A Multiphysics Approach to Basement-Hosted Uranium Targeting at the Davidson River Project, Northern Saskatchewan

Sean Hillacre, M.Sc., P.Geo.
Darren Burrows, Laleh Khadangi, Steve Brennan

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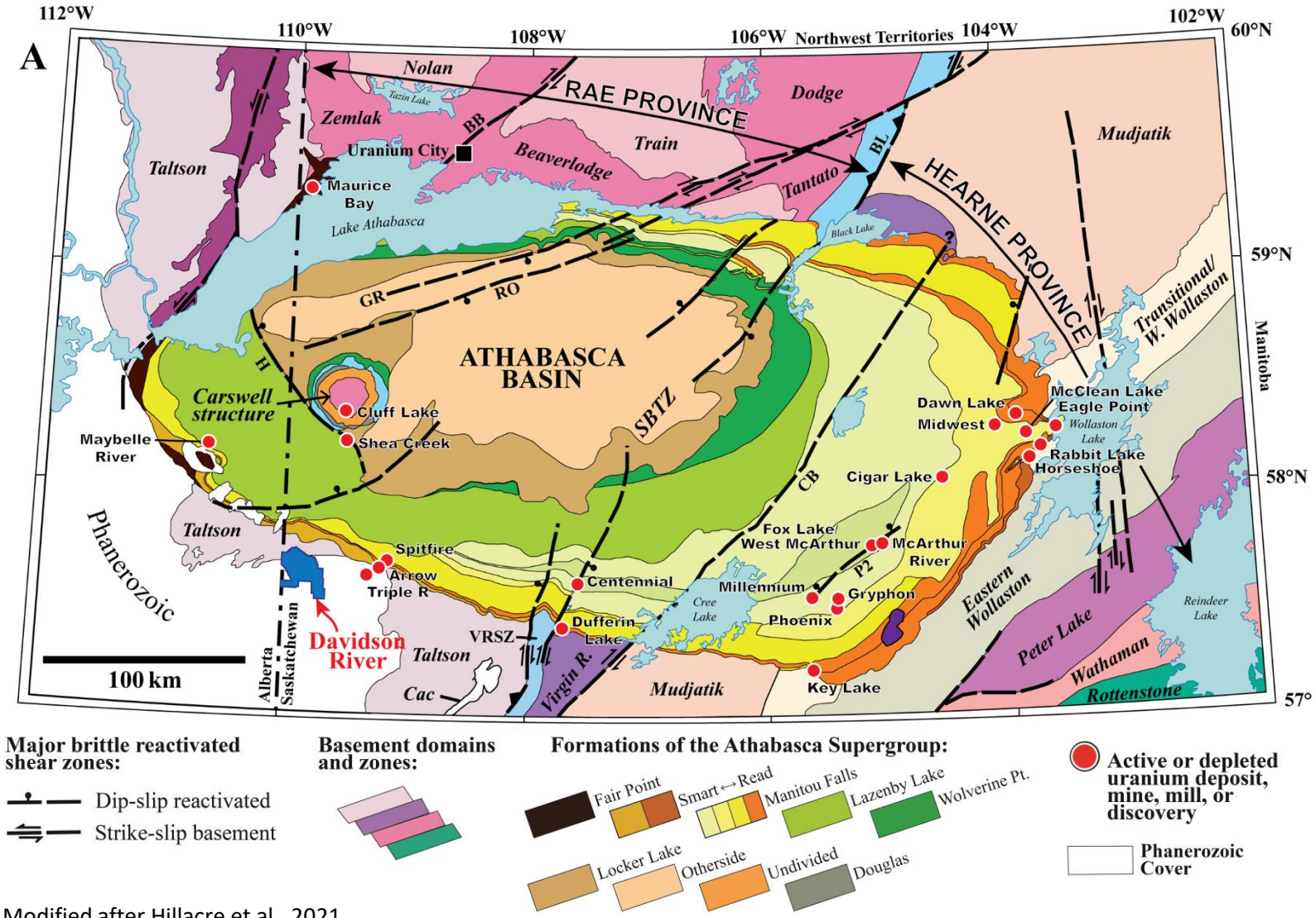
Sean Hillacre, M.Sc., P.Geo., is the Qualified Person under National Instrument 43-101 who has reviewed and approved the scientific and technical content in this presentation.

The Athabasca Basin



Modified after Hillacre et al., 2021

Paleo/Mesoproterozoic sedimentary basin – *Erosional remnant comprised of multiple sedimentary sequences e.g., Manitou Falls, Lazenby Lake, etc.*

Churchill Structural Province of the Precambrian Shield

↓

Rae Province

↓

Taltson Domain

Unconformity-Related Uranium Deposits

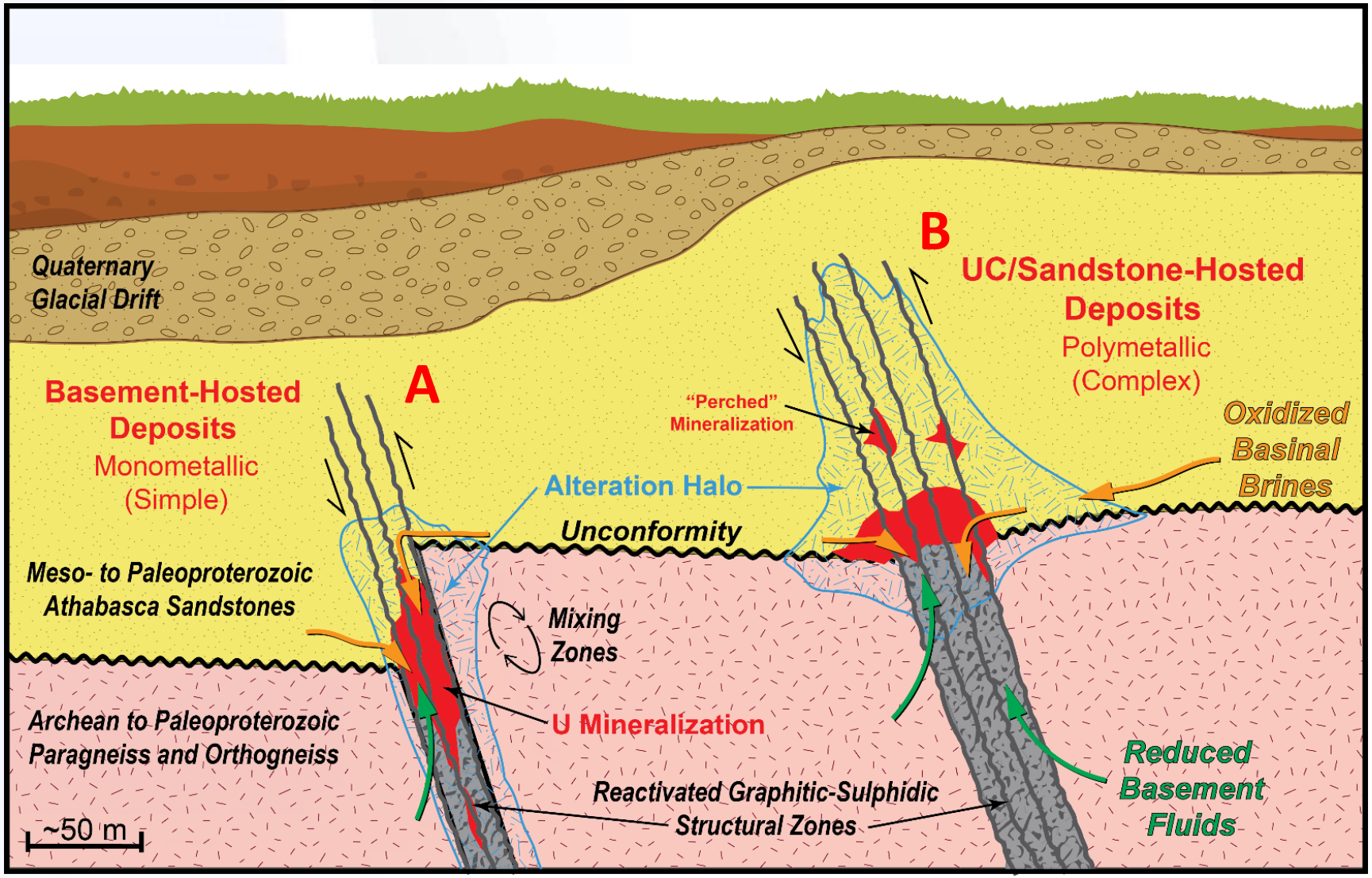
Two main deposit types (end-members):

A. Basement-Hosted

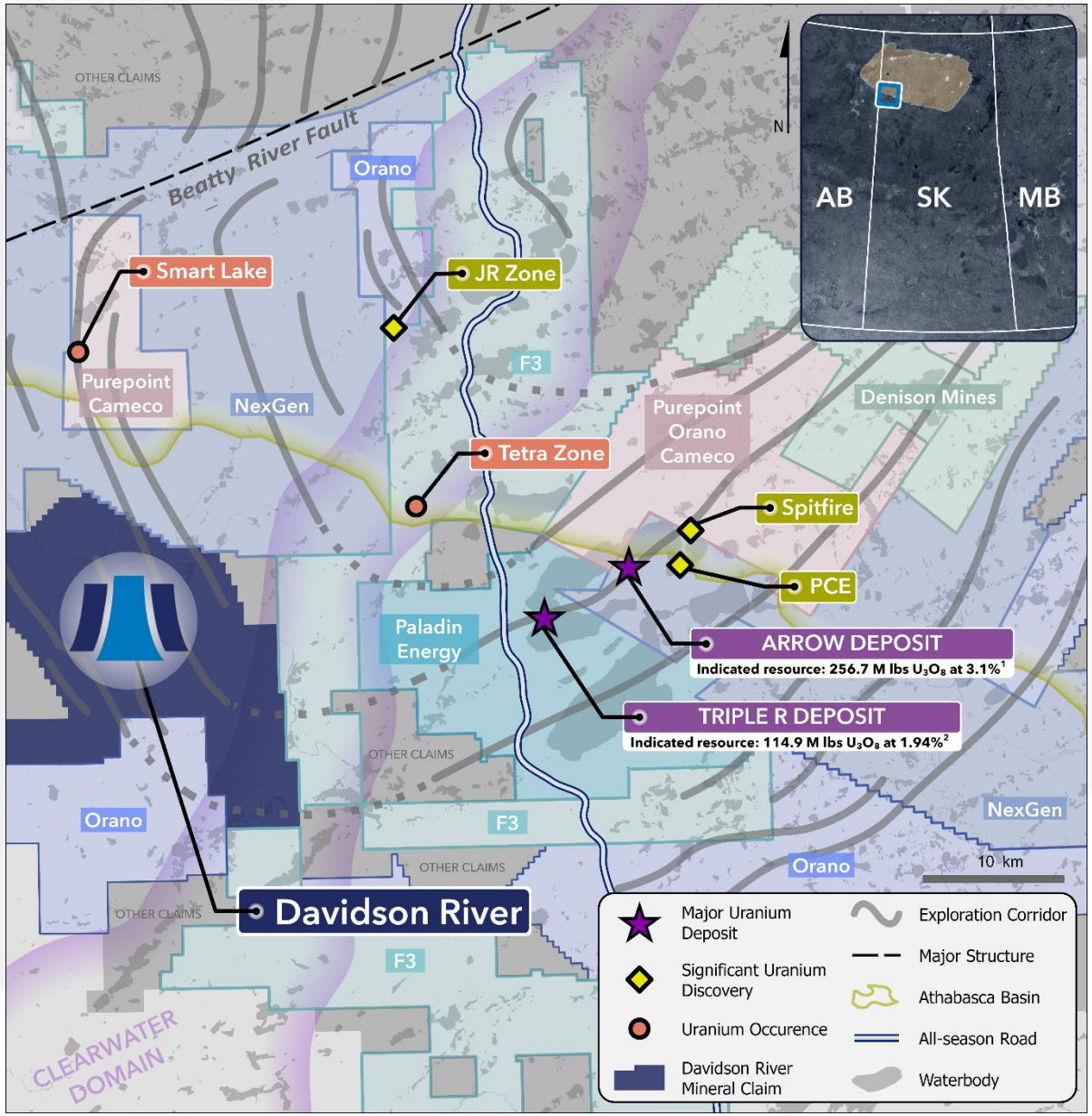
- Monometallic (Simple)
- Discrete alteration halo

B. UC/Sandstone-Hosted

- Polymetallic (Complex)
- Large alteration halo



The Southwest Athabasca Basin Uranium District



THE DAVIDSON RIVER PROJECT

30,737 hectares of prospective land;
>70 kilometres of conductor strike length

Standard Uranium's Davidson River project is in good company in the Southwest Athabasca Uranium District – A hot bed of uranium discoveries for more than a decade.

The Southwest Athabasca district contains **more than 400M lbs. of high-grade uranium** in known deposits, and discoveries continue.

[1] Arrow deposit, Rook I Project, Saskatchewan, NI 43-101 Technical Report on Feasibility Study, Prepared for NexGen Energy Ltd., Effective date: February 22, 2021
[2] Feasibility Study, NI 43-101 Technical Report, for PLS Property, Prepared for Fission Uranium Corp., Effective date: January 17, 2023

Davidson River Project – Clearwater Domain Mirror Theory

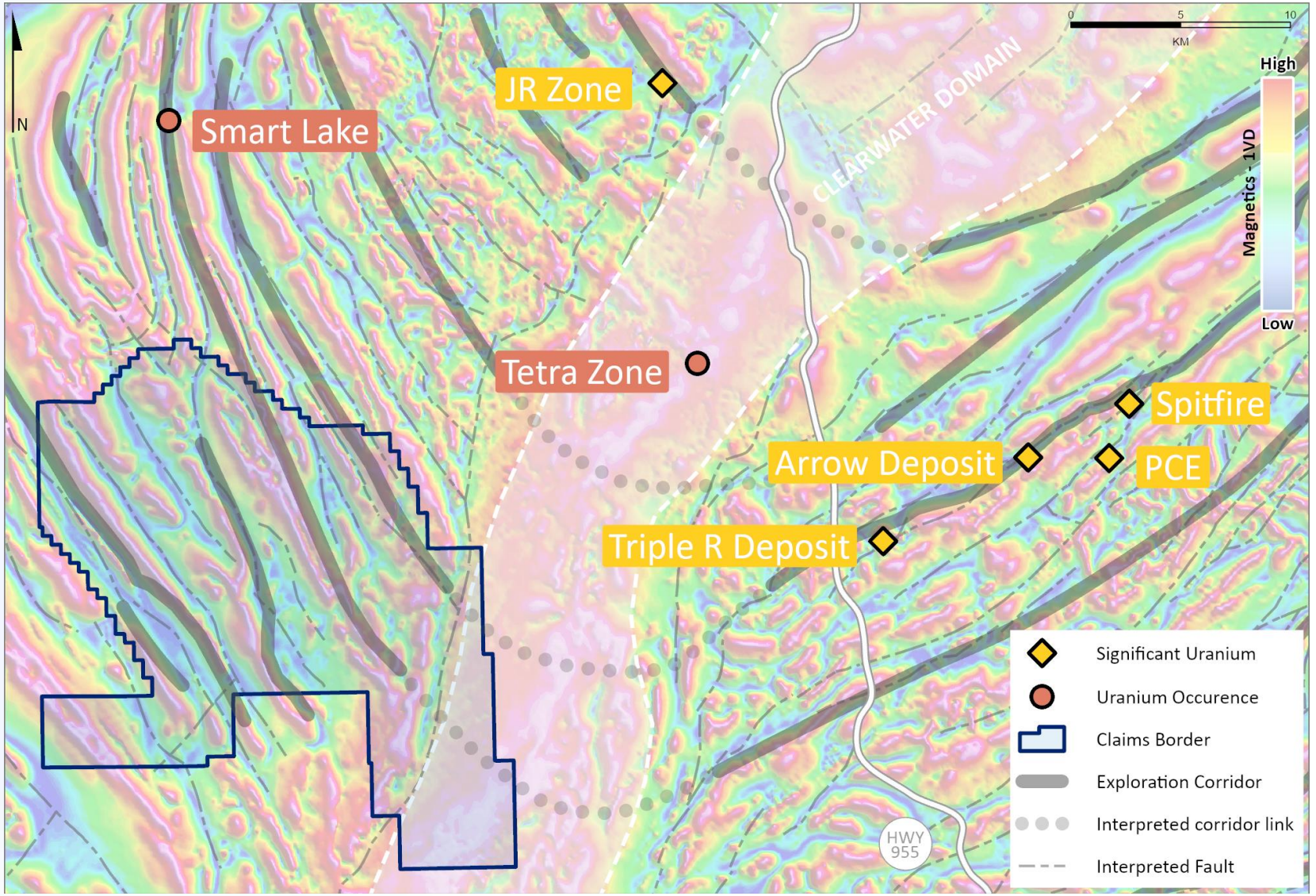
Regional-scale deformation & folding

Clearwater Domain

Parallel deep-seated structural corridors – Electromagnetic (EM) conductors

Heterogeneous strain & polyphase deformation

Multiple uranium discoveries (Arrow, Triple R, Spitfire, JR Zone)



Davidson River Project – Clearwater Domain Mirror Theory

Western fold limb – Geological ***"Mirror Image"***

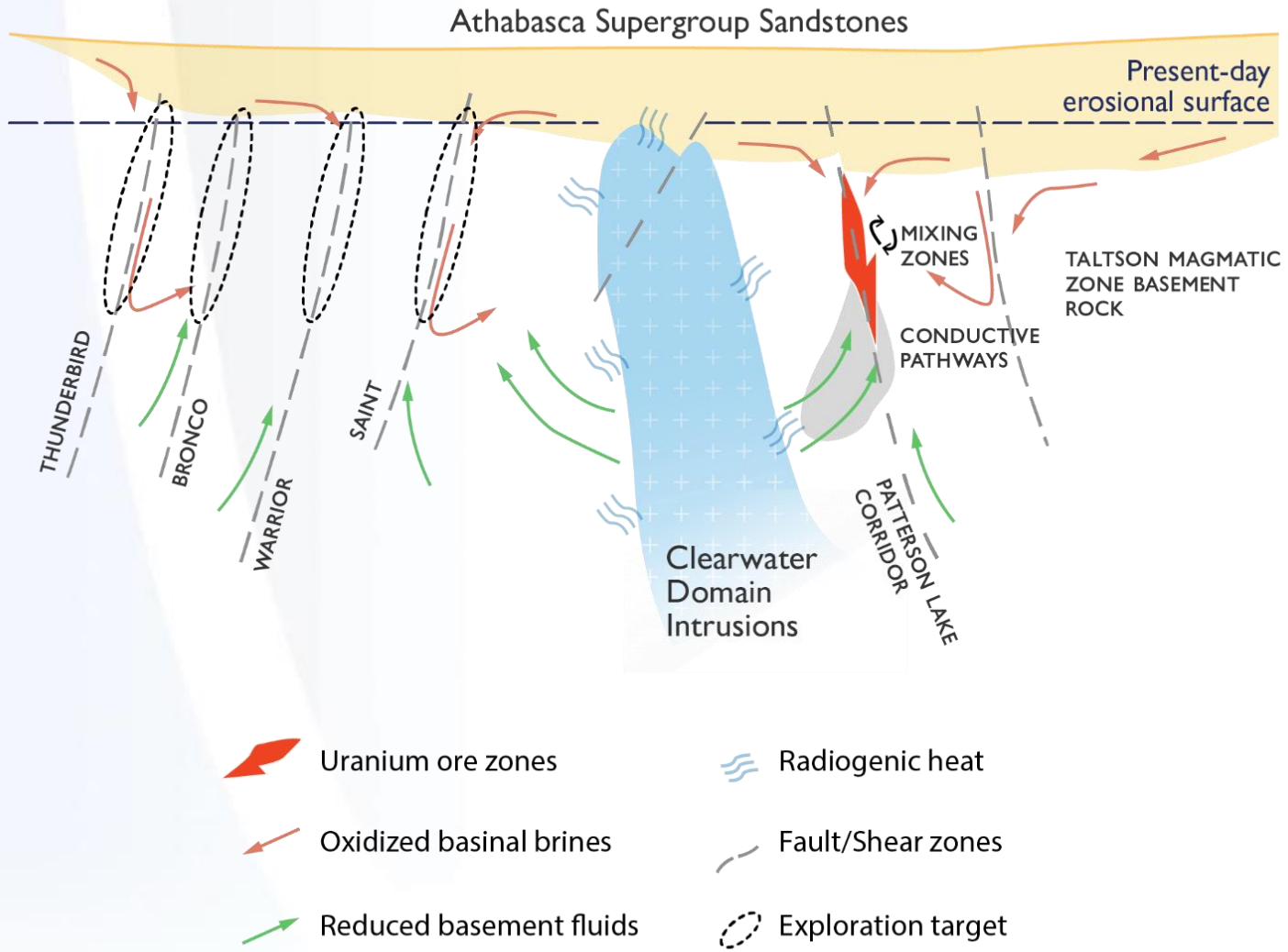
Potential heat source? Uranium source?

Parallel deep-seated structural corridors – New discoveries

Evaluation of regional kinematics – Zones of dilation

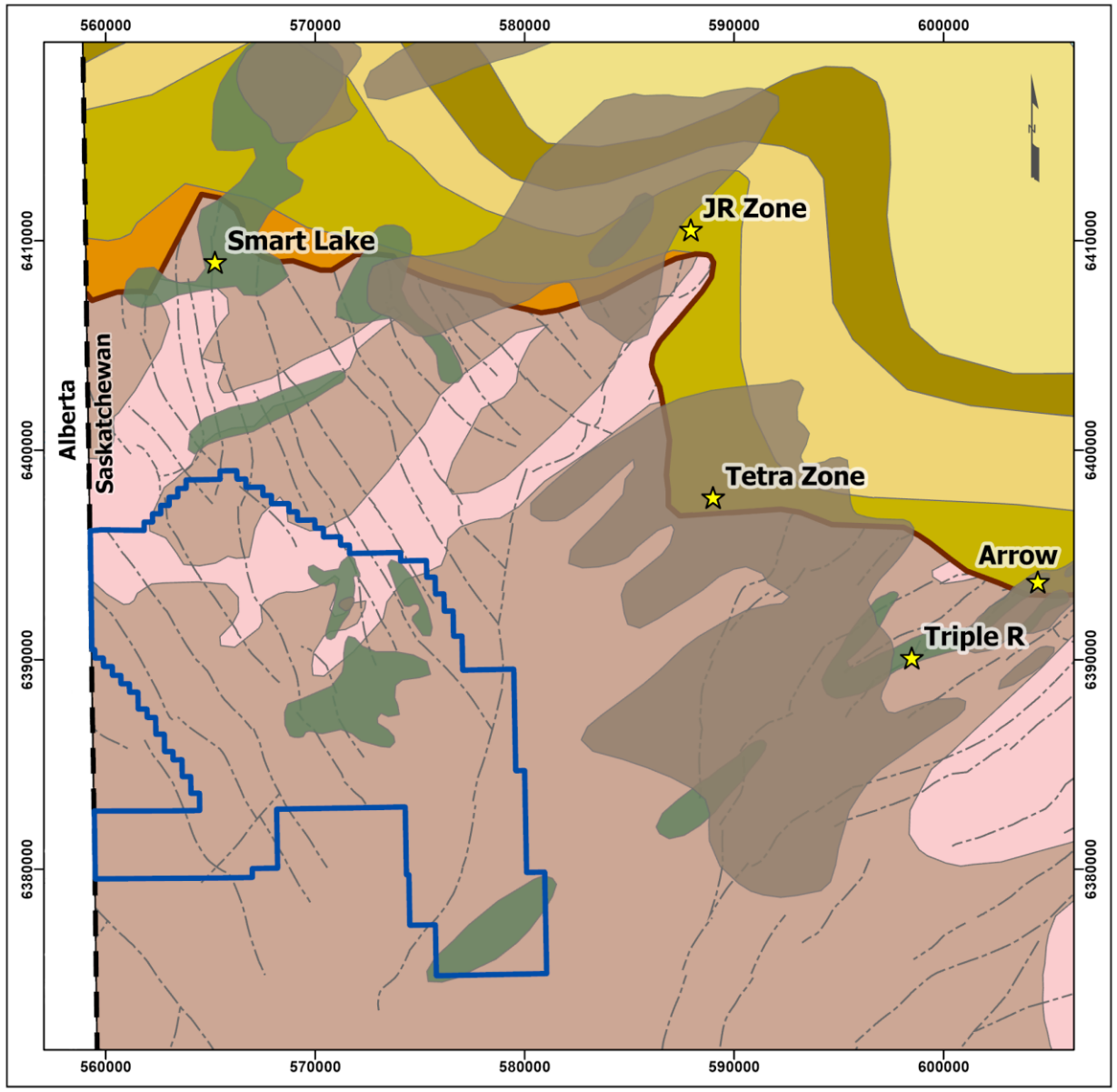
Geophysical surveys – Mag lineaments, EM conductors, Multiphysics

Schematic cross-section looking north



Modified after Potter et al. 2020 – GSC Bulletin 615

Davidson River Project – Regional Geology



- **Basement Rocks:** Paleoproterozoic Taltson Domain, dominated by mafic to intermediate orthogneiss + minor intrusive and ***metasedimentary*** rocks.

- **Cover Sequence:** capped by glacial tills and outwash plains, overlying Phanerozoic sedimentary rocks including dominated by Devonian Elk Point Group Formations.

SK-AB Border
Davidson River Claims
Uranium Occurrence
Interpreted Faults
Diamictite
Cretaceous Manville Group
Devonian Elk Point Group
Athabasca Basin Margin

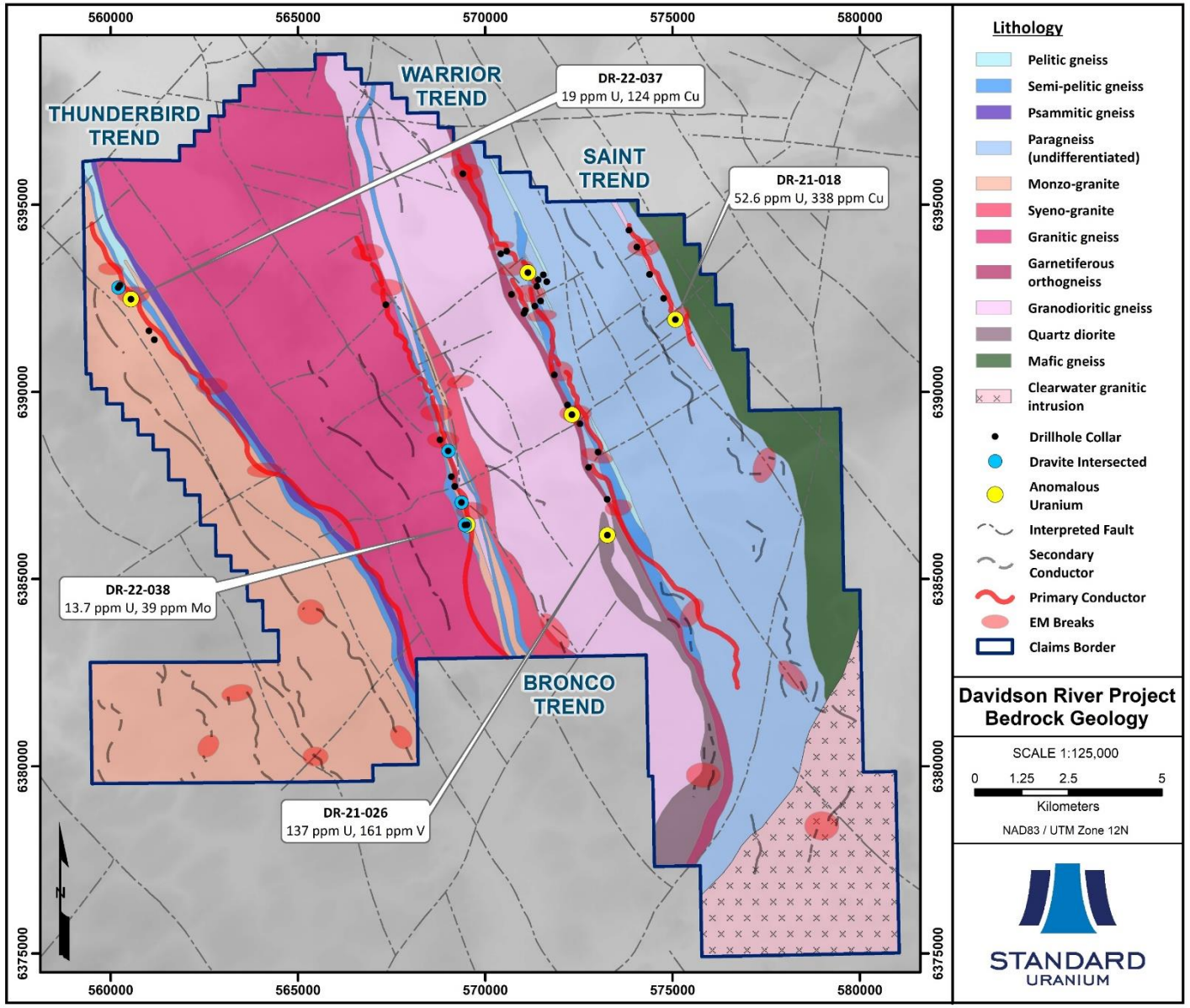
Athabasca Supergroup

Lazenby Lake Larter Fm.
Lazenby Lake Shiels fm.
Manitou Falls Clampitt-Dunlop Fm.
Manitou Falls Hodge Fm.
Manitou Falls Warnes Fm.
Manitou Falls Bird Fm.
Manitou Falls Read Fm.

Precambrian Shield

Taltson Domain Basement

Davidson River Project Geology – Paleoproterozoic Basement



Lithology

- Pelitic gneiss
- Semi-pelitic gneiss
- Psammitic gneiss
- Paragneiss (undifferentiated)
- Monzo-granite
- Syeno-granite
- Granitic gneiss
- Garnetiferous orthogneiss
- Granodioritic gneiss
- Quartz diorite
- Mafic gneiss
- Clearwater granitic intrusion
- Drillhole Collar
- Dravite Intersected
- Anomalous Uranium
- Interpreted Fault
- Secondary Conductor
- Primary Conductor
- EM Breaks
- Claims Border

Davidson River Project Bedrock Geology

SCALE 1:125,000

0 1.25 2.5 5

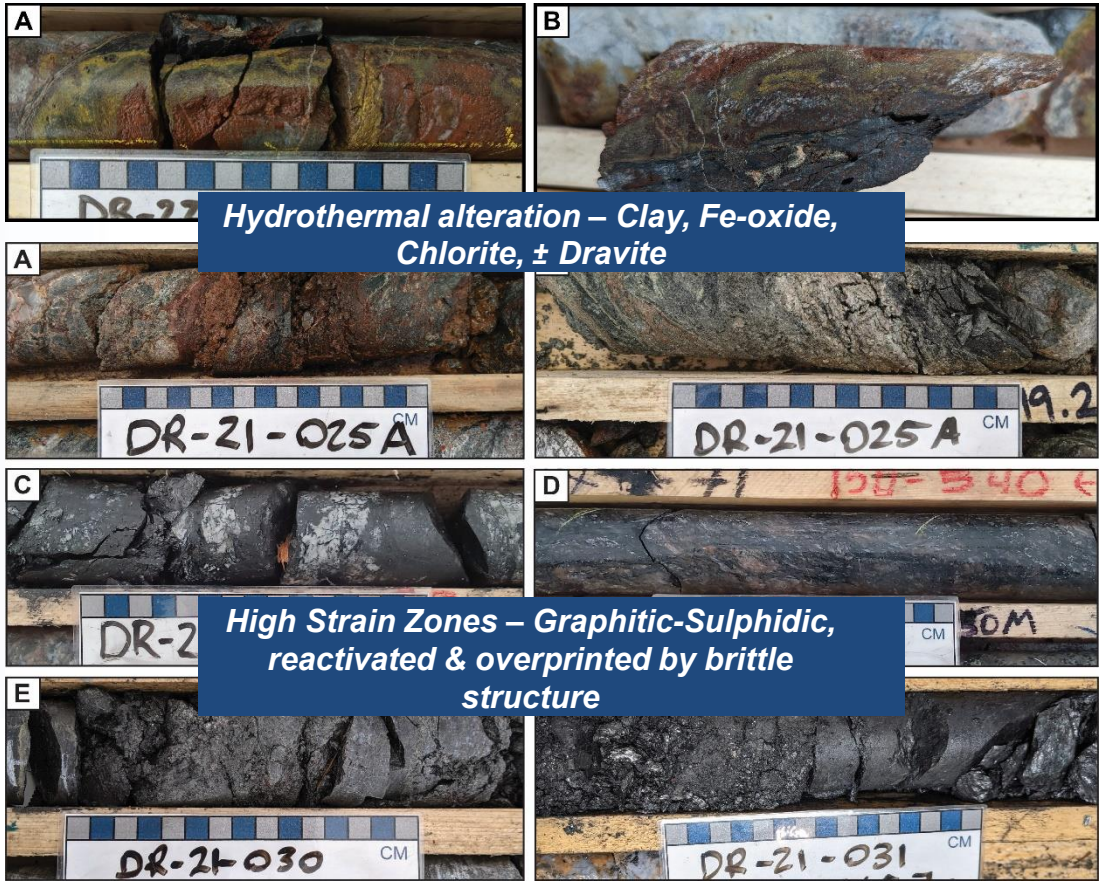
Kilometers

NAD83 / UTM Zone 12N

STANDARD URANIUM

Taltson Geological Domain:

Metasomatized gneisses with blue quartz



Hydrothermal alteration – Clay, Fe-oxide, Chlorite, ± Dravite

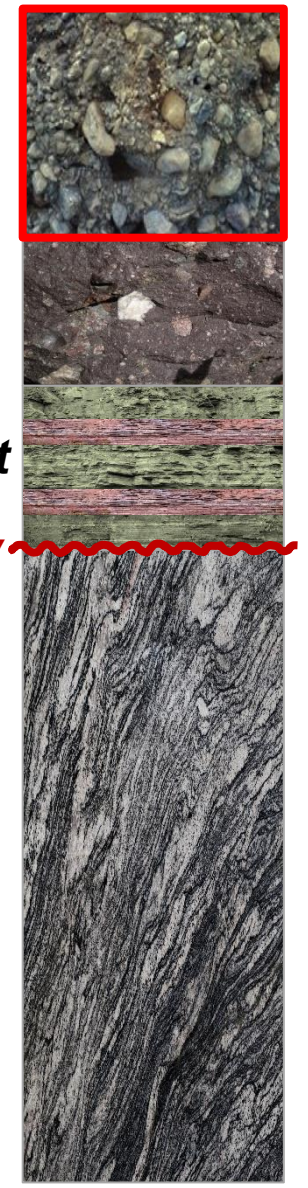
High Strain Zones – Graphitic-Sulphidic, reactivated & overprinted by brittle structure

Davidson River Project Geology – Cover Sequence

Quaternary Till: Unconsolidated pebbles to boulders of:

Athabasca or Phanerozoic sandstones, diamictite, basement rock + sand

Density = ~1.8 g/cc

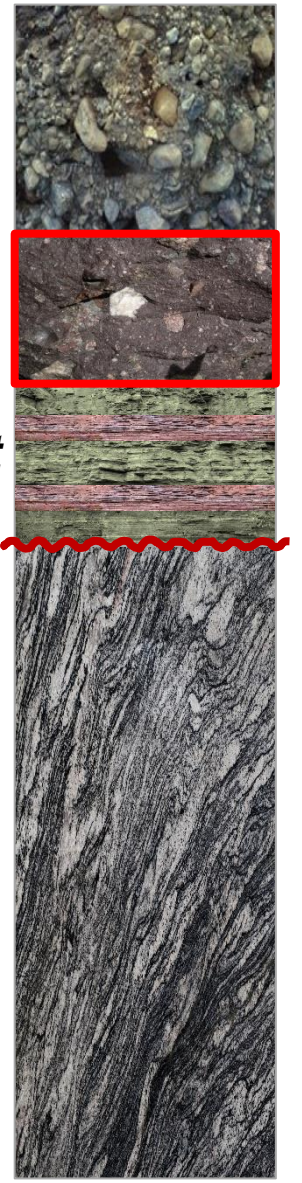


Davidson River Project Geology – Cover Sequence

Quaternary(?) Diamictite: Pebbles, granules, and boulders of Athabasca sandstone and/or basement rock hosted within a brown-black muddy matrix

Variably lithified, often poor recovery throughout

Density = ~2.1-2.3 g/cc



Davidson River Project Geology – Cover Sequence

Devonian Elk Point Group – Winnipegosis Fm/Meadow Lake Fm: Poorly-sorted, green to red, fine- to coarse-grained sandstones with carbonate cement

Very-fine grained laminations of green or reddish clay are common

Usually planar-bedded with local cross-bedding or varves

Grades into basal Meadow Lake (La Loche) Formation below

Density = ~2.35-2.45 g/cc

Davidson River Project Geology – Cover Sequence

Devonian Elk Point Group – Basal Meadow Lake (La Loche – AB)
Fm: Regolithic, poorly sorted with clasts of Athabasca sst and/or basement rock, and fine- to coarse-grained, white to medium brown-grey arkosic sandstone and conglomeratic sandstones

Paleo valley-fill and debris-flow sandstones, bedding usually not well defined

Density = ~2.35-2.45 g/cc

Glacial Till

Diamictite

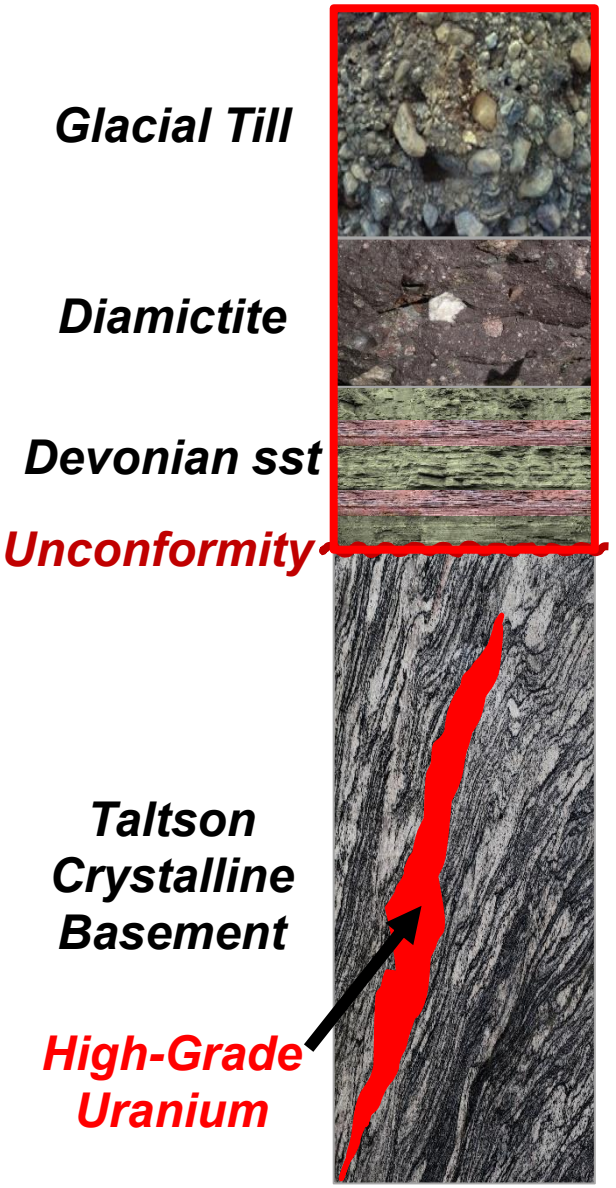
Devonian sst

Unconformity

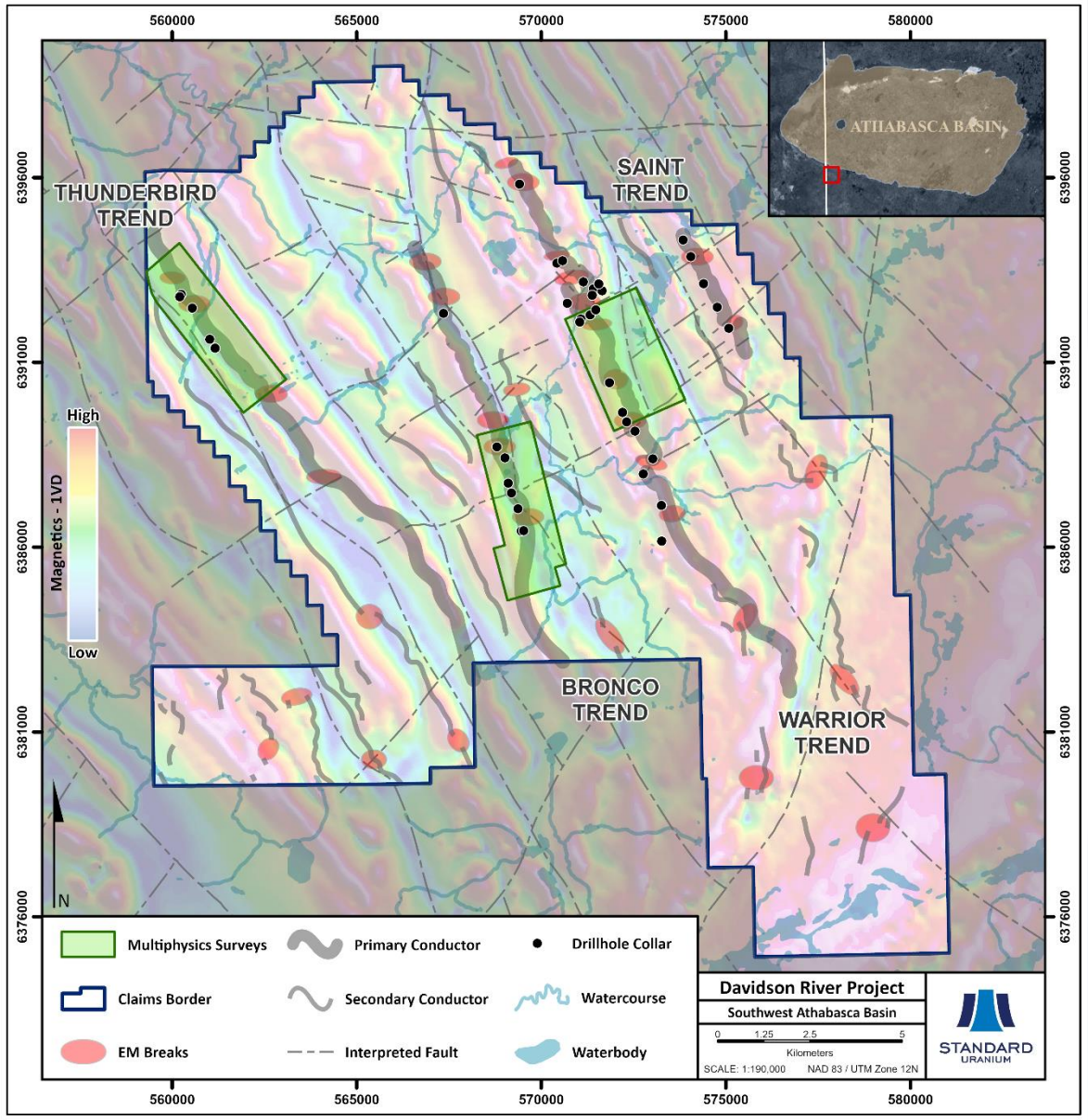
Taltson Crystalline Basement

Davidson River Project – First Multiphysics in SW Basin

Problem: How do we **“see through” this cover sequence** and remove its potential **effect(s) on geophysical surveys** we want to use to target basement-hosted uranium, such as gravity (density)???



Davidson River Project – First Multiphysics in SW Basin



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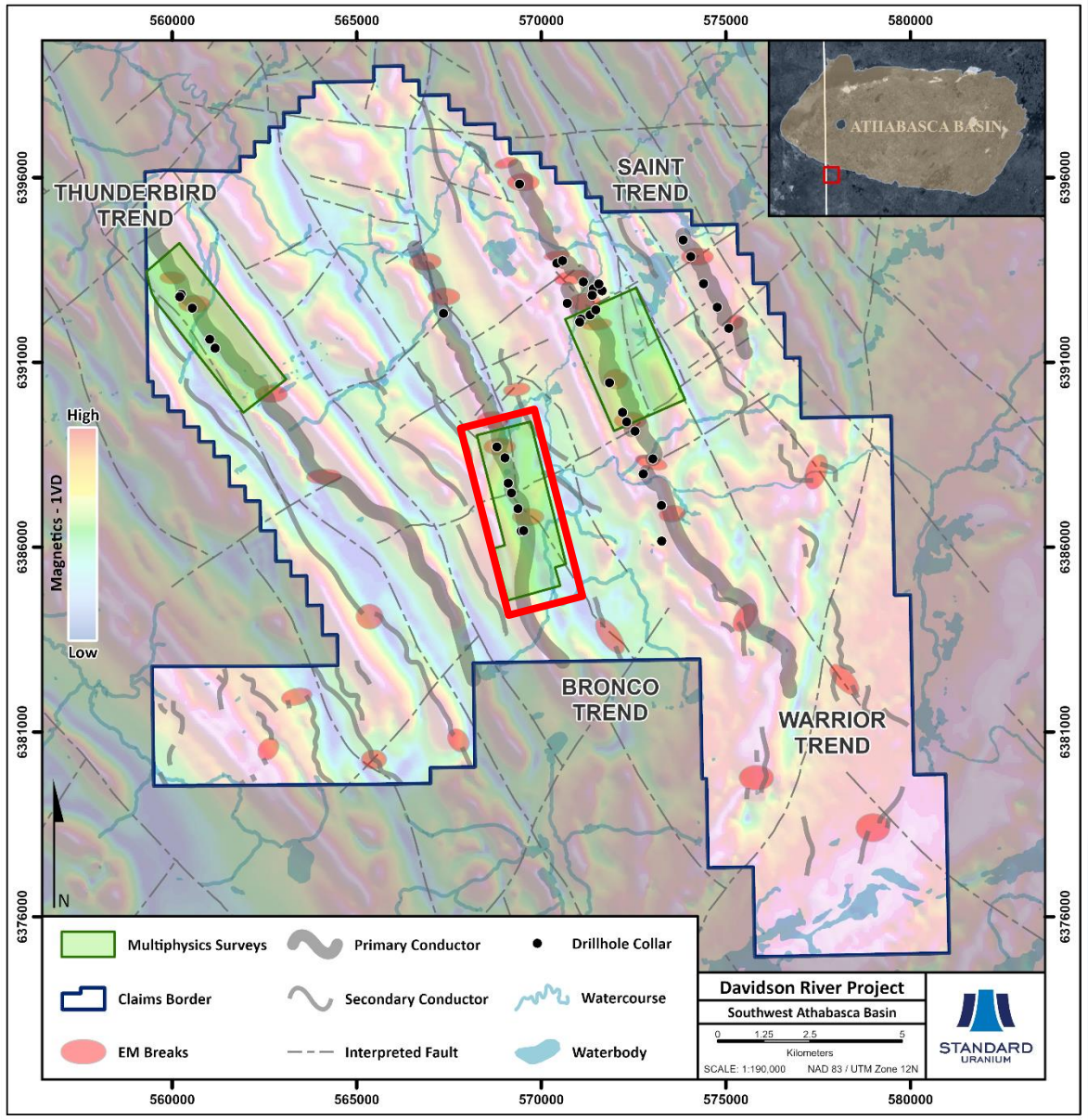
ExoSphere Multiphysics

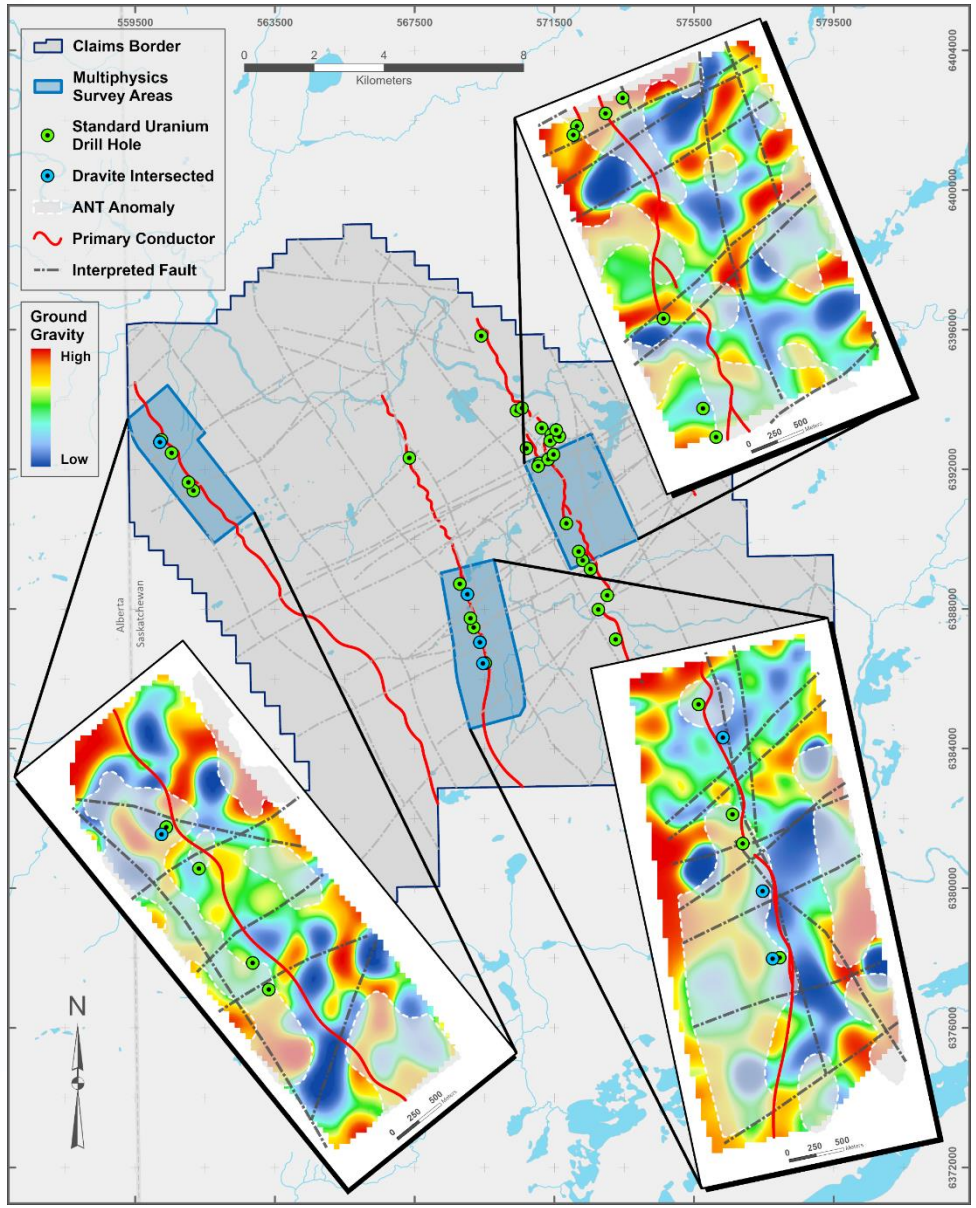
***Three Grids**: Thunderbird, Bronco, Warrior trends*

Each Grid Comprised:
***100 ANT** stations*
***100 HVSR** stations*
***1,000 ground gravity** stations*

Covering ~4-5 km of conductor strike length each

Davidson River Project – First Multiphysics in SW Basin





STANDARD URANIUM

Davidson River – Bronco Corridor

ANT, HVSR, Ground Gravity

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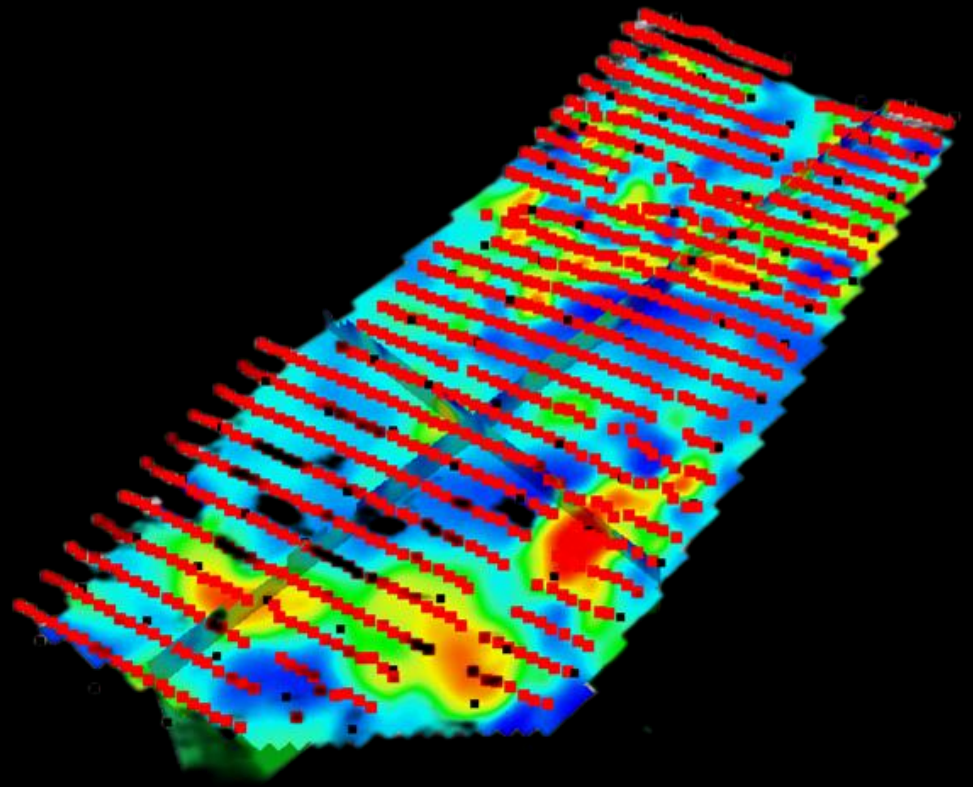
Bronco - Survey Data Collected



Collecting geophysical data that provides as much sensitivity to the geology that matters for Uranium exploration:

- **ANT data** - 300m spacing, 1,300m max depth
- **HVSR data** - 300m, at each ANT station
- **Gravity data** - 50m (E-W) x 150m (N-S).

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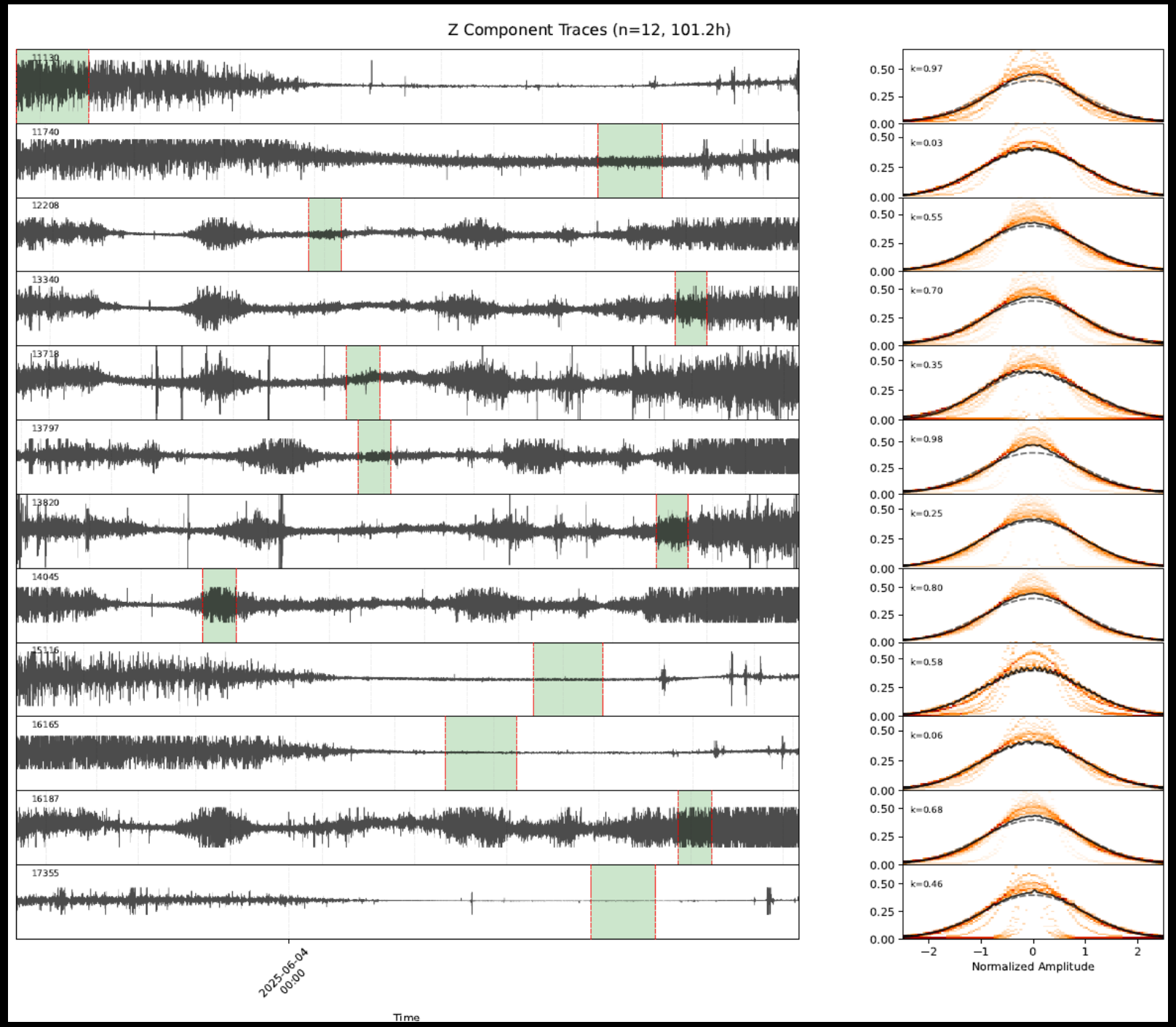
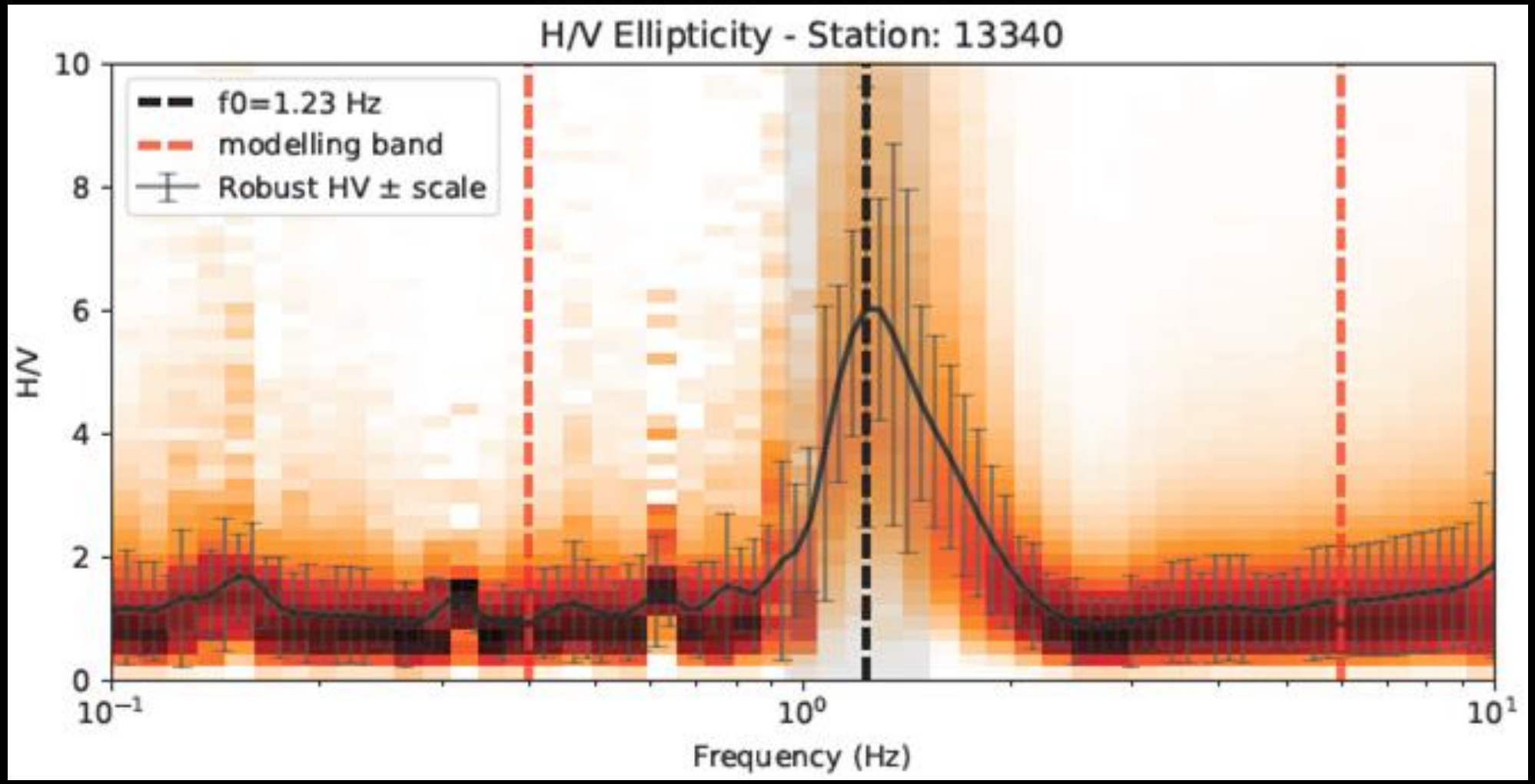
HVSR Data

Time-Series Cleaning and Window Selection Example

The green boxes are the selected time windows for processing.

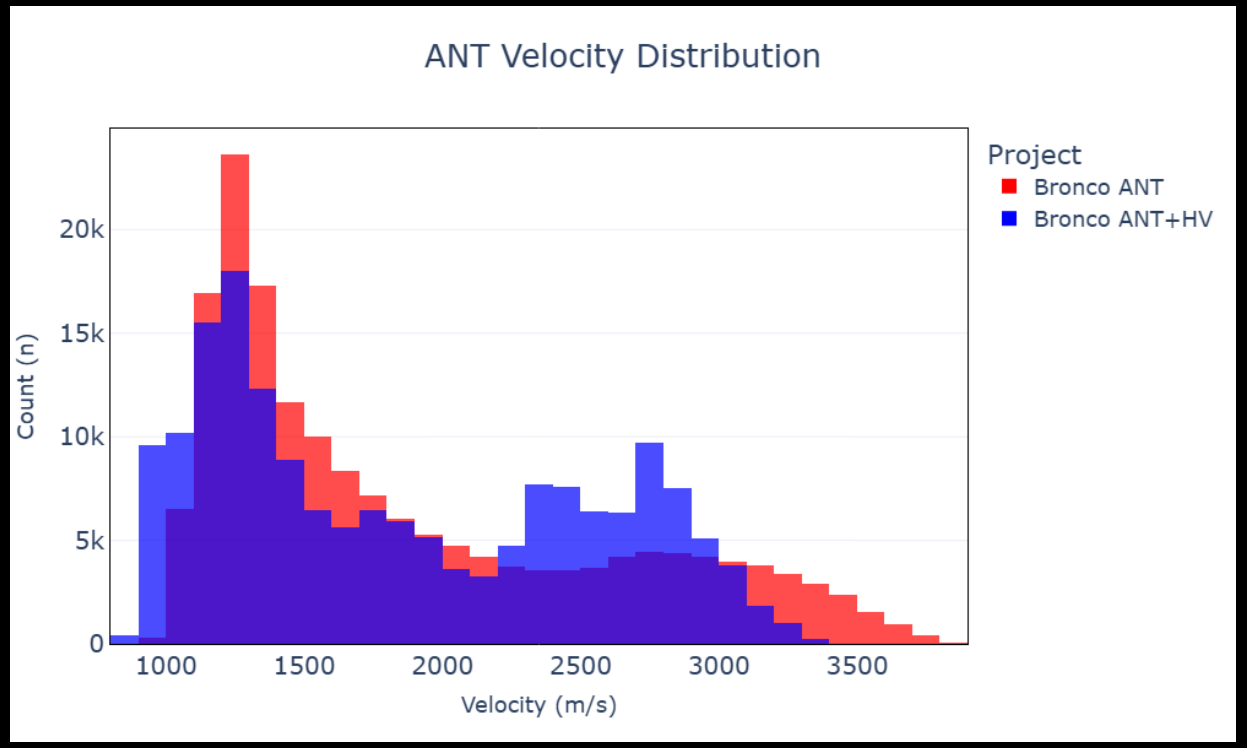


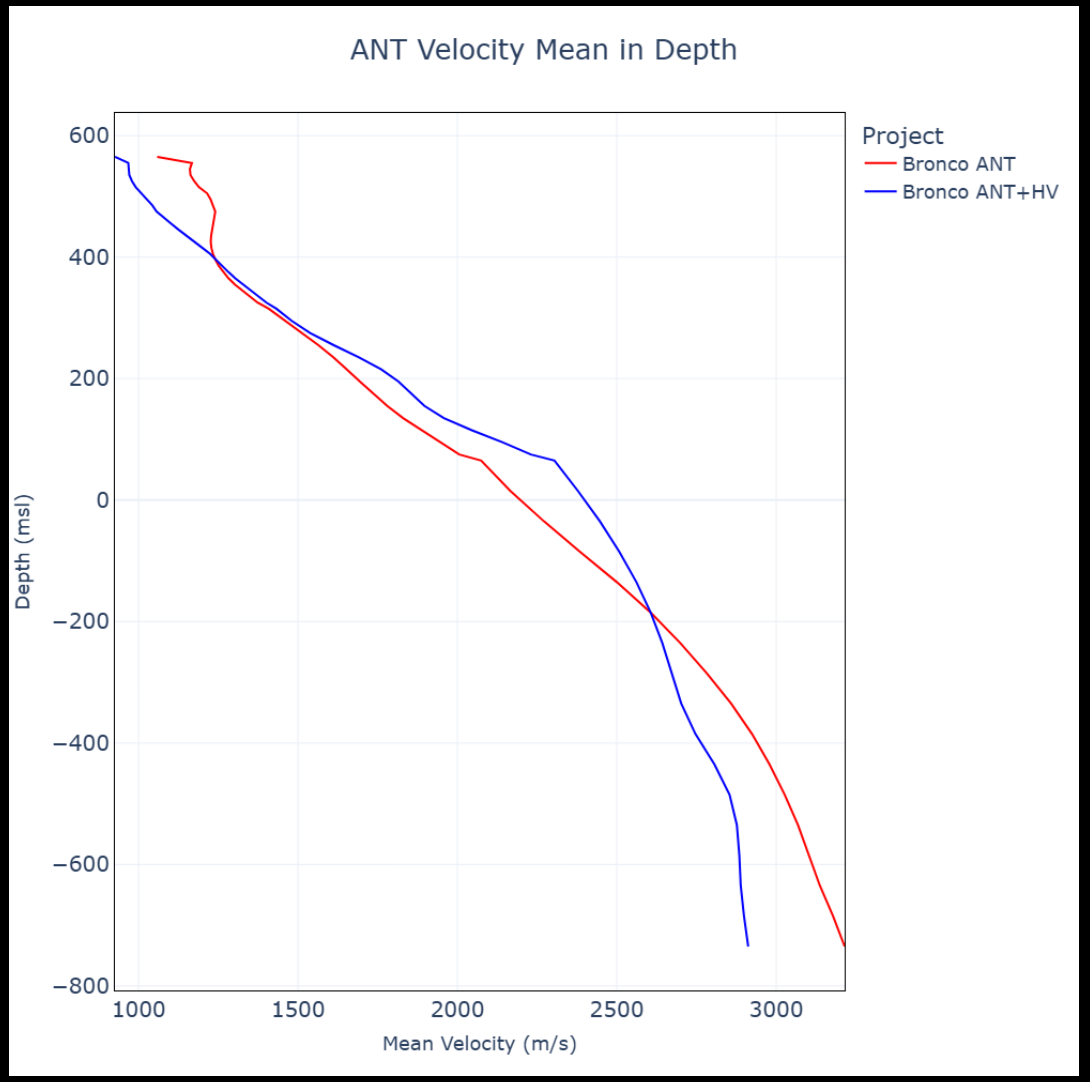
HVSR Data



Frequency band used for ANT modelling: [0.4-6 Hz]

HVSR Data - Combined with ANT

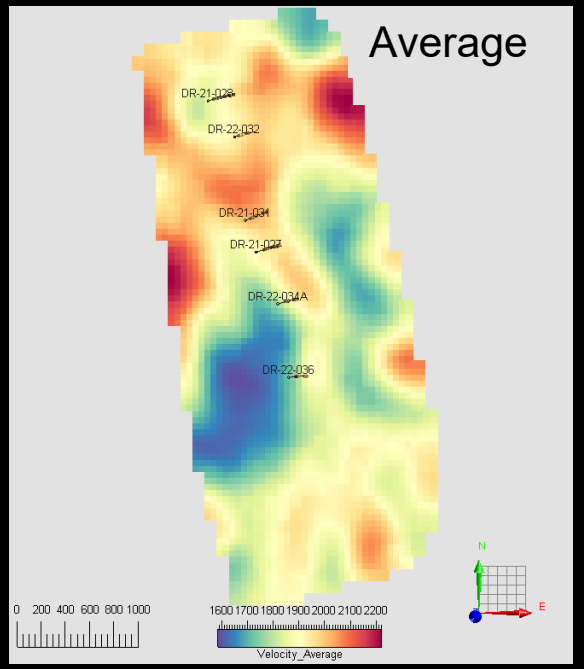


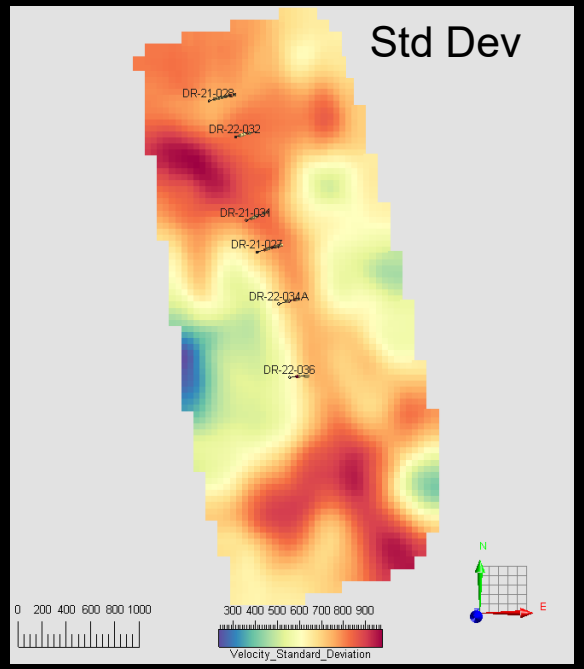


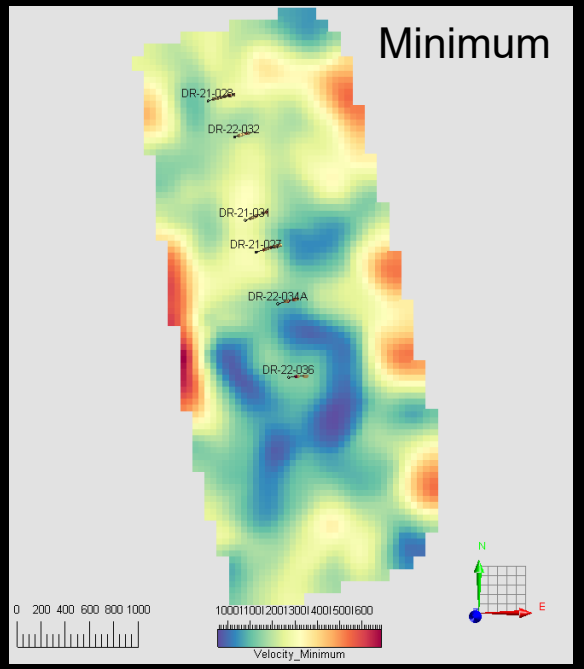
Survey	Mean	Std Dev	Min	Max
Bronco ANT	1876 m/s	720	955	3834
Bronco ANT+HV	1852 m/s	678	853	3358

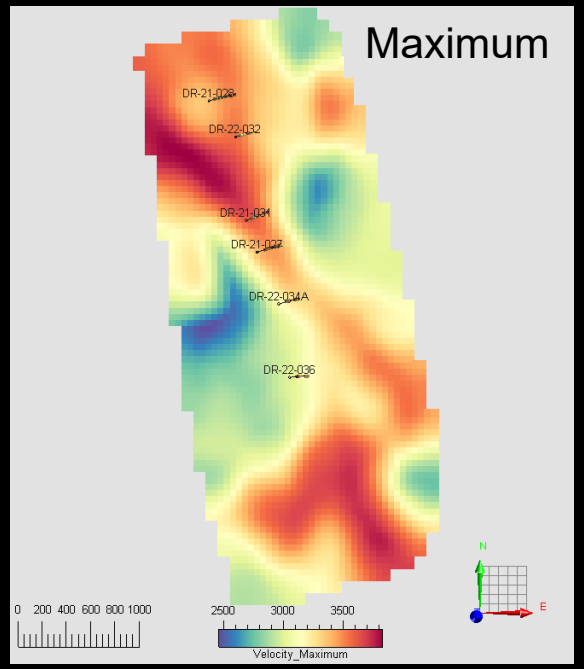
ANT

Statistical Mapping









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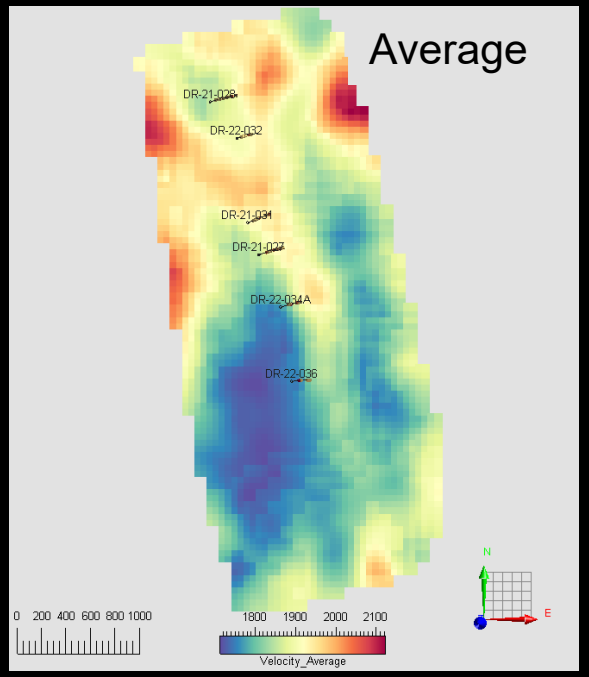
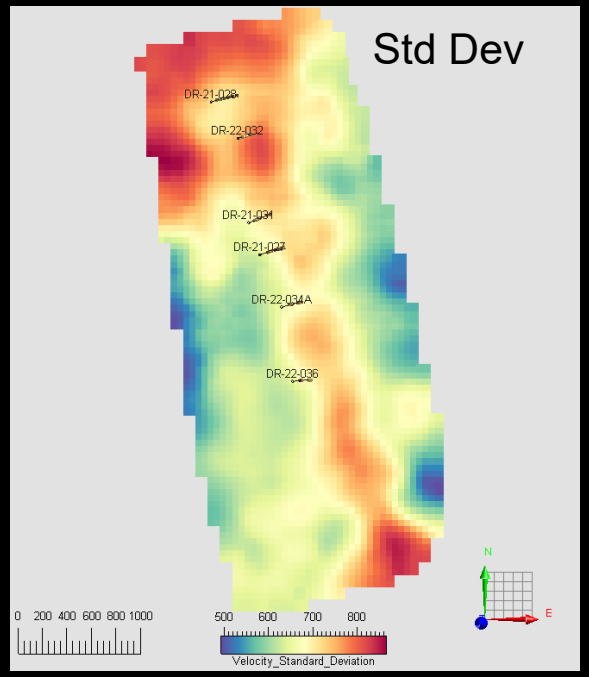
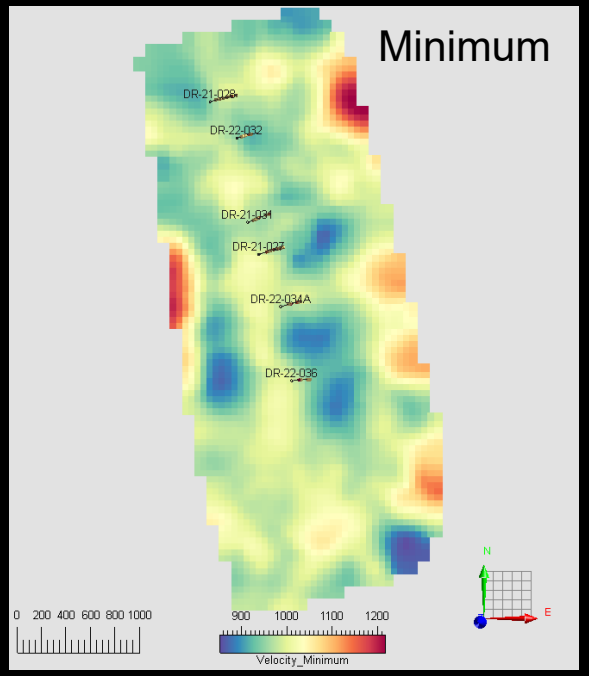
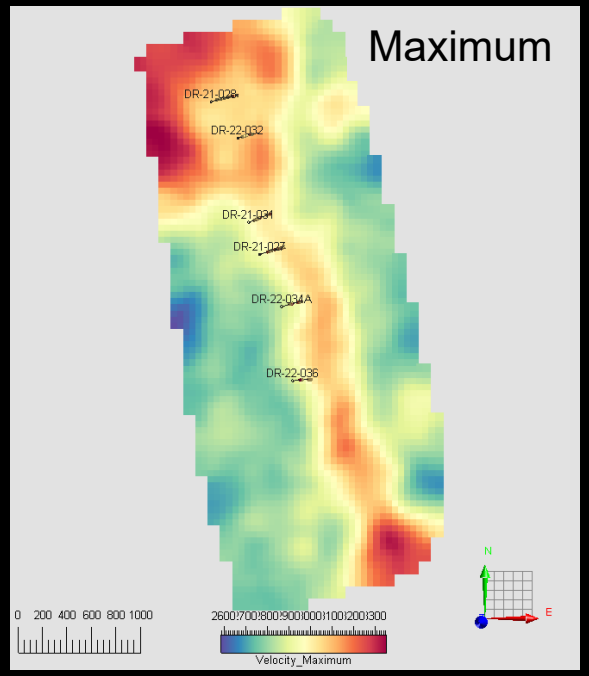
ANT + HVSR

Statistical Mapping









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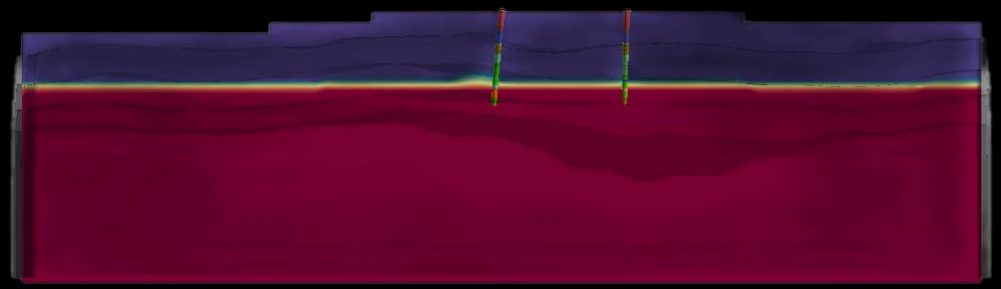
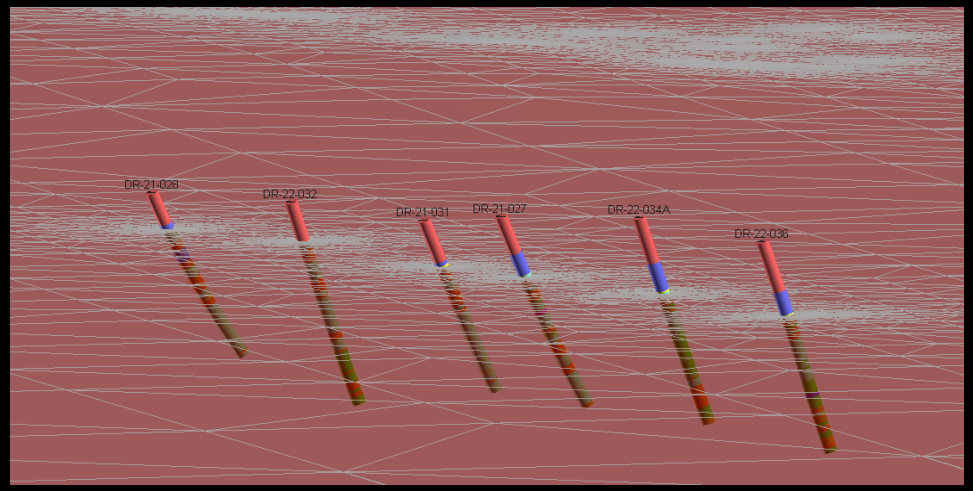
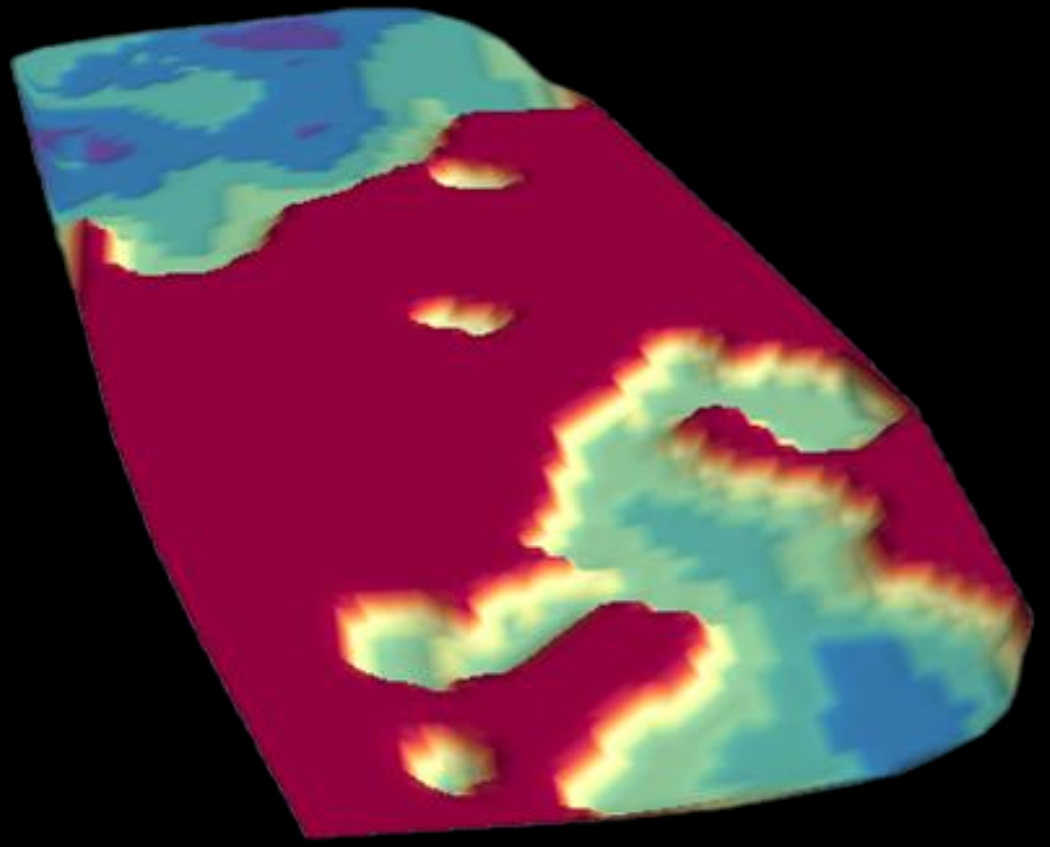
Identifying Cover / Basement Interface



ANT+HV (Cover Depth)

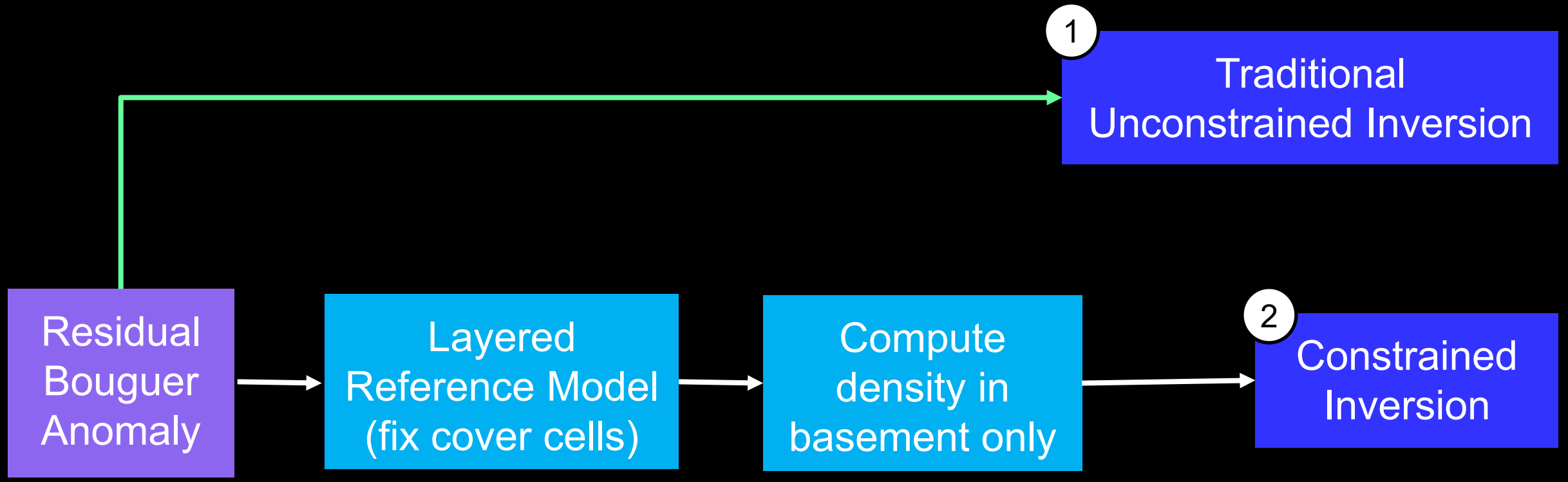


Unconformity Geomodel



Cover depth used for gravity correction

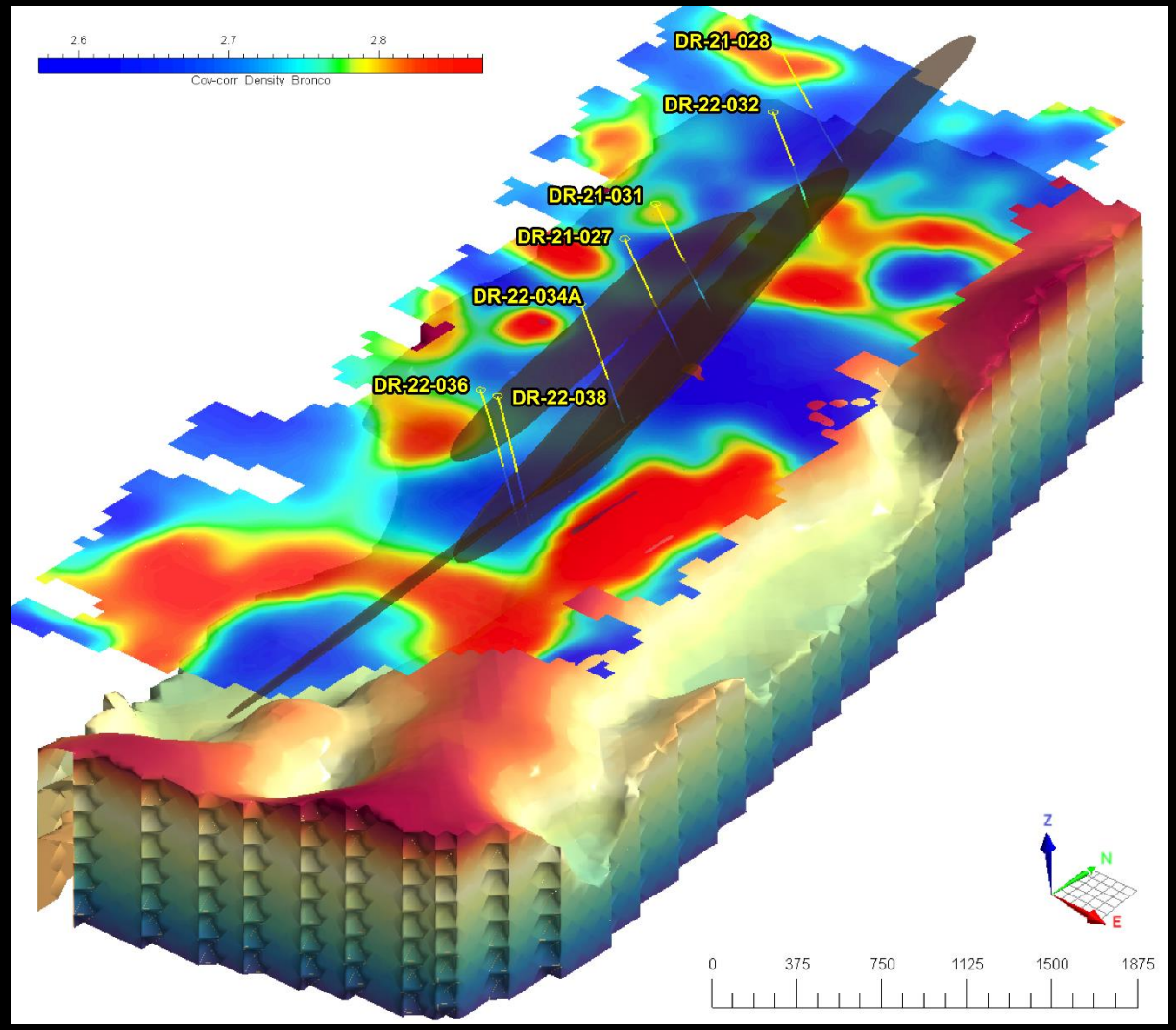
Gravity Cover Correction Workflow



Multiphysics Recap

Stack of geophysics techniques used:

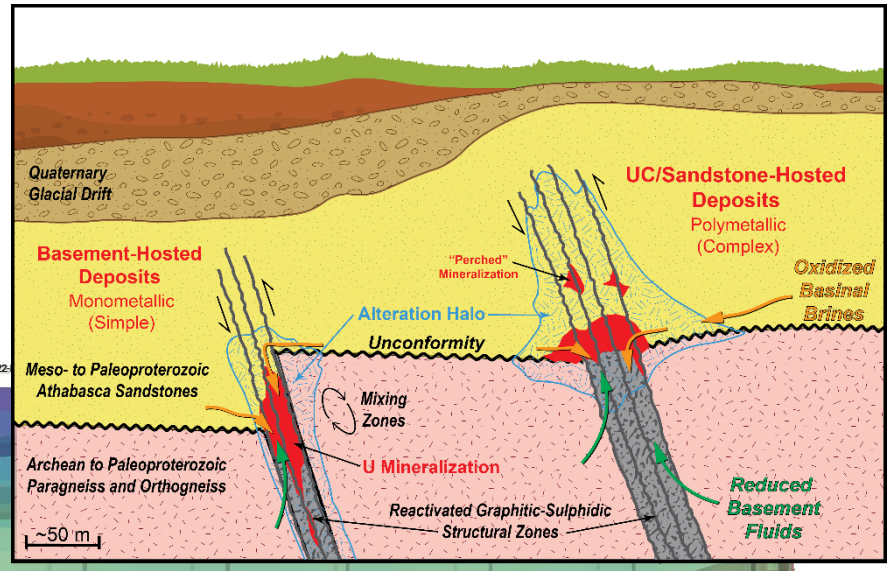
- **ANT** to provide an overall velocity model
- **HVSR** to improve the near surface of the velocity model, and provide a constraint on the depth of cover.
- **Cover-corrected gravity** as the main targeting dataset, but constrained by the velocity model.

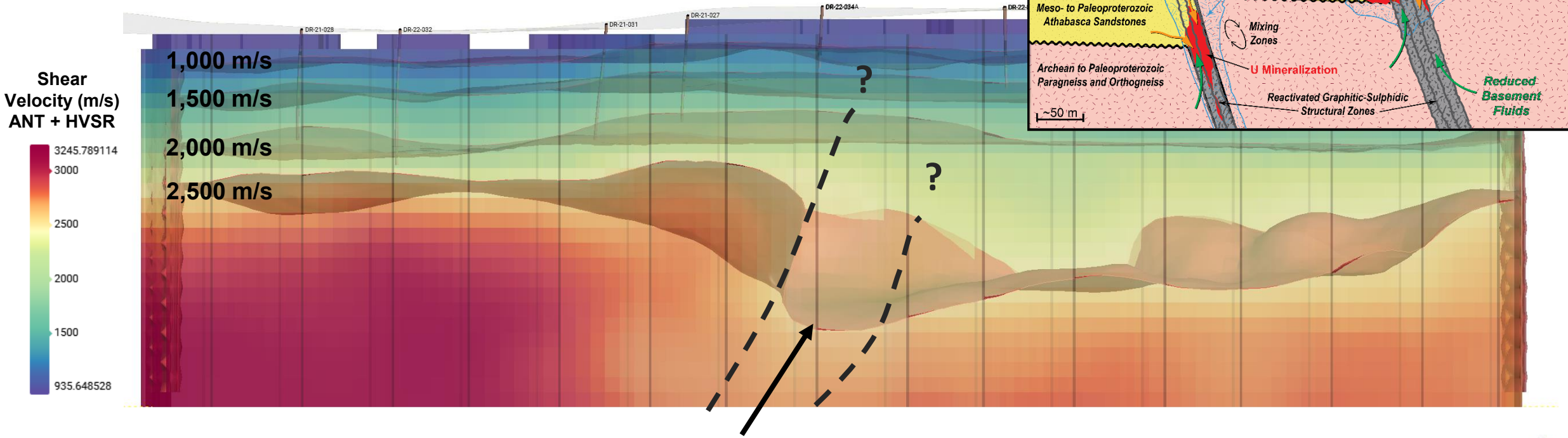


ExoSphere Multiphysics – Targeting Integration

EXPLORATION USING MODERN TECHNOLOGY:

Ambient Noise Tomography (ANT) + Horizontal-to-Vertical Spectral Ratio (HVSR) 3D Model





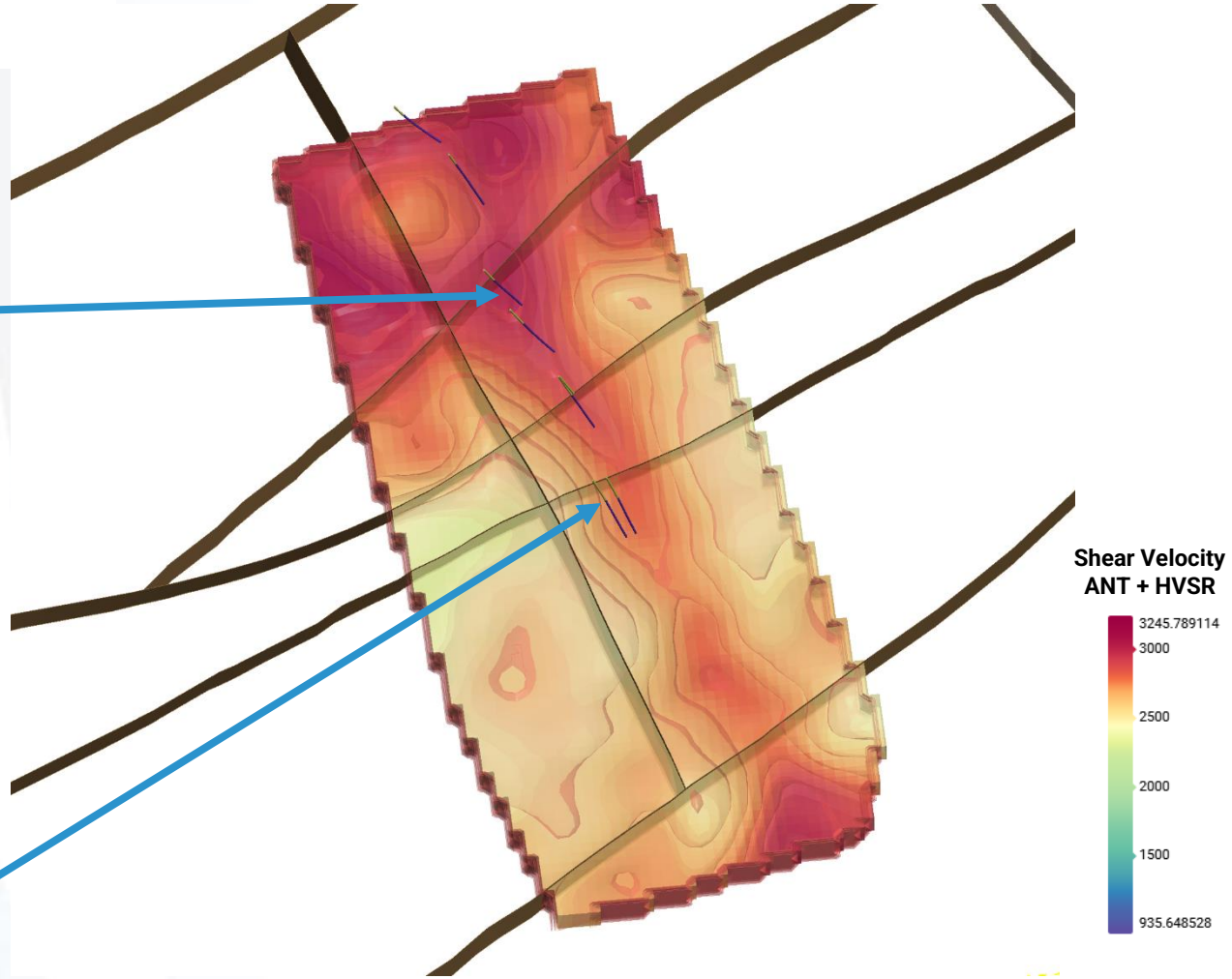
Abrupt decreases in basement velocity may indicate significant structural offset and/or alteration system in basement rock – Basement "wedges" can create structural traps for uranium mineralization

Plunge 00
Azimuth 080
0 100 200 300

Looking East

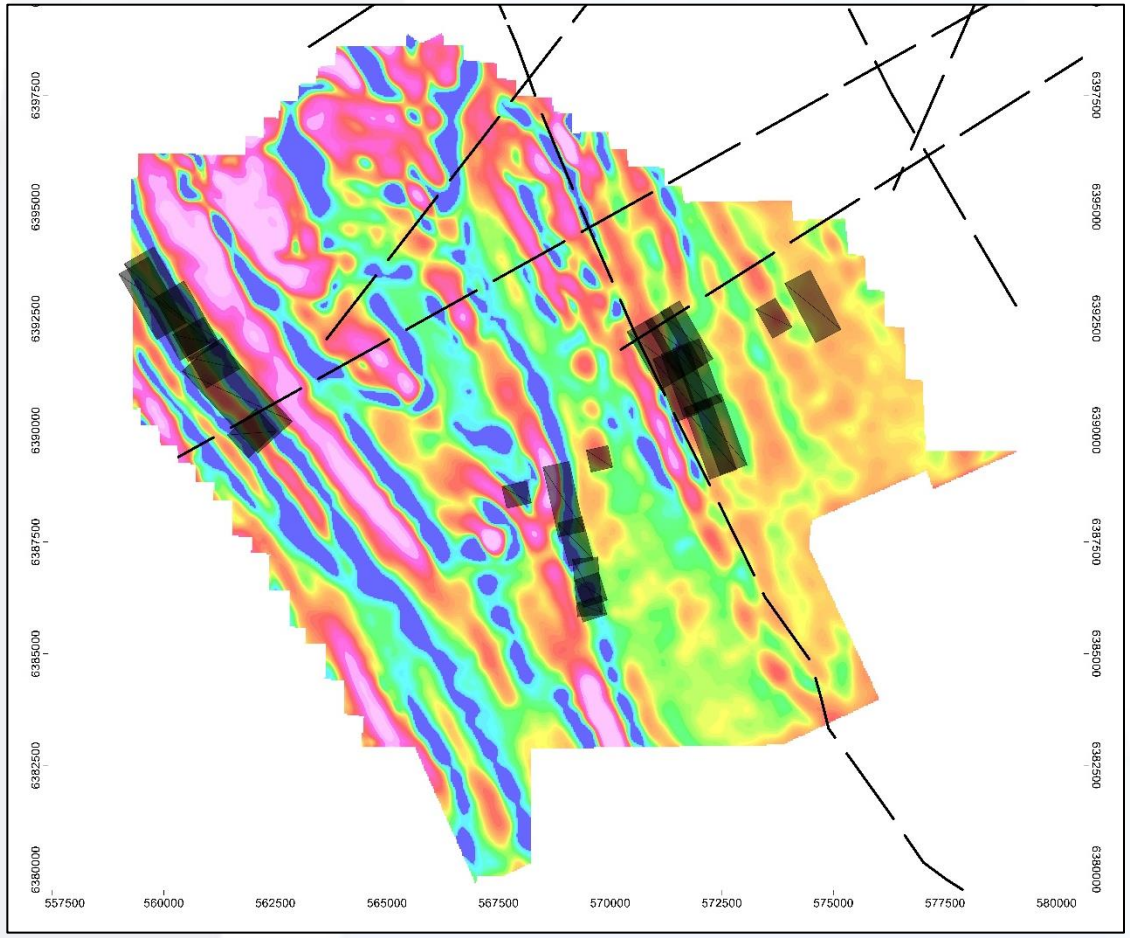
ExoSphere Multiphysics – Targeting Integration

ANT + HVSR 3D Model – Major Faults



Changes in velocity can highlight trends related to structural architecture – Key features for basement-hosted uranium mineralization

Davidson River Project – Targeting Integration



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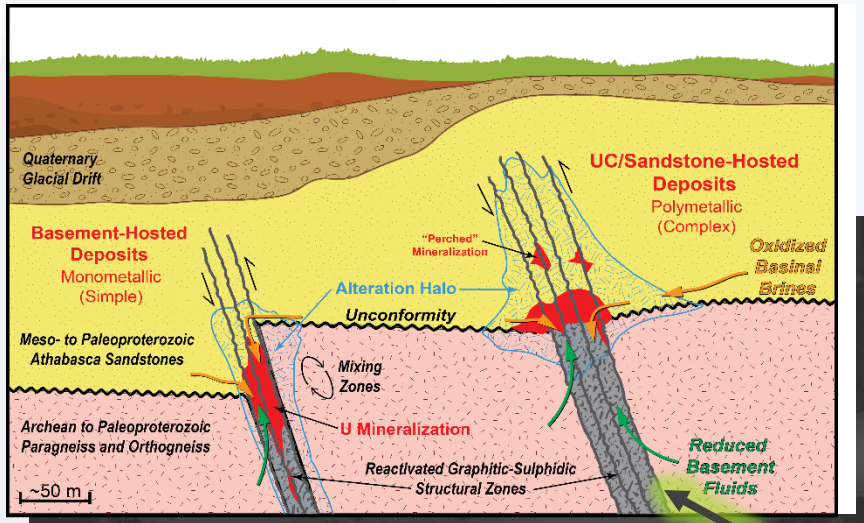
***Updated EM/Mag Interpretation & Modelling**: Thunderbird, Bronco, Warrior trends*

Geologically constrained 3D plate modelling from 2018 VTEM

Basement constrained 3D magnetic susceptibility inversion

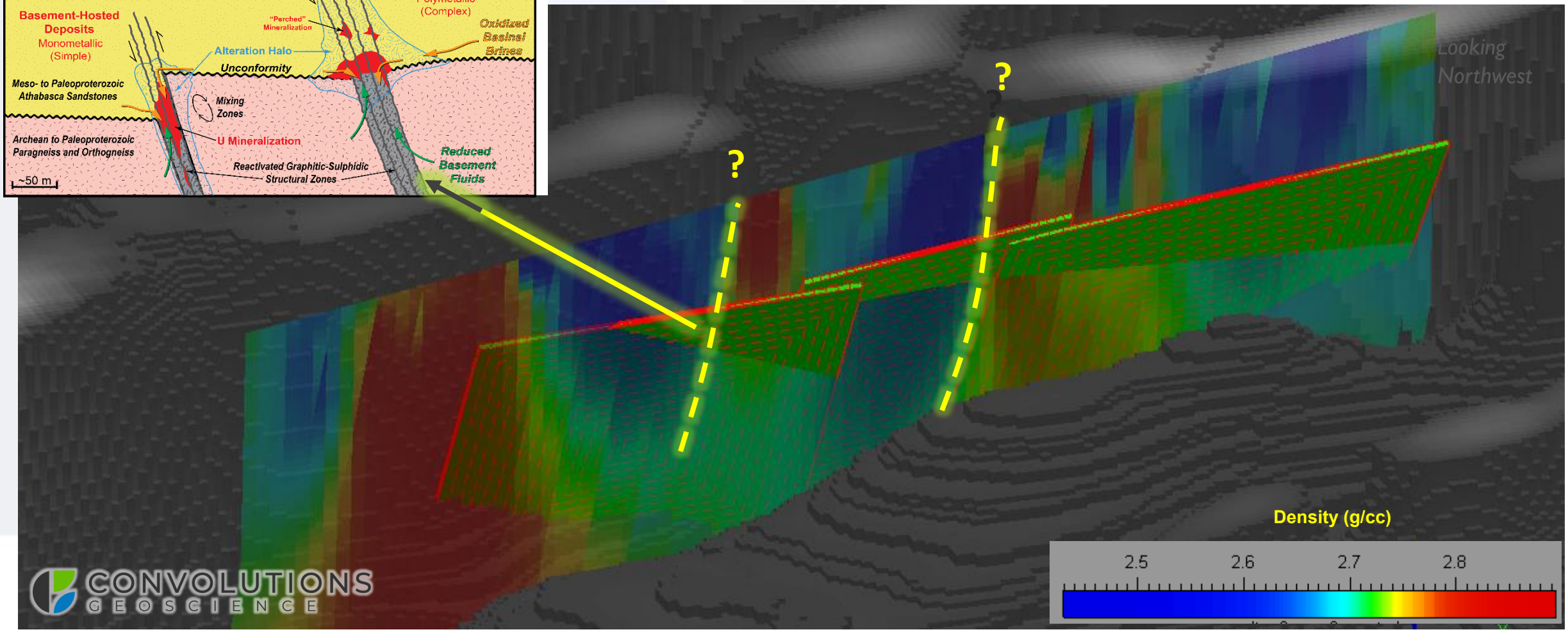
Integration of ALL data to identify ideal uranium deposit targets – "mineralization footprints"

Convolutions Integrated Modelling – A Framework for Collaboration



GEOLOGICALLY CONSTRAINED 3D MODELLING:

Cover-Corrected 3D Density Model +
Geologically Constrained 3D VTEM and Mag



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Davidson River Project – Targeting Integration

2026 Drill Program Targeting

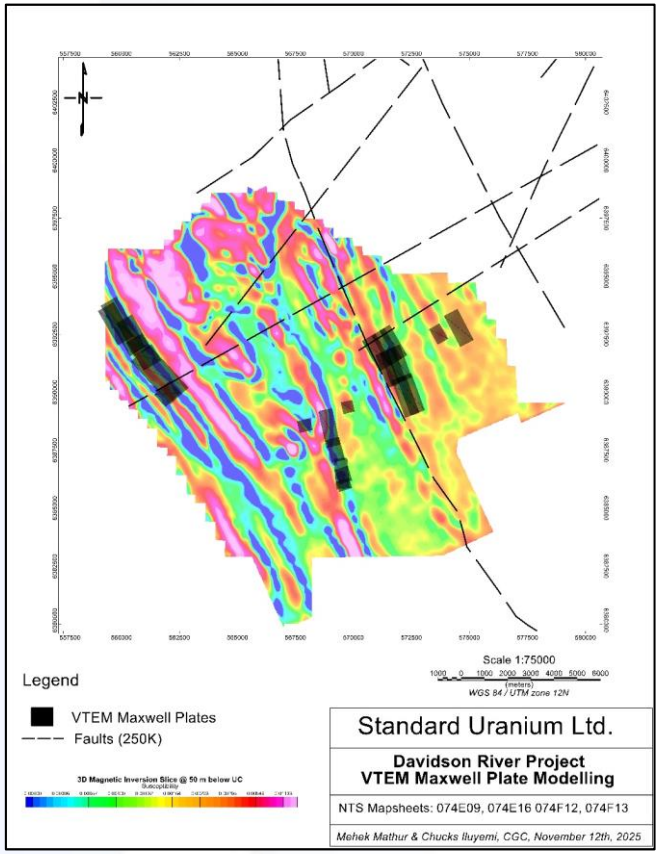
Geologically Constrained ***EM/Mag inversions*** *& plate modelling*

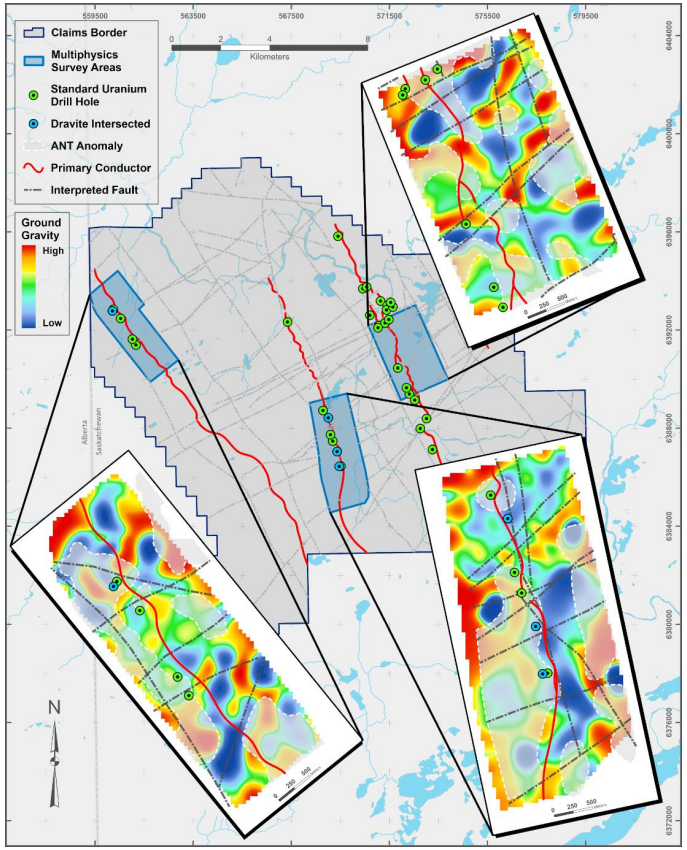
+

Multiphysics *velocity & gravity models*

+

Drilling data *– Lithogeochemistry, structure, & alteration vectors*





Thank You

A special thanks to our partners and collaborators:

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