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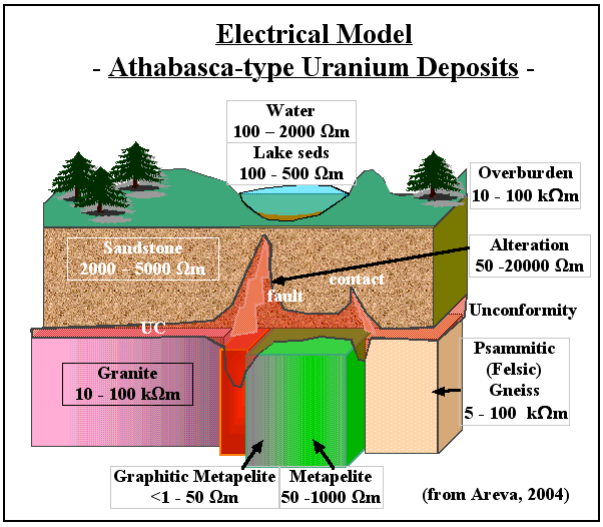
Inductive Source Resistivity - ISR - Update
Shea Creek Test ISR Data Reprocessed 2010
Detecting Alteration at depth in the Athabasca

ISR Processing - E-field Imaging

The ISR **E-Field imaging** processing software has undergone a major upgrade in order to allow for the processing of data from a wider range of geological environments. As a test of the upgraded ISR **E-Field imaging** processing software the ISR data collected at the Shea Creek deposit has been reprocessed and the results are presented here.

ISR Survey Background

A UTEM Inductive Source Resistivity (ISR) test was carried out in late November 2006 over the Shea Creek deposit to test the ability of the ISR method to detect the presence of the alteration associated with the deposit. The survey results also serve to showcase the depth penetration of ISR.

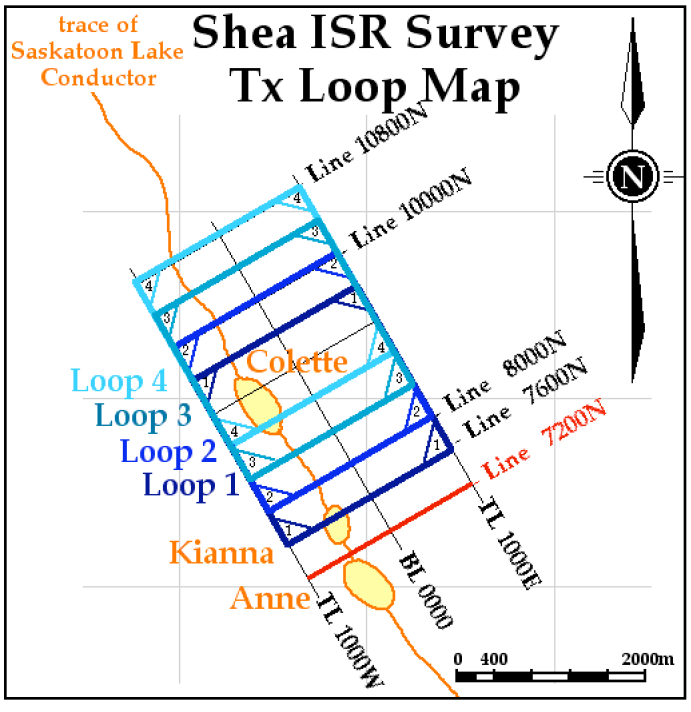


ISR Survey Setting (Nimeck and Koch, 2008)

The Shea Creek deposit is in the western part of the Athabasca Basin, approximately 15km south of the Cluff Lake Mine which is within the Carswell Structure. The Shea Creek deposit consists of three mineralized uranium zones (Anna, Kianna and Colette) that are on a long-strike-length NNW trending graphitic conductor - termed the Saskatoon Lake Conductor (SLC).

A distinctive zone of low resistivity associated with the three mineralized zones extends approximately 300m above the unconformity. This zone is interpreted to reflect regions affected by structural reactivation and possible associated hydrothermal alteration processes resulting in increased sandstone porosity.

Mineralization is found in three locations:
- perched within the Athabasca sandstone
- at the unconformity (~710-750m)
- below the unconformity within the basement units



ISR Survey layout

Line 7200N was selected for surveying because of its proximity to the Kianna and Anne zones. The in-line component of the electric field - Ex - was measured from four 2000x2000m ungrounded transmitter loops:

Loop 1 - offset 400m gridnorth
Loop 2 - offset 800m gridnorth
Loop 3 - offset 1200m gridnorth
Loop 4 - offset 1600m gridnorth

E-field measurements were collected with standard electrode dipoles - in -40° weather.

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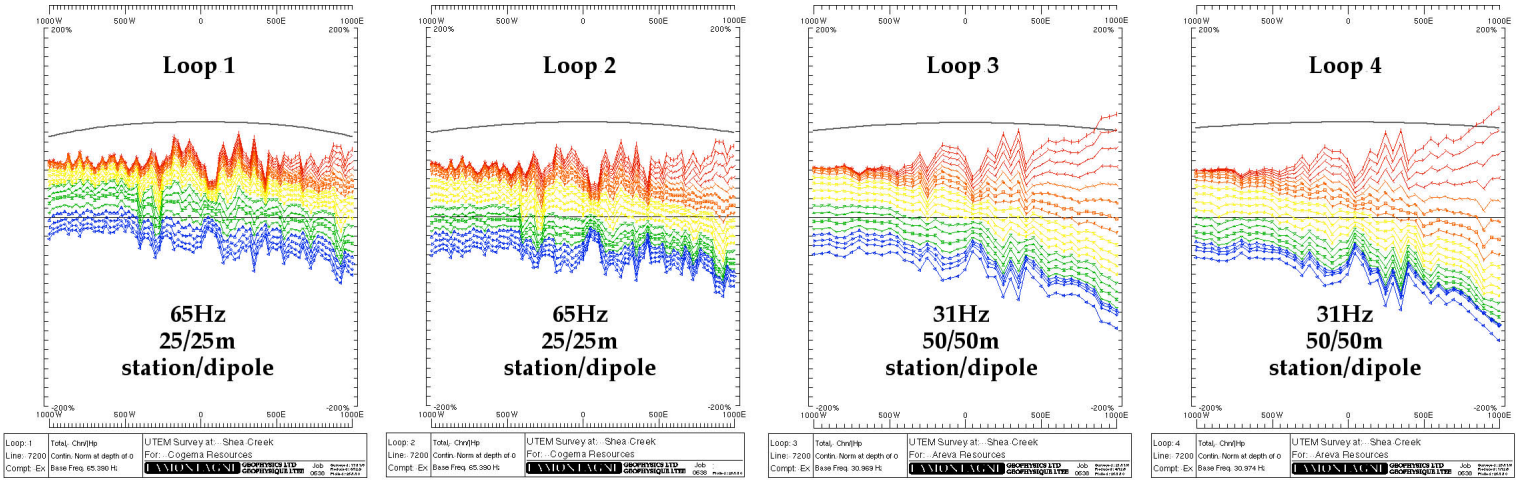
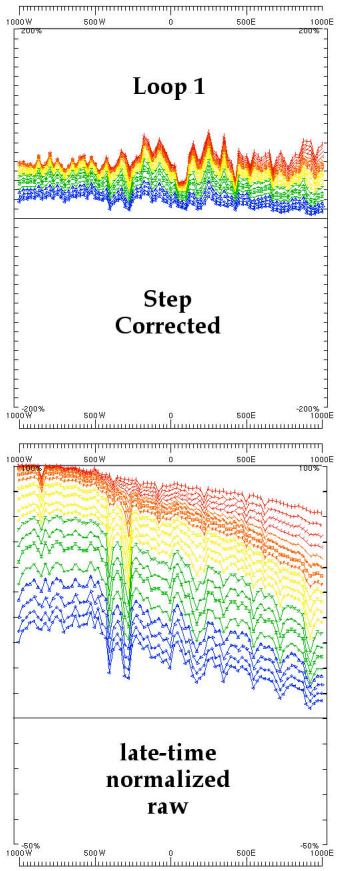




ISR Survey data

The four L7200N Ex profiles are shown across the top of the page. Survey parameters were varied as labelled on the profiles - basically the closer Loops - 1 and 2 offset 400 and 800m respectively - were surveyed at a higher frequency and a smaller station/dipole spacing to provide shallow detailing. Spikiness is evident - indicative of variations in the near-surface. Characteristic mirroring of late-time profiles in the early-time data indicates that no periodic correction has yet been applied to these data.

Note: The Loop 3 and 4 profiles - offset 1200 and 1600m respectively - show the influence of an overall more resistive block toward the east

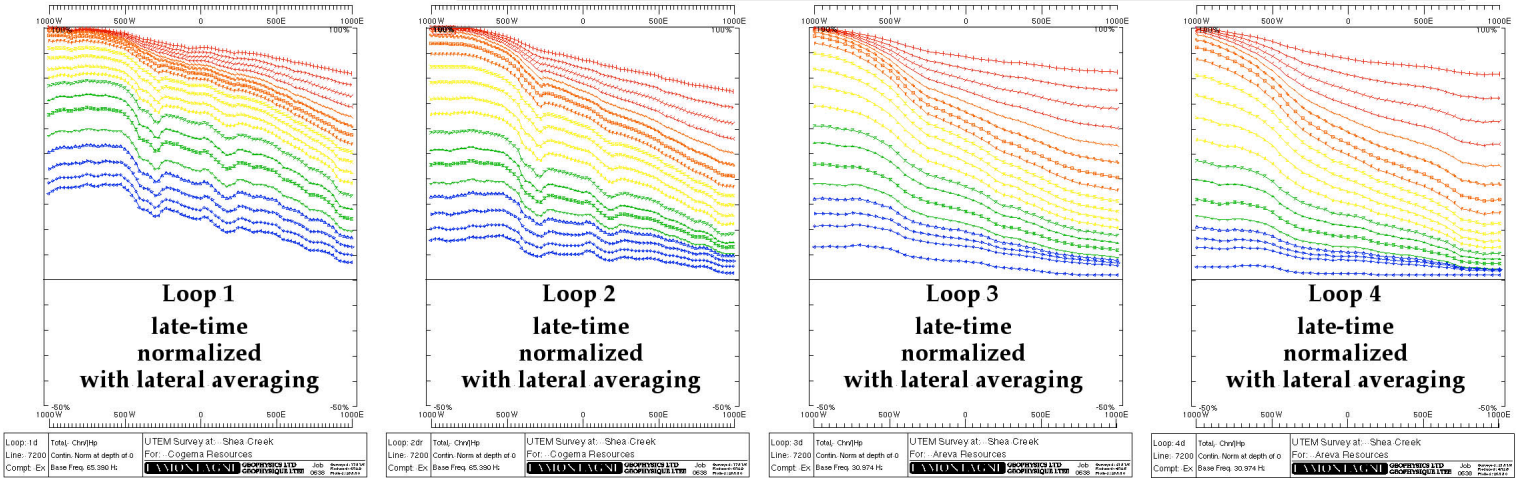
ISR Processing

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: **E**-field **C**onductivity **D**epth **I**maging and **E-field Imaging**.

ISR Processing - 1) ECDI (E-field Conductivity Depth Imaging)

The **ECDI** (**E**-field **C**onductivity **D**epth **I**maging) process is as follows:

- Step Correct the data - this corrects for the data being collected using a periodic waveform and not a single step.
- normalise the data to the late-time (Last Channel) limit
- apply revised lateral averaging to the late-time normalised data
- these data are then fit to apparent diffusion time as a function of depth



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ISR Processing - 2) E-field Imaging

As a test of the upgraded ISR **E-Field imaging** processing software the ISR data collected on Line 7200N at the Shea Creek deposit has been reprocessed.

Features of the upgraded ISR **E-Field imaging** include:

- to reduce edge effects the inversion grid is now extended beyond the survey line - the grid extensions are indicated by shading in the upper and lower images.
- the forward modelling and inversion grid cell size, originally conductivity dependant, are now equidimensional and increase in size with depth.
- the implementation of inversion-grid-size-dependent model smoothness constraints and ECDI constraints has been jointly redesigned - and trade-offs between the datafit and the ECDI constraint have been introduced.

These changes, along with a number of more minor changes, allow the ISR **E-Field imaging** to better handle a wider range of geological cases and to tolerate cases where induced polarization effects are apparent.

ISR Results - The L7200N ISR Section

The L7200N ISR Section, the result of the **E-field imaging** process, is presented to the right after selected complete iterations - **M**ain **ITER**ations 01, 06 , 10 and 17.

MITER 01: overall character of the section is established (grid extensions are shaded)

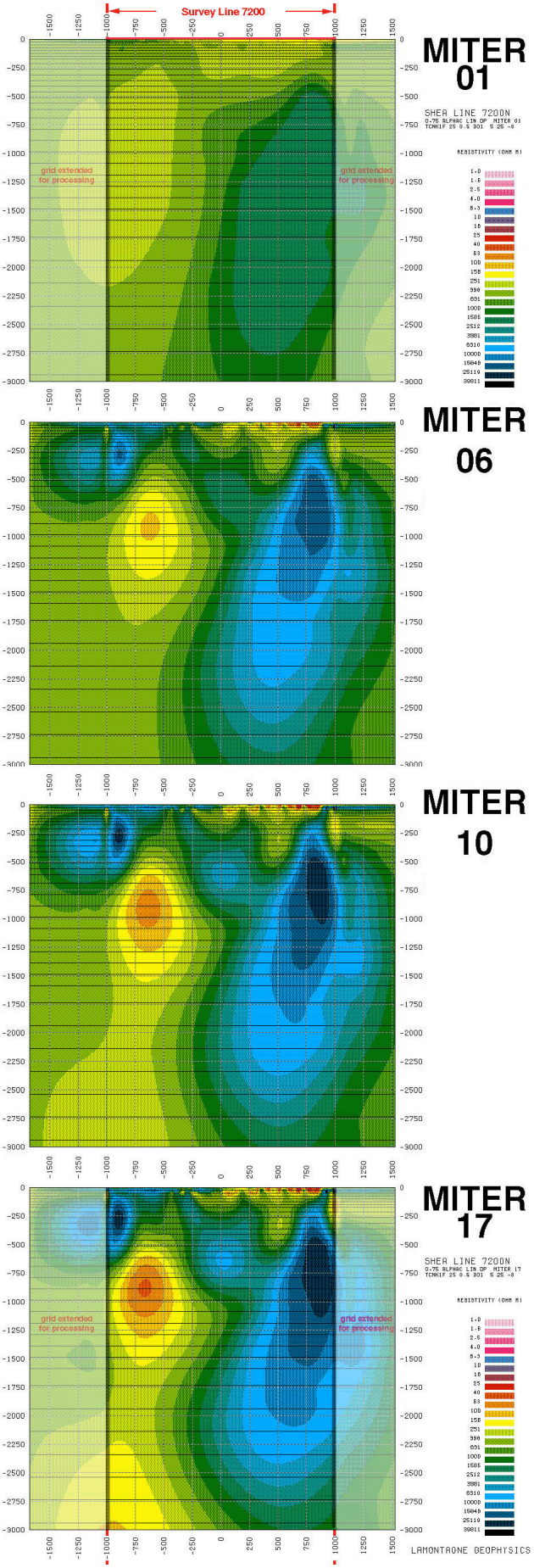
MITER 06: character of the section develops

MITER 10: further development. Conductive feature is coincident with the Shea Creek deposit/SLC.

MITER 17: section complete - error of fit is minimized. (grid extensions are shaded)

Notes:

- the ISR section as shown is cropped at a depth of 3000m (the ECDI grid used extended to 3600m)
- the more resistive basement block to the east is confirmed by the resistivity data but it is located gridnorth of Line 7200N. With all four transmitter loops located gridnorth of the survey line the ISR section shown is biased towards features local to the line and to the gridnorth. A more symmetric array - loops on both sides of the survey line - could correct for this bias.
- ISR data collection is quite rapid at the usual base frequencies. And ISR surveying of a grid or a series of lines is quite efficient - each transmitter loop can be used to survey a number of lines on one or both sides of the loop.



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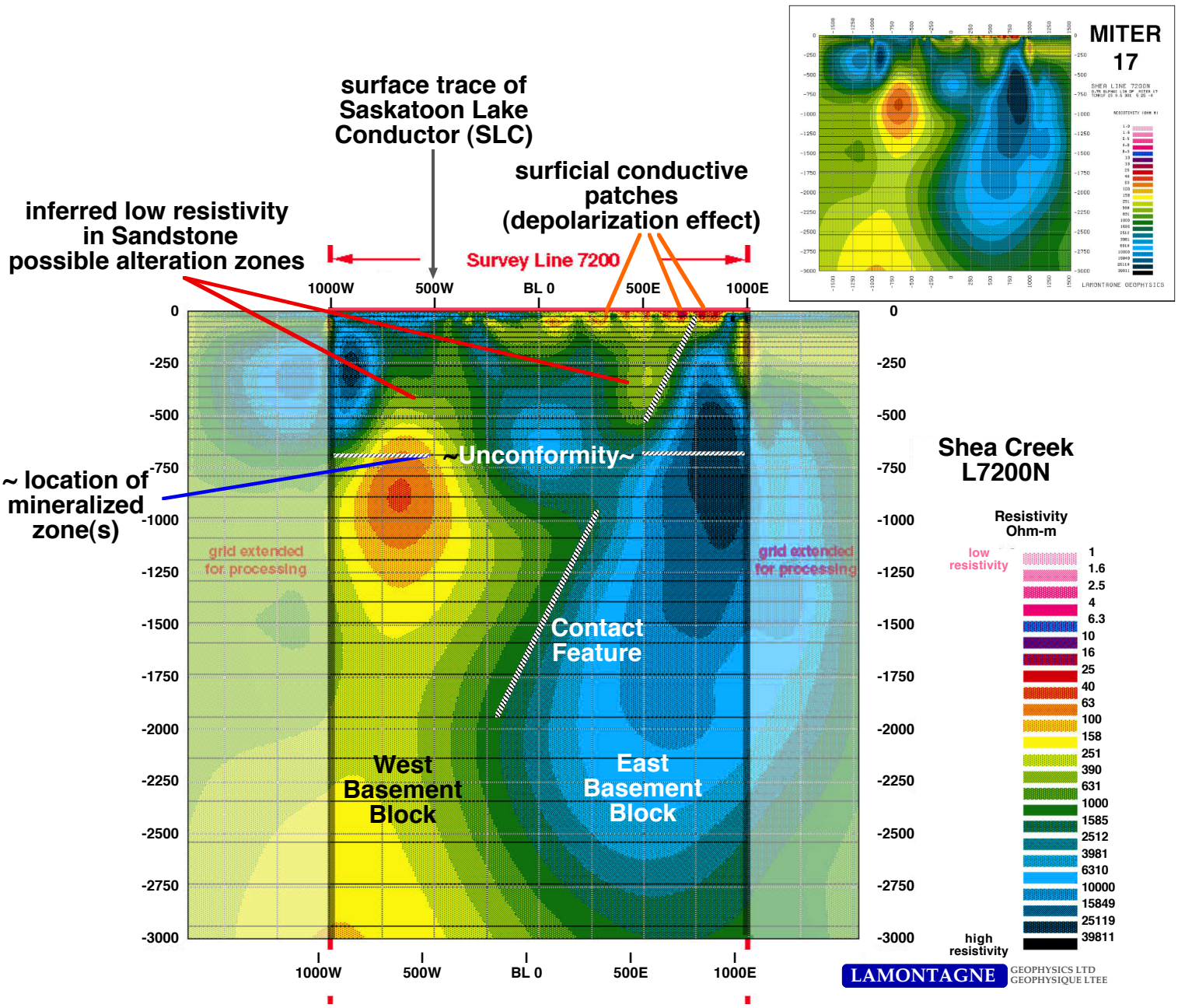

Annotated ISR Section - discussion

The L7200N ISR Section is presented above with annotations. For reference a smaller unshaded section is shown upper right.

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

There is an anomalous low resistivity feature in the ISR section at the trace of the SLC (Saskatoon Lake Conductor) - ~500W - and at a depth-to-top of ~450m. This is in the sandstone roughly 300m above the unconformity.

The UTEM ISR (Induced Source Resistivity) feature is coincident with the zone of low resistivity interpreted to reflect the top of the structural reactivation/alteration zone overlying the Kianna and the Anne zones.

The ISR section is cropped at 3000m and features are traceable to that depth.

This indicates the potential of UTEM ISR (Induced Source Resistivity) to map features at considerable depth.

For more information, please visit us at PDAC booth 1103