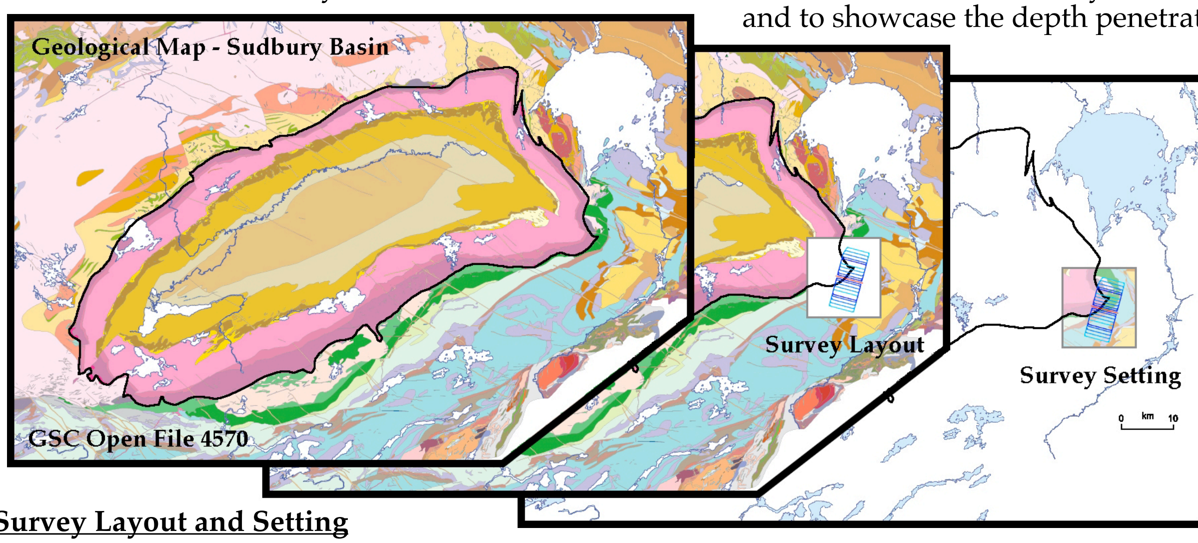
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE
20 Binnington Court, Kingston, Ontario, Canada K7M 8S3
Tel: (1) 613.531.9950 Fax: (1) 613.531.8987 info@lgl.kos.net
http://www.lamontagnegeophysics.com/

Inductive Source Resistivity - ISR - Sudbury Falconbridge Footwall Test ISR Data

ISR across the SIC/footwall contact and out into the footwall

ISR Survey Background

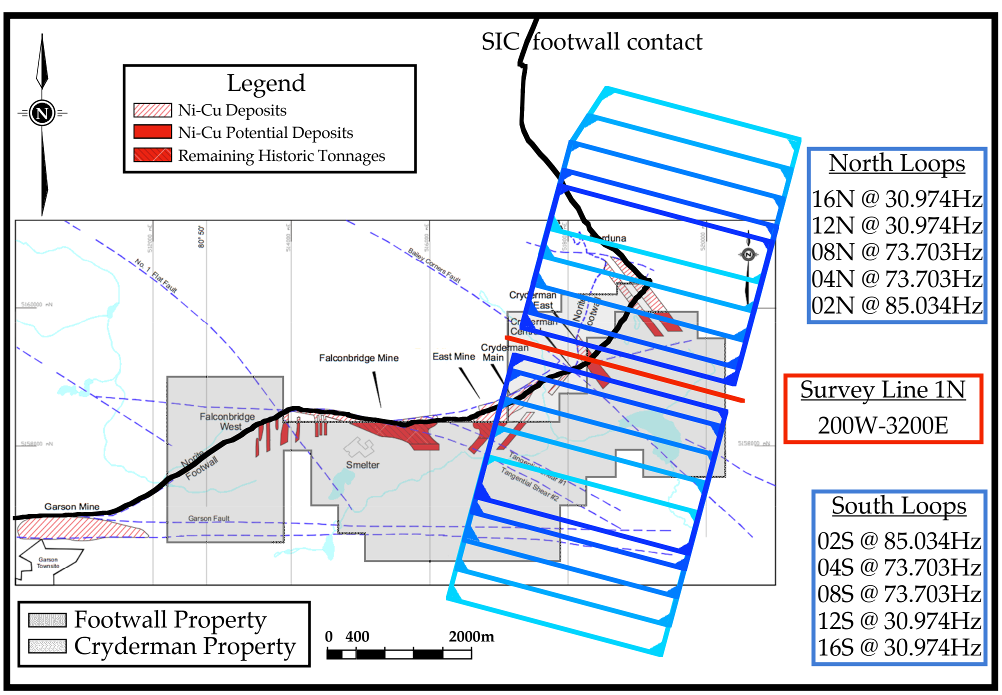
A UTEM Inductive Source Resistivity (ISR) test was carried out in July 2009 over the southeast corner of the Sudbury Basin as shown. The survey was carried out on the Falconbridge Footwall and Cryderman Properties - historically significant and very prospective properties situated at the eastern end of the South Range Shear Zone. The survey was carried out as a test of the ISR method in the Sudbury environment and to showcase the depth penetration of ISR.



ISR Survey Layout and Setting

The ISR Survey Layout and Setting is shown on a regional scale above. The figure below sets the ISR survey on a property scale - on pertinent sections of the Falconbridge Footwall/Cryderman Properties. Significant historic producers are shown in the figure. **Line 1N** was selected as the site of the test survey because of the highly-prospective geological setting - both at the contact and out into the footwall rocks. The site is also ideal for a test - relatively flat and essentially free of cultural features.

The in-line component of the electric field - Ex - was measured along **Line 1N** from 2 sets of five 3000x2000m ungrounded Tx loops. E-field measurements were collected with standard electrode dipoles.



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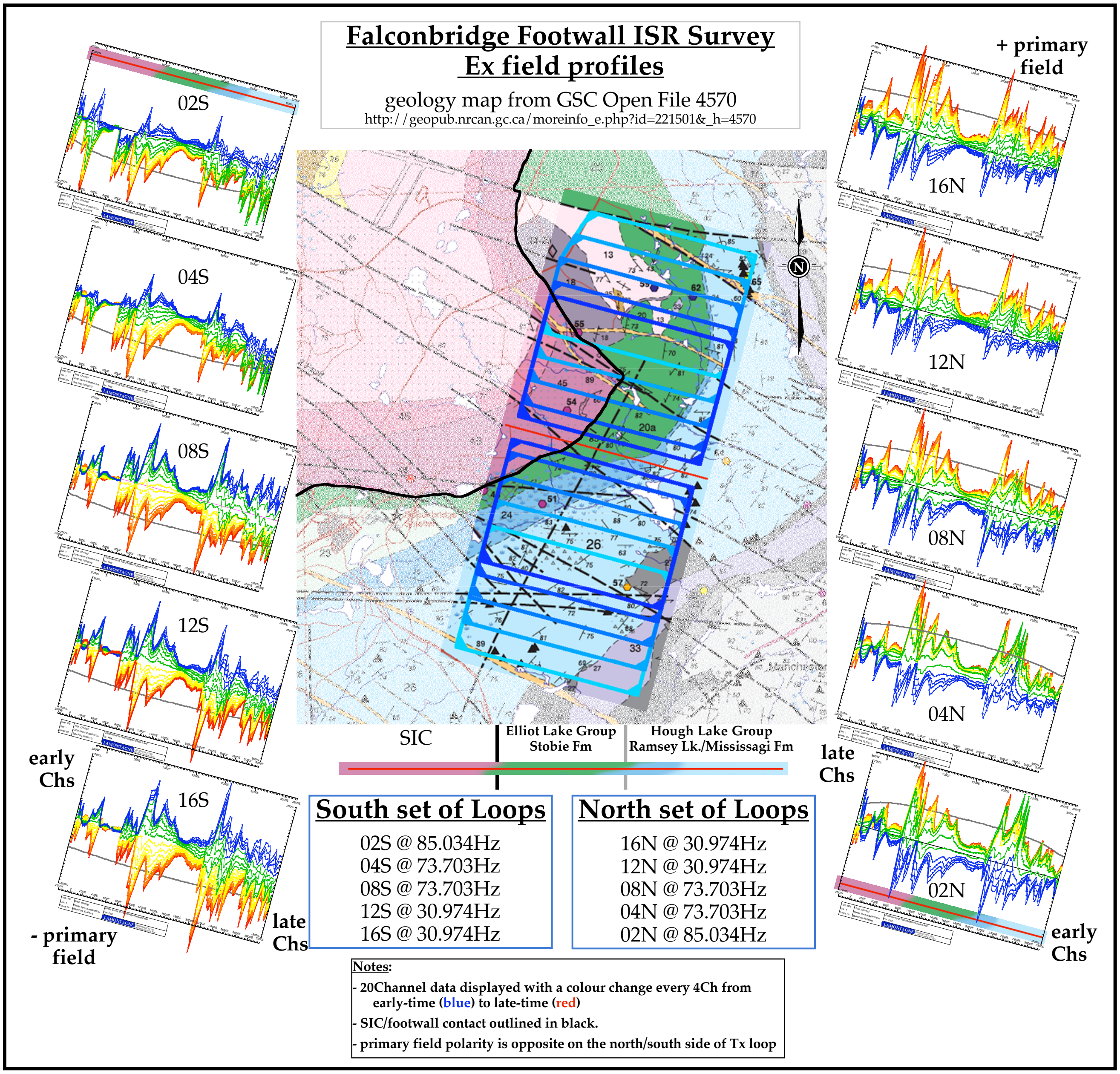

ISR Survey data

The two sets of five L1N Ex profiles are shown - the South set of loops to the left, North to the right. Survey parameters were varied as summarized in Tables. The closest Loops (200m offset Loops 02N/02S) were surveyed at the highest frequency, the intermediate loops (400/800m offset Loops 04N/04S and 08N/08S) at an intermediate frequency and the furthest offset loops were surveyed @ the lowest frequency - ~31Hz. All data was collected at a station/dipole spacingof 25m.

The profiles display considerable character - a detail of the geological map is included for reference. Note the change in strike at the survey line. The geology south of L1N is oblique to the line while north of L1N the geology is roughly perpendicular to the line - closer to a 2D case.

The simplified geology along the survey line is shown on the Loop 02N/S profiles - the broad correlation is good and it is evident that more detail is present in the profiles. Note that some of the spikiness in the profiles is indicative of variations in the near-surface.

The profiles show the 20-channel data as collected and reduced in the field. The characteristic mirroring of late-time-channel profiles in the early-time data indicates that no periodic correction has yet been applied to these data.

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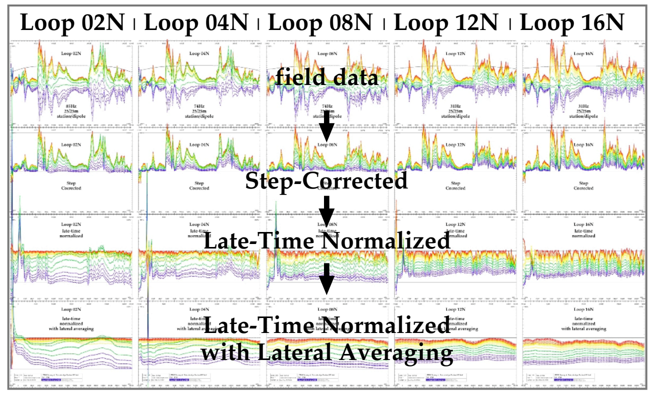
ISR Processing

The E-field data collected during this test was processed with the goal of obtaining an ISR - **I**nduced **S**ource **R**esistivity - resistivity-depth section for the line surveyed. The method used to obtain the resistivity section involves two processes: 1) **E**-field **C**onductivity **D**epth **I**maging and 2) **ISR E-field Imaging**.

1) ECDI (E-field Conductivity Depth Imaging)

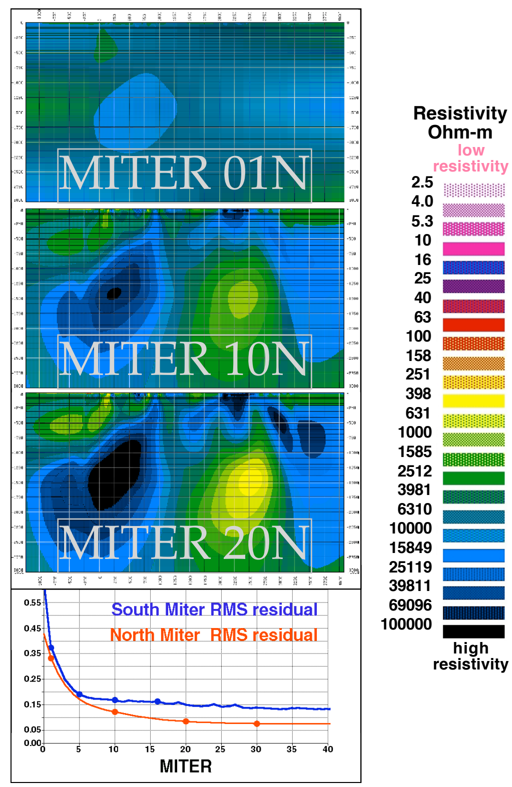


The **ECDI** process is as follows:

- Step Correct the field data - this converts the periodic waveform into a single step response.
- normalise the data to the Late-Time (Last Channel) limit
- apply lateral averaging to the late-time normalised data

The averaged data are then fit to apparent diffusion time as a function of depth, creating a laterally-smooth conductivity distribution.

2) ISR E-field Imaging



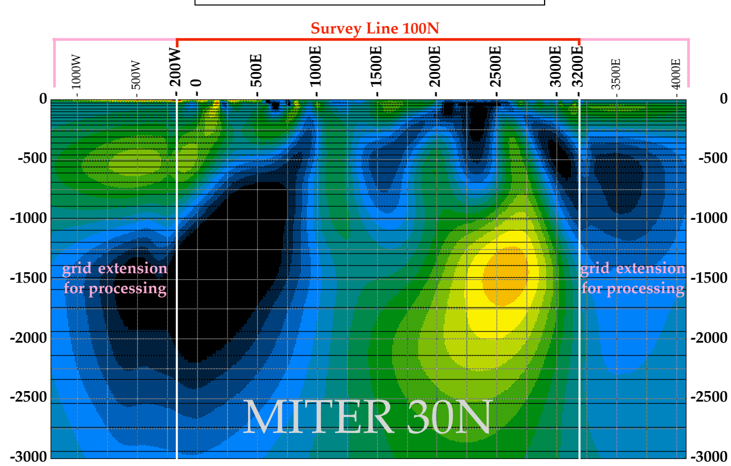
E-field imaging is done on stacked, Step-Corrected data which are not late-time normalized. E-field imaging is simply a DC resistivity inversion process where the source E-field is inferred as a function of time from the ECDI results.

The ISR inversion is a 2-step process. At each outer (main) iteration (MITER) ithe Step-Corrected E-field data and the diffusion time data are jointly fitting using a trade-off parameter subject to smoothing conditions. The updated synthetic response and residuals in both data and diffusion times are recalculated after each miter.

The number of anomaly profiles fitted in this process is the number of channels (20) multiplied by the number of loops.

This process is repeated until the RMS (root mean square) residuals no longer appreciably decrease - the generally accepted practice. The number of main iterations (MITER) required to reach this point varies with the data set. Further iterations beyond this tend to lower the residuals marginally but generally result in increasing complexity in the model that is not supported by the structure of the data .

ISR Results - The L1N North Loops ISR Section



The L1N North Loops ISR Section is presented to the right after **M**ain **ITER**ations 01-10-20-30.

MITER 01: section with extensions - tweaked from original half-space

MITER 10: overall character of the section is established

MITER 20: character develops, RMS residuals flatten off

MITER 30: further development. RMS residuals ~flat selected as the L1N North Loops ISR Section. enlarged, labeled section presented to the right

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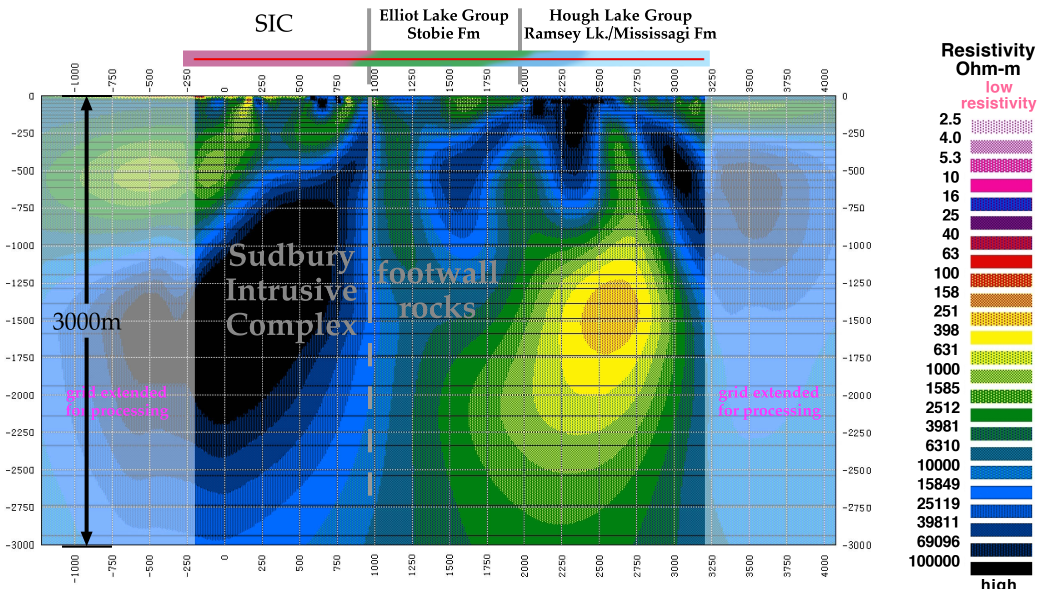


L1N North Loops ISR Section

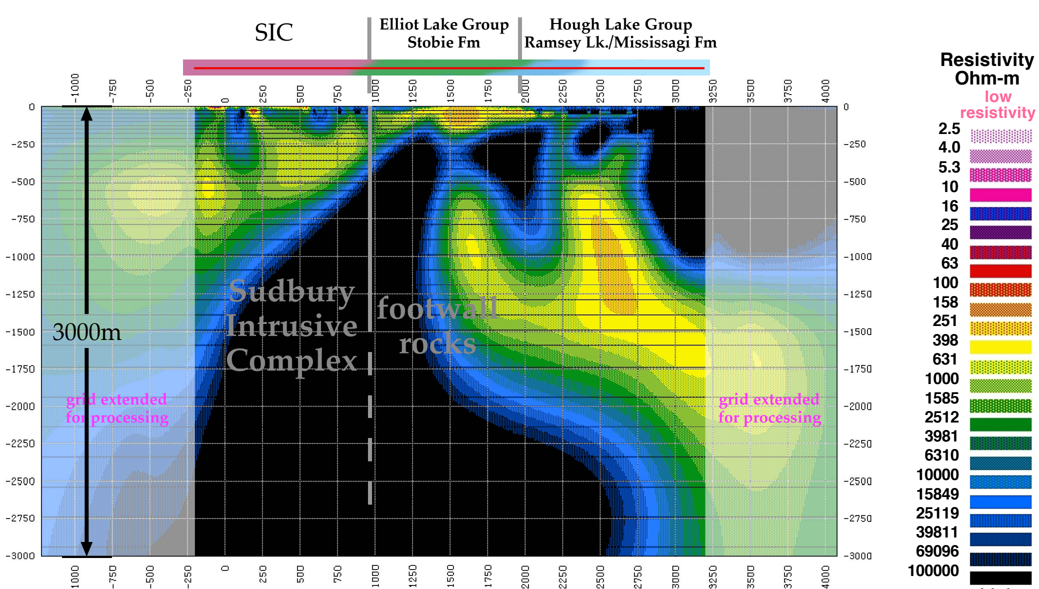
Annotated L1N ISR Section - discussion

The L1N ISR North Loops Section a(above) and L1N ISR South Loops Section a(below) are presented with annotations . There are both similarities and differences between the sections - comparison with the geology indicates differences should be expected - a change in strike occurs roughly at the survey line. In general these two sections will be more alike the simpler/more 2D the geologic setting because the inversion assumes a 2D structure perpendicular to the traverse line.

A number of features are evident in the sections but two stand out:

- the gridwest-dipping "wedge" of generally lower resistivity, upper part of both Sections, west of the SIC contact at ~1000E. This "wedge" correlates to a "nose" in the SIC-Footwall contact on the geological map - the dip in the Sections is likely apparent. This area has been significant historically and the "wedge" feature definitely warrants a more detailed interpretation.
- a broad low-resistivity feature imaged @~2500-2700E at a depth range of ~750-1500m
  This is well out into the footwall rocks - footwall conductors can indicate prospective mineralization. Both Sections show the feature, in a weaker form, extending closer to surface.
  Definitely a feature of interest.

Note that ISR section is shown to 3000m and features are traceable to that depth - indicating the potential of UTEM ISR (Induced Source Resistivity) to map features at considerable depth.



L1N South Loops ISR Section