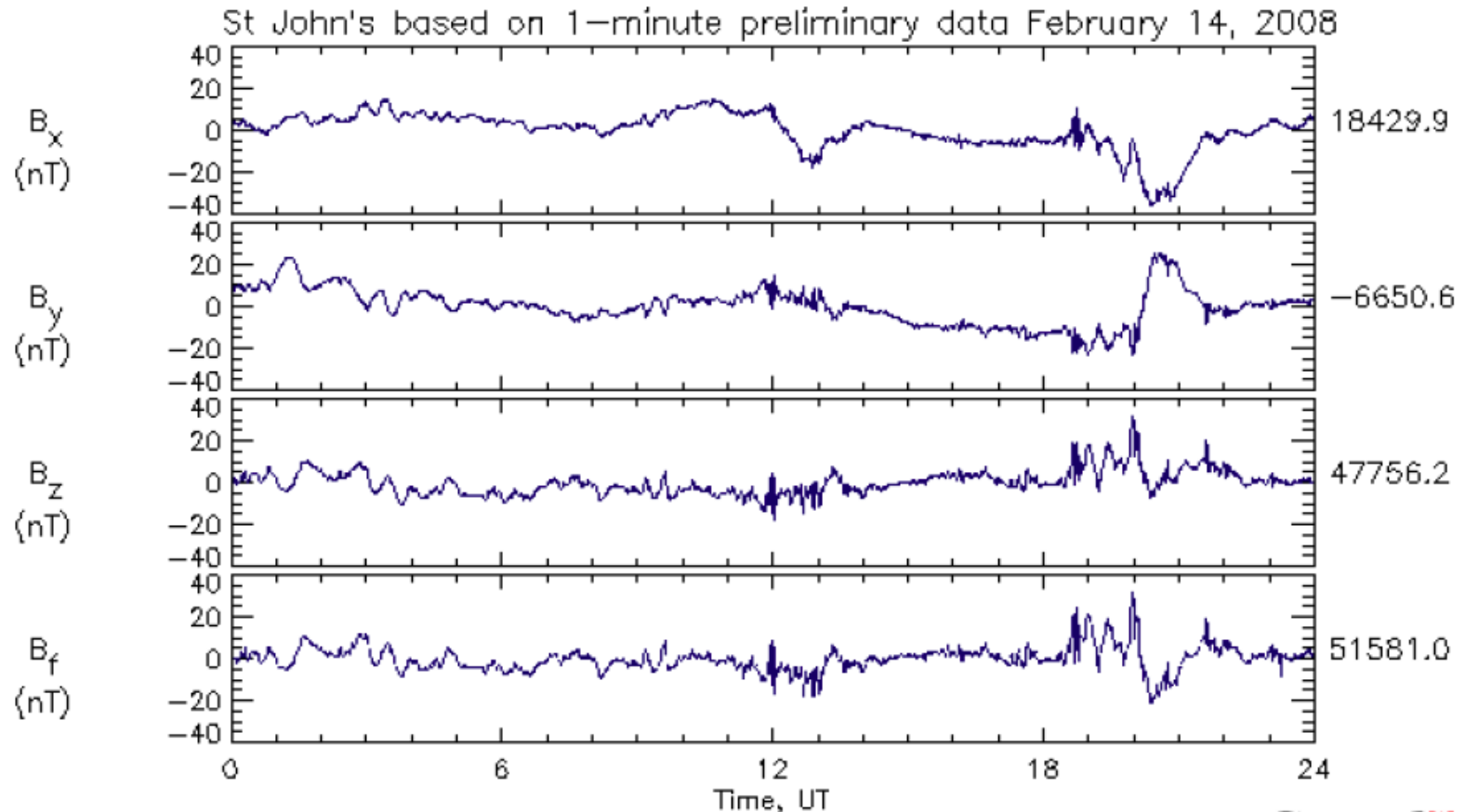


# The Magnetotelluric Method



The Internet

# The Magnetotelluric Method

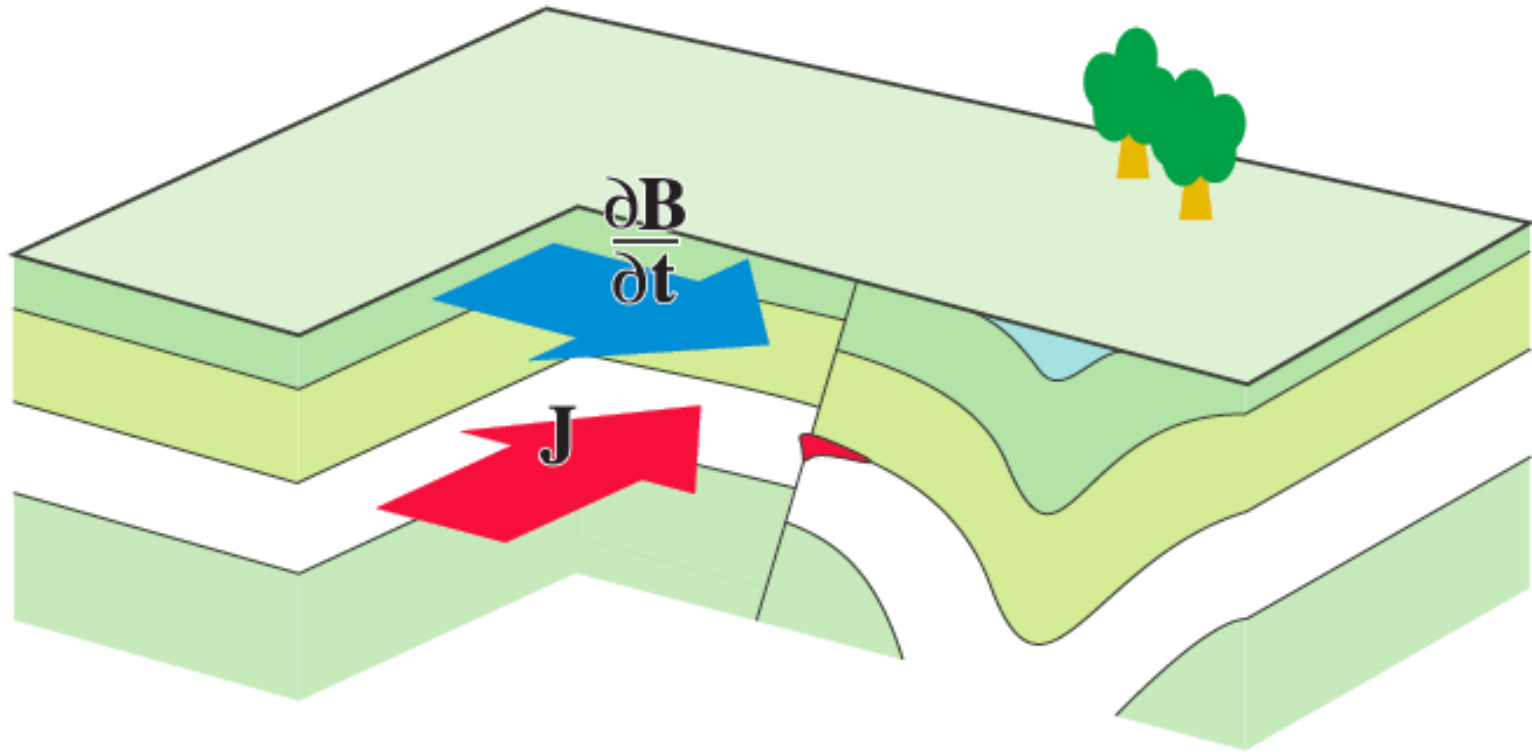


Natural Resources  
Canada

Ressources naturelles  
Canada

Canada

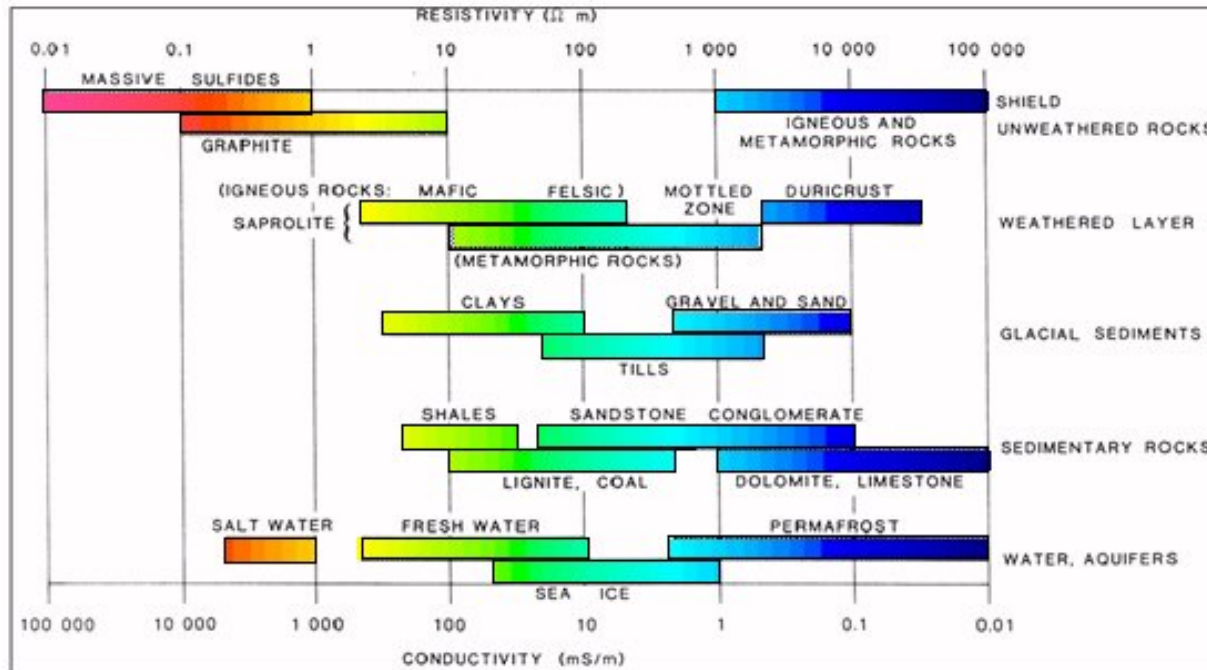
# The Magnetotelluric Method



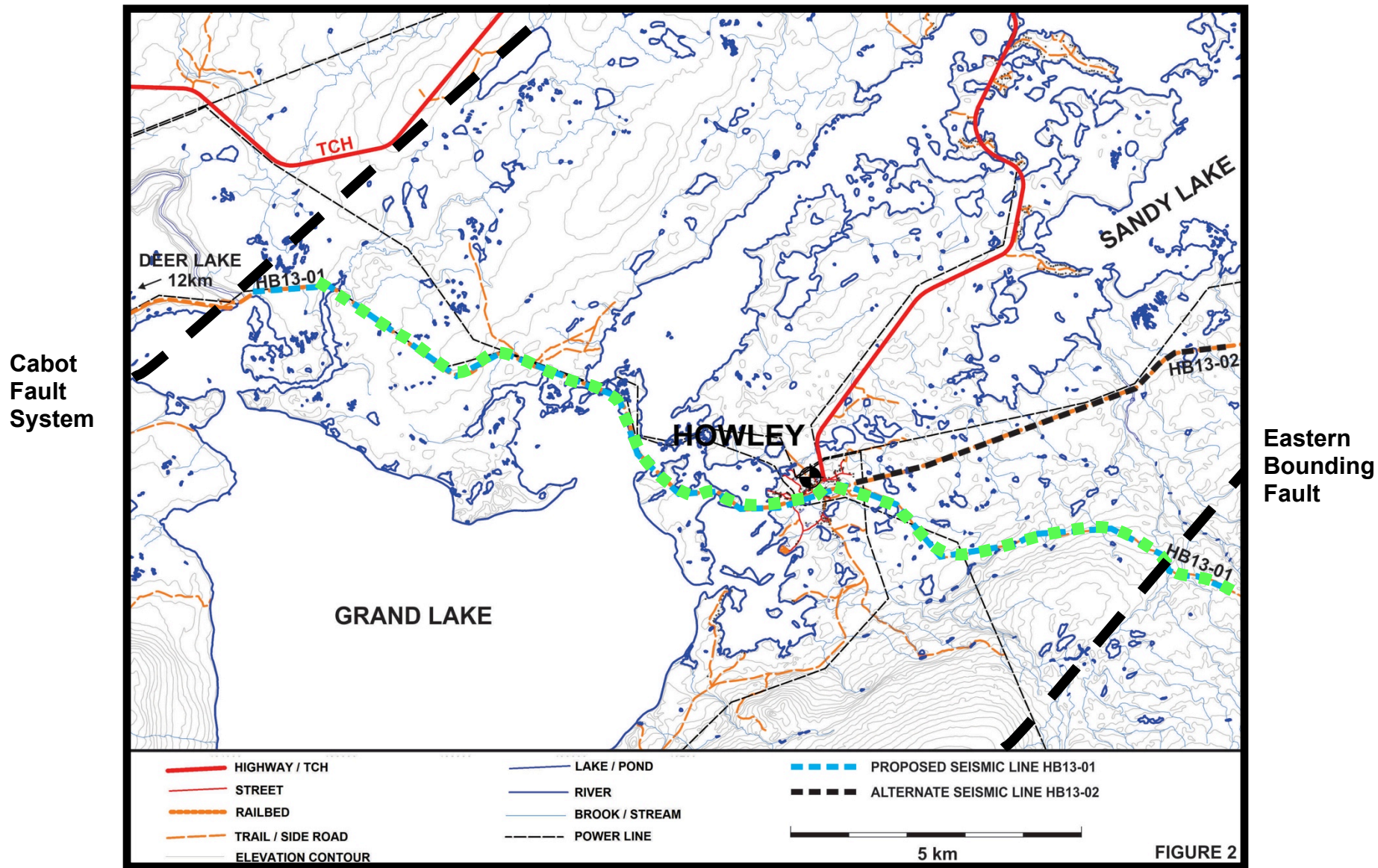
Measure  $\mathbf{E}$  and  $\mathbf{H}$ . Their ratio contains information about the electrical conductivity of the subsurface.

# Magnetotelluric Method

- **Source:** the flow of charged particles in the ionosphere, such as lightning and solar energy, causing natural variation in the magnetic field under the Earth's surface, that induce electric currents.
- **Results:** imagines the earth's electrical resistivity structure from depths of a few 100 meters to several 100's kilometers.



# August/September 2013 MT Program –Howley Basin



# August/September 2013 MT Program –Howley Basin



AMT Sites (39 in total)

BBMT + AMT Sites (10 in total)

Remote Site

# Survey Stats

## Recording Data

- Four Phoenix MT Units
- 12 AMT Coils, 6 BBMT Coils
- Two types of electrodes: pots and rods
- AMT spacing: 500 m
- AMT recording time: 2-4 h
- BBMT spacing: 2 km
- BBMT recording time: overnight
- Profile length – ~18km

## Personnel/training

- Jessica Spratt and 3 graduate students



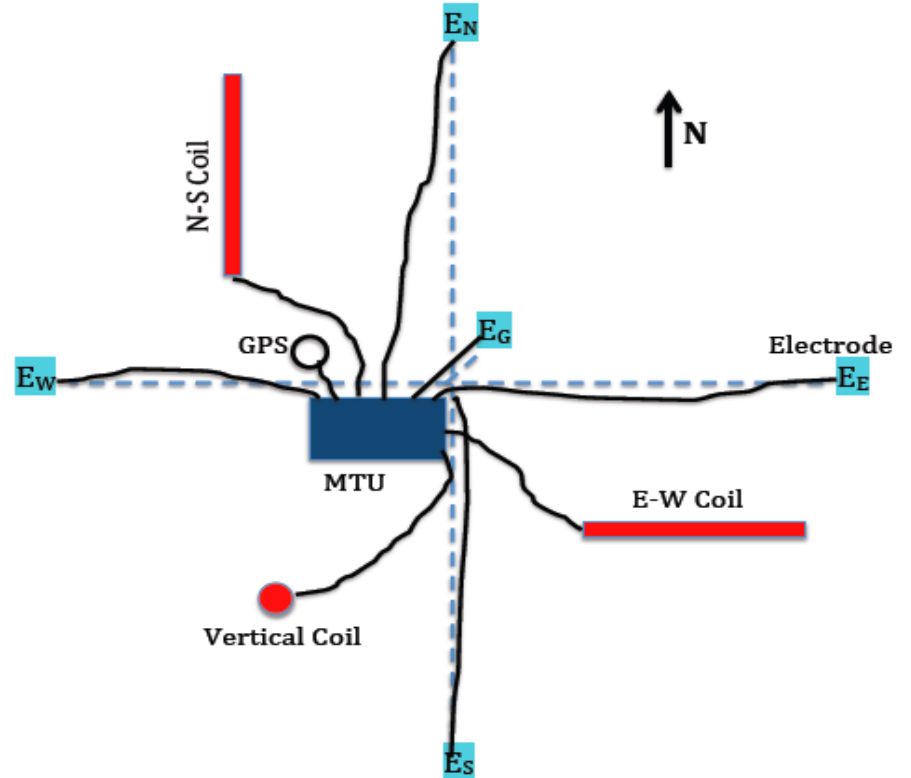
# Data Acquisition and Field Work



Jessica Sprat connecting and turning on the MTU



Placing a coil underground



Equipment layout



# • TM mode

- Electric field polarized across electric strike.
- When  $H_x$ ,  $E_y$  and  $E_z$  are comprise.
- Affected mainly by galvanic effects.

# • TE mode

- Electric field polarized along (parallel) electric strike.
- When  $E_x$ ,  $H_y$  and  $H_z$  are comprise
- Affected by galvanic and inductive effects.

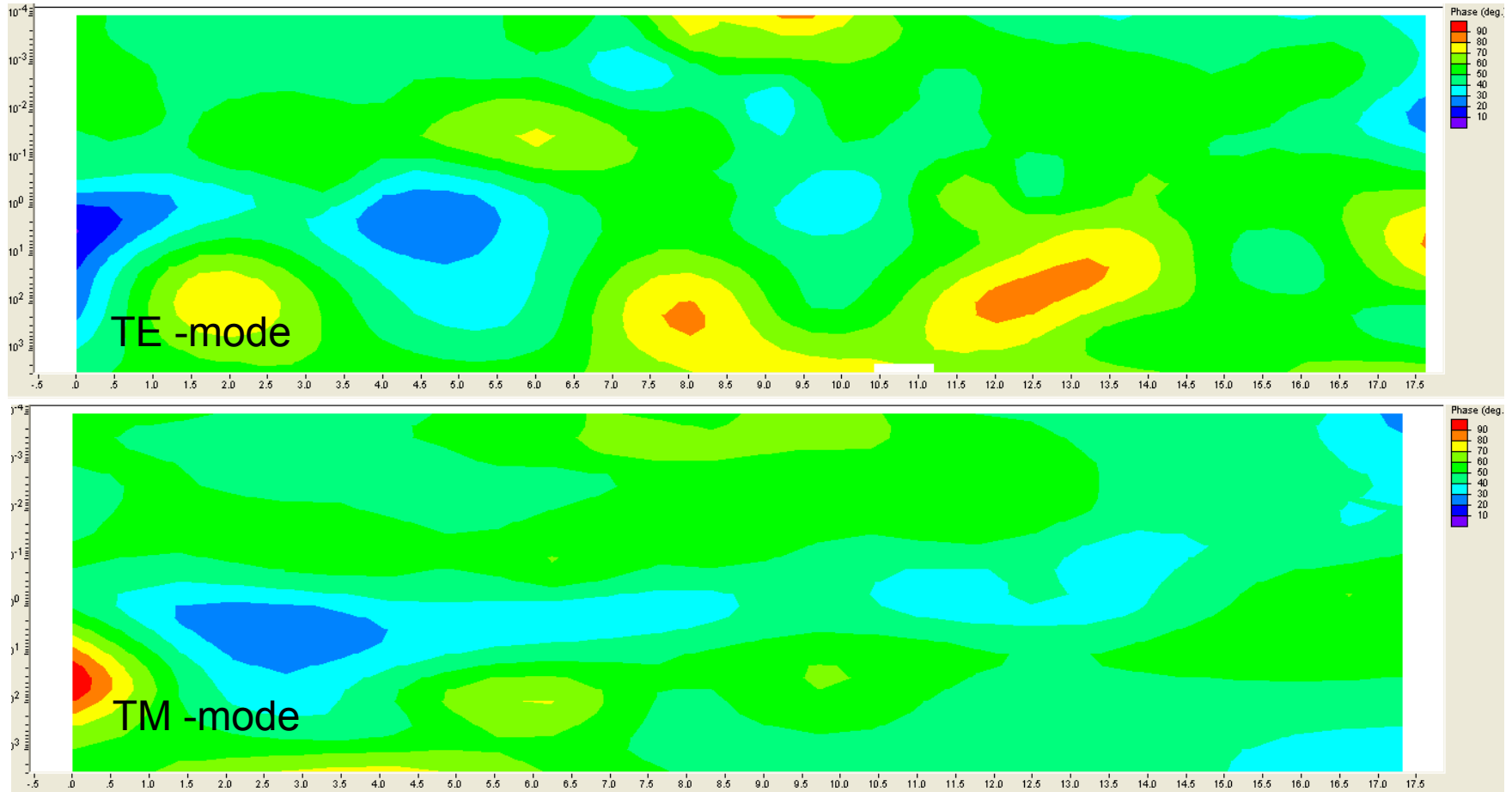


An image of MT data from MTEditor after data has been cleaned from the noise

# Phase Pseudosection

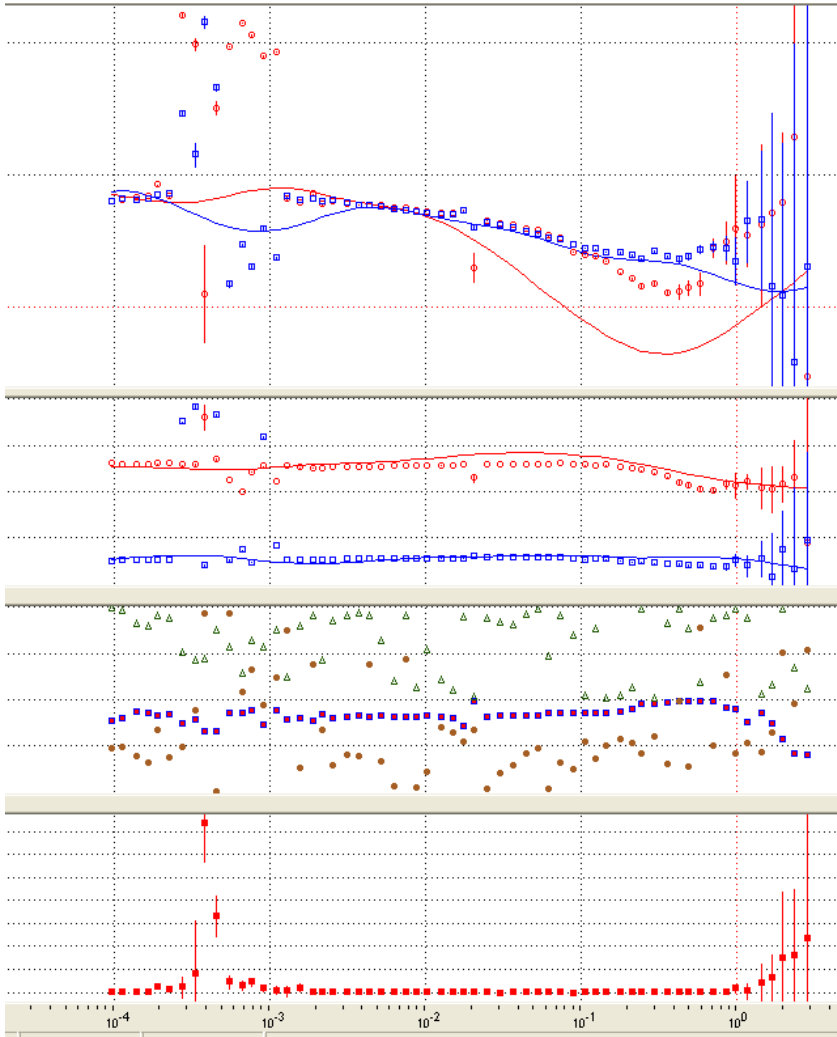
NW

SE

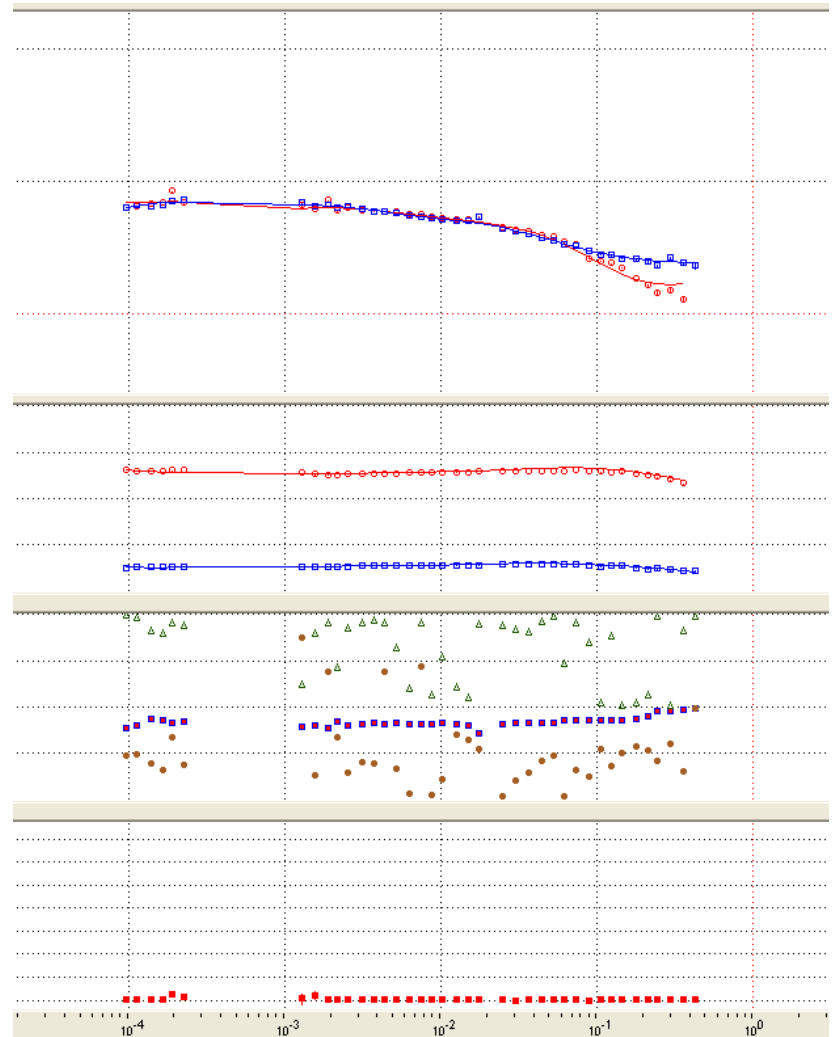


Pseudosections of the phases with increasing period of TE and TM modes.  
Data is 1D where the difference between phases is less than  $10^\circ$

# 1D Example

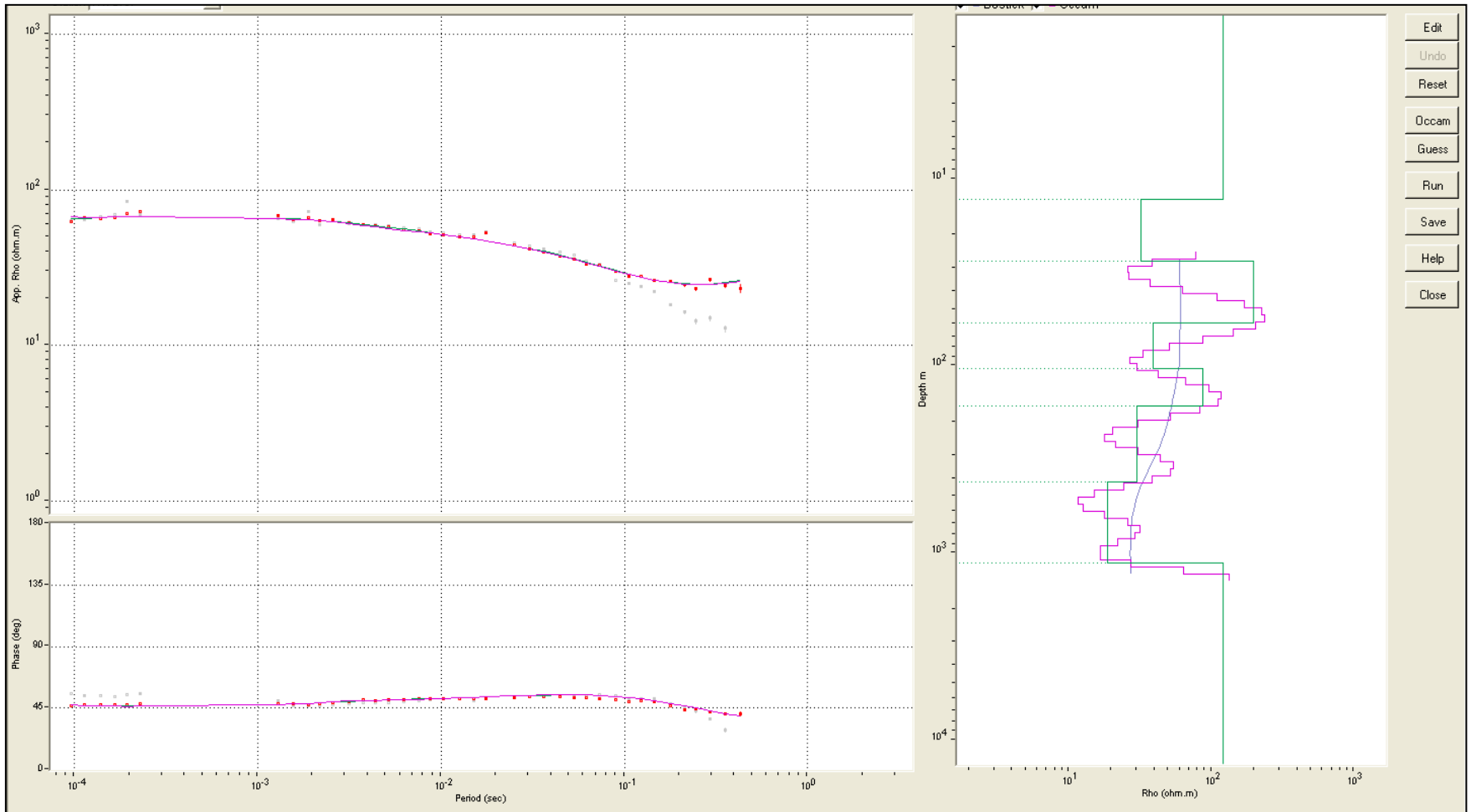


Pre-editing



Post-editing

# 1D Example



An image of MT data from WinGLink of Station HW136, with fitted resistivity model

# Resistivity Profile from 1D TE and TM modes

