Interpretation Report: Thursday’s Gossan 2D Seismic Survey, Stavely, Victoria

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Summary

- In early 2020, HiSeis designed, acquired, processed and interpreted two 2D seismic lines for Stavely Minerals at their Thursday's Gossan project in Western Victoria.
- The lines total 15 kilometres in length.
- The style of mineralisation at Thursday's Gossan is thought to be analogous with the Magma mineral system associated with the Resolution Porphyry, Arizona, USA, in which rapidly rising hot fluids sourced from porphyries occupied steep structures and formed economic deposits of metal sulphides.
- Such mineral systems typically exhibit zonation of alteration mineral assemblages.
- HiSeis has interpreted strong horizontal reflections in the seismic data to be indicative of alteration zonation from two intrusive events, most likely to be the boundary between phyllic and potassic alteration assemblages.

Contents:

Introduction

- Two short 2D seismic lines were acquired by HiSeis at Stavely, Victoria, in early 2020:
  - Line 1 = 8km
  - Line 2 = 7km
- Data shows very good reflectivity and off plane events are likely.
- The seismic data supports the mineralisation model adopted by Stavely Minerals and adds further support for a second intrusive (and associated alteration halo).
- A geological and structural model was generated during the interpretation of the data.
- A separate alteration model was also generated as a visualisation aid for the HiSeis interpretation of the seismic data.

Objectives of the Seismic Survey

- Stavely Minerals' high-level objectives for the application of seismic include identifying and delineating:
  - Lithological contacts and key structures.
  - To better understand the geological architecture in the vicinity of the Stavely Project Mineralisation and thereby assist further exploration in the area
  - The depth of interest would primarily be the top 2 km with additional information down to 5km.

Data Used for this Interpretation*:

- Seismic Reflection Data:
  - Stavely_L1_DMOMIG_v2_120220313_depth@270m_SZ.sgy
  - Stavely_L2_DMOMIG_v2_20200317_depth@270m_SZ.sgy
  - Attributes generated from the above lines (Pseudo Relief, Laplacian Edge Detection.)
  - Stavely_L1_DMO_20200701_depth@270m_SZ.sgy
  - Stavely_L2_DMO_20200701_depth@270m_SZ.sgy
- Seismic Tomography:
  - Stavely2D_L1_TomoRay_20200324_depth@290m_LVv2.sgy
  - Stavely2D_L1_TomoVel_20200324_depth@281m_LVv2.sgy
  - Stavely_Line2_TomoRay_20200324_depth@309m_LVv2.sgy
  - Stavely_Line2_TomoVel_20200324_depth@300m_LVv2.sgy
- Aeromagnetic Data (Client-supplied and Government data)
- Rock property measurements (sonic velocity and density)
- Drilling data (holes deeper than 100m)
  - Lithology, Alteration, RQD and Magnetic Susceptibility

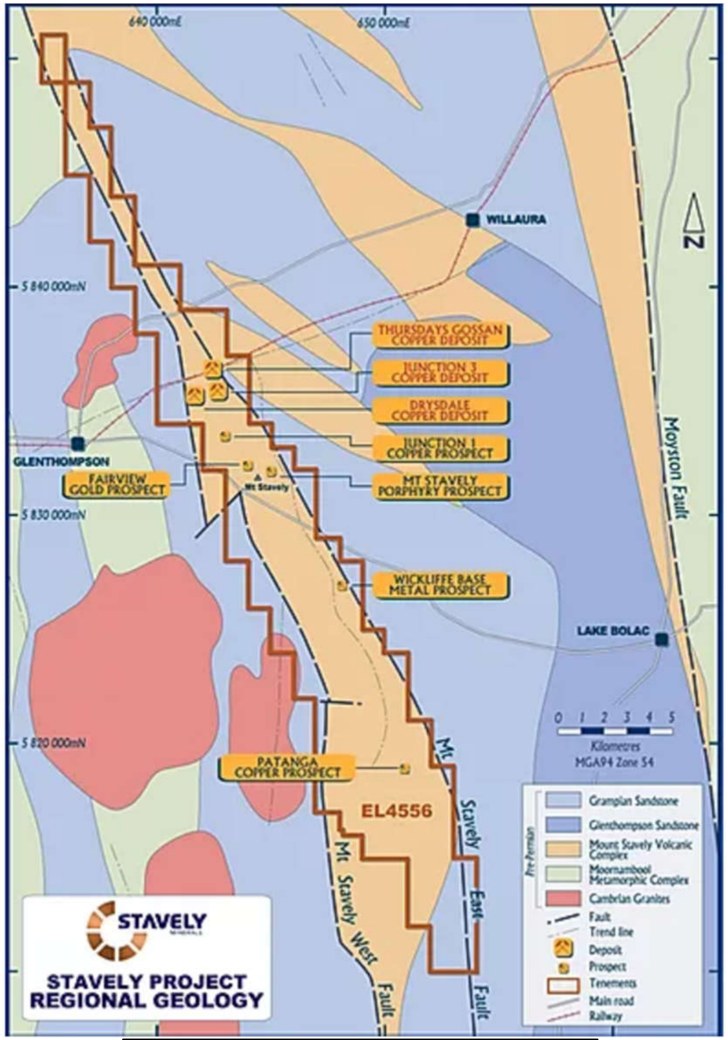
* All data supplied with this report

Location:

The Stavely Project is located approximately 200km west of Melbourne, Victoria.

Local Geology

- Mt Stavely Volcanic Complex – basal ultramafic unit overlain by a suite of andesitic lavas, felsic volcanics and sediments
- Fault bounded block surrounded by Glenthompson Sandstone (quartz-rich turbidites) and the interpreted "Mt Stavely East" and "Mt Stavely West" faults
- Intruded by Cambrian age felsic intrusives including mineralised porphyries
- Unconformably overlain by Ordovician-Silurian shallow marine and fluvial Grampian Group sediments



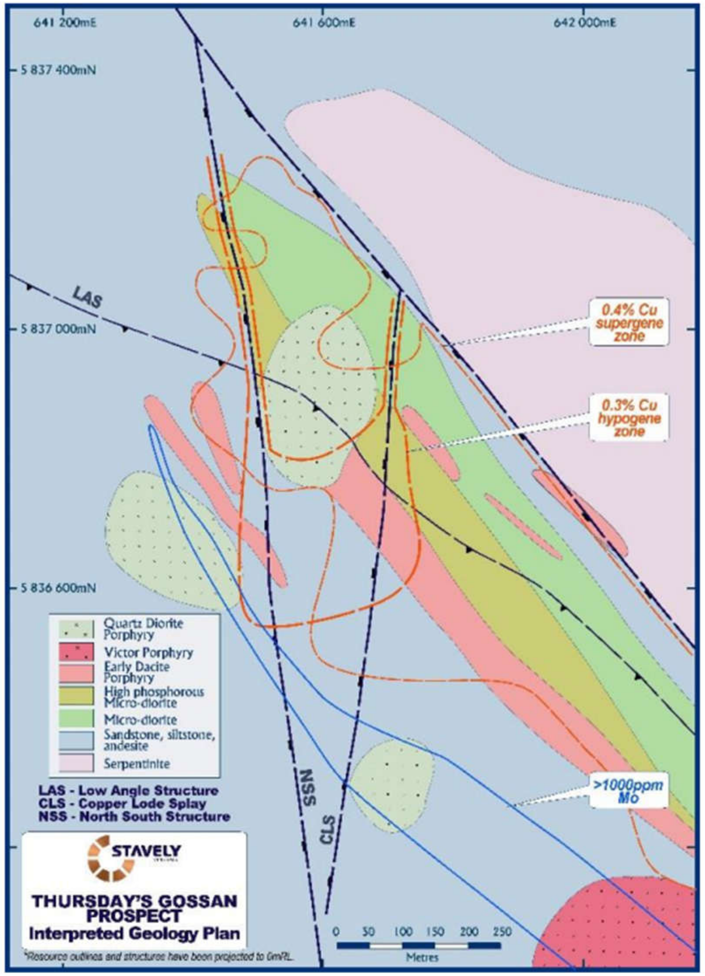
(Figure supplied by Stavely Minerals)

Local Geology

- Four significant local structures have been identified identified at Thursday's Gossan Prospect prior to the seismic program.

- LAS – Low Angle Structure (D1a thrust?)
- NSS - North South Structure (D1b?)
- CLS - Copper Lode Splay (D1b?)
- Ultramafic Fault (D1b?)

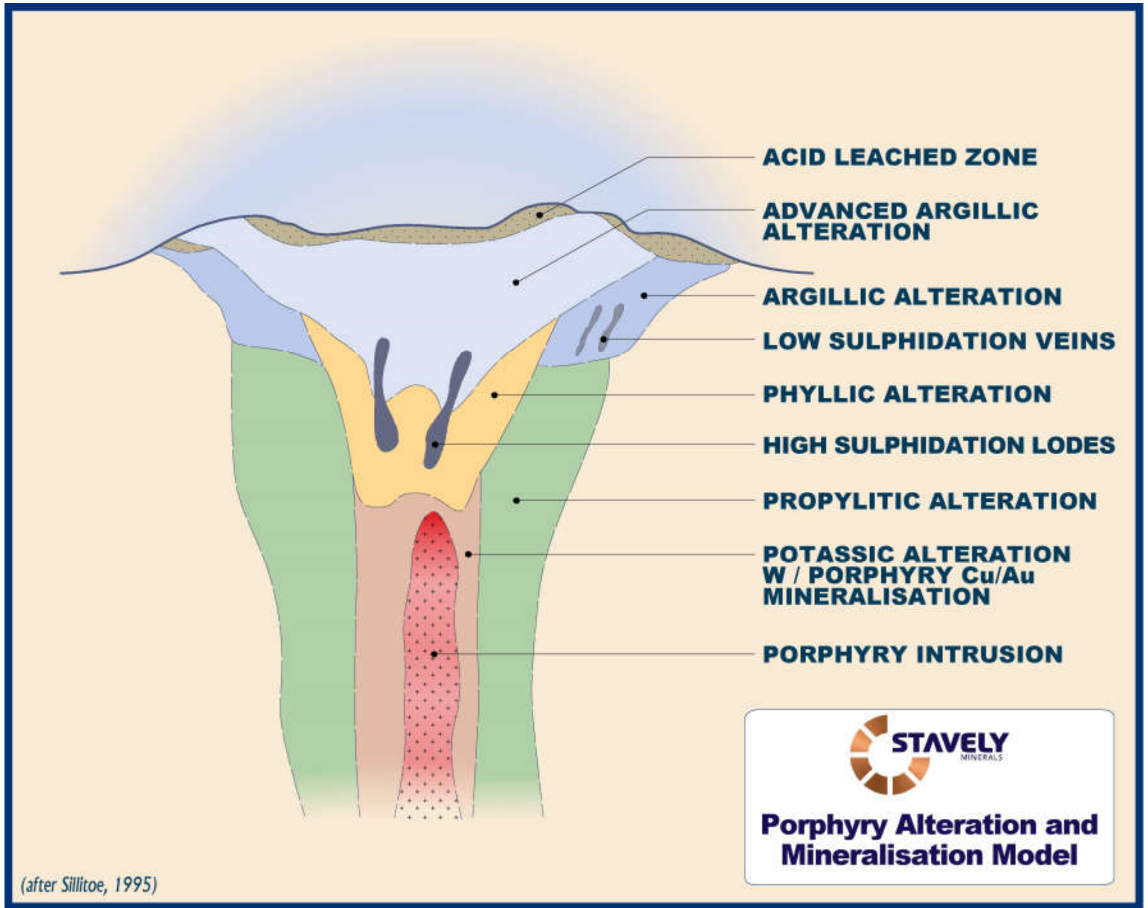
- All four structures are described as having some degree of mineralisation. These were originally D1a and D1b structures but may have undergone later reactivation.
- See the appendix for more information on the structural settings described here.



(Figure supplied by Stavely Minerals)

Ore Genesis Model: A Porphyry Copper/Gold System

- Stavely Minerals is basing their ore genesis model for the Stavely Prospect on the idealised alteration and mineralisation model proposed by Sillitoe (1995).
- In this model, felsic intrusives are emplaced into a pull-apart basin structural setting.
- Fluids emanating from an intrusion drive progressive alteration zonation, characterised by distinctive alteration assemblages.
- Economic copper and gold deposits occur within the potassic alteration zone (low grade, high tonnage) and vein systems in (sub-) vertical structures acting as outflow conduits above the intrusion (high grade, lower tonnage).

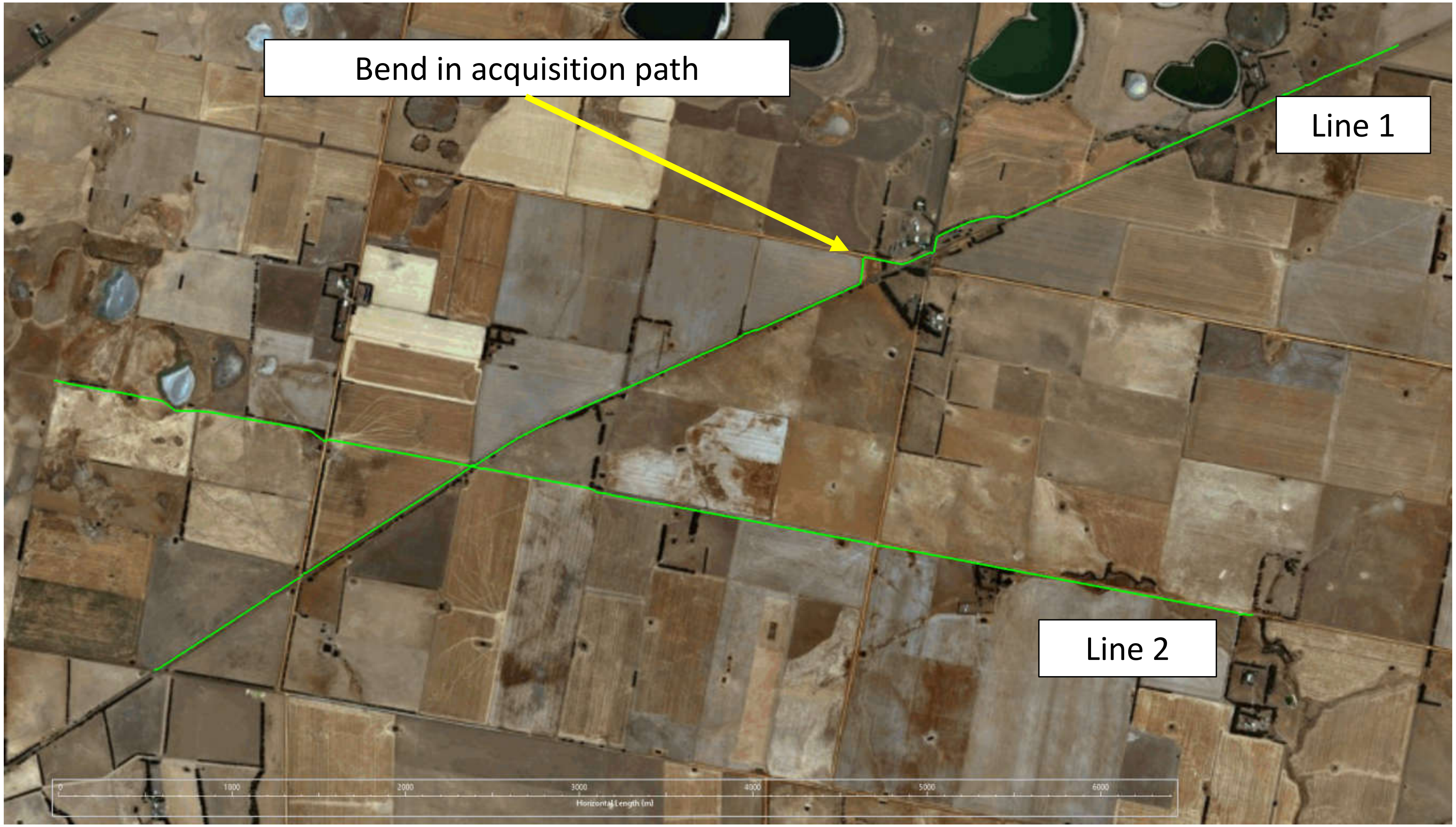


(Figure supplied by Stavely Minerals)

Refraction Tomography

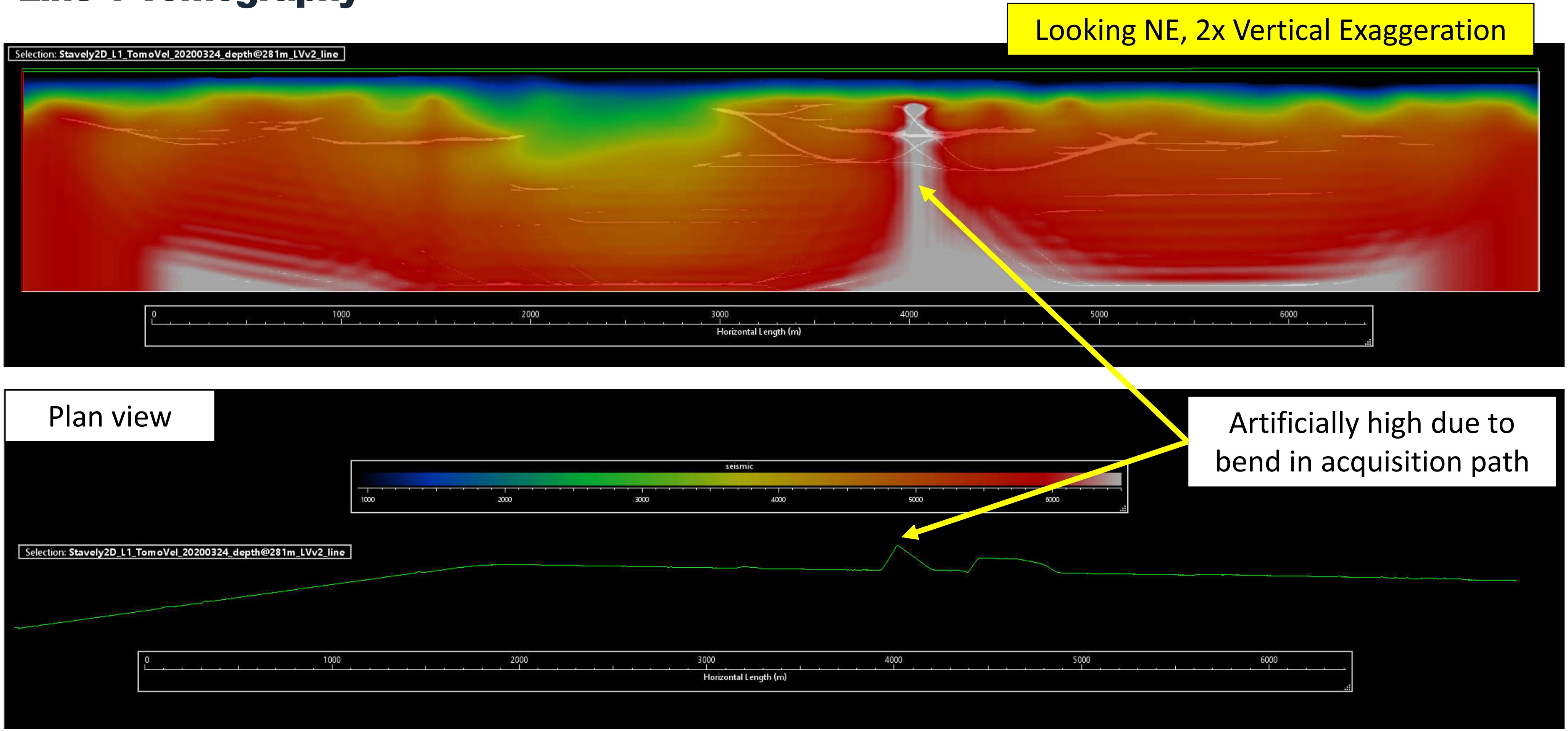
- Refraction is a change in the direction of propagation of any wave as a result of its travelling at different speeds at different points along the wave front, in this case due to changes in acoustic impedance.
- Tomography is a method of imaging the internal geometries of various zones near the surface based on how seismic energy interacts with the seismic velocity in those zones.
- Refraction tomography data provides an indication of seismic velocity in the near-surface environment (~300m below surface).
- Seismic velocity is a proxy for rock competency.
- Tomography also determines the preferred pathway for the fastest sound waves.
- Combined, these two factors can be utilised to determine hydrogeological and geotechnical information and depth of weathering
- In 2D surveys, care must be taken in the vicinity of bends in the acquisition line. Artificial high velocity zones occur on bends due to the manner in which velocities are calculated.

Refraction Tomography



Refraction Tomography

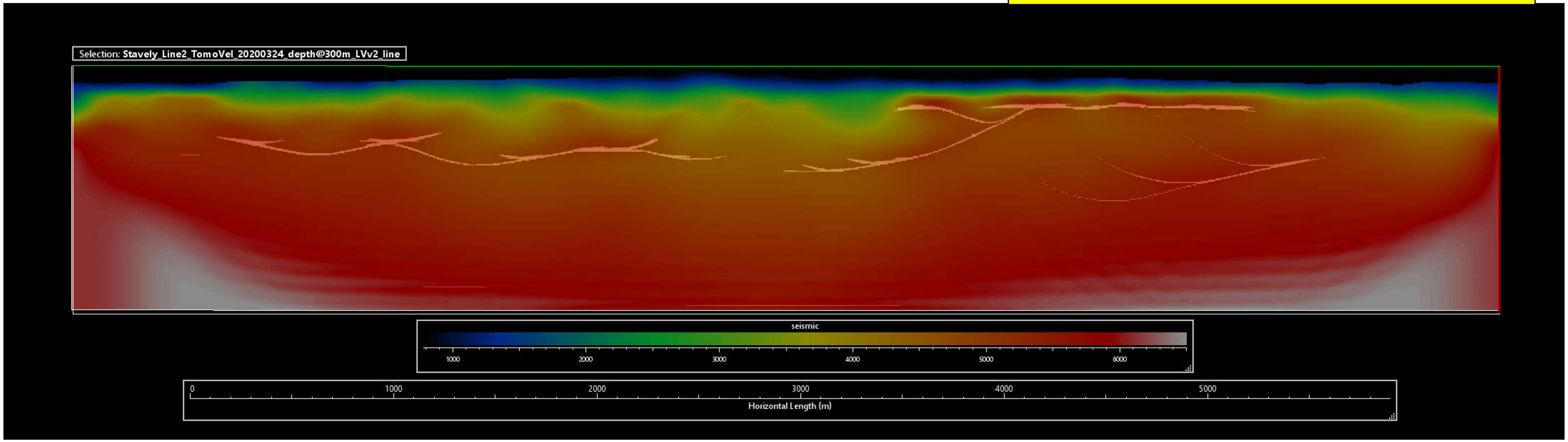
Line 1 Tomography

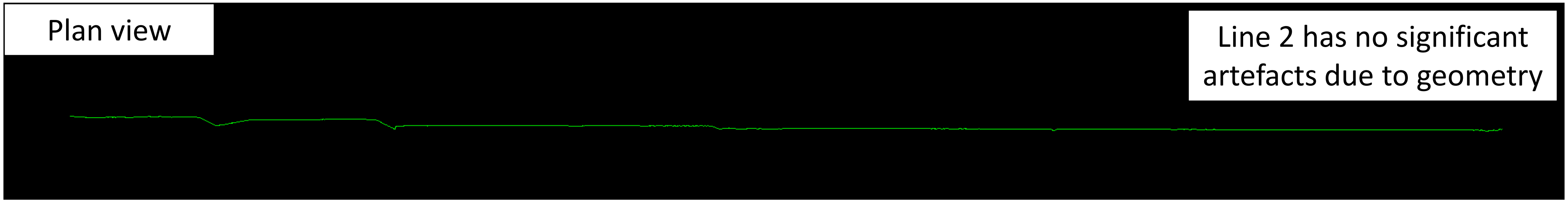


Refraction Tomography

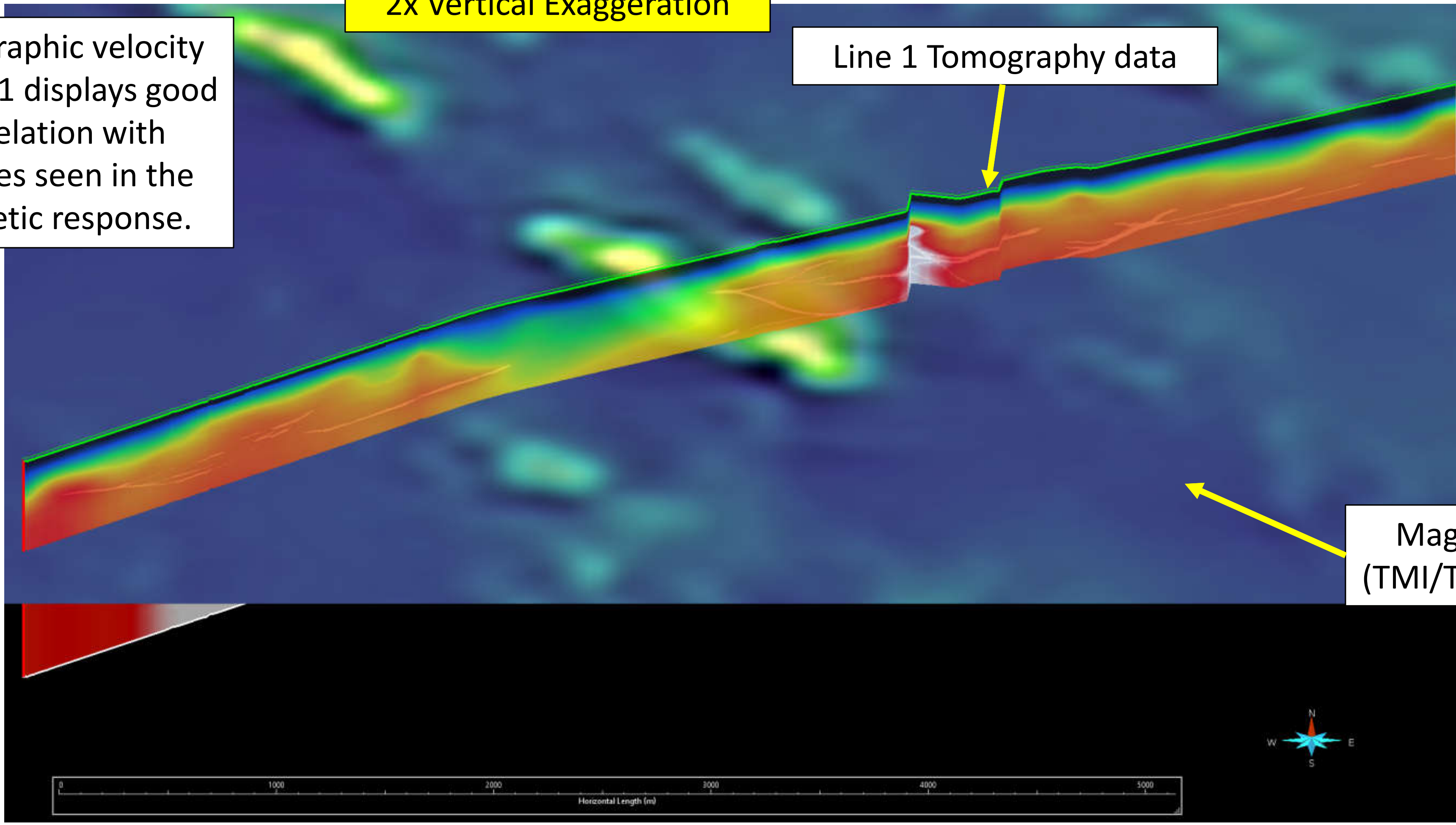
Line 2 Tomography

Looking N, 2x Vertical Exaggeration

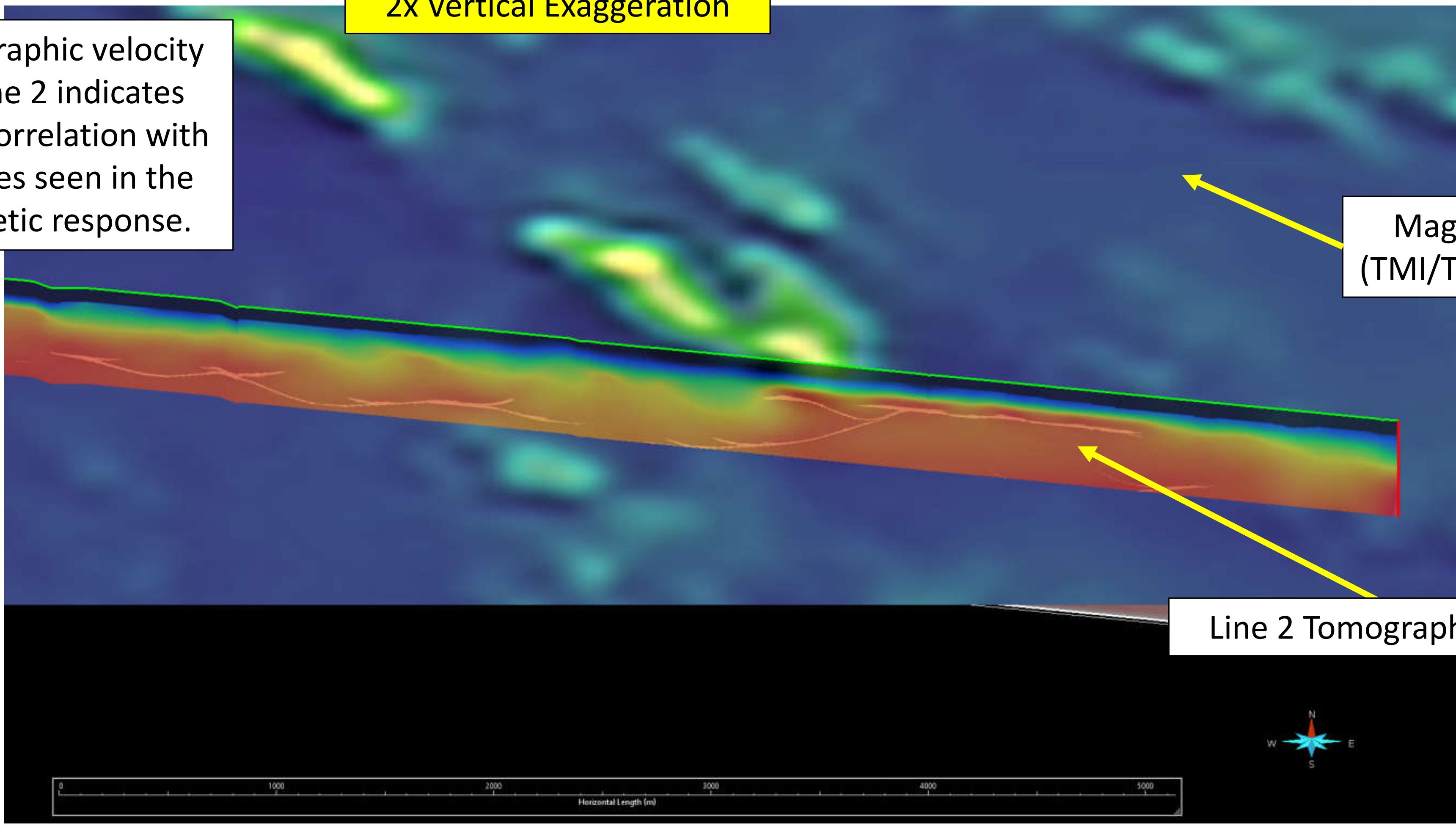




Refraction Tomography



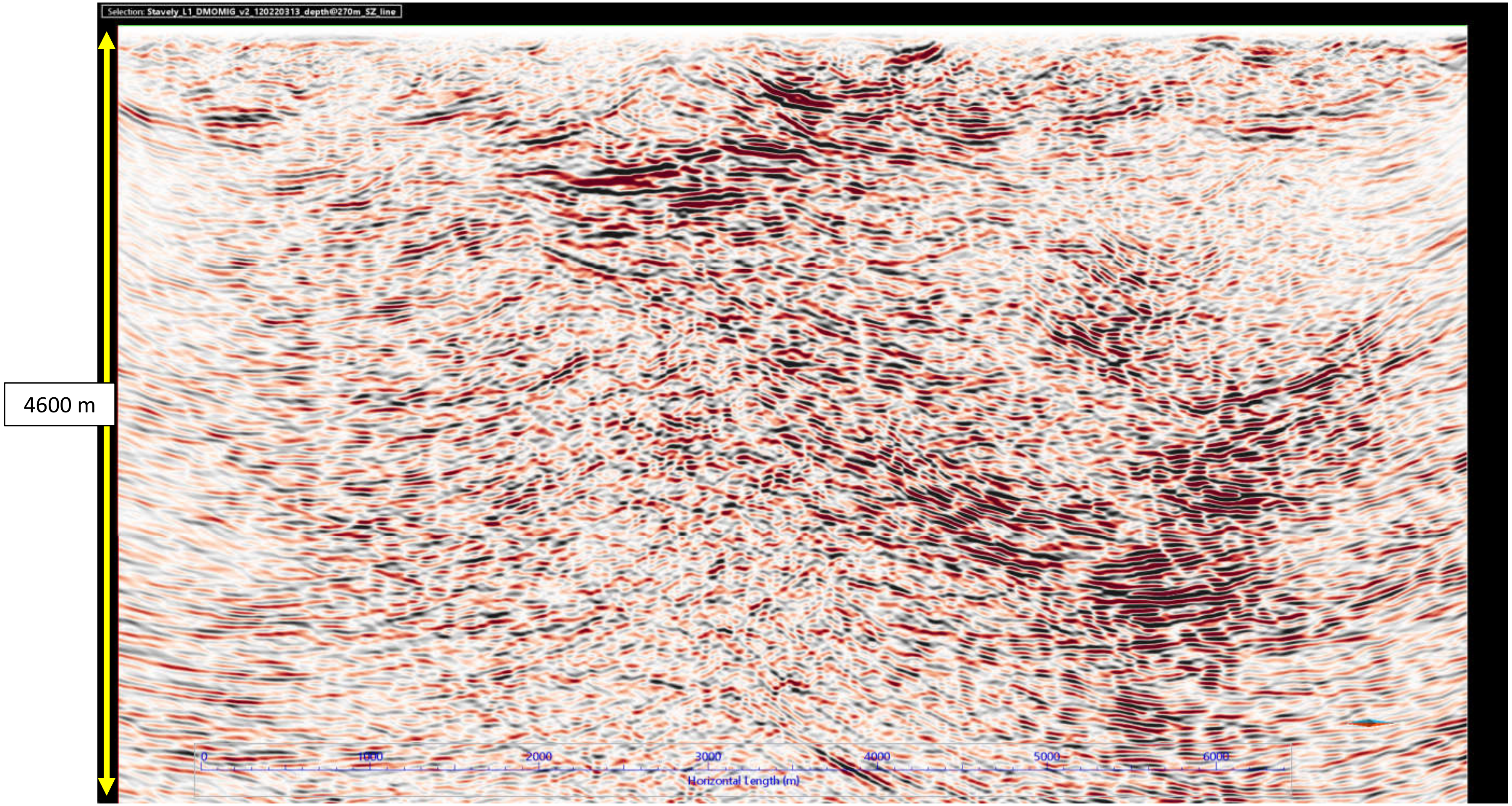
Refraction Tomography



Reflection Seismic Data (General Information)

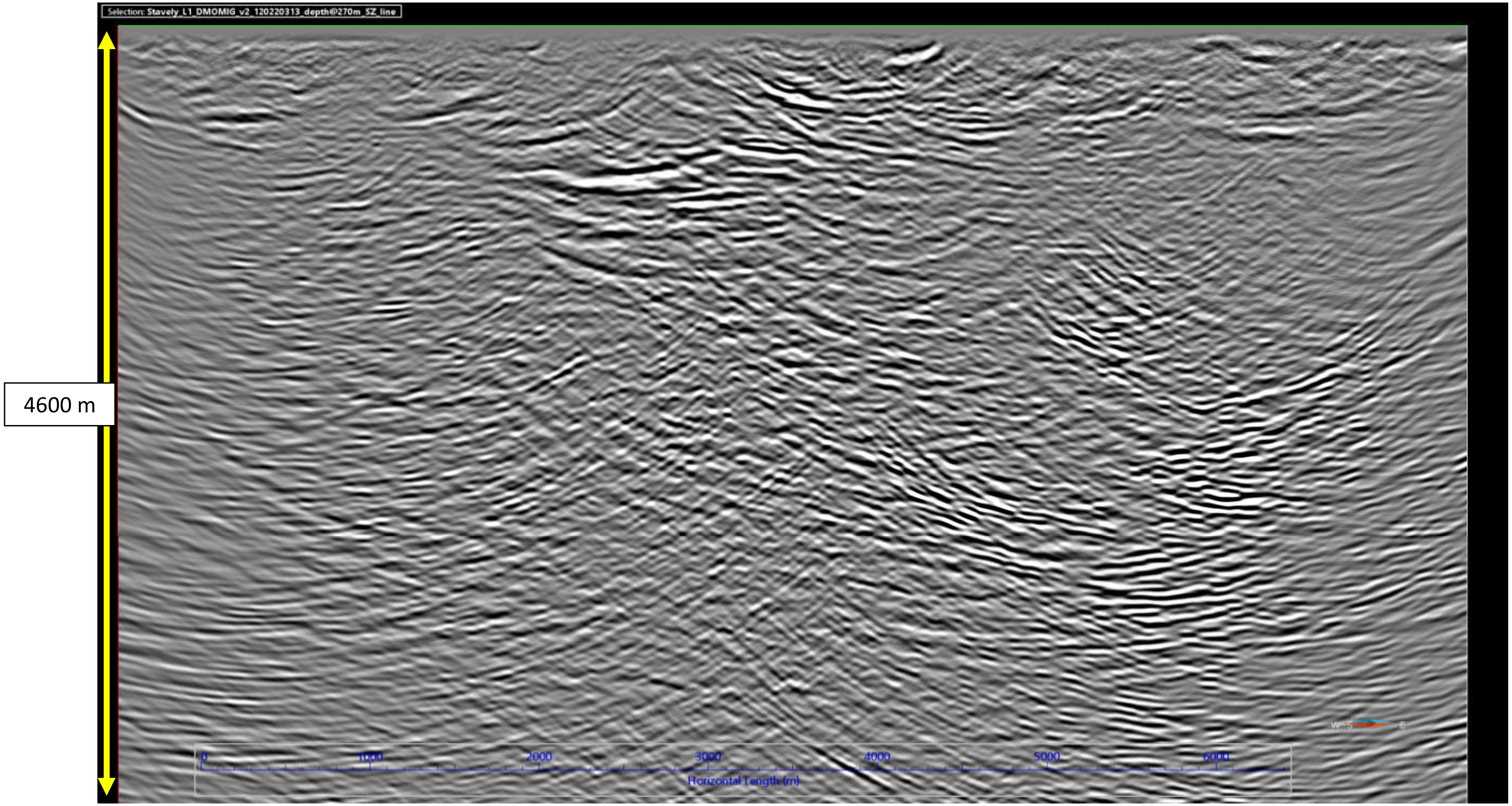
- Reflection seismic information is generated when seismic energy is reflected from abrupt changes in acoustic impedance (AI).
- That information is recorded when geophones are located appropriately, based on the geometry of the reflector and the location of the energy source.
- On 2D seismic lines, an underlying assumption is that acquisition is carried out in the dip direction of reflectors. Any reflector with a different dip direction will be recorded as an "off plane event", causing ambiguity during interpretation. The steeper the reflector and the closer acquisition line is to the strike orientation, the worse the effect is.
- Sources of reflection in hard rock seismic data include:
  - Changes in Lithology
  - Structures (faults and shears)
  - Alteration

Stavely Reflection Seismic Data
Line 1 DMOMIG* Looking NE (Grey Red Colour Scale)



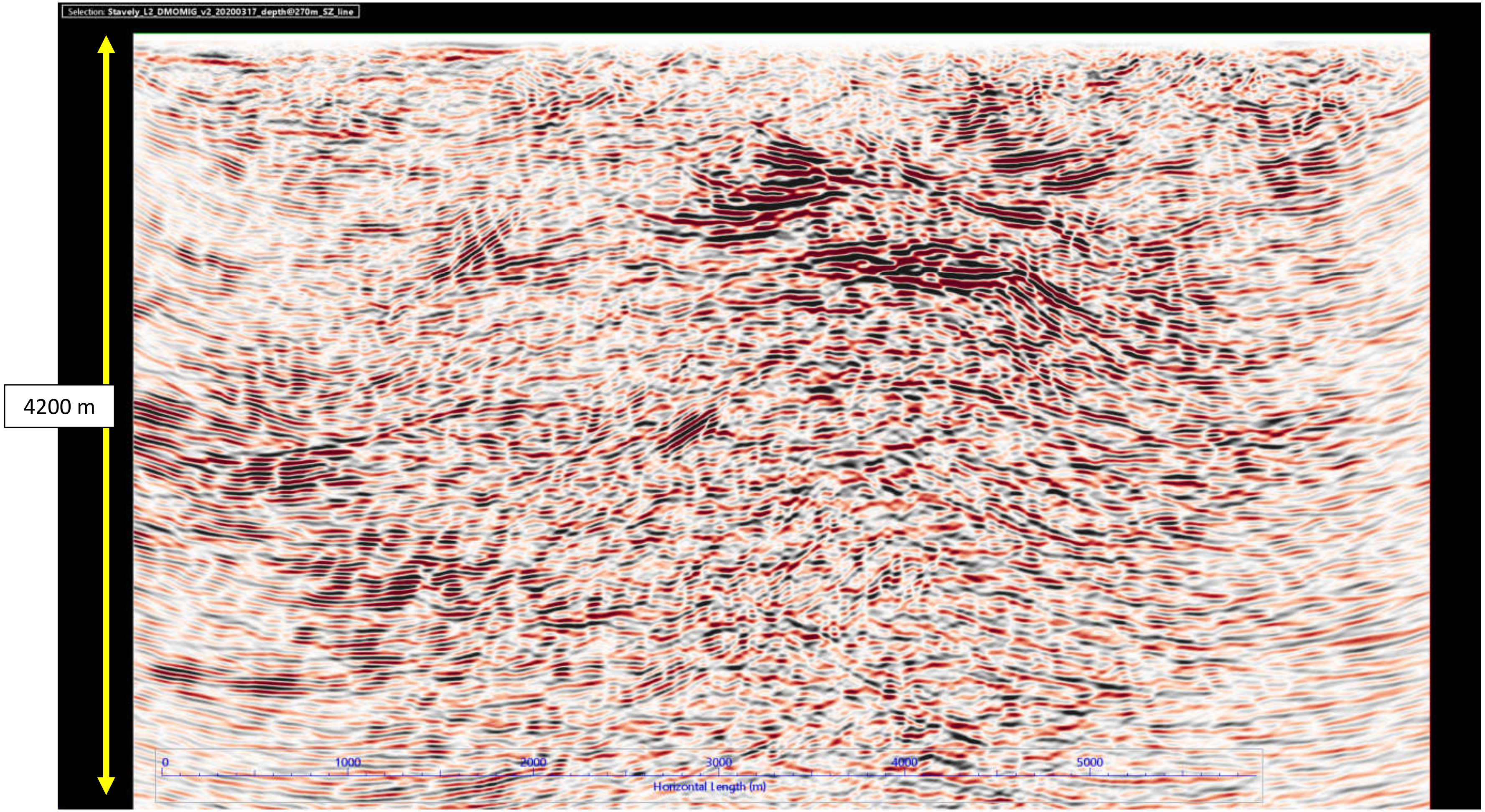
* DMOMIG = Dip Move-Out Migration

Stavely Reflection Seismic Data
Line 1 DMOMIG Looking NE (Grey Scale)



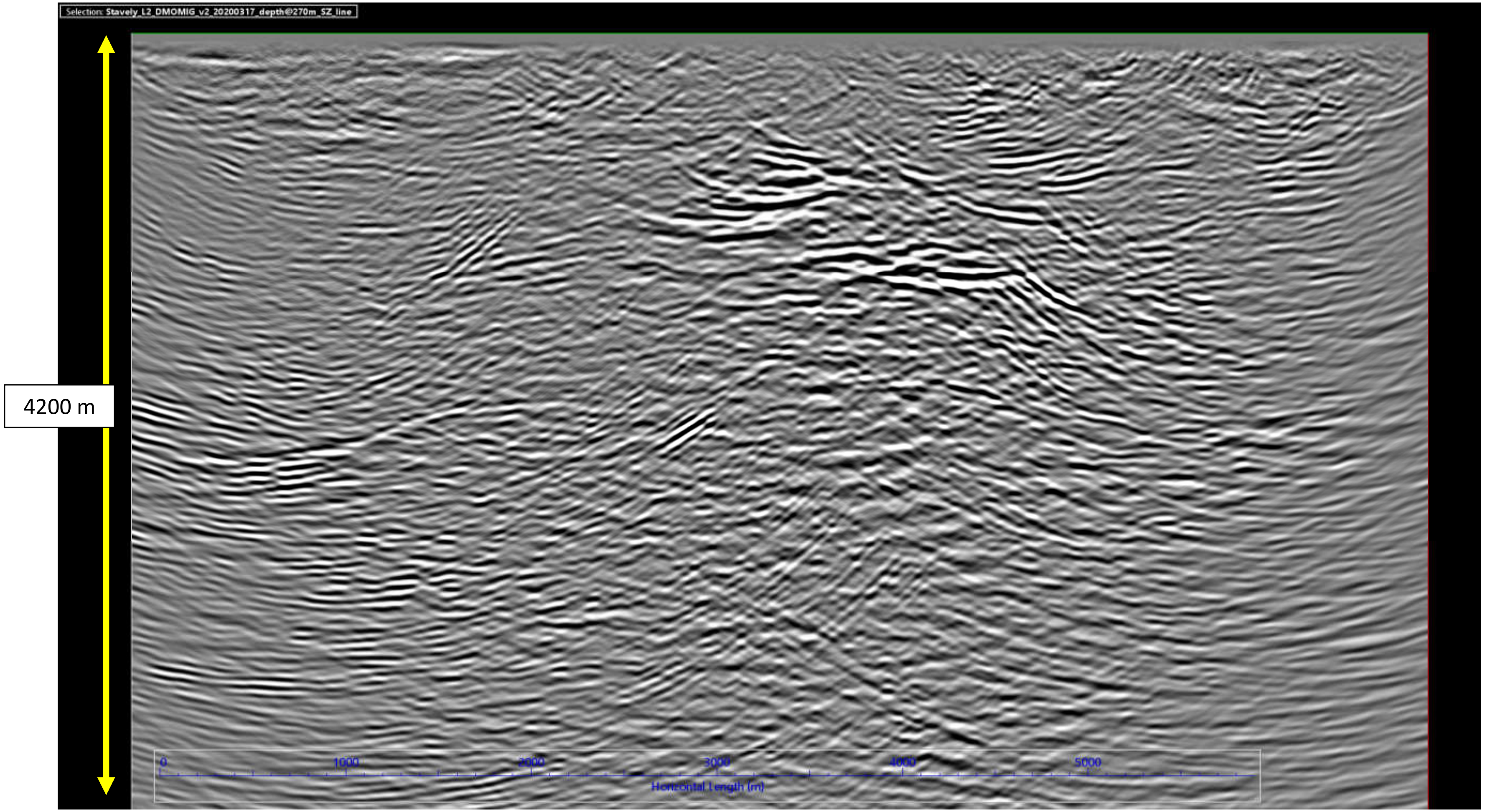
Stavely Reflection Seismic Data

Line 2 DMOMIG Looking N (Grey Red Colour Scale)



Stavely Reflection Seismic Data

Line 2 DMOMIG Looking N (Grey Scale)



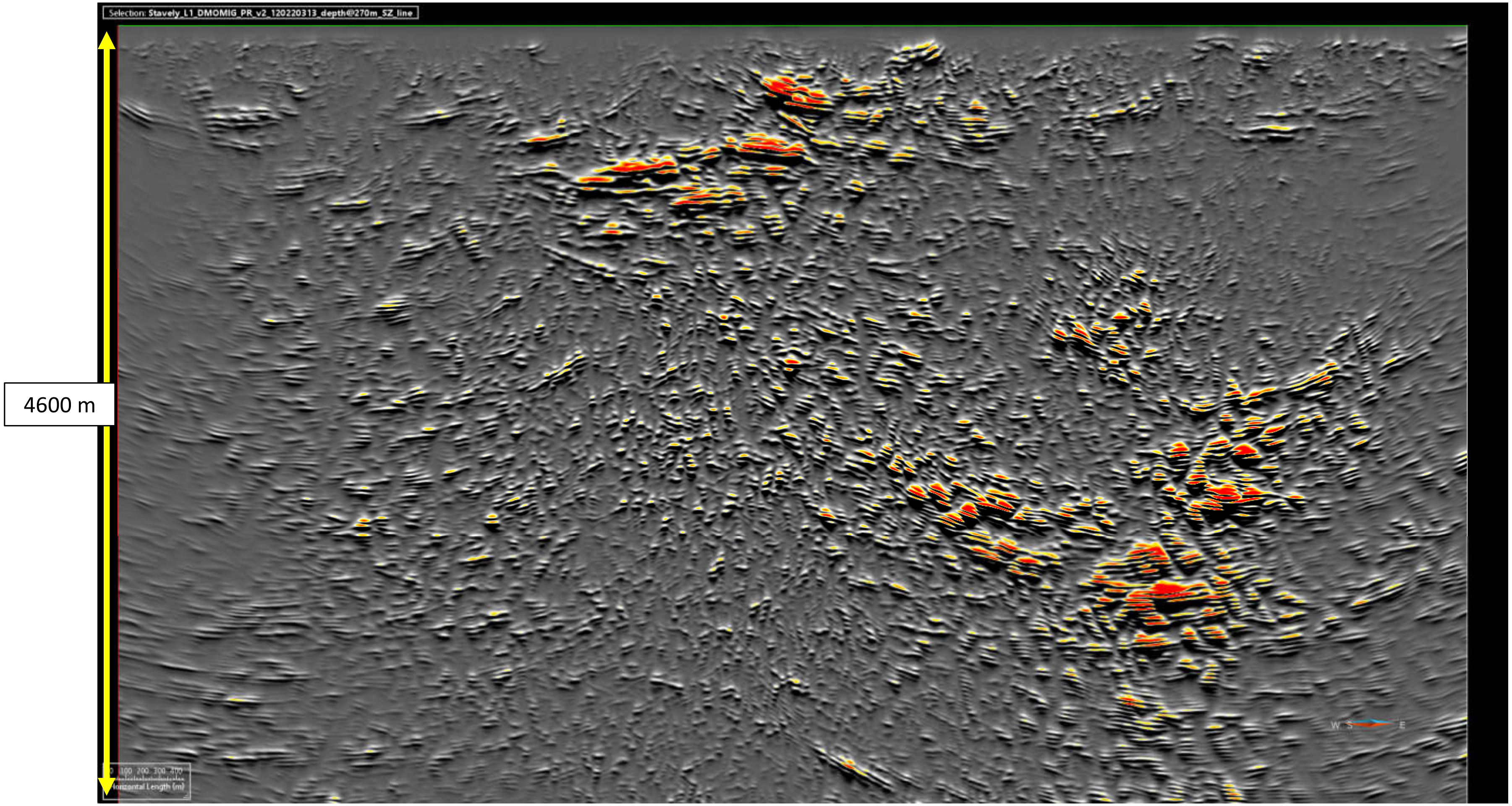
Description of Various Attributes In Seismic Data

HiSeis has applied Pseudo Relief and Laplacian Edge detection attributes to the Stavely data

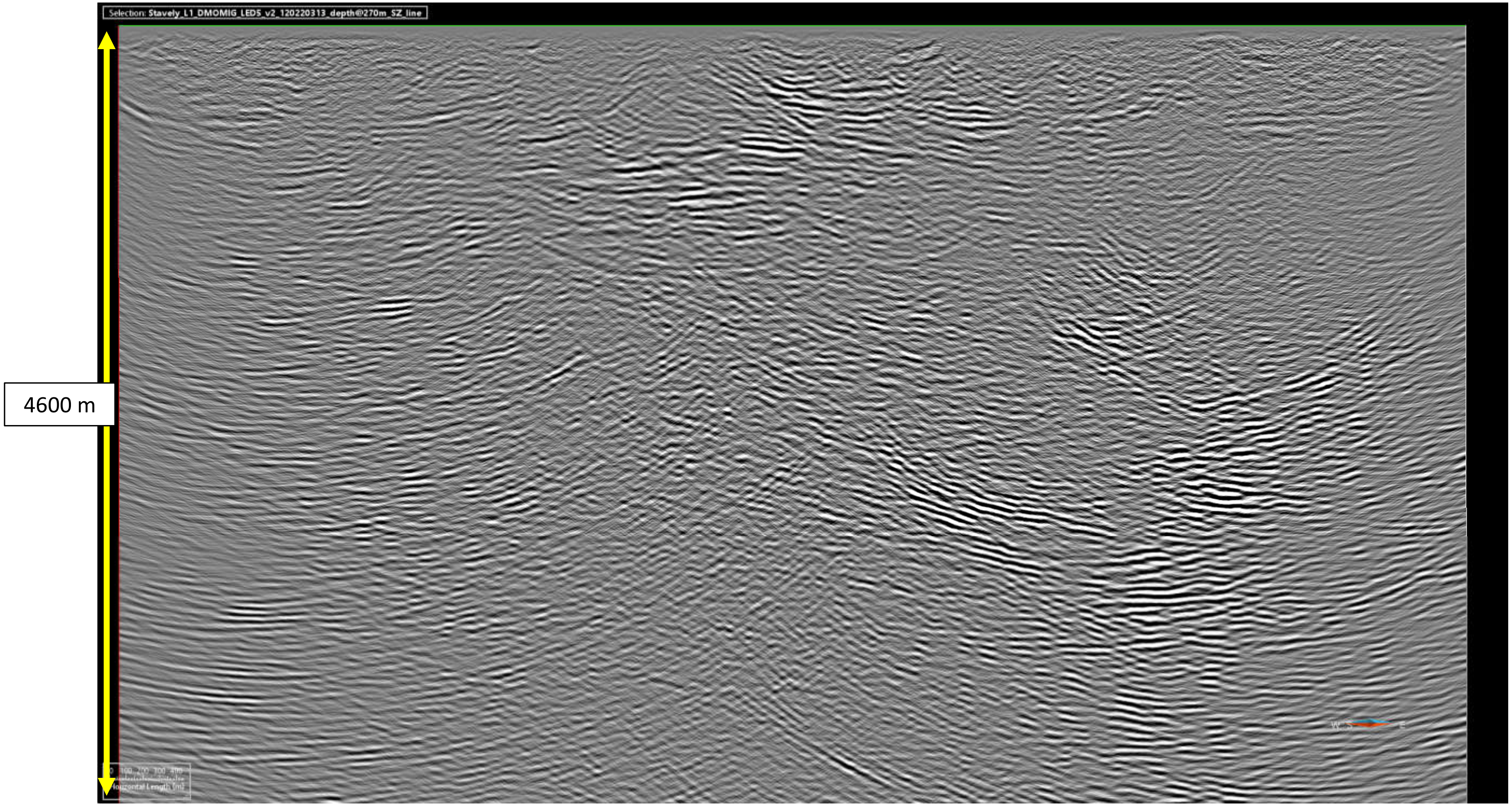
Seismic attributes can be likened to the various filters and enhancements applied to photographic images. The seismic attributes applied to the underlying data sets enhance or diminish particular features that already exist but may not be immediately apparent to the human eye. In particular, Pseudo Relief seems to help the untrained eye perceive features very well, allowing many first-time viewers of seismic data to see structures that are often obscured by the “chatter” that is present in hard rock seismic data.

Attribute	HiSeis Naming	Domain	Descriptor	Uses
Instantaneous Phase	IP	Frequency	Enhances continuity of reflectors by giving them equal strength, removing any amplitude information.	Locates major faults, discontinuities
Laplacian Edge Detection	LED	Filter	Filter that returns output of a convolution, edge preserving filter.	Sharpens reflectors, allows detection of small-scale structures
Pseudo Relief	PR	Amplitude	RMS amplitude with phase rotation and further smoothing.	Helpful in interpreting broad geometries, faults become more apparent
Energy	En	Amplitude	Sum of amplitudes squared, the higher the energy the higher the amplitude	Enhances high amplitudes which may represent changes in lithology, alteration etc.
Cosine Phase	CosP	Frequency	Cosine of instantaneous phase but is continually smooth	Locates major faults, discontinuities
Instantaneous Frequency	IF	Frequency	Frequency in a single trace, calculated sample by sample	Porosity changes (caused my fracture zones or bedding) and angular disconcordancies
Spectral Decomposition	SD	Frequency	Data is spectrally decomposed into its constituent frequencies which can be tuned to specific wavelengths	Removes the wavelet overprint, improves detection of lateral discontinuities, channel detection

Seismic Attributes
L1 Pseudo Relief (Looking NE)

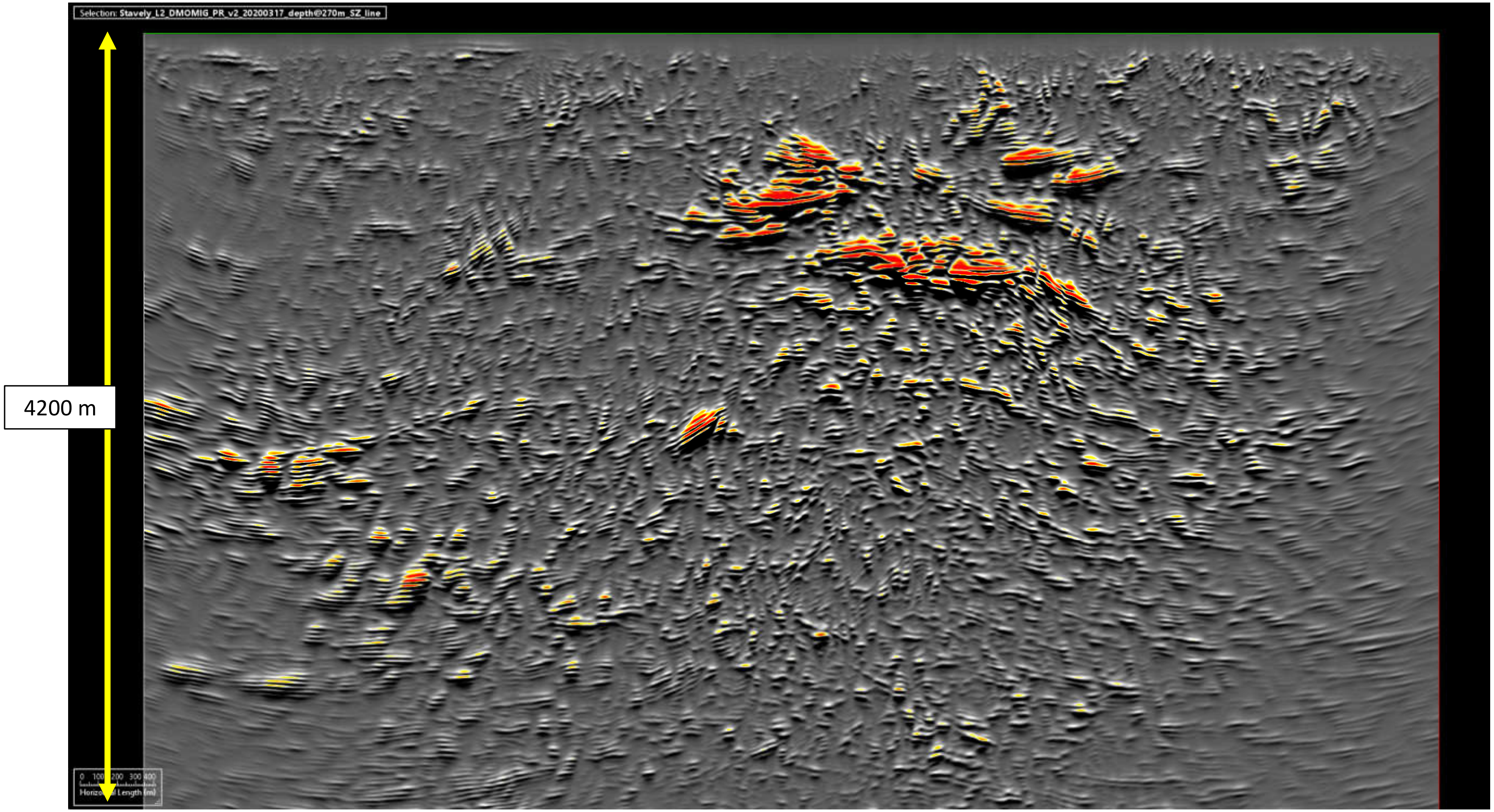


Seismic Attributes
L1 LED5 (Looking NE)



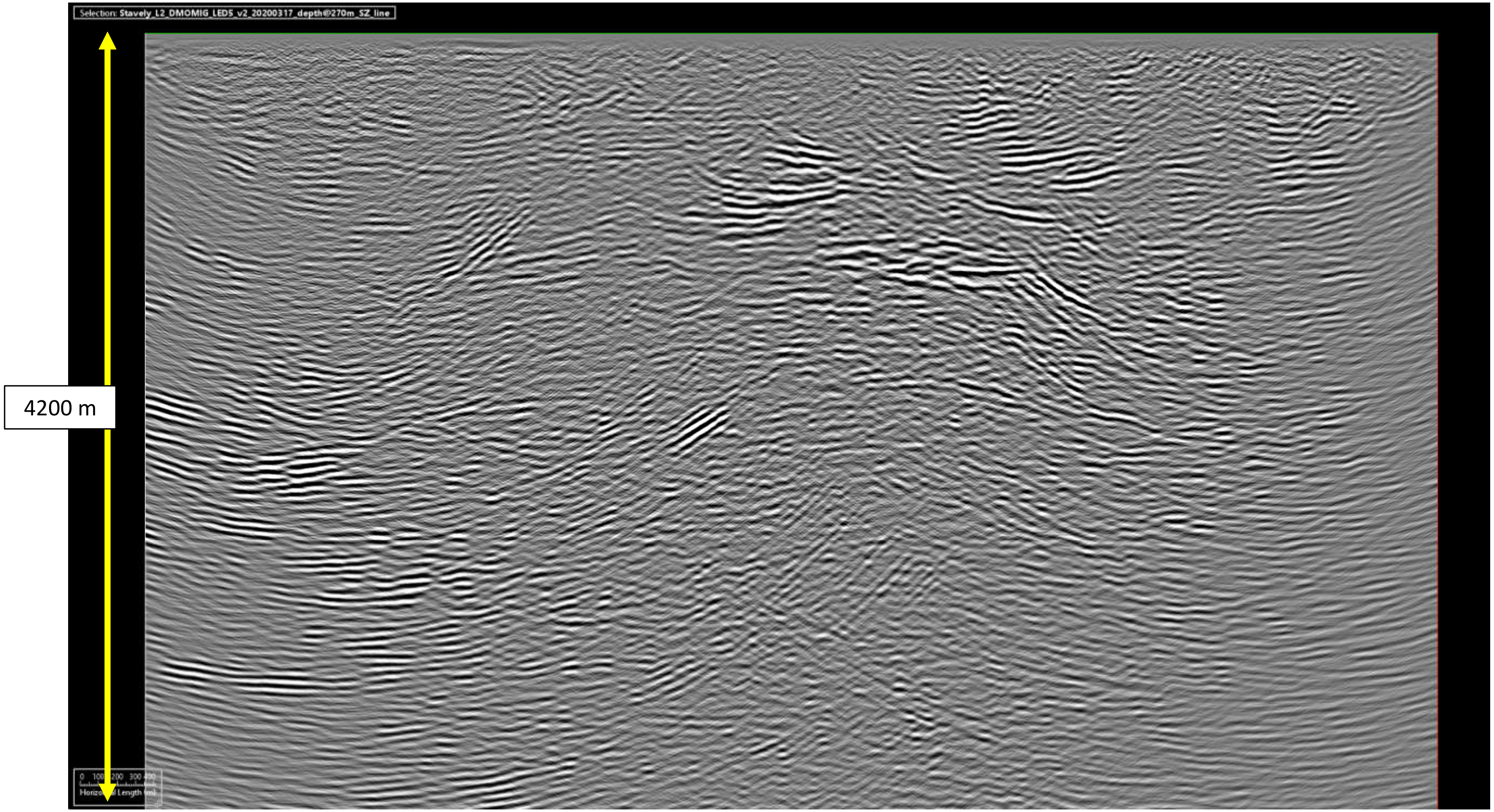
Seismic Attributes

L2 Pseudo Relief (Looking N)



Seismic Attributes

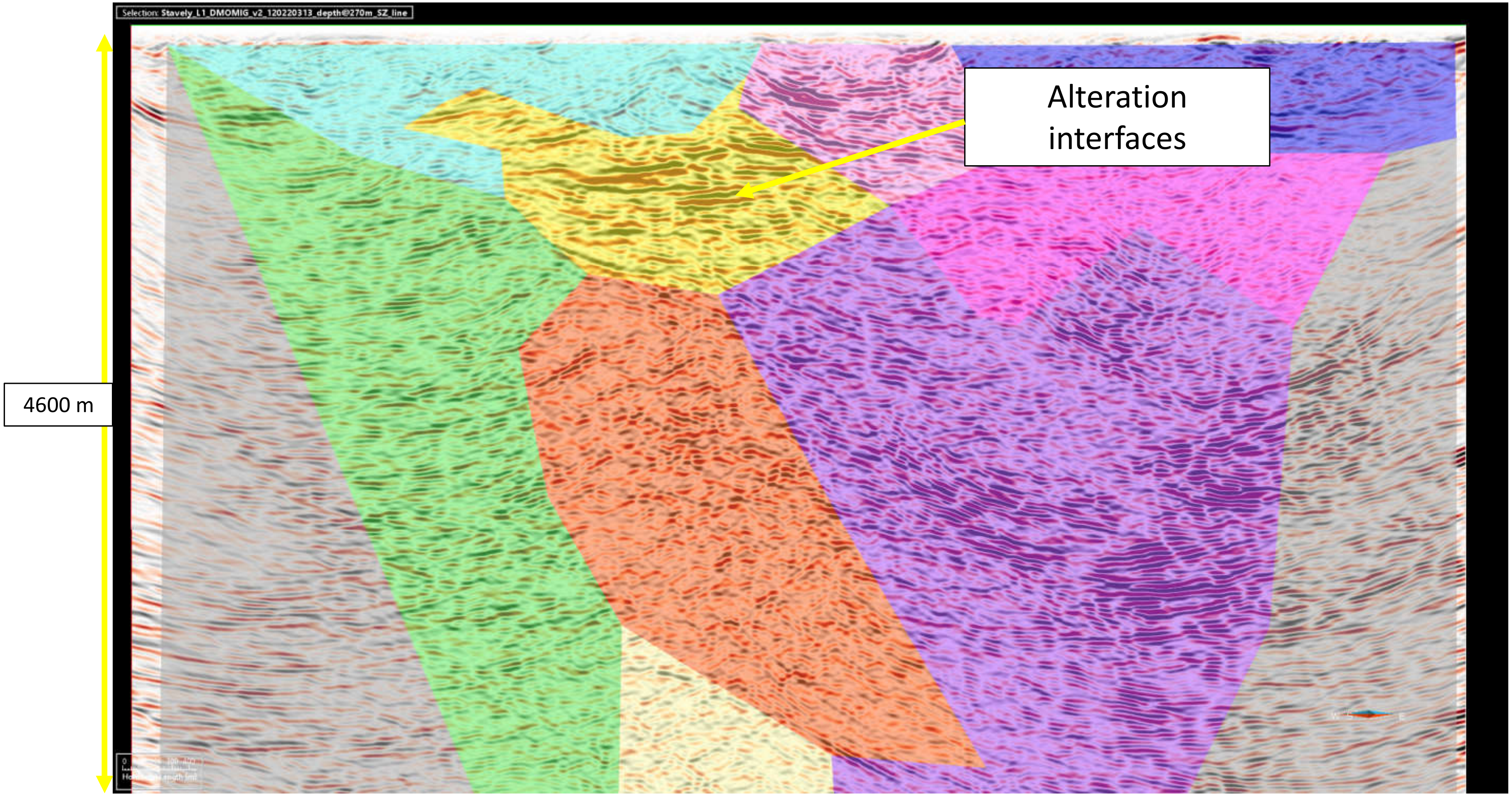
L2 LED5 (Looking N)



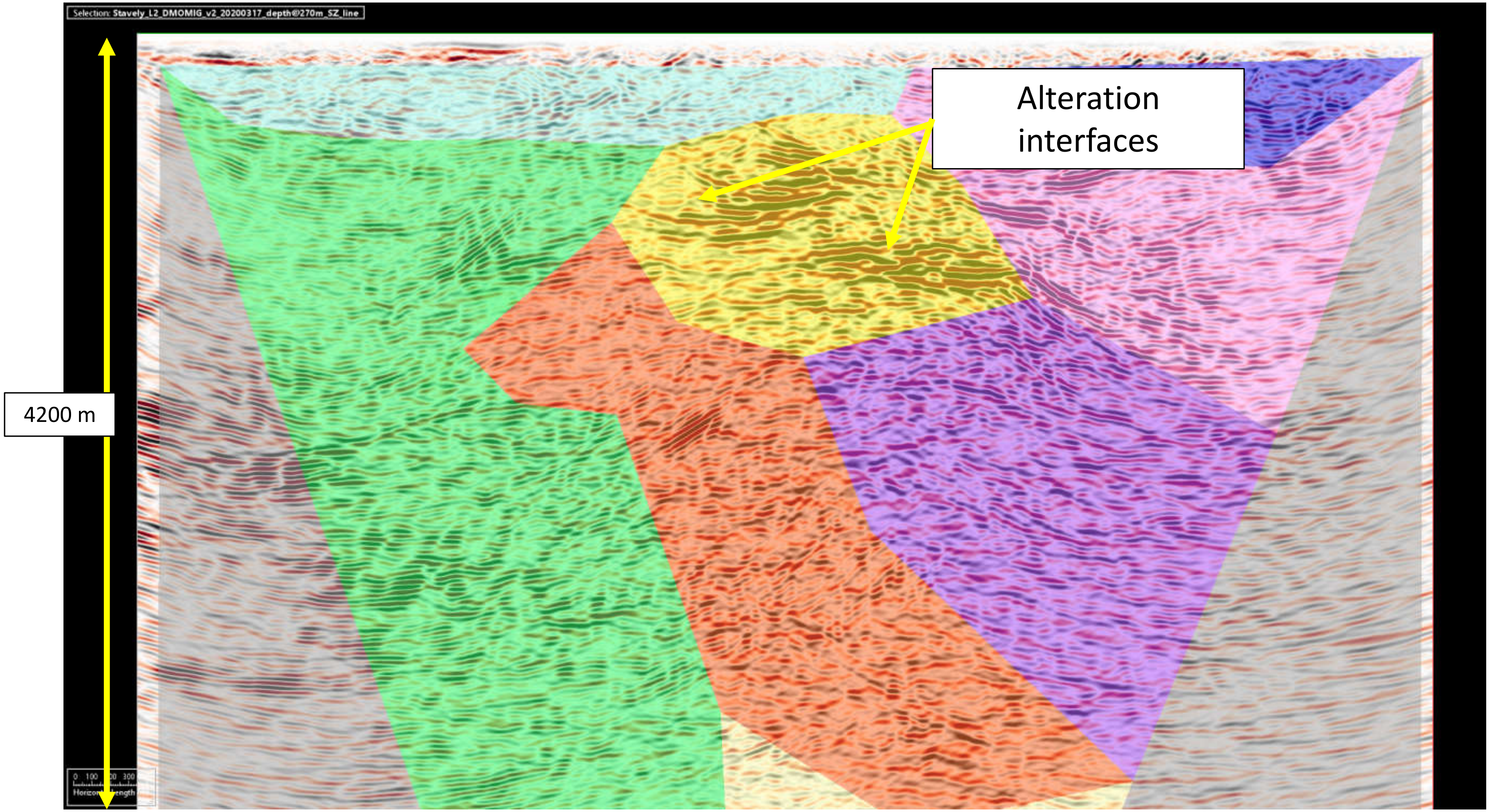
Seismic Domains

- Seismic domains are areas of similar seismic character.
- They are defined by grouping reflection zones based on similarities such as:
  - Texture
  - Frequency Content
  - Amplitude
  - Apparent dips of reflections
- Domains are useful during interpretation as drilling does not inform the interpretation throughout the length and depth interrogated by the seismic reflection method. Although we may not be able to determine the exact nature of units being shown, we may still make assumptions about their continuity within a line and across the two lines shown in this project area.
- Of interest in this project are the yellow domains shown on each line in the following slides. They represent domains with mostly horizontal reflectors, interpreted as being alteration interfaces.

Stavely Line 1 Seismic Domains (Looking NE)



Stavely Line 2 Seismic Domains (Looking N)

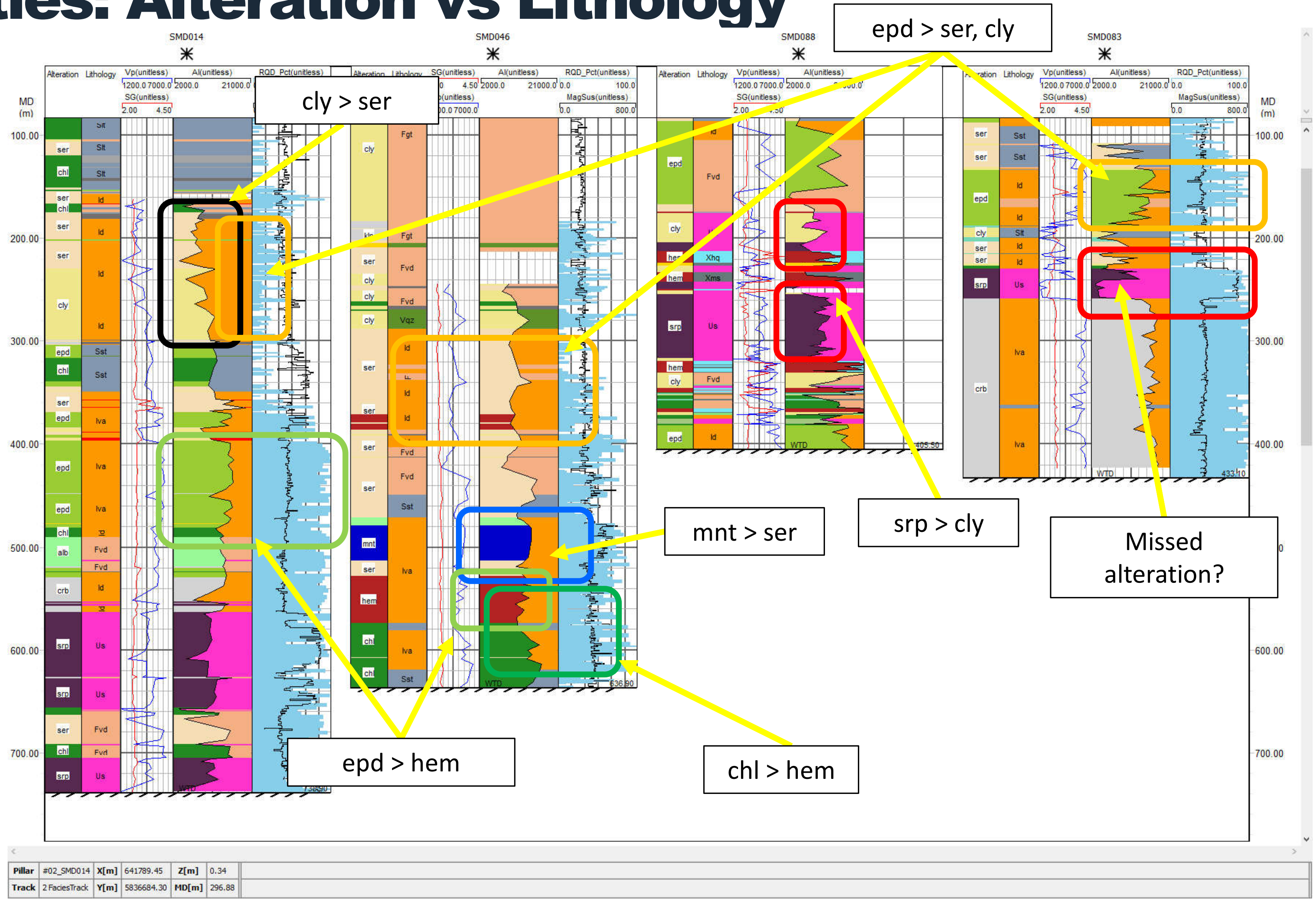


Rock Property Measurements

- Stavely staff collected seismic velocity and SG data on drill core from five holes, using a hand-held sonic tool (UK1401) and the wet and dry weight method for density. (SMD014, SMD046, SMD049, SMD083 and SMD088)
- Comparisons of this data against other core properties were completed within Gocad to establish the major causes of acoustic impedance (AI) contrasts within the project.
- Core properties analysed included:
  - Lithology
  - Alteration
  - RQD
  - Magnetic susceptibility
  - Vp, SG and AI
- This work indicated alteration is the main factor causing acoustic impedance contrasts (and thus seismic reflectivity), with the interface between phyllic and potassic alteration assemblages likely to cause high seismic reflectivity.

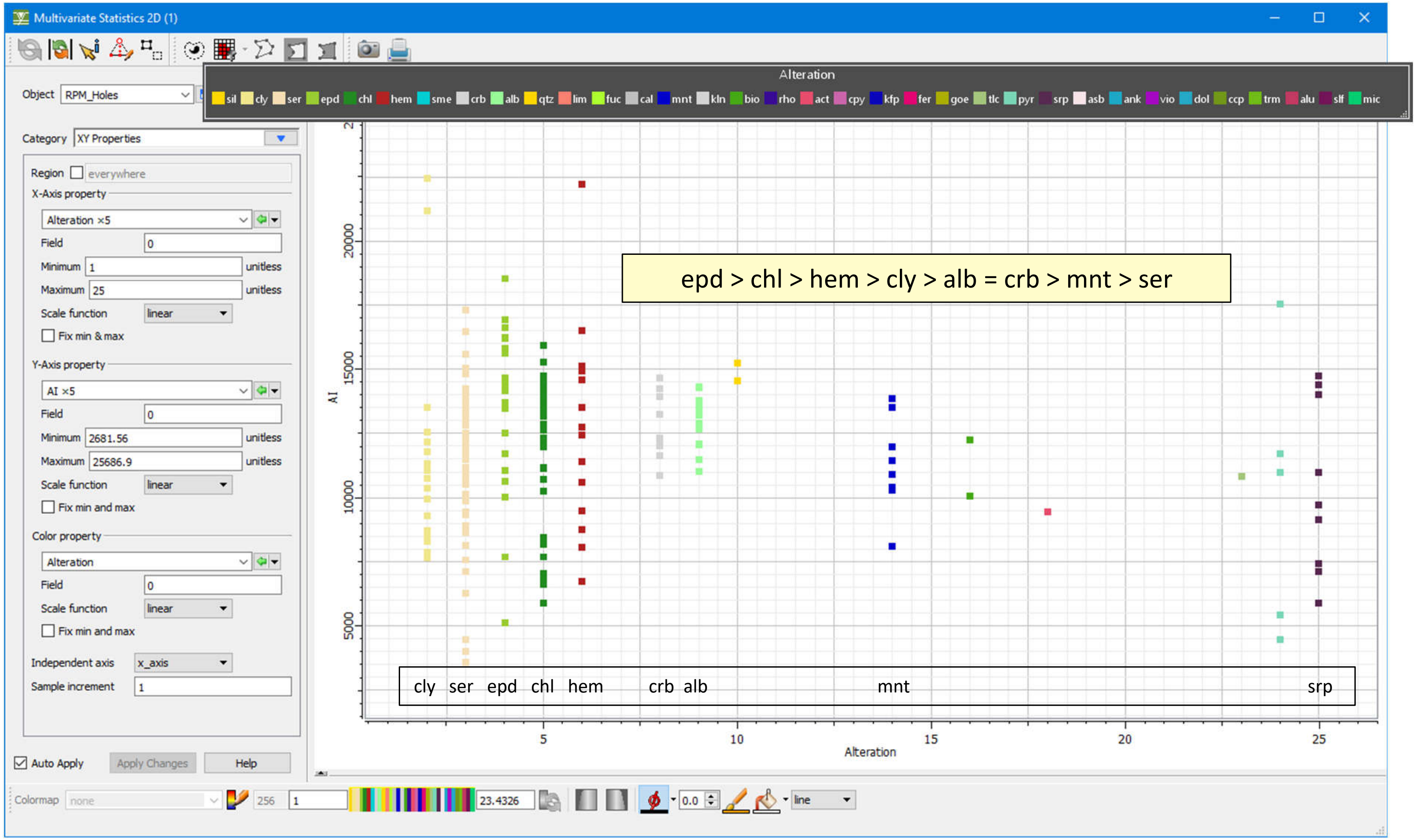
Rock Properties: Alteration vs Lithology

- Acoustic Impedance (AI) is influenced more by alteration than lithology.
- The effects of alteration on AI are variable and dependent on the lithology being altered.
- Horizontal reflections are likely to be caused by alteration.
- Dipping reflections are likely to have resulted from host lithologies.
- (SMD049 not shown in this plot)



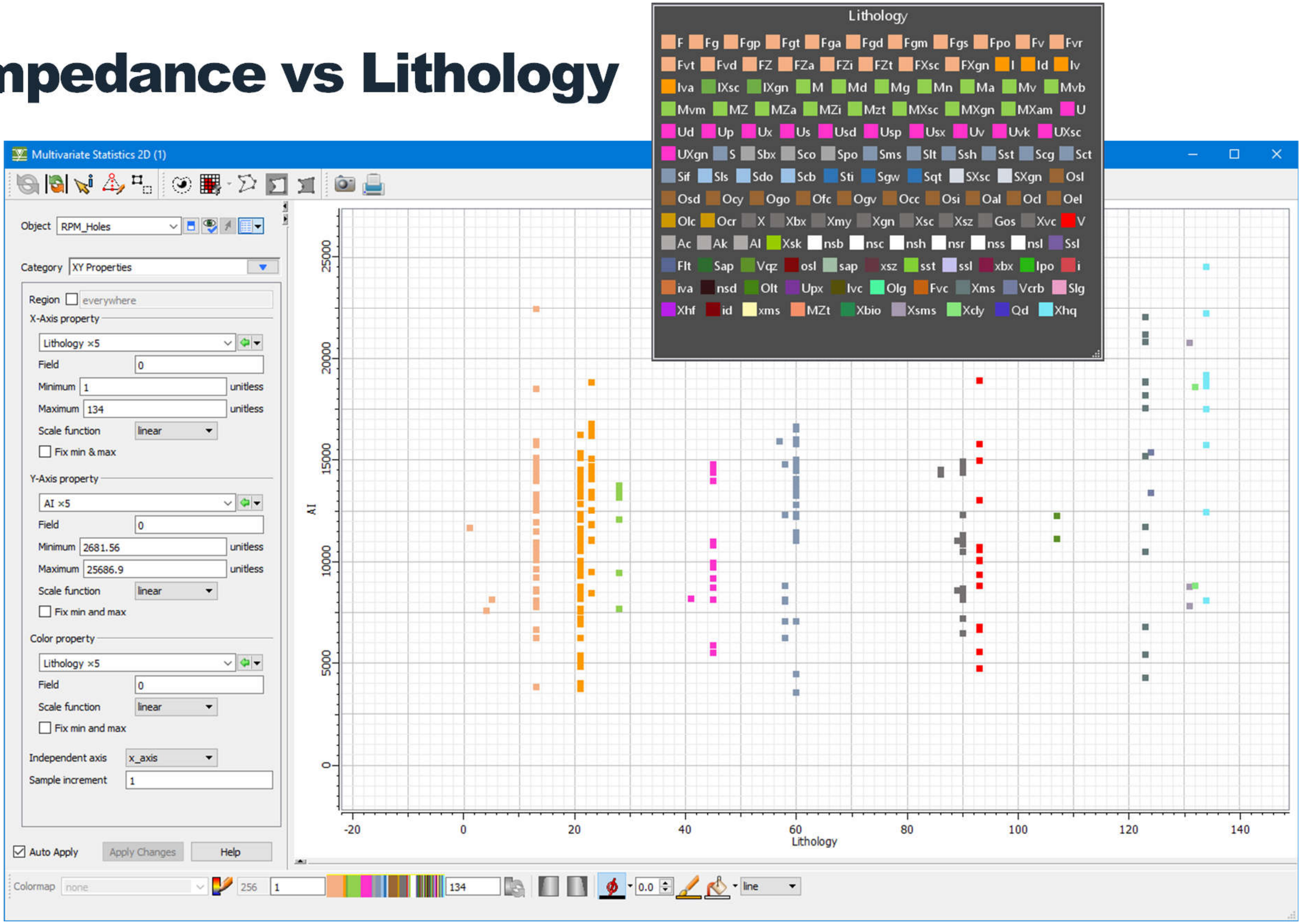
Acoustic Impedance vs Alteration

- Of the available data, AI shows the strongest correlation with alteration.



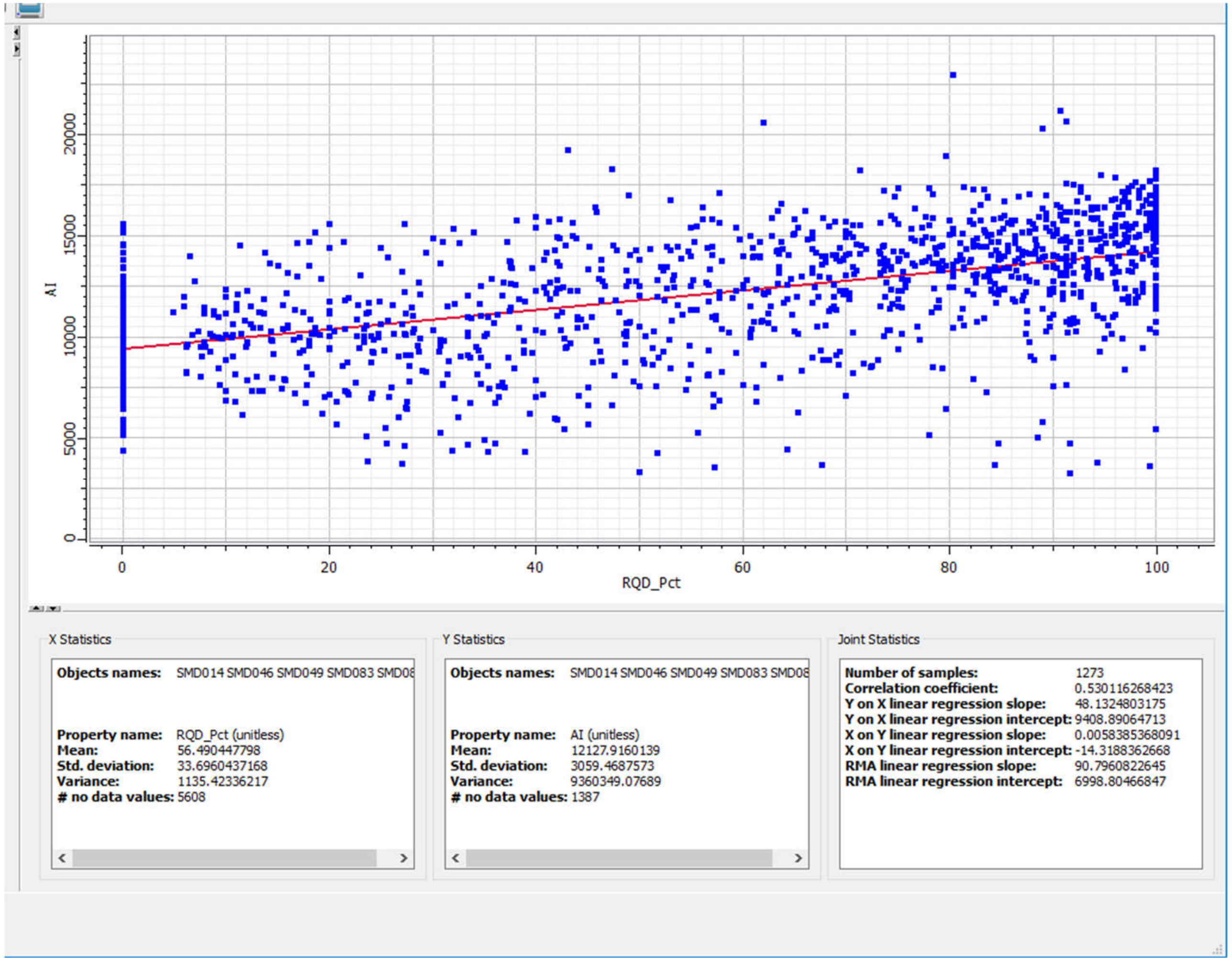
Acoustic Impedance vs Lithology

- Lithologies display a large spread of AI values
- AI values overlap too much to be diagnostic.



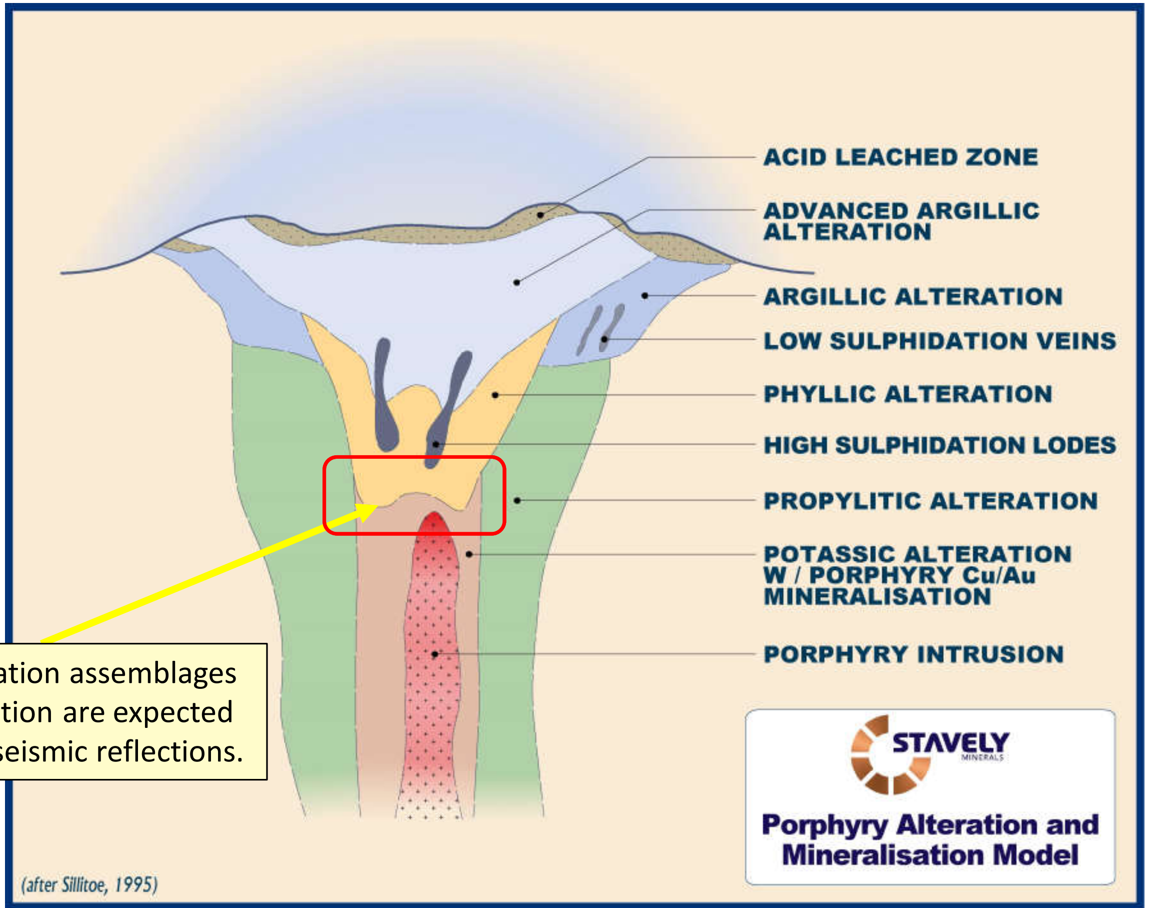
Acoustic Impedance vs RQD

- Loose correlation between RQD and AI (0.53)
- Correlation is not strong enough to be predictive (i.e. brittle structures may not act as reflectors here.)



Idealised Porphyry Copper Deposit

- Stavely Minerals is using the model proposed by Sillitoe (1995) as the basis for exploration at this prospect.
- In this model, vertical zonation of the alteration assemblages provides approximately horizontal interfaces of some alteration fronts.
- Rock property measurements predict these will act as seismic reflectors.



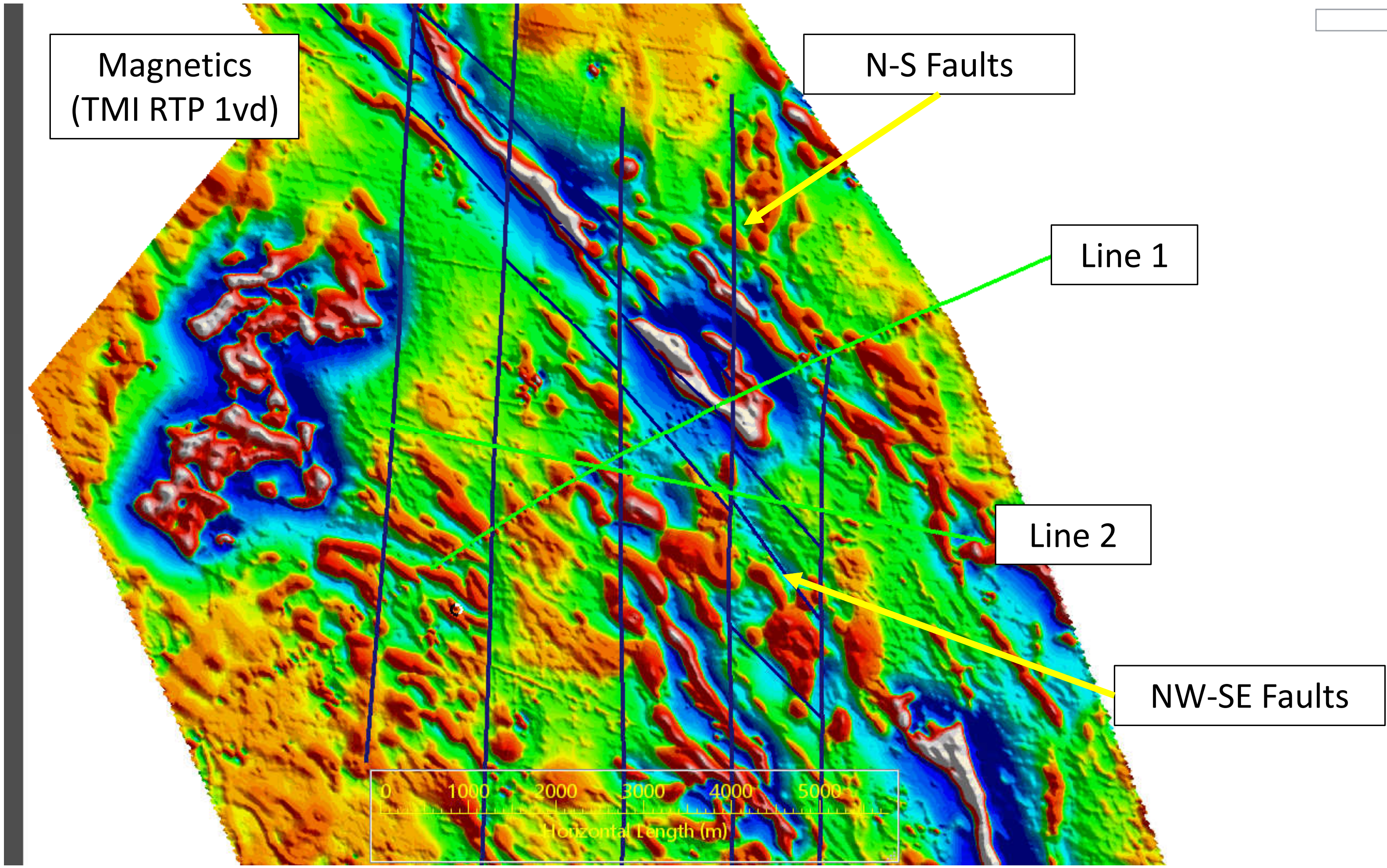
These alteration assemblages in juxtaposition are expected to produce seismic reflections.

(Figure supplied by Stavely Minerals)

Interpreted Models

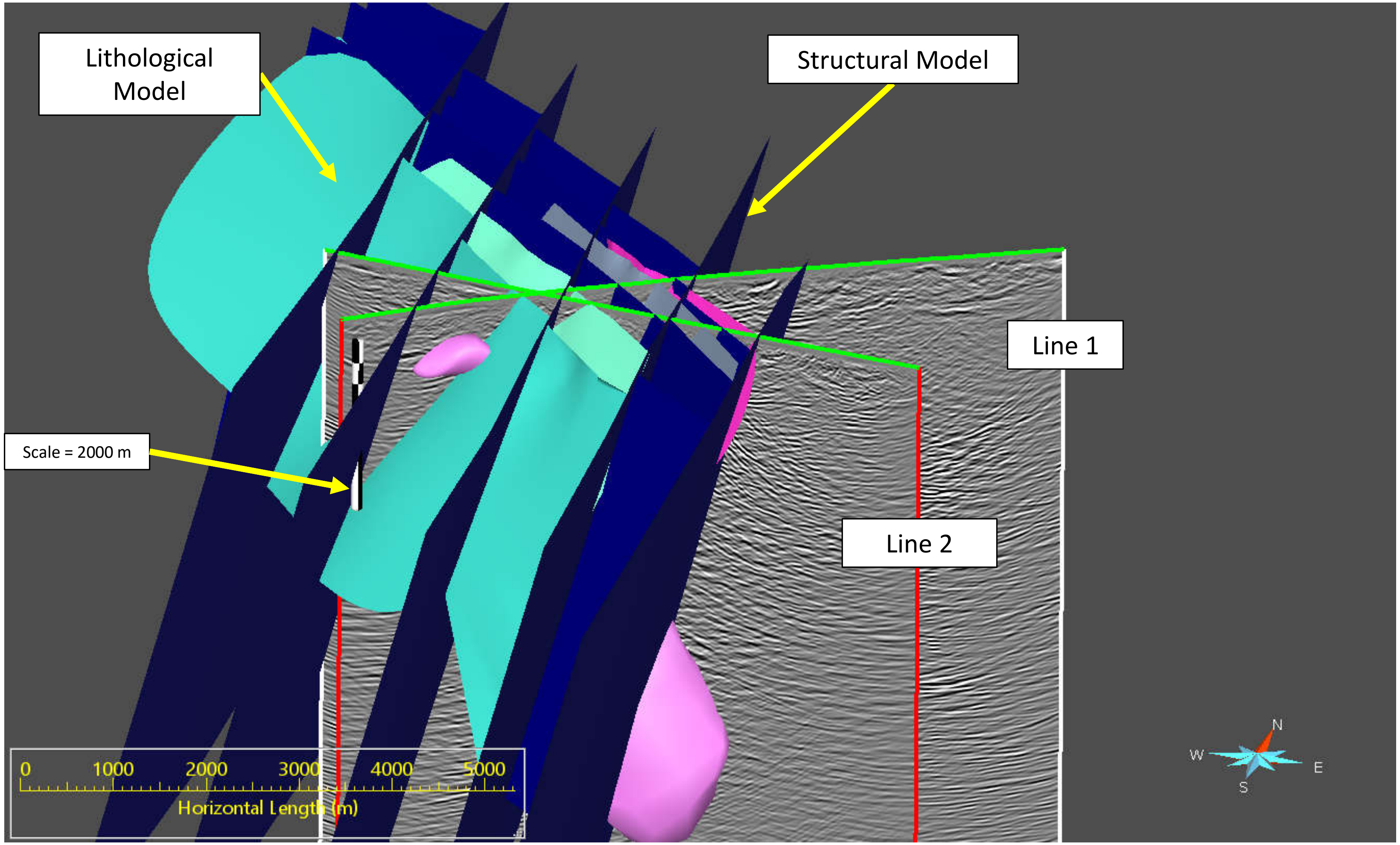
- A conceptual structural and lithological model was produced based on the understanding provided by Stavely, using magnetics and seismic data.
- An alteration model was generated from the flat lying reflectors in the seismic data.
- Steeply dipping host lithologies were snapped to faint seismic reflectors. These surfaces are modelled with a shallower-than-actual dip due to the complications of modelling “off-plane events” seen in 2D seismic data.
- A separate model of intrusives and their associated alteration haloes was produced and is presented independently, since it is considered to be the mineralisation model for this project.

Magnetics (1vd), Seismic lines and Structural Model



Structural and Lithological Model Overview

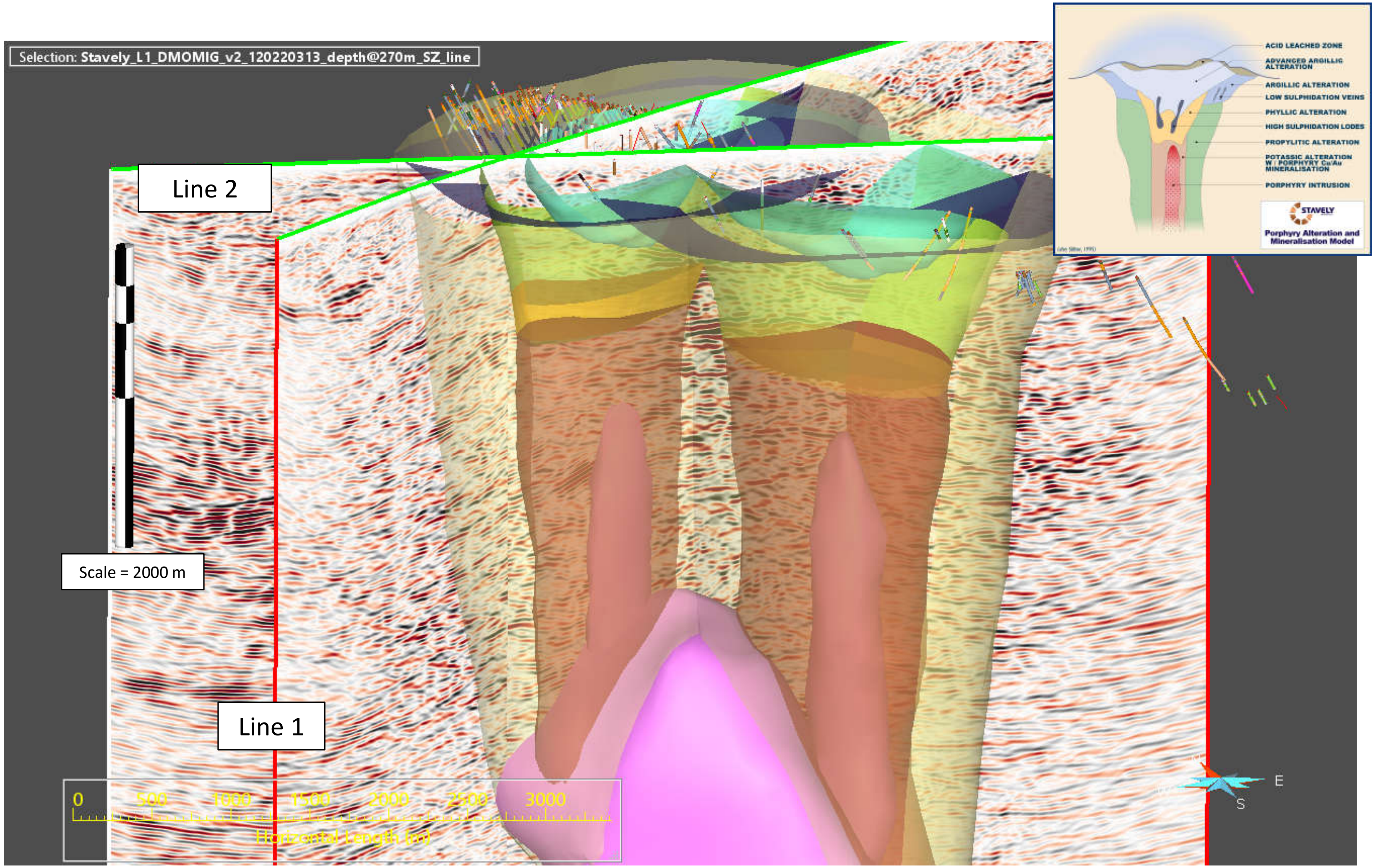
- A lithological and structural model was derived from seismic and magnetic data.
- Host lithologies (siltstones and sandstones) are modelled at a shallower dip than actual.
- They are presenting in the seismic data as "off-plane events" due to the oblique intersecting angles of strike and acquisition orientation and thus the apparent dip is less than true dip.



Interpreted Alteration Surfaces

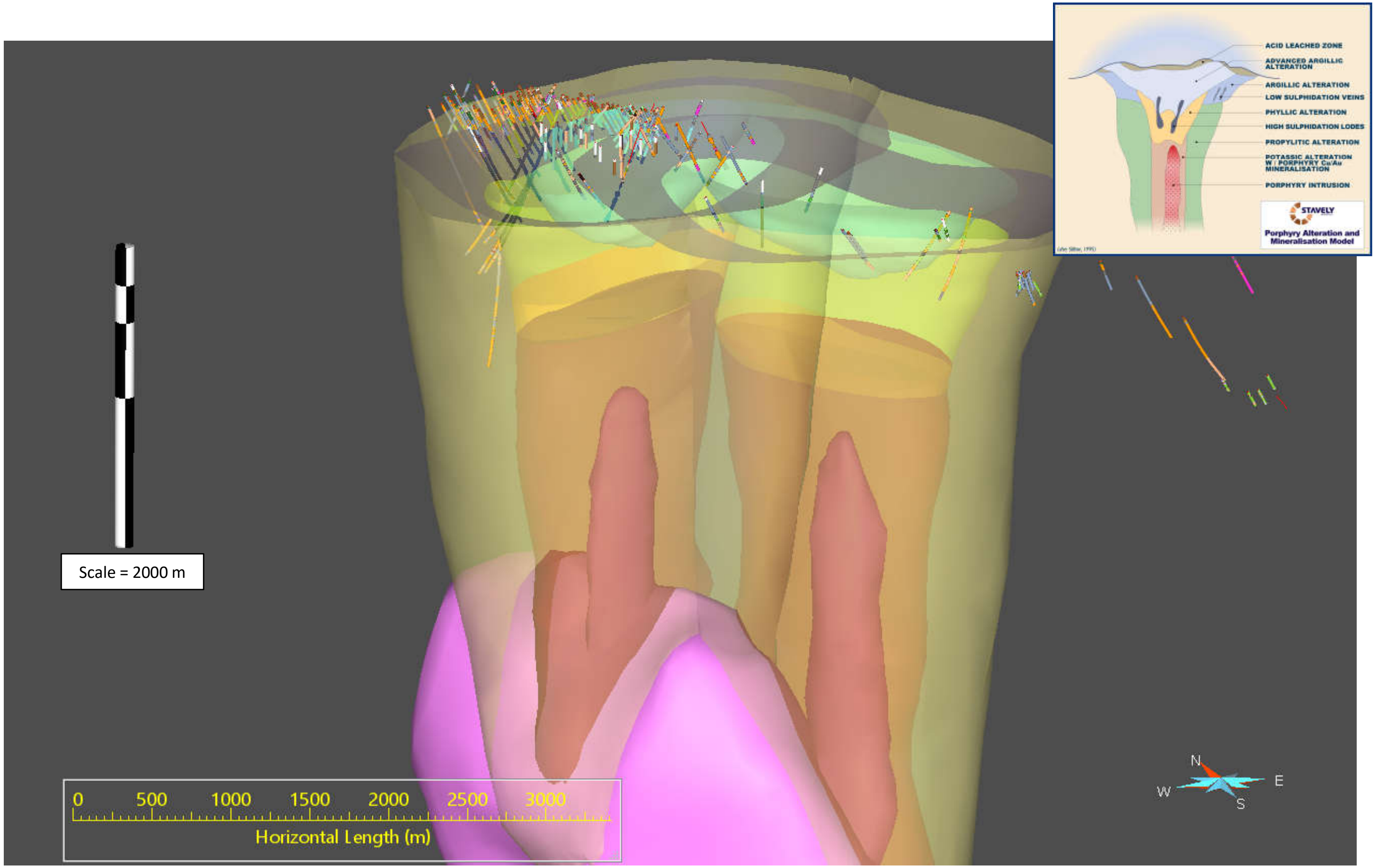
- This model of porphyry intrusives and their associated alteration haloes is presented independently of the host lithologies for the sake of clarity, since it is considered to be the mineralisation model for this project
- Seismic data supports the presence of two porphyry intrusions separated spatially by about 1400m.
- The northern porphyry is proposed to have been emplaced later, with its alteration halo overprinting that of the southern porphyry

Inset: Sillitoe schematic model, 1995.



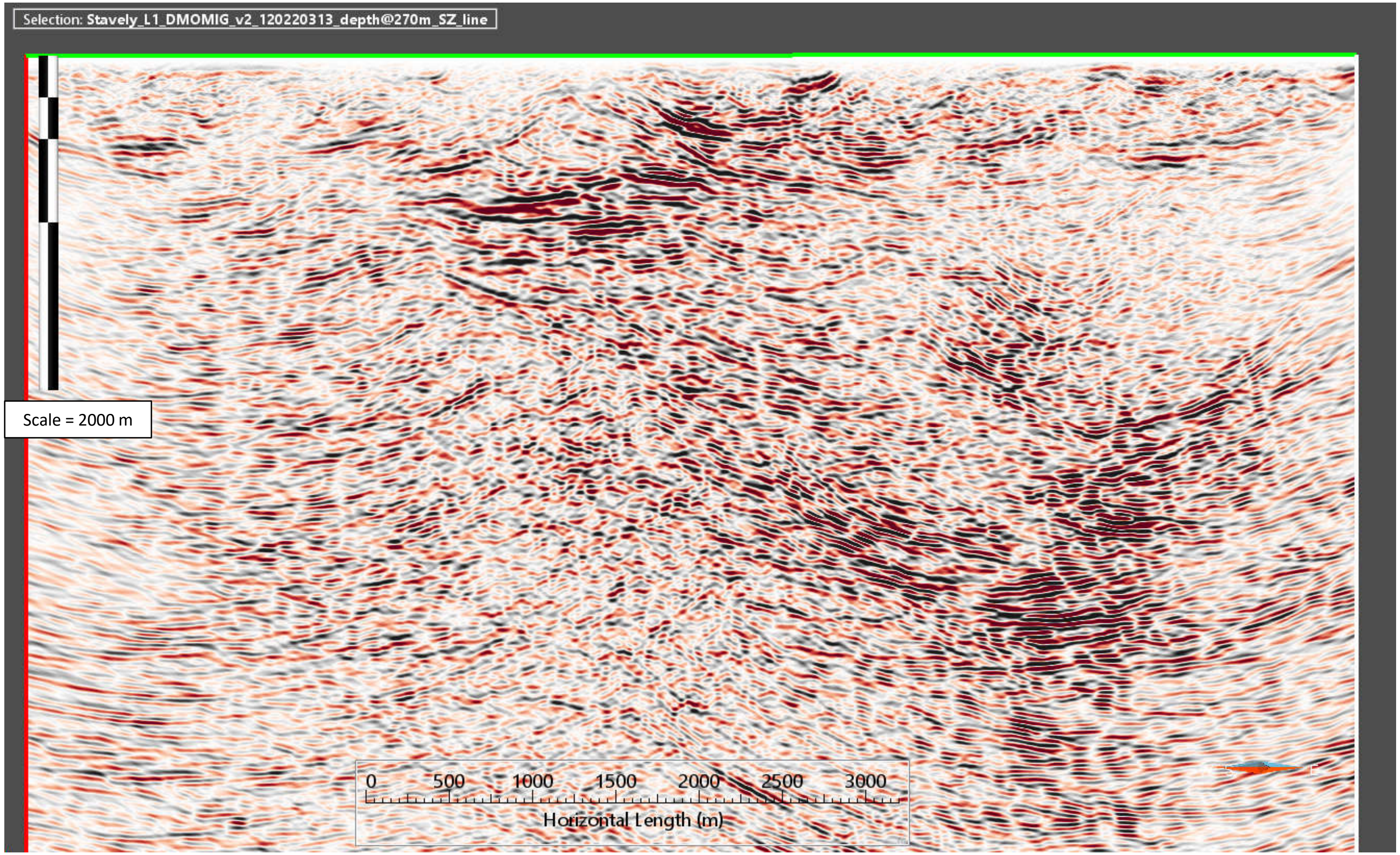
Interpreted Alteration Surfaces (*sans* seismic lines)

- This model of porphyry intrusives and their associated alteration haloes is presented independently of the host lithologies for the sake of clarity, since it is considered to be the mineralisation model for this project
- Seismic data supports the presence of two porphyry intrusions separated spatially by about 1400m.
- The northern porphyry is proposed to have been emplaced later, with its alteration halo overprinting that of the southern porphyry
- Inset: Sillitoe schematic model, 1995.



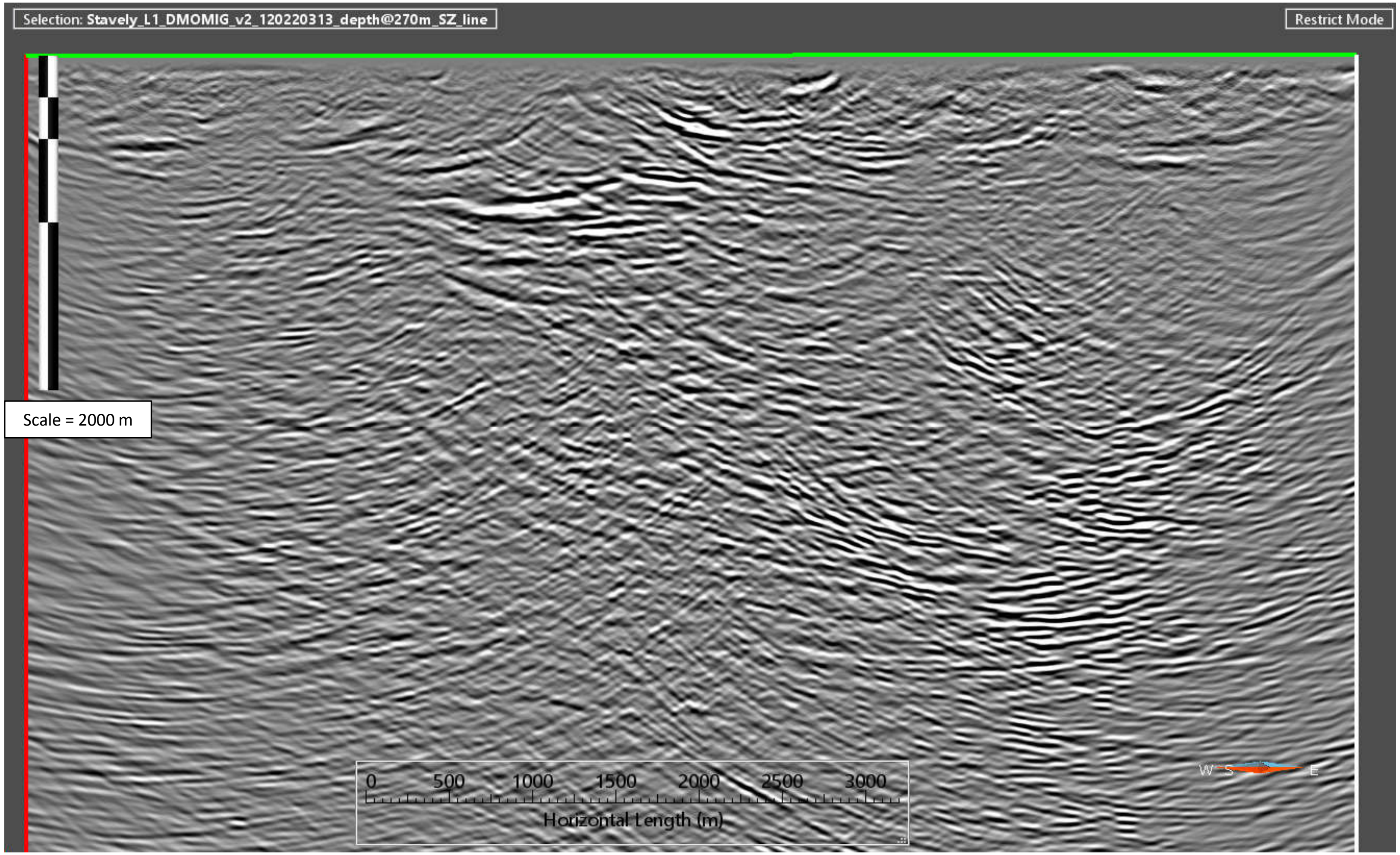
Line 1 (DMOMIG)

- Line 1 has excellent reflectivity throughout.
- The preponderance of horizontal reflectivity is interpreted to be due to overprinting by alteration rather than caused by lithological contacts



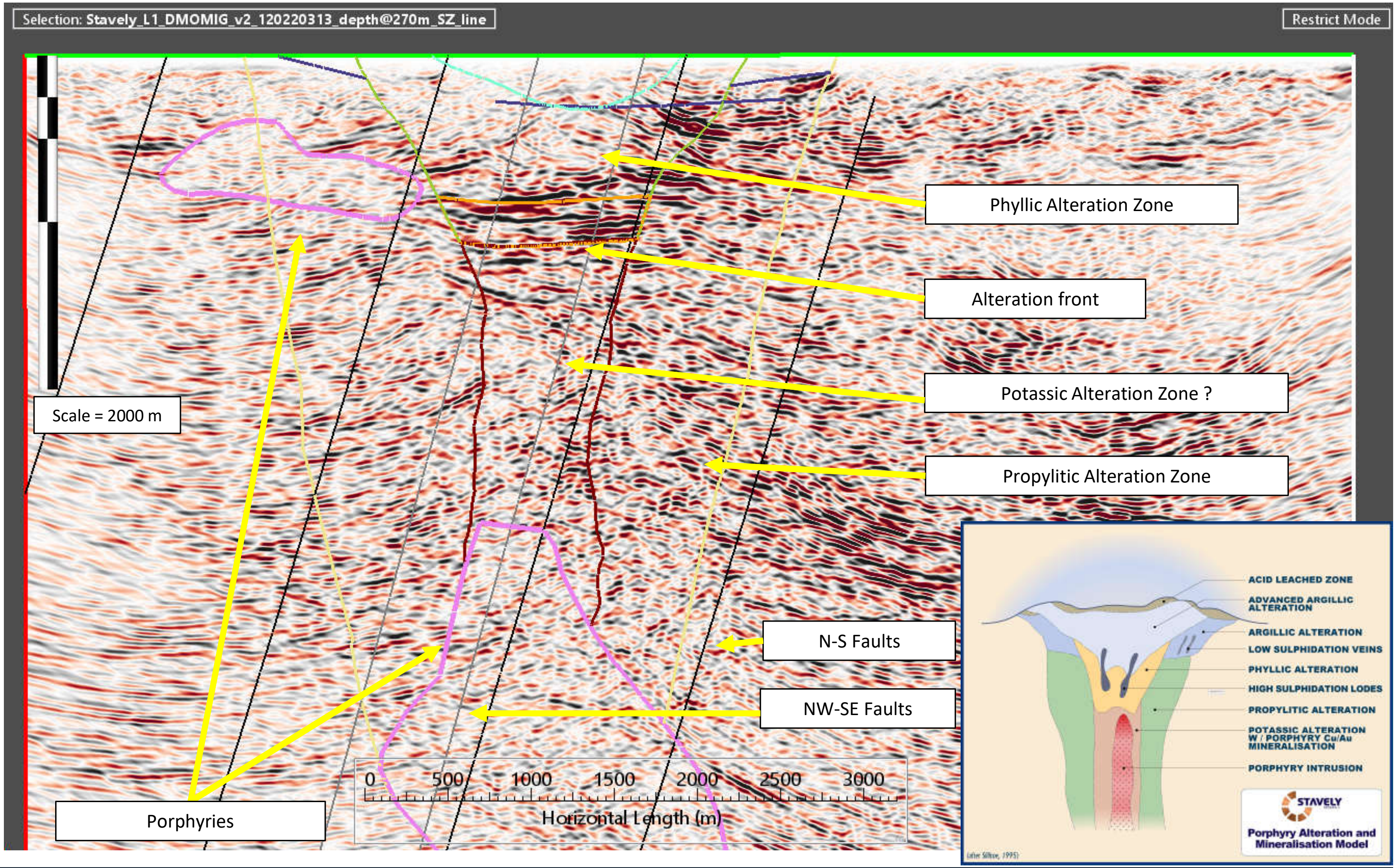
Line 1 (DMOMIG) (Grey scale)

- Line 1 has excellent reflectivity throughout.
- The preponderance of horizontal reflectivity is interpreted to be due to overprinting by alteration rather than caused by lithological contacts
- Grey scale reveals details not seen in the colour image. Otherwise, the data shown is exactly the same as in the previous image.



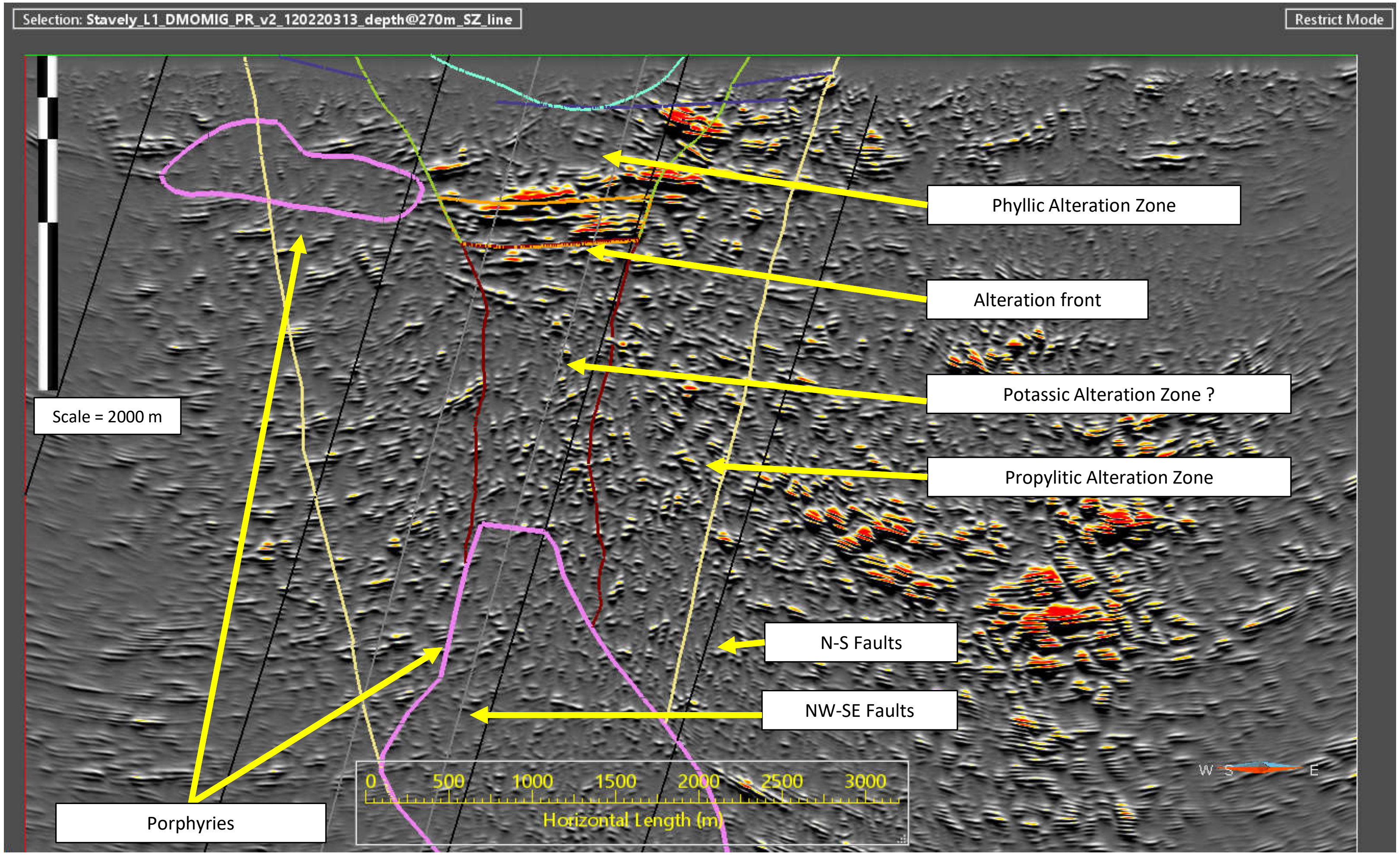
Line 1 (DMOMIG) with Alteration and Structural Model

- Line 1 shows characteristics supporting the mineralisation model used by Stavely (after Sillitoe, 1995, shown bottom right)
- Taking into account rock property measurements from core samples, HiSeis interprets the strong horizontal reflectivity to be derived from an alteration front between potassic and phyllic alteration zones.
- There is potential for the enhanced reflectivity to be indicative of increased density in addition to increased seismic velocity, perhaps indicating the presence of sulphides.



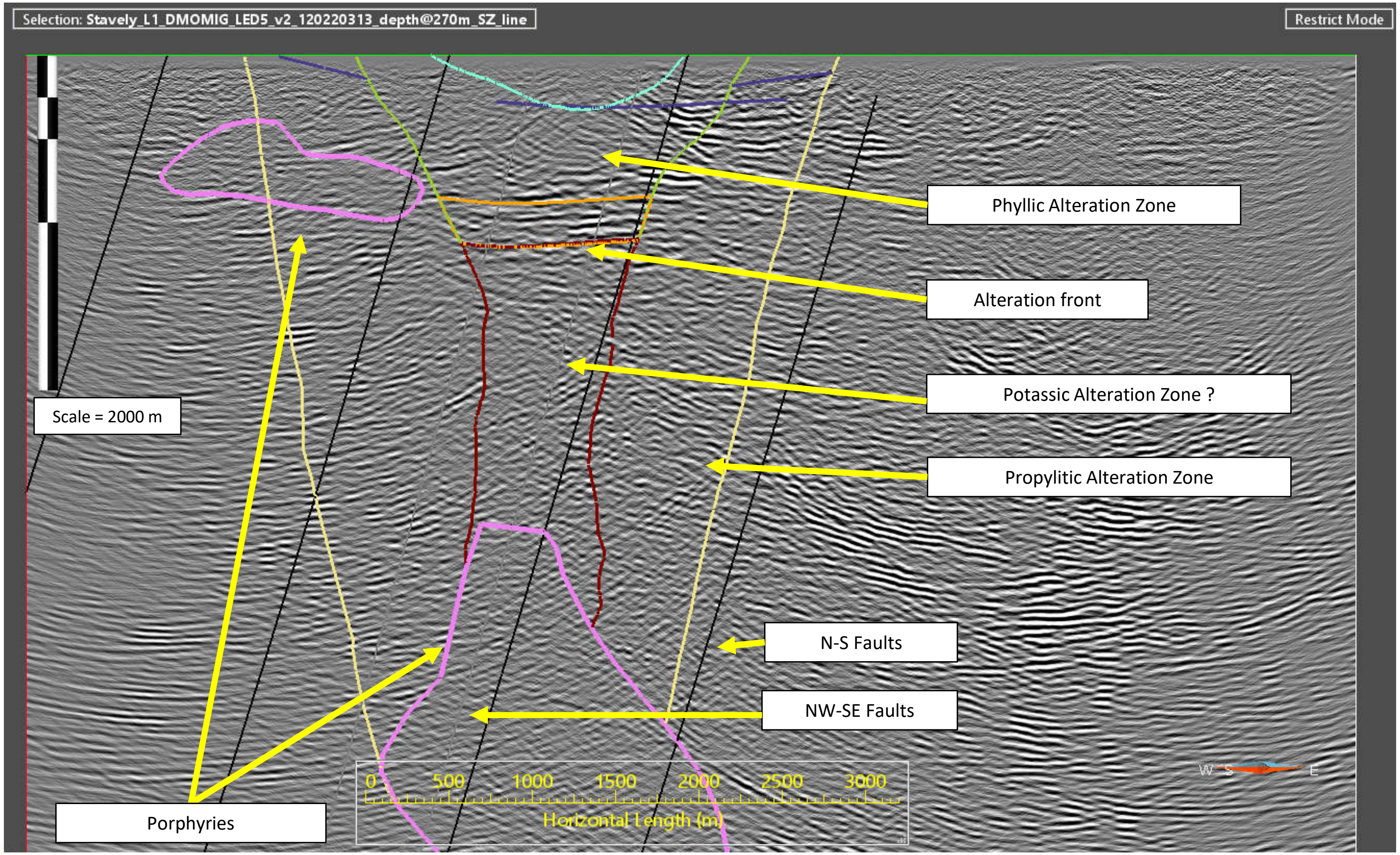
Line 1 (Pseudo Relief) with Alteration and Structural Model

- Pseudo Relief attribute highlighting high amplitude reflectors and minimising lesser amplitudes.
- The attribute tends to simplify the image at the expense of some detail.
- Here, the horizontal reflections caused by the interpreted alteration front are well emphasised.



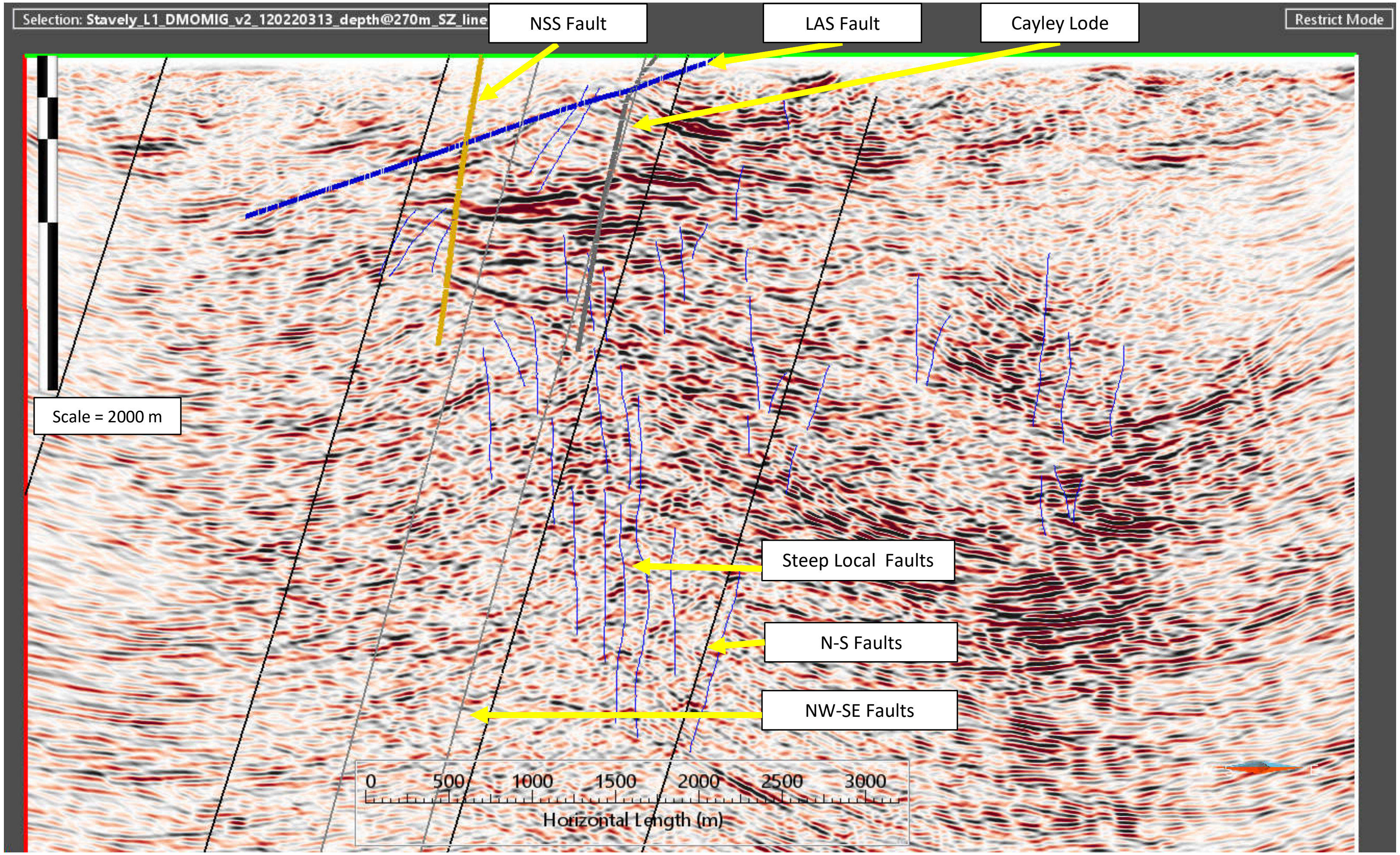
Line 1 (LED5) with Alteration and Structural Model

- The LED5 attribute (Laplacian Edge Detection) can be used for detailed line work.
- It has been of limited use in this interpretation and is included in this report for the sake of completion.



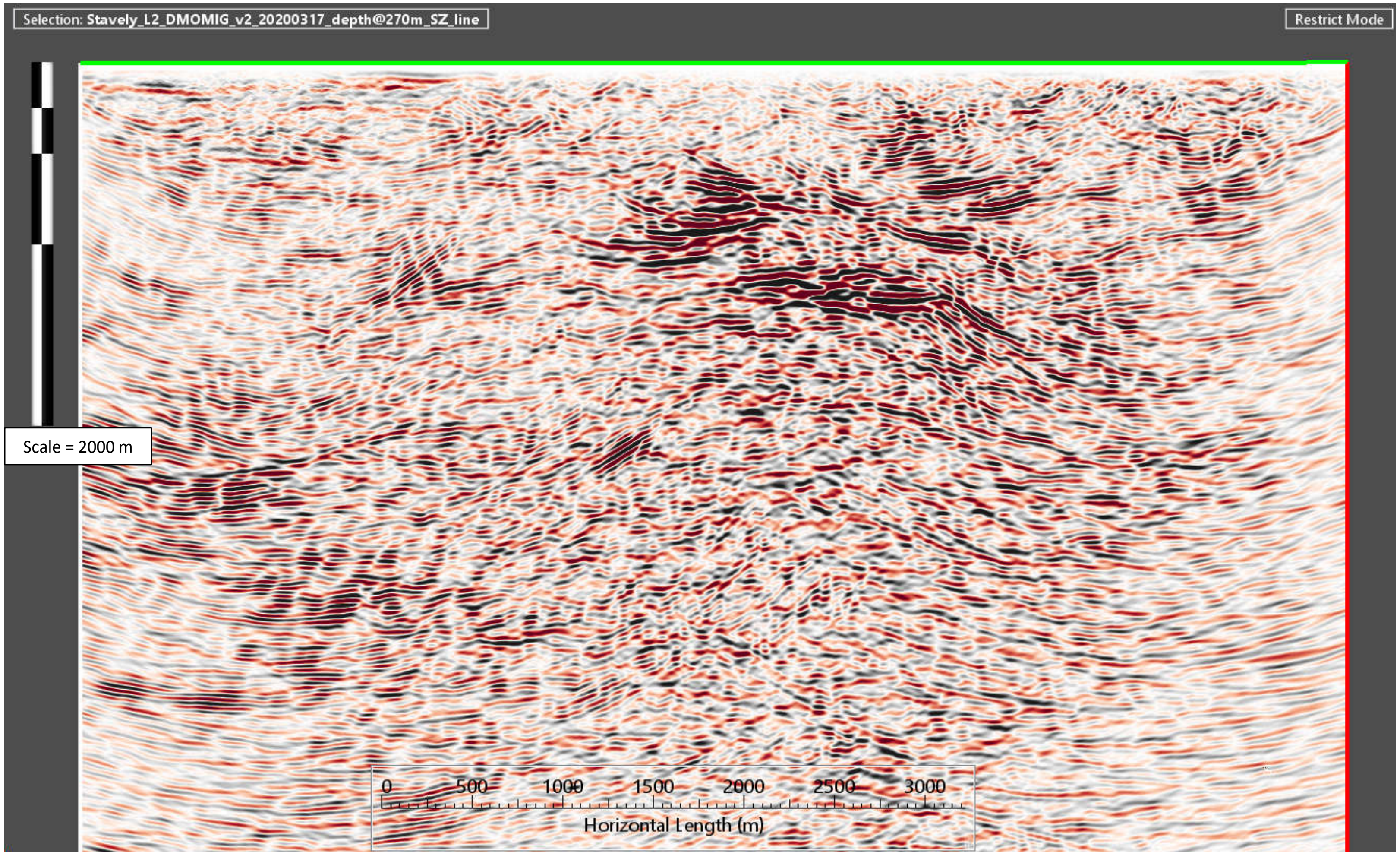
Line 1 (DMOMIG) with Stavely and HiSeis Structural Models

- The pre-existing Stavely structural model is supported by the seismic data.
- HiSeis has extended faults to depth and added further faults.
- Due to the uncertainty of spatial positioning within 2D seismic lines, only a general location of the regional faults (N-S and NW-SE Faults) has been interpreted.
- Steep local faults have been shown on this line, where reflections are disrupted and offset. These steep local faults provide an indication of localised fracturing that perhaps provides permeability, facilitating increased alteration.



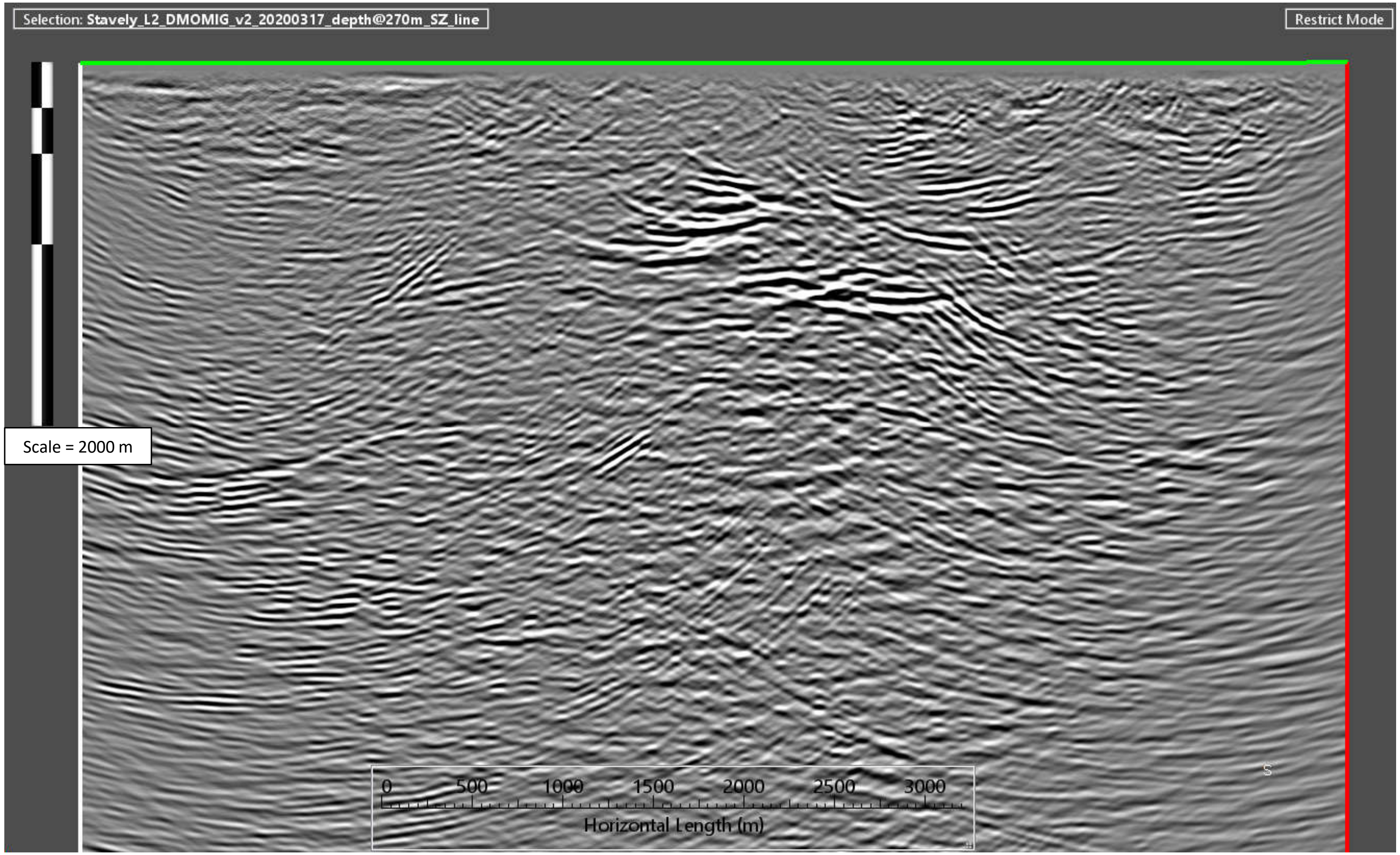
Line 2 (DMOMIG)

- In a similar manner to Line 1, Line 2 has excellent reflectivity throughout.
- The preponderance of horizontal reflectivity is interpreted to be due to overprinting by alteration rather than caused by lithological contacts



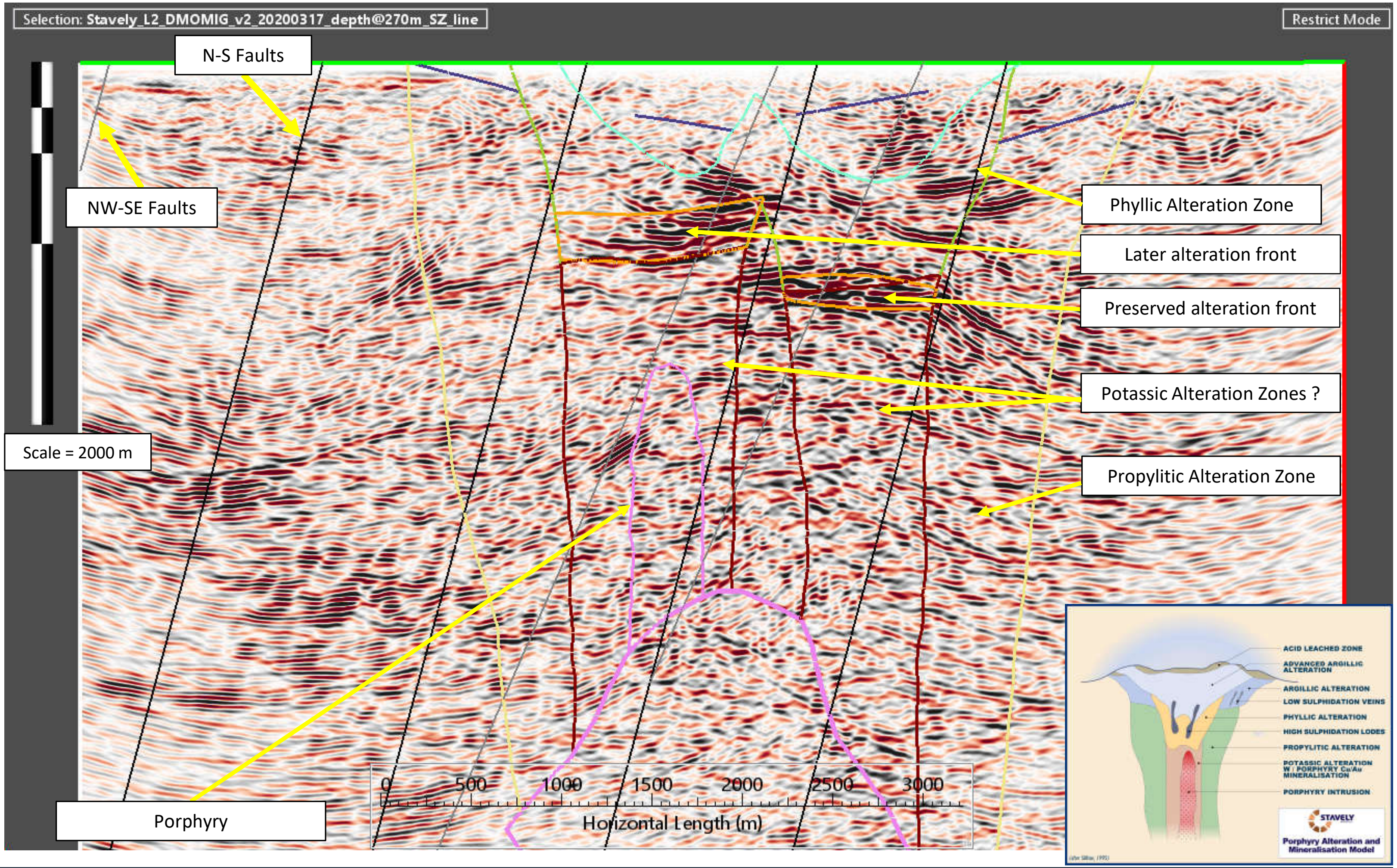
Line 2 (DMOMIG)

- Grey scale reveals details not seen in the colour image. Otherwise, the data shown is exactly the same as in the previous image.



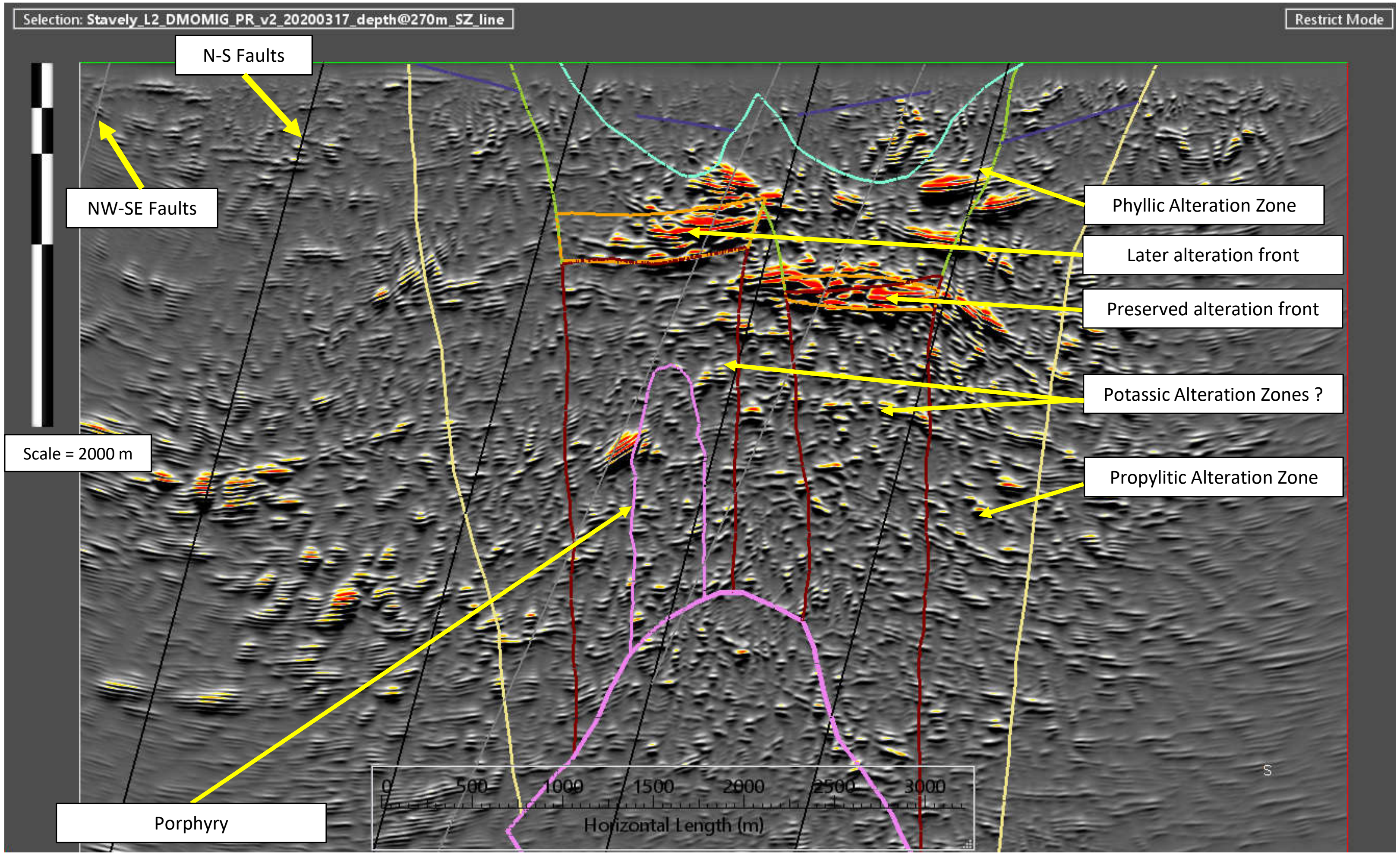
Line 2 (DMOMIG) with Alteration and Structural Model

- Line 2 also shows characteristics supporting the mineralisation model used by Stavely (after Sillitoe, 1995, shown bottom right)
- The geometries seen in line 2 indicate the presence of two intrusive events, with the (interpreted) northern event overprinting the southern event.
- The earlier horizontal potassic alteration front is preserved and shown here to be east and lower than the later front.
- This lower set of reflectors does not extend north to line 1, while the upper set is interpreted to extend north and is seen on both lines.
- As noted for line 1, there is potential for the enhanced reflectivity to be indicative of increased density in addition to increased seismic velocity, perhaps indicating the presence of sulphides.



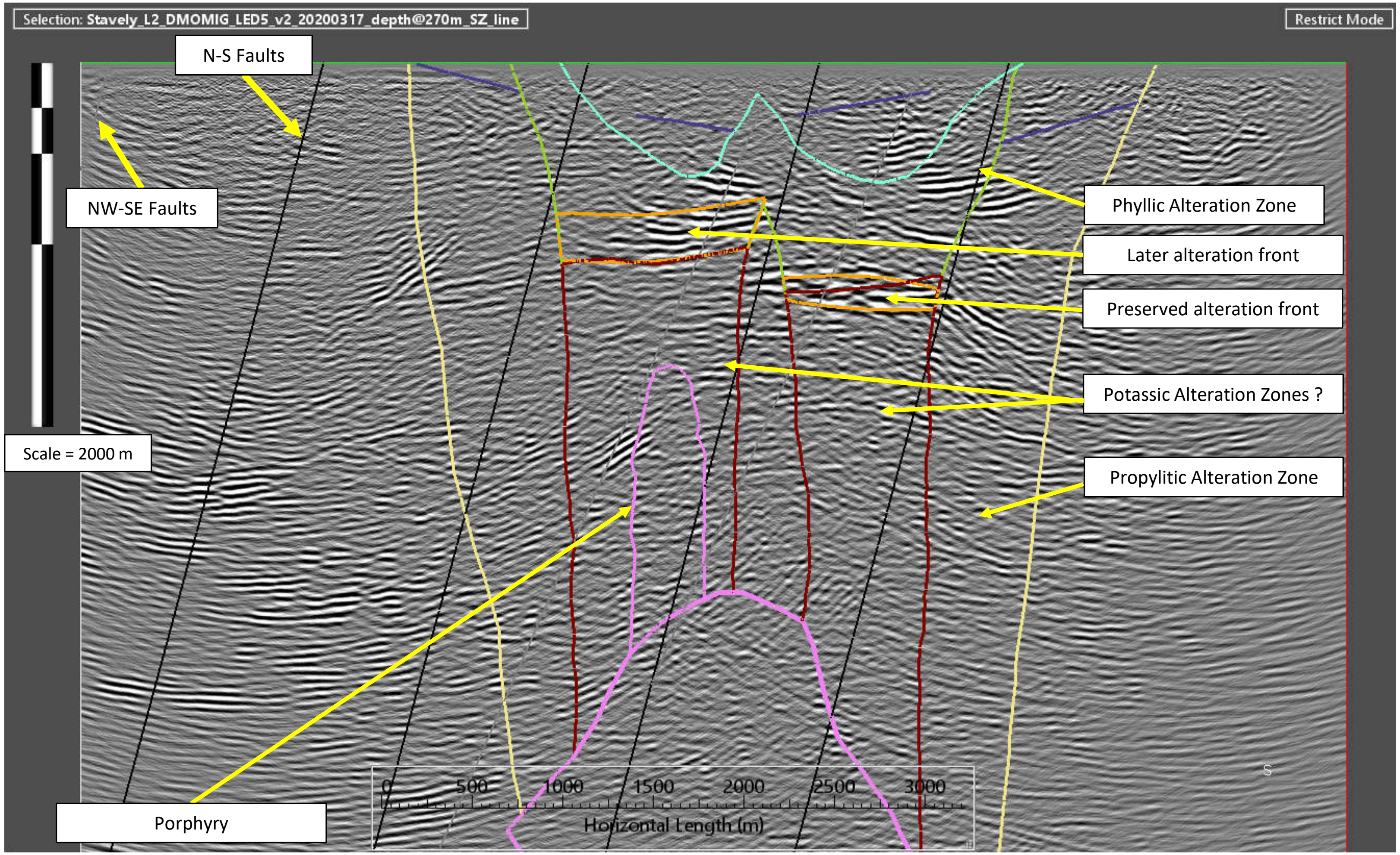
Line 2 (Pseudo Relief) with Alteration and Structural Model

- Pseudo relief attribute highlighting high amplitude reflectors and minimising lesser amplitudes.
- The attribute tends to simplify the image at the expense of some detail.
- Here, the horizontal reflections caused by the interpreted alteration front are well emphasised.



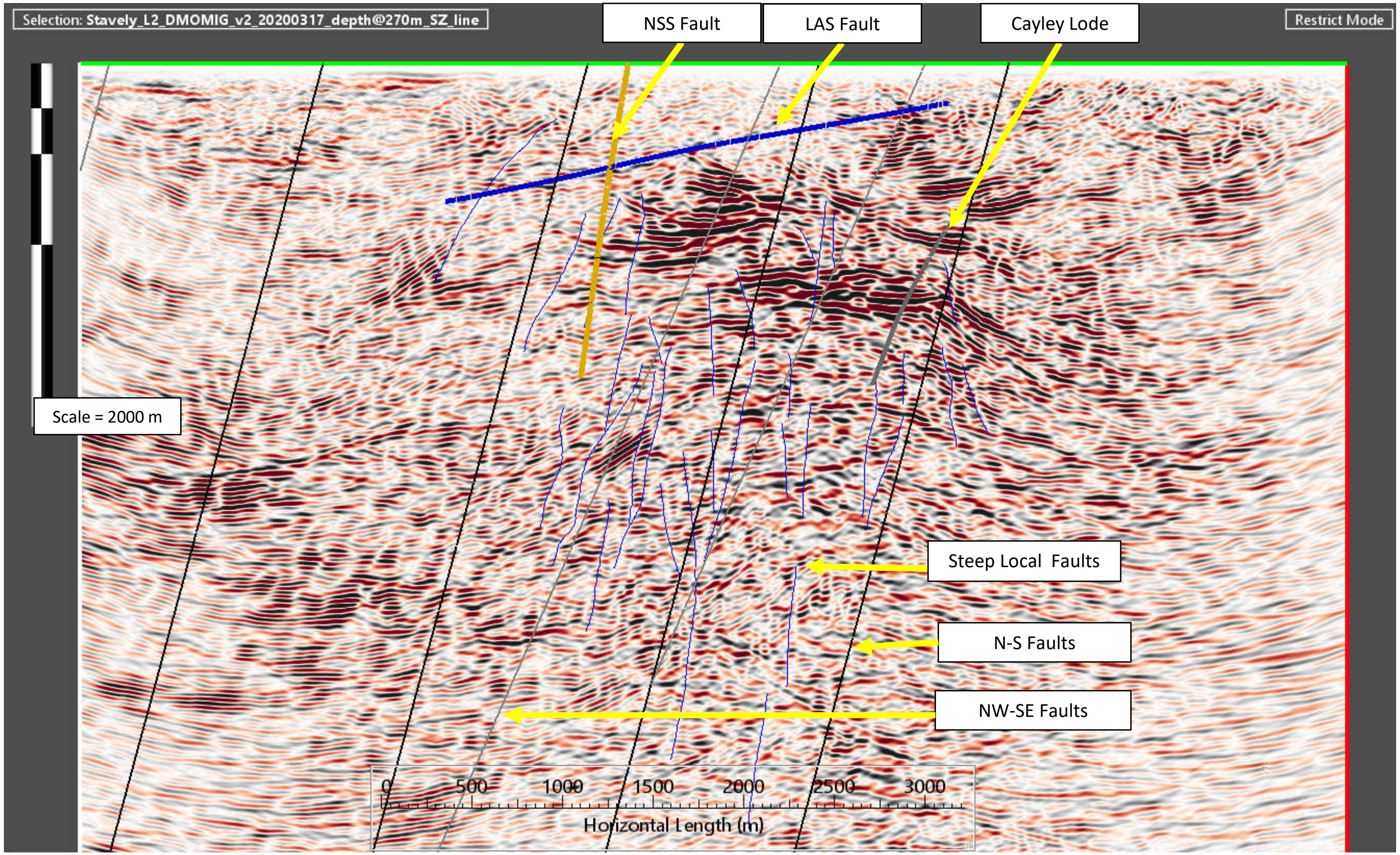
Line 2 (LED5) with Alteration and Structural Model

- The LED5 attribute (Laplacian Edge Detection) can be used for detailed line work.
- It has been of limited use in this interpretation and is included in this report for the sake of completion.



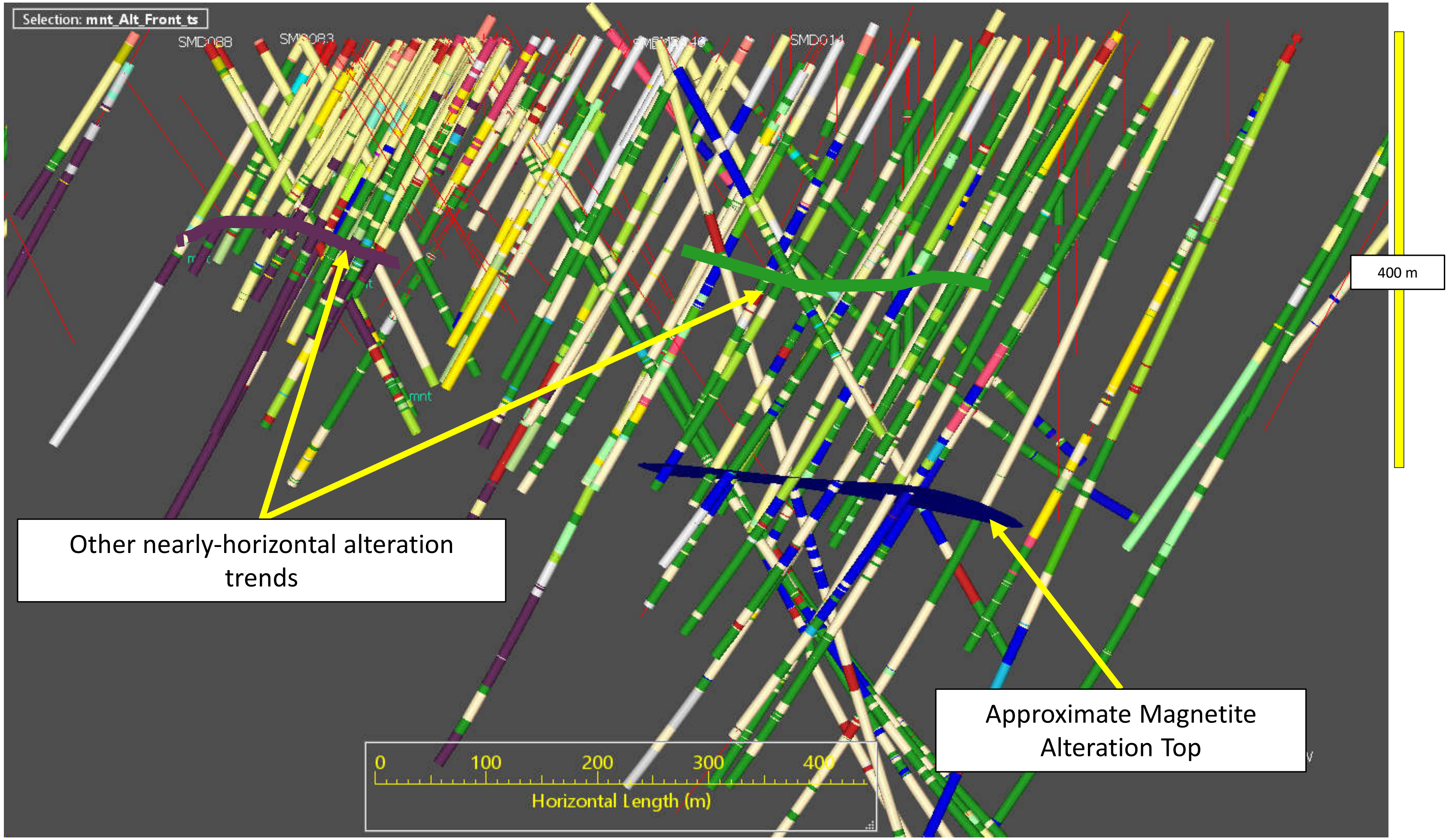
Line 2 (DMOMIG) with Stavely and HiSeis Structural Models

- As noted from Line 1, the pre-existing Stavely structural model is supported by the seismic data.
- HiSeis has extended faults to depth and added further faults.
- Due to the uncertainty of spatial positioning within 2D seismic lines, only a general location of the regional faults (N-S and NW-SE Faults) has been interpreted.
- Steep local faults have been shown on this line, where reflections are disrupted and offset. These steep local faults provide an indication of localised fracturing that perhaps provides permeability, facilitating increased alteration.



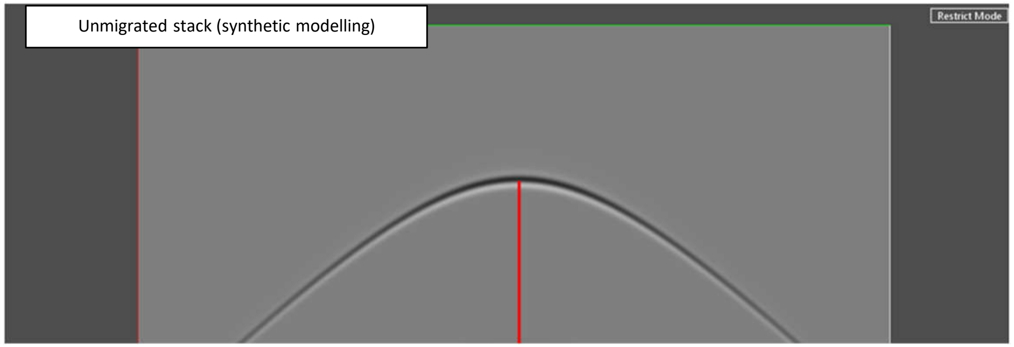
Drilling with alteration, looking SE

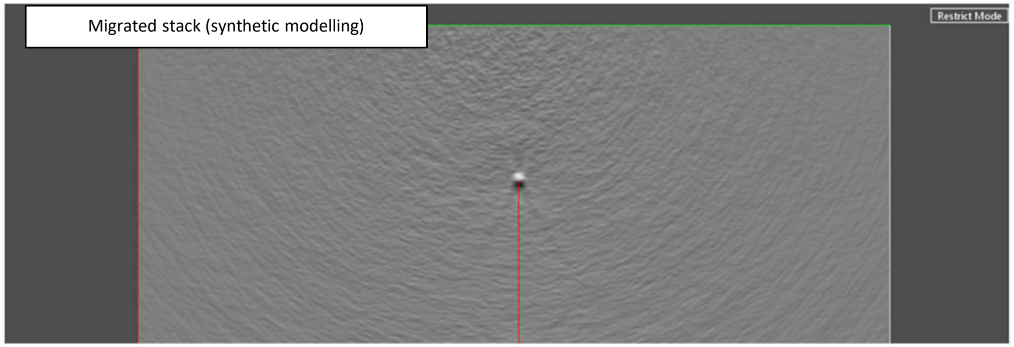
- Drilling is centred north of line 1, so only an approximate correlation with the interpreted alteration model is possible
- Drilling shows indications of horizonal zonation, but it's not a strong trend in drilling to date.



Diffraction Data: DMO stack vs DMOMIG

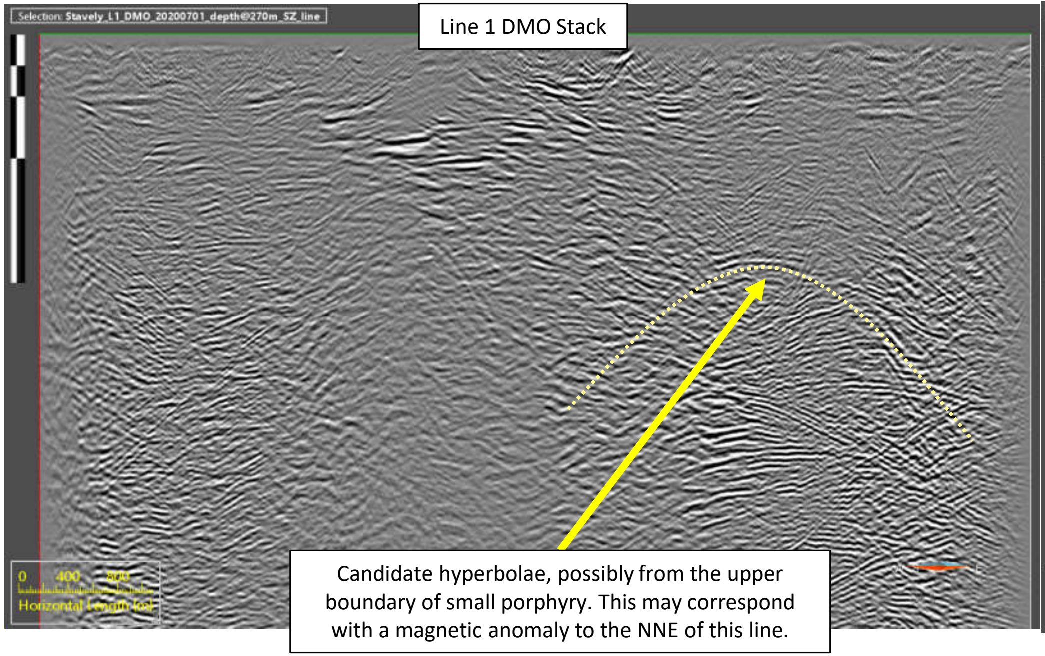
- "Migrating" seismic reflection data is usually carried out to reposition reflections into their "correct" spatial position.
- Migrated reflections will move up-dip, steepen and become shorter.
- "Point sources" of reflection - as we expect from the caps of vertical, narrow porhyritic intrusions - will appear as hyperbolae in the DMO stack. After migration, they manifest as small discontinuous reflections of high amplitude and may be visually hidden amongst other, more linear reflections in the final migrated data sets.
- However, the original hyperbolae in the unmigrated stacks are somewhat easier to identify.

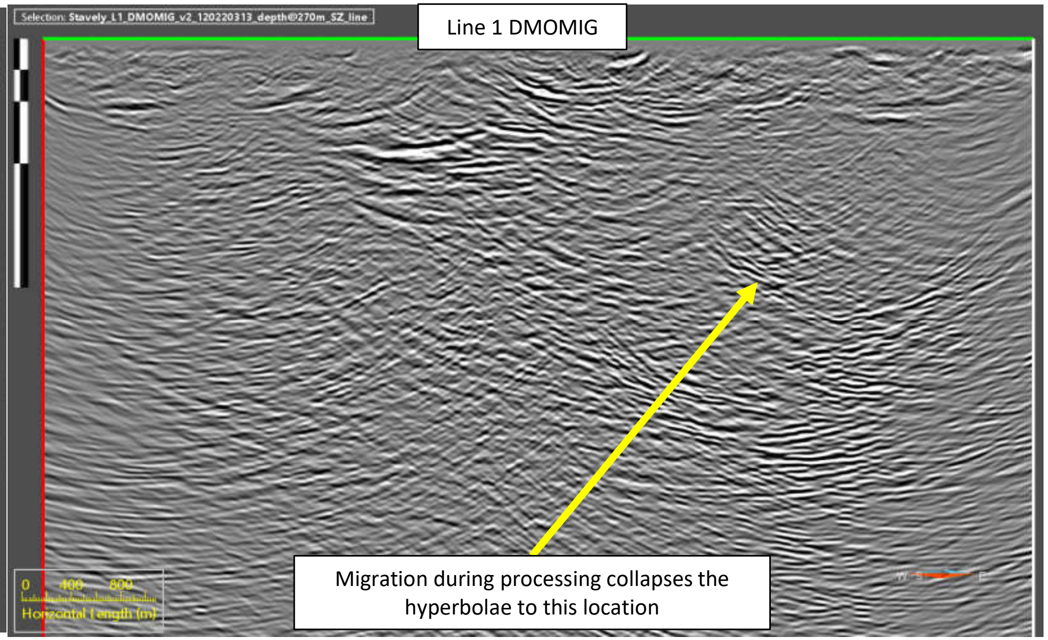




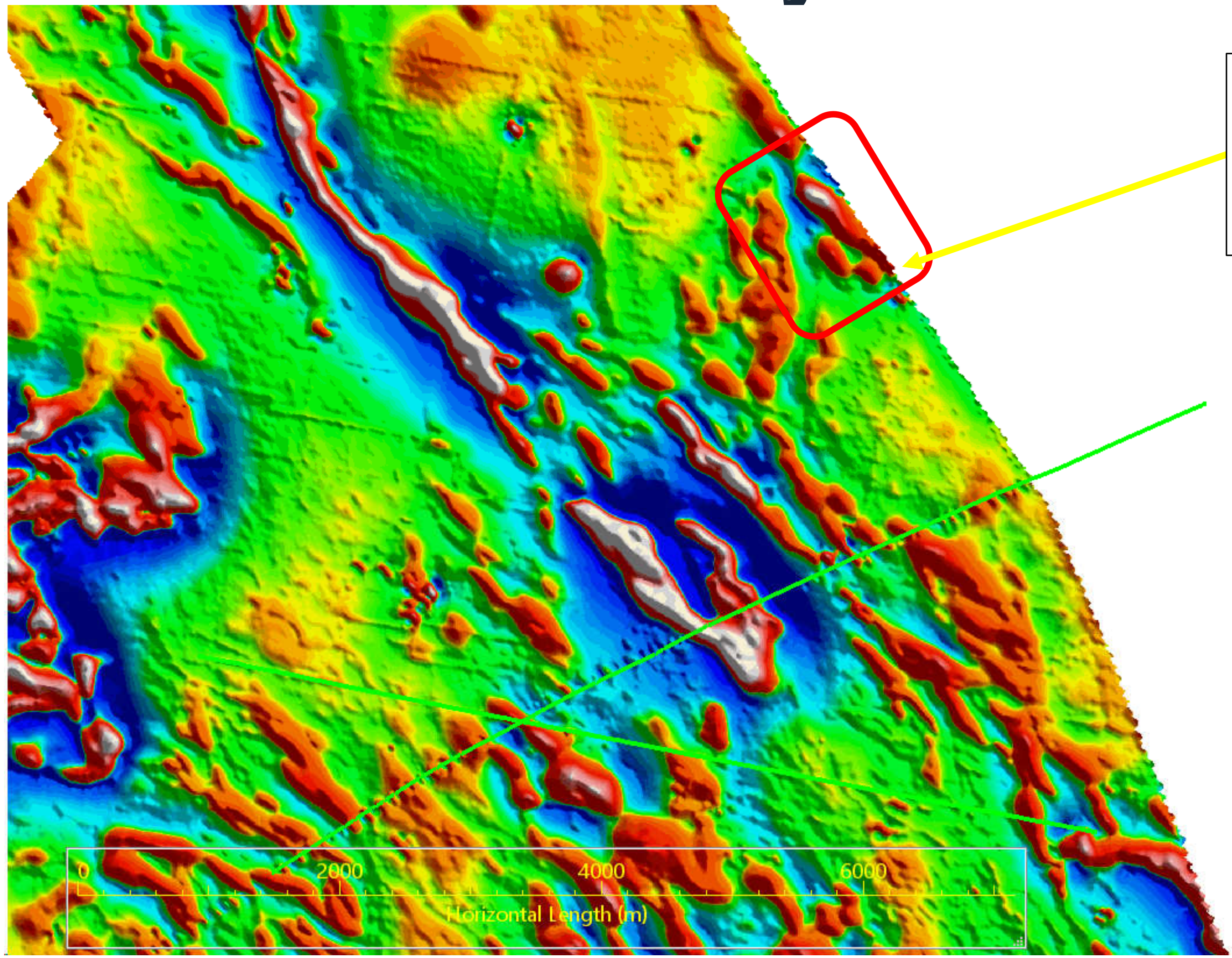
Line 1: DMO Stack vs DMOMIG

- One strong candidate for a reflective “cap” of a porphyry is seen in the DMO stack of Line 1.
- The location of the migrated reflection has an apparent depth of 1780 metres below surface.
- The true depth of the reflector is shallower if the reflector is off the plane of the seismic section.
- HiSeis speculates the cause of this diffraction signature may be related to a magnetic anomaly situated 2400 metres NNE of Line 1. This distance corresponds with the approximate depth of the diffraction hyperbola.





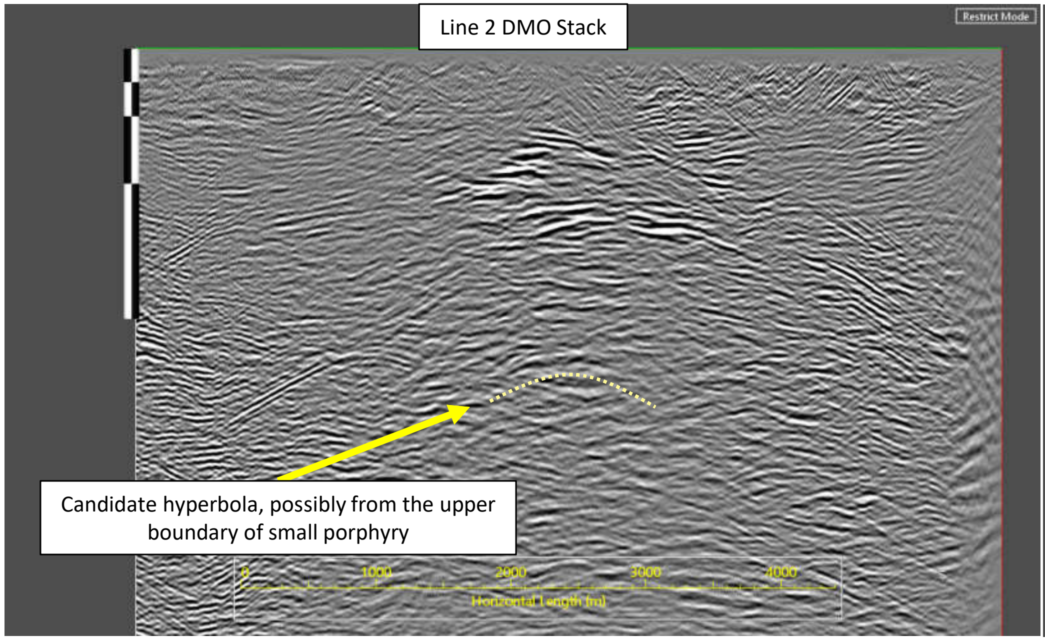
Possible Diffraction Anomaly Location.

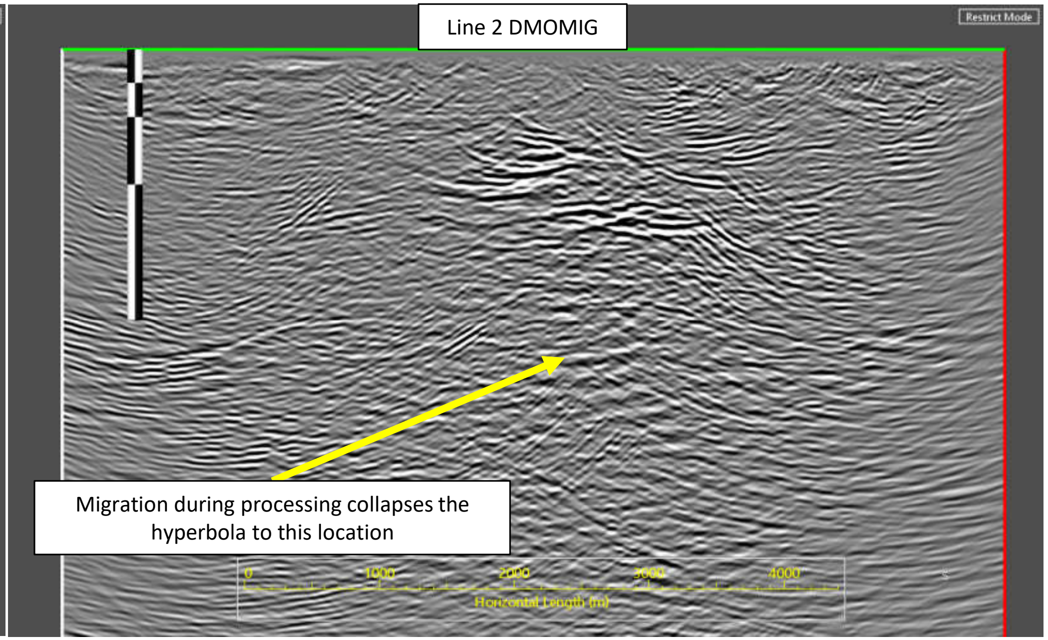


A magnetic anomaly may correspond with the diffraction signature seen in Line 1.

Line 2: DMO Stack vs DMOMIG

- One possible (weak) candidate for a reflective “cap” of a porphyry is seen in the DMO stack of Line 2.
- The location of the migrated reflection has an apparent depth of 2150 metres below surface.
- The true depth of the reflector is shallower if the reflector is off the plane of the seismic section.
- HiSeis is not able to speculate on the cause of this diffraction signature.





Conclusions

- Mineralisation at Thursday's Gossan is thought to be analogous with the Magma mineral system associated with the Resolution Porphyry, Arizona, USA, in which rapidly rising hot fluids sourced from porphyries occupied steep structures and formed economic deposits of metal sulphides. (Reference: *Pers Comms* – Chris Cairns, Stavely Minerals)
- Such mineral systems typically exhibit zonation of alteration minerals.
- Rock property measurements completed at Thursday's Gossan indicate the alteration has sufficient impact on acoustic impedance to produce reflectivity in the seismic surveys.
- HiSeis has interpreted strong horizontal reflections in both seismic lines to be indicative of alteration zonation from two intrusive events, most likely to be the boundary between phyllic and potassic alteration assemblages.
- Planned drilling is expected to test these locations in the system and thus inform the seismic interpretation. We expect a more complete interpretation can be completed after drilling.

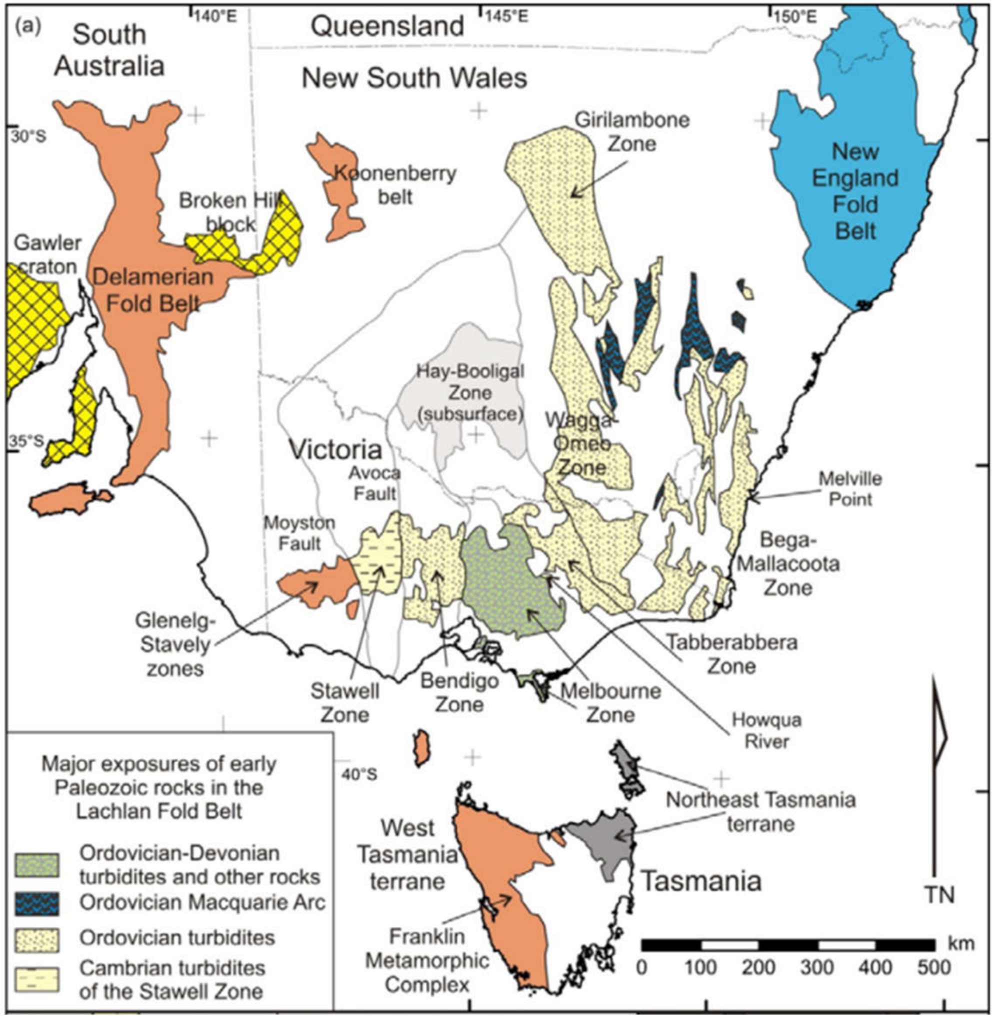
References

- Fergusson, C. L., Nutman, A. P., Kamiichi, T. & Hidaka, H. (2013). Evolution of a Cambrian active continental margin: the Delamerian-Lachlan connection in southeastern Australia from a zircon perspective. Gondwana Research, 24 (3-4), 1051-1066.
- Schofield, A. (ed.) 2018. Regional geology and mineral systems of the Stavely Arc, western Victoria. Record 2018/02. Geoscience Australia, Canberra.

Appendix 1: Background Information

Regional Context

- Stavely zone located on the eastern margin of the Cambrian Delamerian Fold Belt
- Cambrian aged fault bounded belts of calc-alkaline volcanics – Mt Stavely Volcanics (520-500Ma) = Stavely Arc
- Belts of volcanic rocks separated by panels of Cambrian sedimentary rocks of the Nargoon Group and Glenthompson Sandstone.

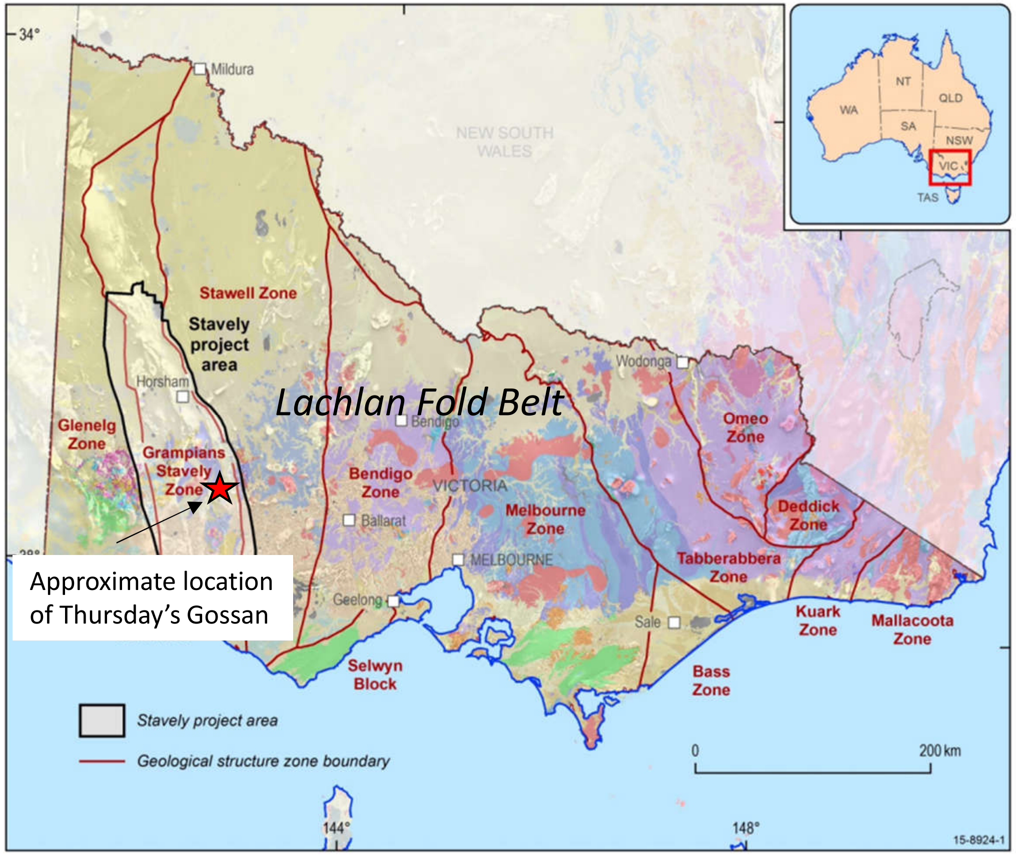


Fergusson et al 2013

Regional Context

- Intermediate to felsic intrusive rocks (genetically and temporarily associated with the Stavely Arc), including mineralised porphyries, intrude the entire Cambrian succession.

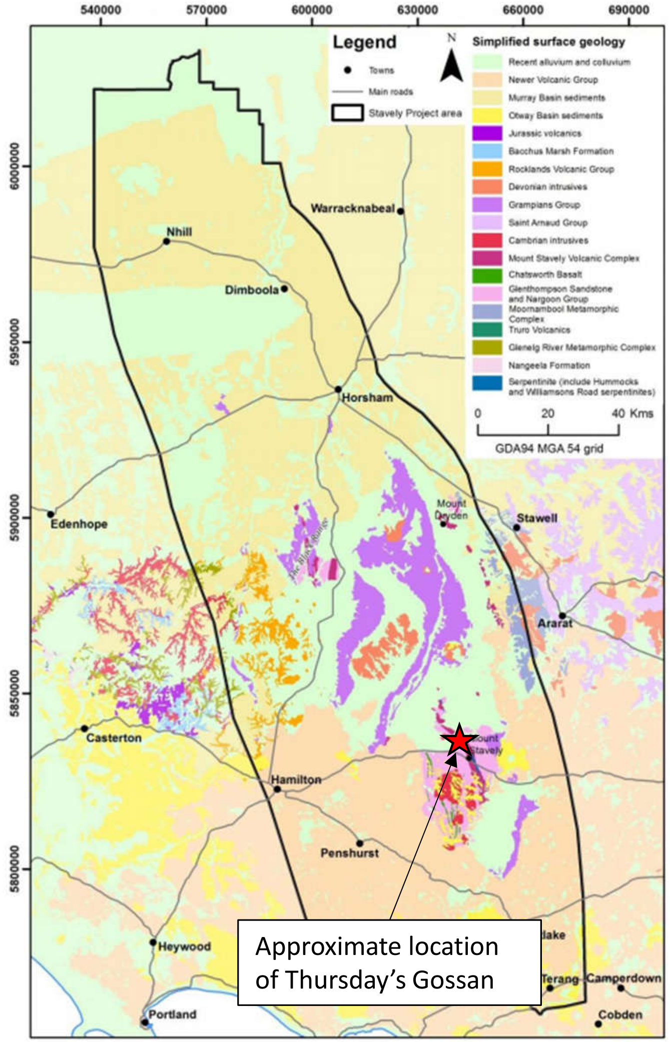
- Structural contact with the turbidite sequences of the Lachlan Fold Belt to the east – east-dipping Moyston Fault Zone (Terrane bounding structure).



A. Schofield (2018)

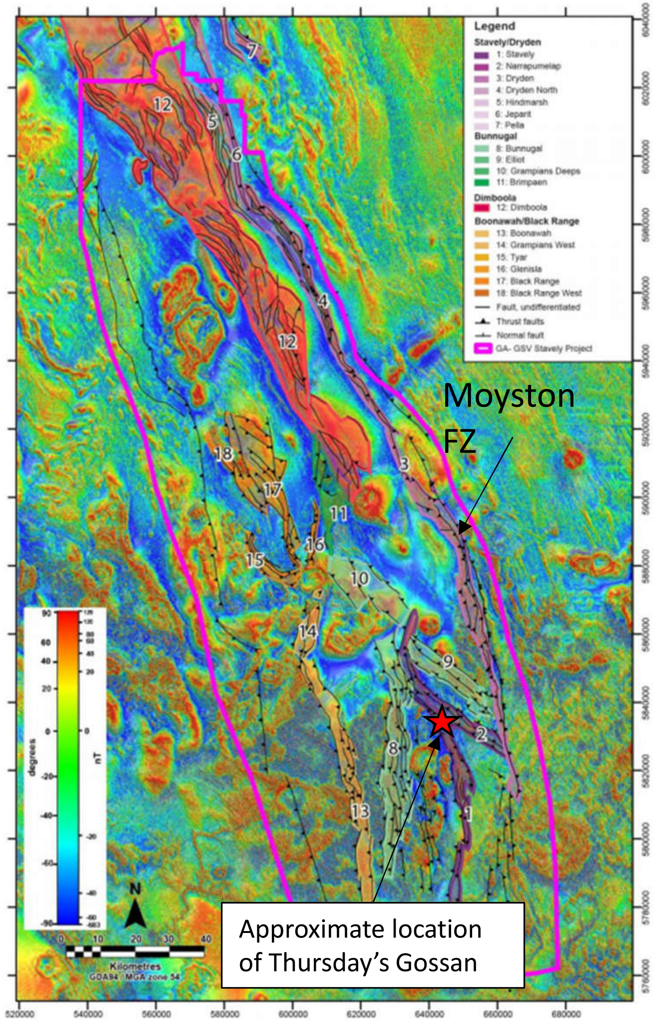
Regional Context

- Stavely Arc rocks largely under younger cover sequences
- Porphyry intrusions and related mineralisation occurred late in the arc forming event – likely preserved and relatively undeformed
- Low metamorphic grade



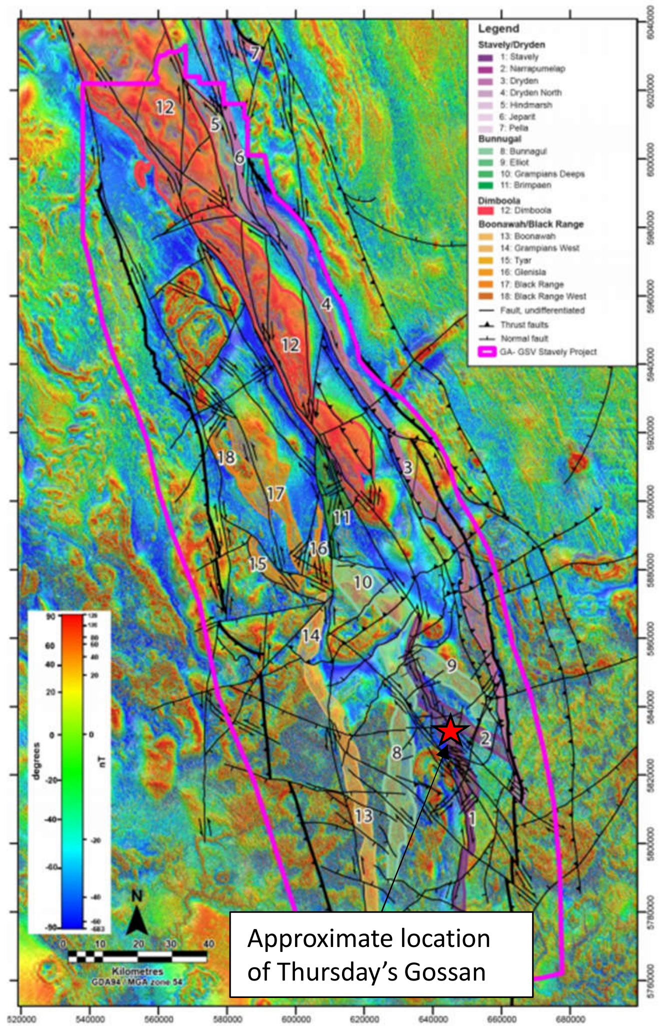
Regional Deformation Events

- Cambrian D1 structures
- N-S to NW-SE trending largely west-dipping (west over east) thrusts
- Steep and shallow dips - thrust ramps and flats?
- East-dipping thrust zone bounding the eastern side of the Stavely Zone– Moyston Fault Zone
- *Thursday's Gossan located in complex area with NNW-SSE trending west-dipping thrusts and NW-SE trending east-dipping thrusts*



Regional Deformation Events

- Silurian to Devonian D3-D4 structures
- Largely ENE-WSW and WNW-ESE trending + reactivation of D1 structures
- Strike-slip dextral movement on reactivated N-S trending structures

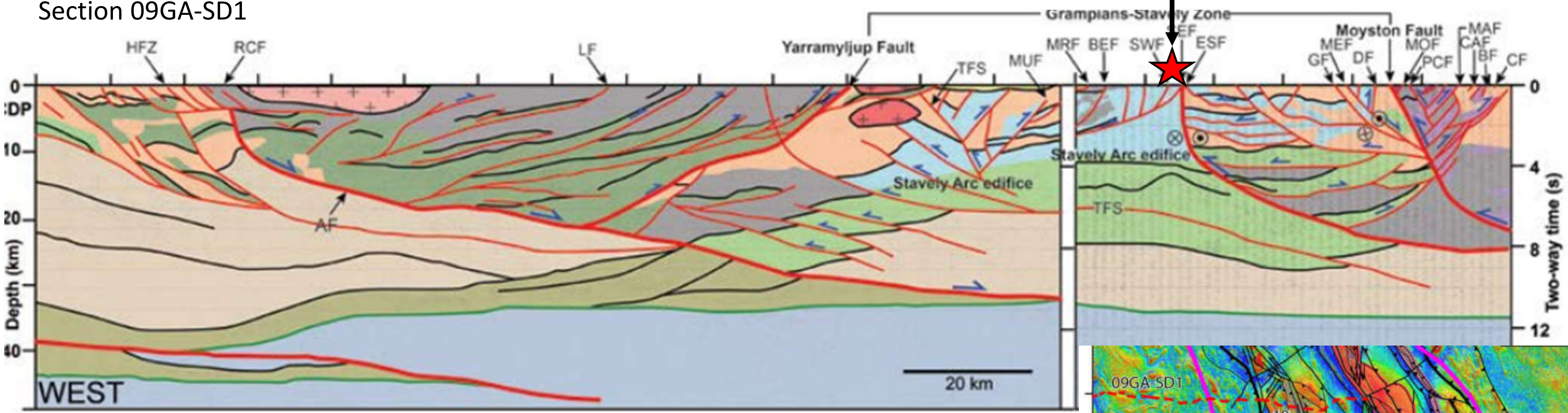


Regional Context

Approximate location of Thursday's Gossan (projected along strike to the north)

Section 09GA-SD1

Section 09GA-AR1

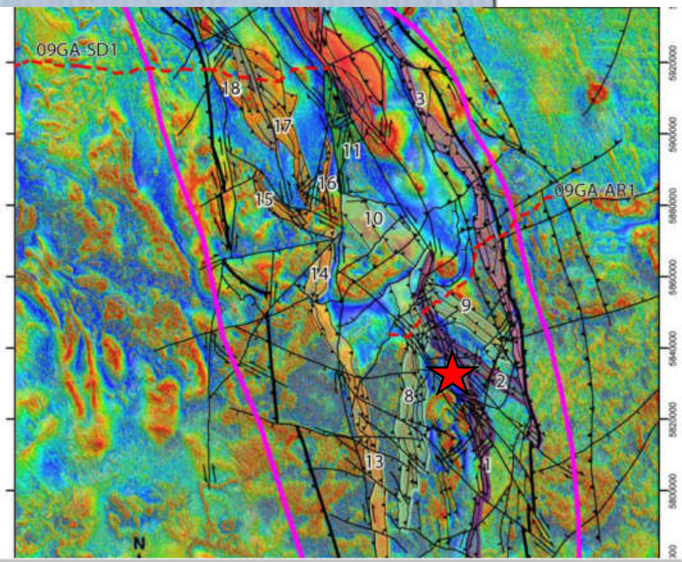


Section Legend

- Silurian Grampians Group
- Cambrian greenschist grade metasedimentary rocks
- Mid Cambrian Stavely Arc
- Early Cambrian Stavely Arc
- Early Cambrian mafic MORB BAB
- Cambrian ampibolite (MMC) and migmatite (GRMC) grade metasedimentary rocks
- Late Cambrian granite
- Mesoproterozoic sialic cratonic rocks
- Mesoproterozoic mafic cratonic rocks
- Mesoproterozoic Hummocks Serpentinite
- Sub-continental mantle lithosphere

Formline — Fault — Fault sense — Moho

AF: Apsley Fault
BEF: Bunnugal East Fault
BF: Barbican Fault
CAF: Cathcart Fault
CF: Congee Fault
CHF: Cherrypool Fault
DF: Dryden Fault
ESF: Elliott South Fault
GF: Golton Fault
HF: Henty Fault
HFZ: Hummocks Fault Zone
LF: Latani Fault
MAF: Mount Ararat Fault
MRF: Marathon Fault
MF: Moyston Fault
MEF: Mehuse Fault
MOF: Moornambool Fault
MUF: Muirfoot Fault
PCF: Pleasant Creek Fault
RCF: Robertston Creek Fault
SEF: Stavely East Fault
SWF: Stavely West Fault
TFS: Tyar Fault System



Regional Context

E-W shortening converting low relief magmatic arc into uplifted and thickened continental crust N-S to NW-SE trending thrusts

Intrusion of mineralised porphyries Interpreted extension related - sinistral transtensional stress field – subduction extinction

Large-scale D4 faults associated with abrupt termination of volcanic belts and drag folding of D1 structures - highly variable orientations– but dextral-subvertical to east-dipping SE trending strike-slip is predominant.

Reactivation of D1 structures

Event	Timing	Orogenic event	Deformation in STAVELY	Structural regime	Major structural effects	Influence on the Stavely Arc
D1a	~500 Ma	Delamerian	Major	Sinistral transpression	Predominately north-trending, west-dipping thrust faulting; possible development of west-northwest trending transfer structures	Cessation of arc volcanism; deformation and tilting of Stavely Arc sequence to form four north-trending thrust packages represented by the D1a volcanic belts; overthrusting of the Stavely Arc by the back-arc (Glenelg Zone) and forearc (Stawell Zone); uplifting of low-relief arc and translation of the Stavely Arc westwards onto east Gondwana continental margin
D1b	~505-500 Ma	Delamerian	Minor	Sinistral transtension	West-northwest-trending extensional structures	Intrusion of post-orogenic intrusives, including the Bushy Creek Igneous Complex and mineralised porphyries
D2	~440 Ma	Benambran	Minor	Sinistral transpression	Minimal. Possible development of foreland basin via downwarping of Moyston Fault footwall into which Grampians Group was deposited	Not known
D3	~420-400 Ma	Bindian	Minor	Sinistral transpression	Low-angle to bedding-parallel faults and large open folds apparently confined to the Grampians Group	Not known
D4	~400 Ma	Bindian	Major	Dextral transtension	Local reworking of and drag folding of D1-D3 structures; low-angle extensional, transtensional, and strike-slip faults and associated warp folds in the Grampians Group; predominately dextral, subvertical, southeast-trending strike-slip faults and related kink and fold structures, and subordinate sinistral transtensional antithetic faults and folds in basement rocks; brittle and cataclastic structures in basement	Structural dismembering, re-orientation, and drag folding of D1a volcanic belts and other structures. Second phase of granite intrusion and eruption of co-magmatic Rocklands Volcanic Group.
D5	Middle Devonian	Tabberabberan	Minor	Sinistral transpression	Subvertical joint arrays; minor sinistral strike-slip reactivation of existing faults	None known

THANK YOU

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