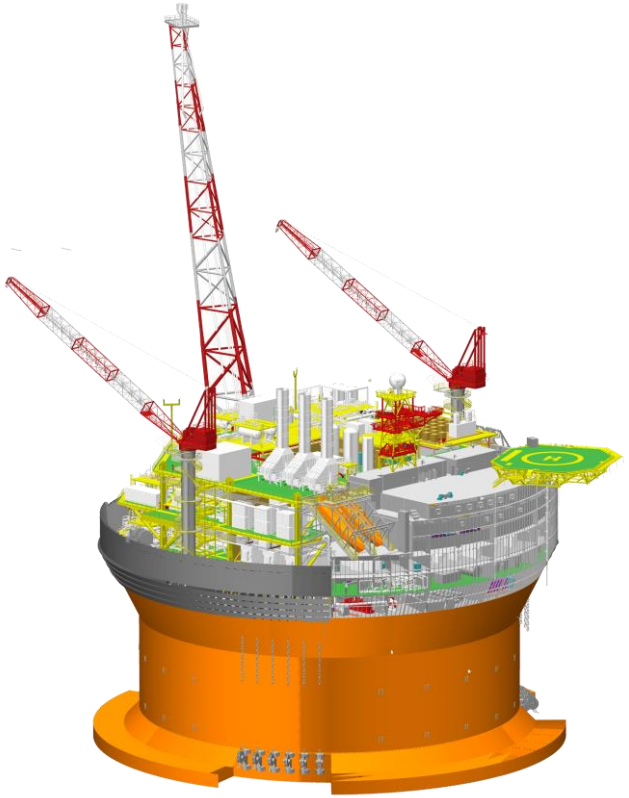
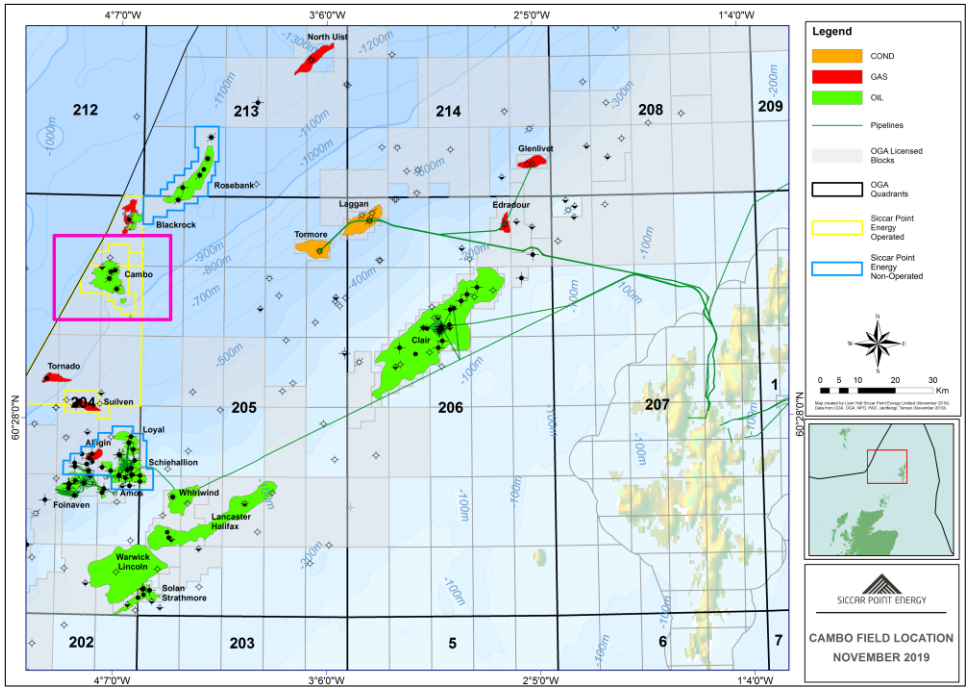
Combined stratal geometry and seismic inversion characterisation of sand distribution, Cambo





Siccar Point Energy gratefully acknowledges TGS and PGS for permission to show seismic data

C Ellis, K Overshott, K Purvis, C Grove, A Alexander, L Holt, N Jaffey(1), I Barron(1), H Juhl-Hansen(2)

Siccar Point Energy Ltd, Shell UK Ltd (1) and Qeye Labs (2)

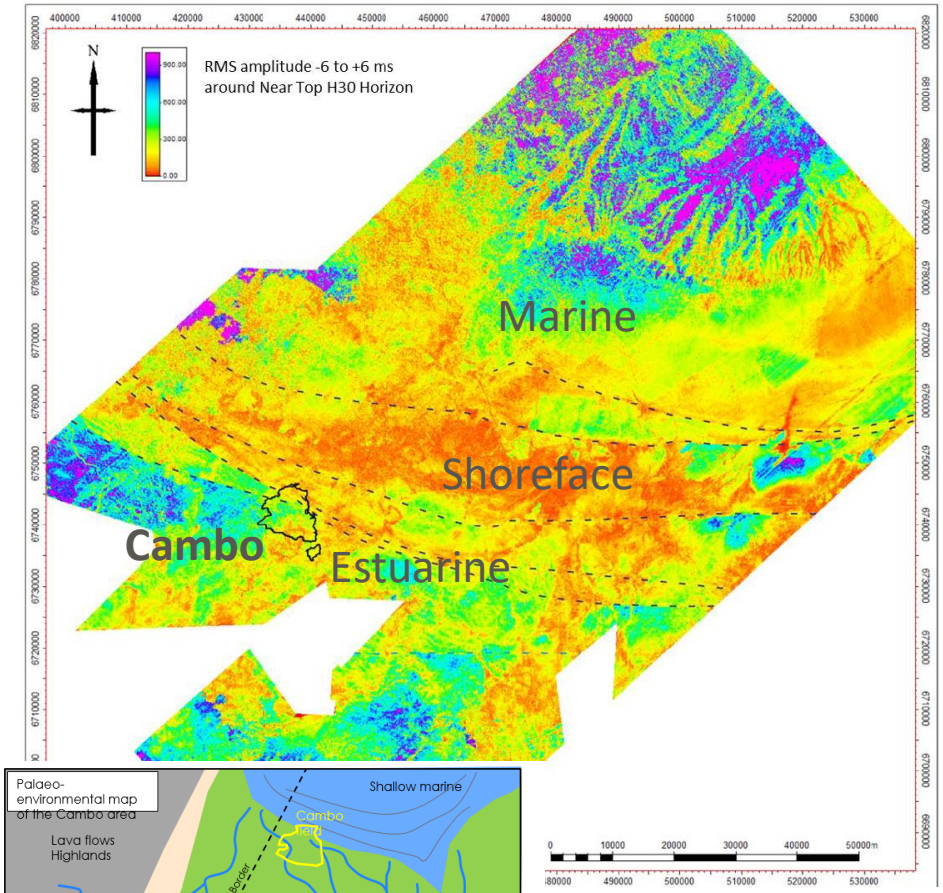
Outline

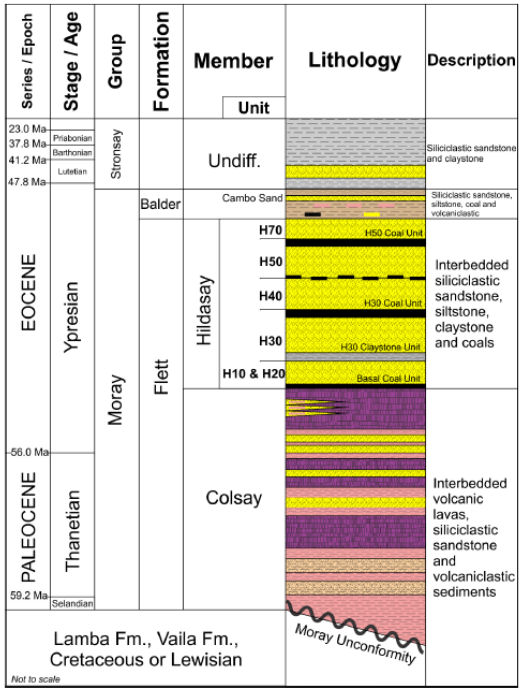
SICCAR POINT ENERGY

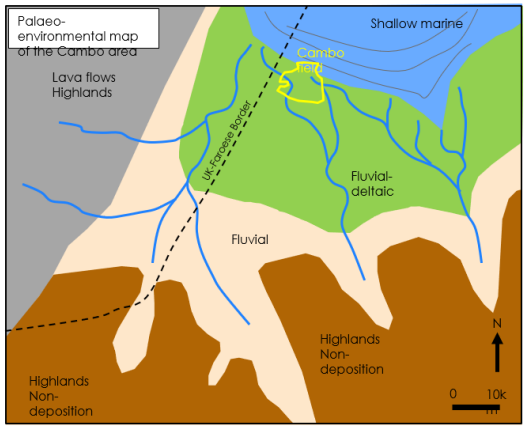
- Geological and Dynamic understanding improvement from 204/10a-5/z/y appraisal well
- Depositional setting of Hildasay Member of the Cambo Field
- Seismic Stratigraphic Motifs of the Hildasay Member (H50)
  - Sheets
  - Amalgamated Channels
  - Mounded Facies
  - Late Stage Meandering Channels
- Gradient – Intercept (GI) response of H50 high Net-to-Gross (NTG)
- Inverted response of H50 high NTG
- Seismic geometry / GI / Qeye inversion – **Consistent Sand Model**
- Colsay Member channels – potential follow-on appraisal

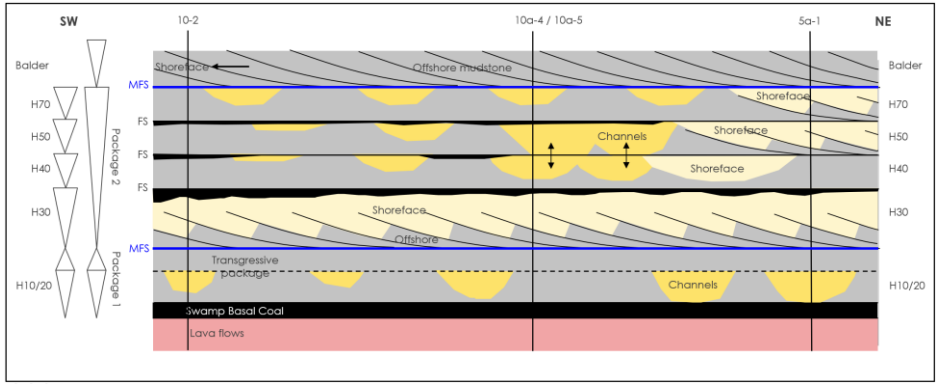
Regional Hildasay Member setting

SICCAR POINT ENERGY





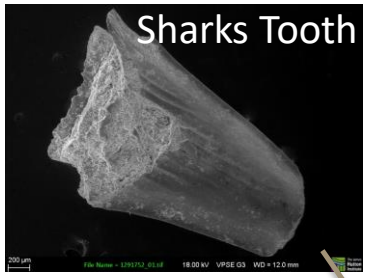




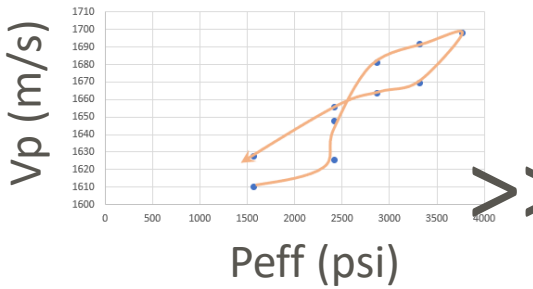
204/10a-5/z/y – Rich data product suite

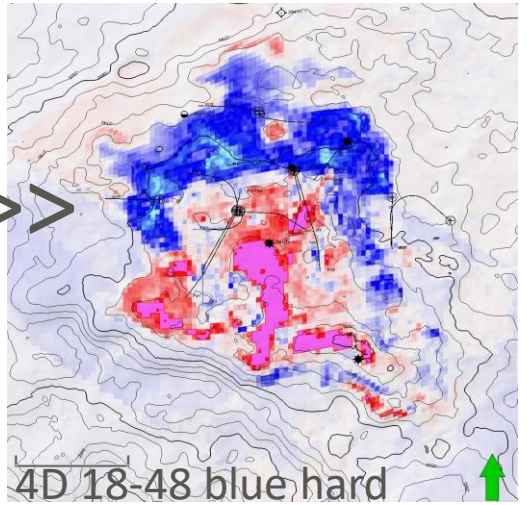
SICCAR POINT ENERGY

Palaeo-environment



Rock compressibility >>> 4D calibration





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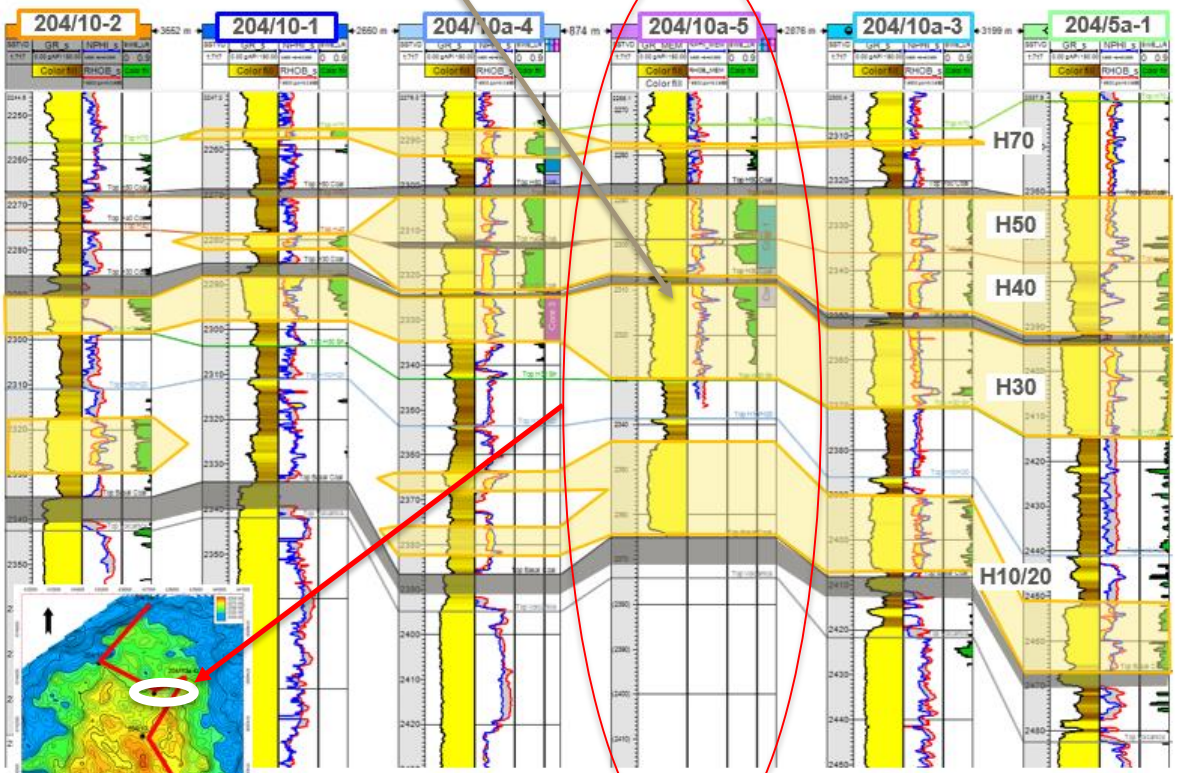
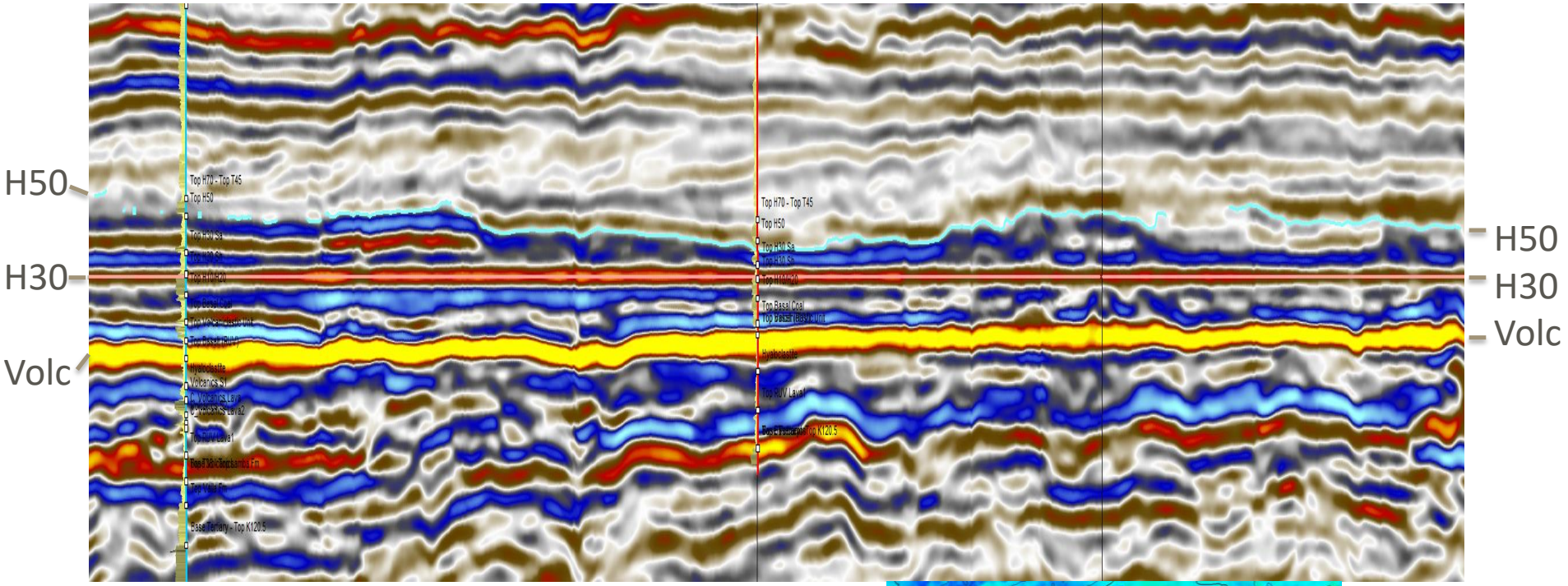


N

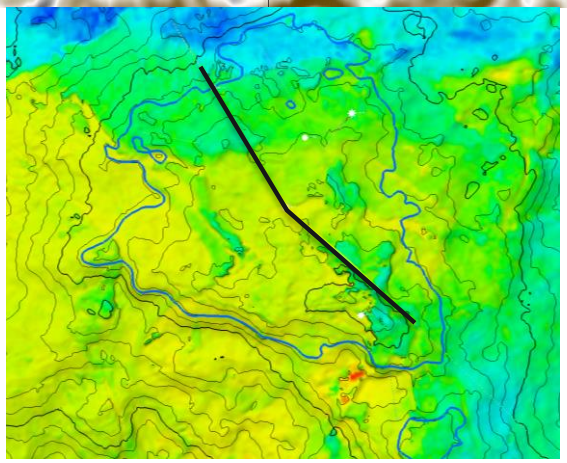
Heavy Minerals / Biostratigraphy / Oil Geochemistry supports a general layer-cake reservoir architecture comprising a paralic coastal plain with marine incursions

NW – SE Seismic Architecture: H50

SICCAR POINT ENERGY

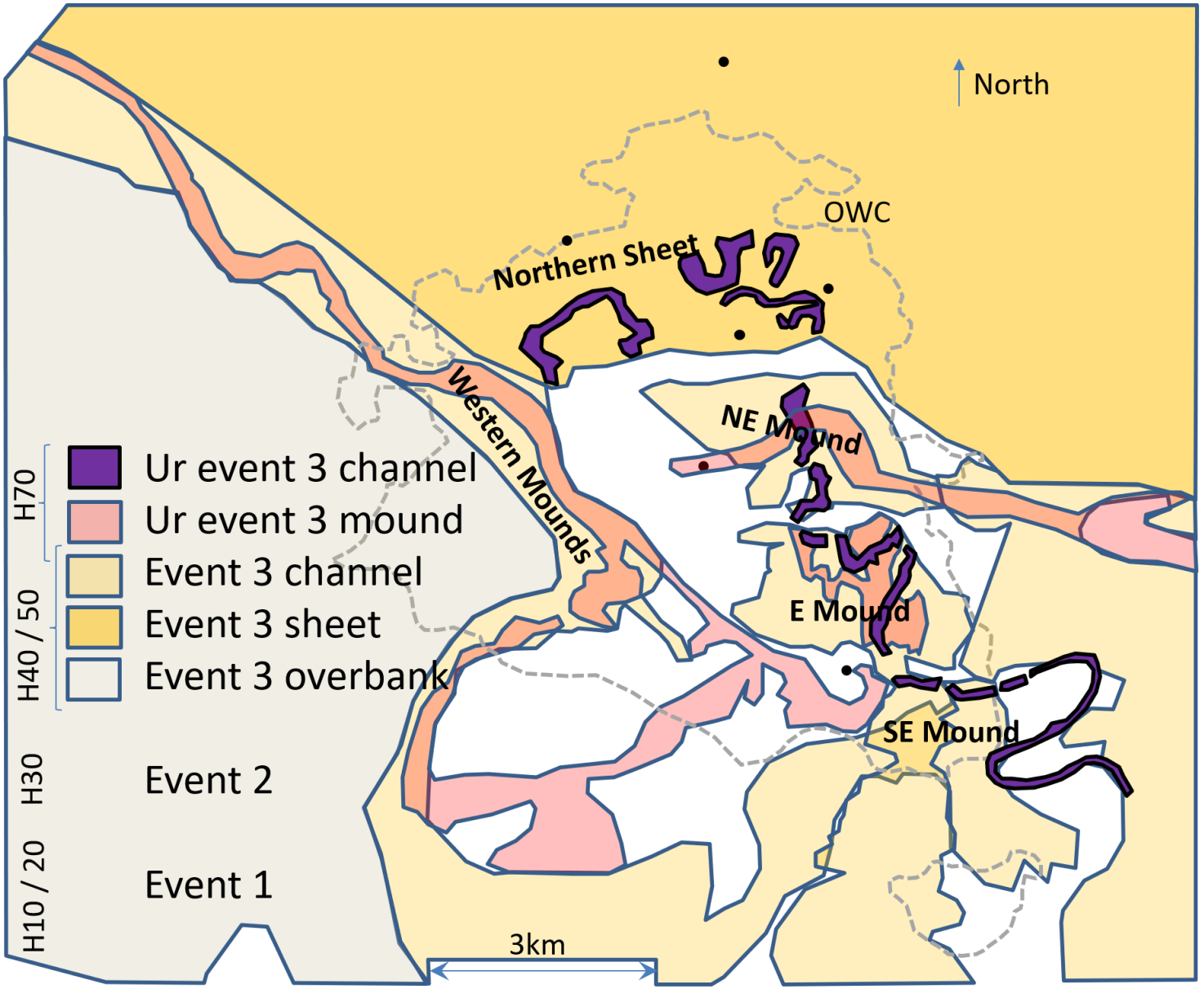


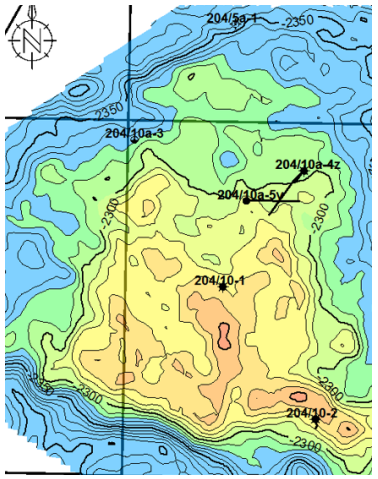
Tuned System

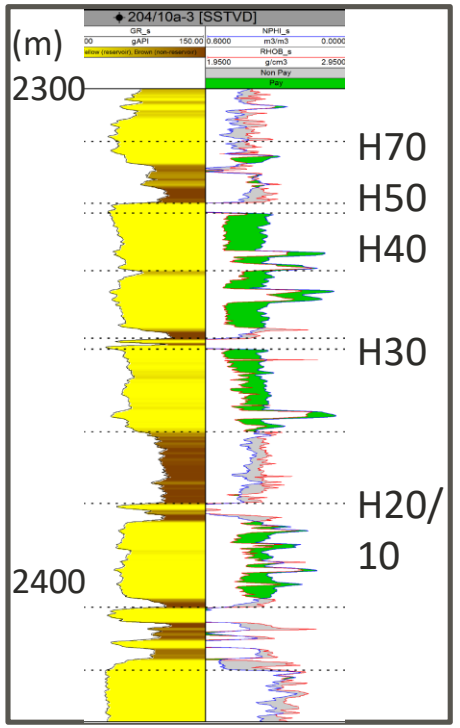


Seismic geometries H40/50/70

SICCAR POINT ENERGY

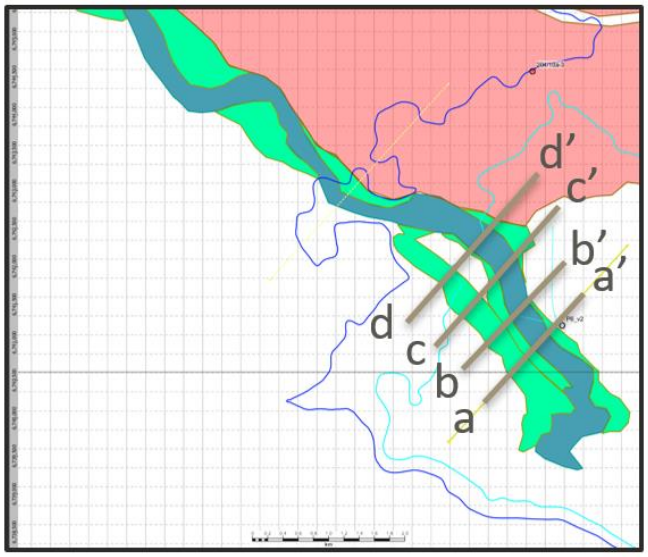


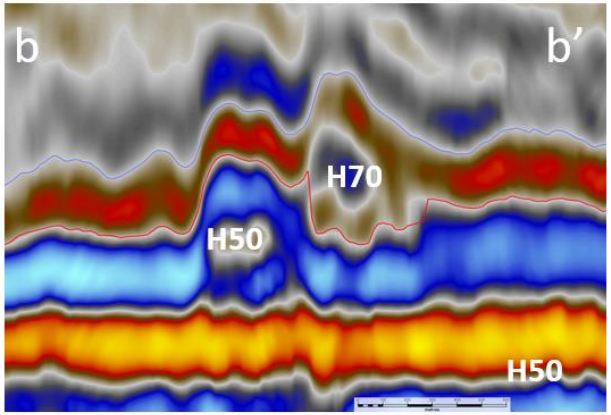


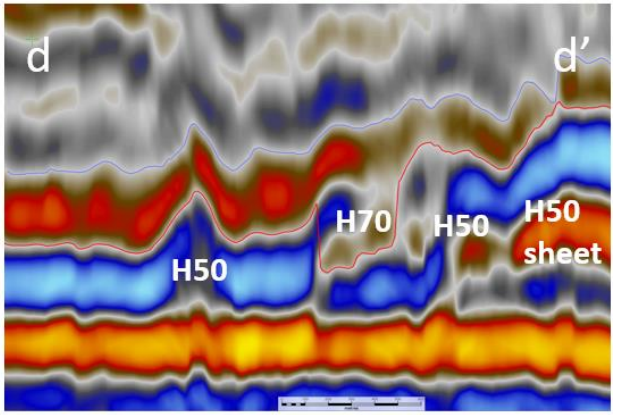


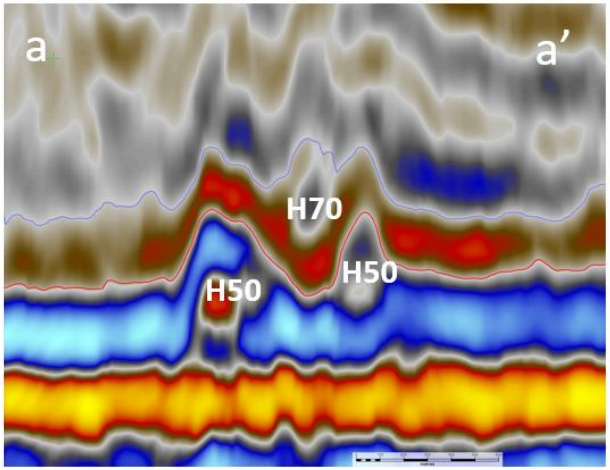
Western Mounds

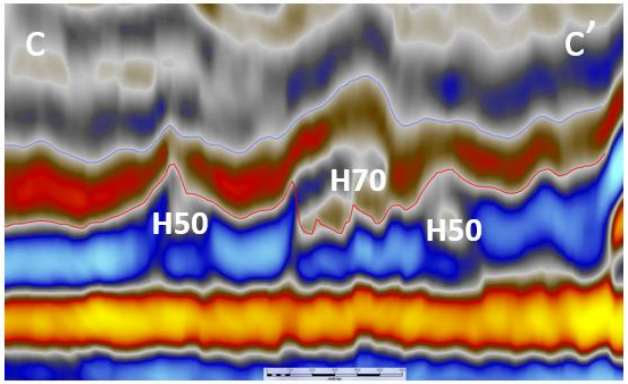
SICCAR POINT ENERGY

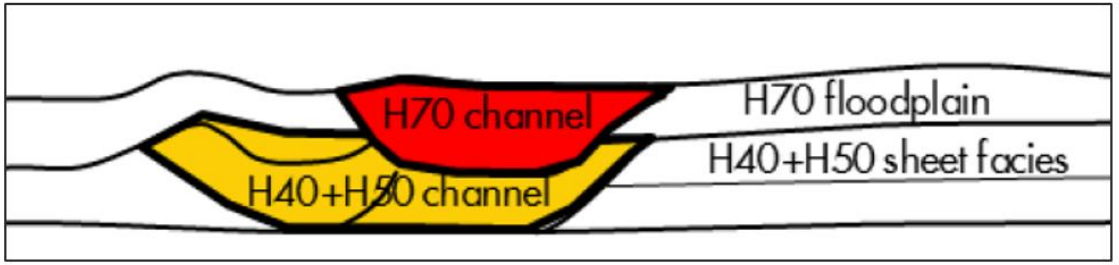








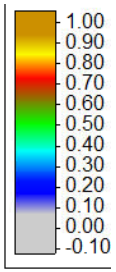


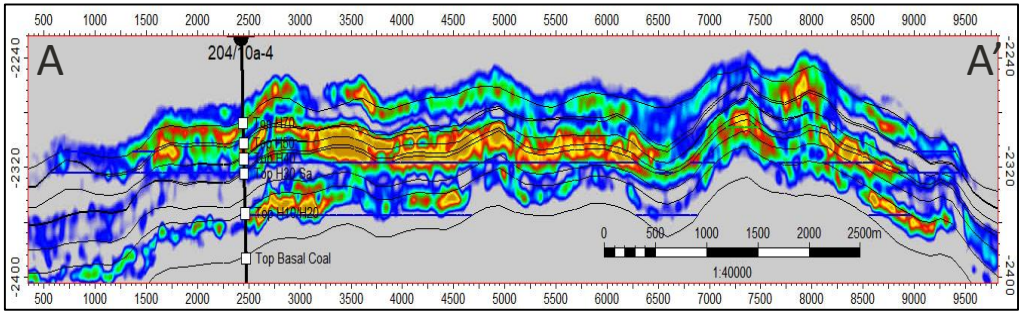


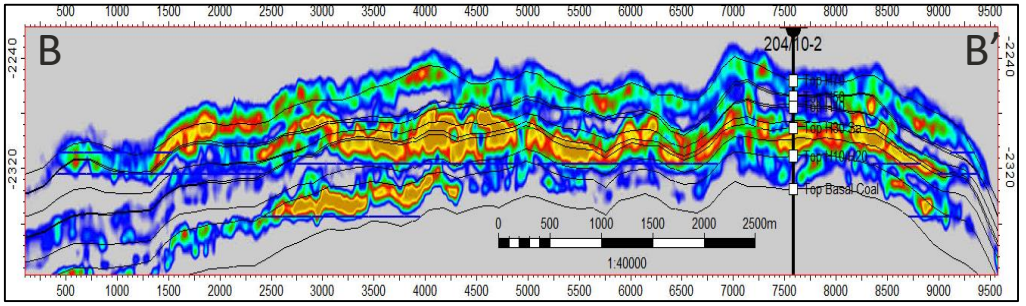
Eastern Mounds

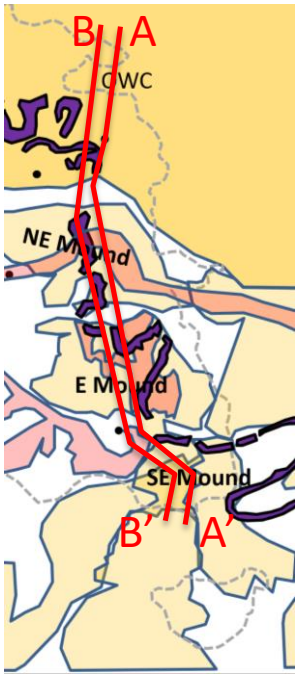
SICCAR POINT ENERGY

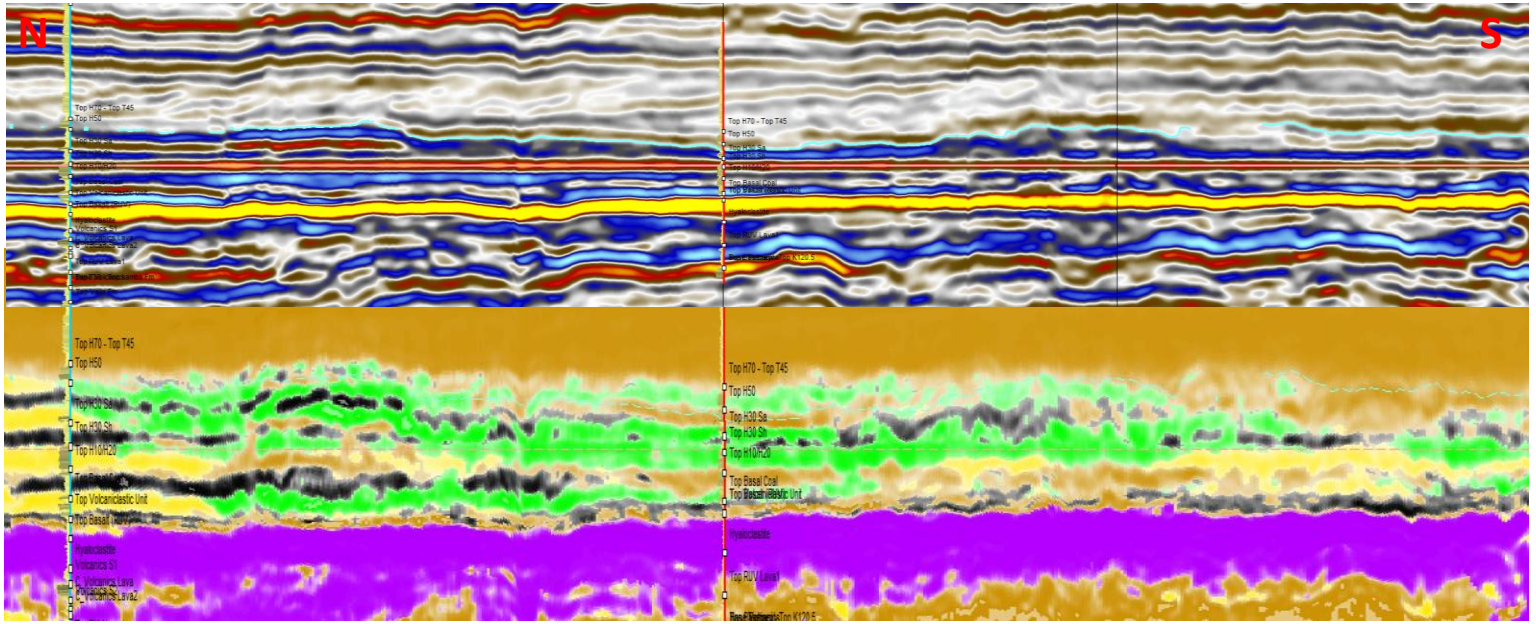
HC bearing NTG

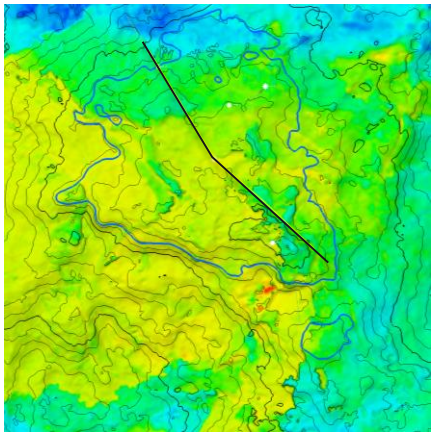






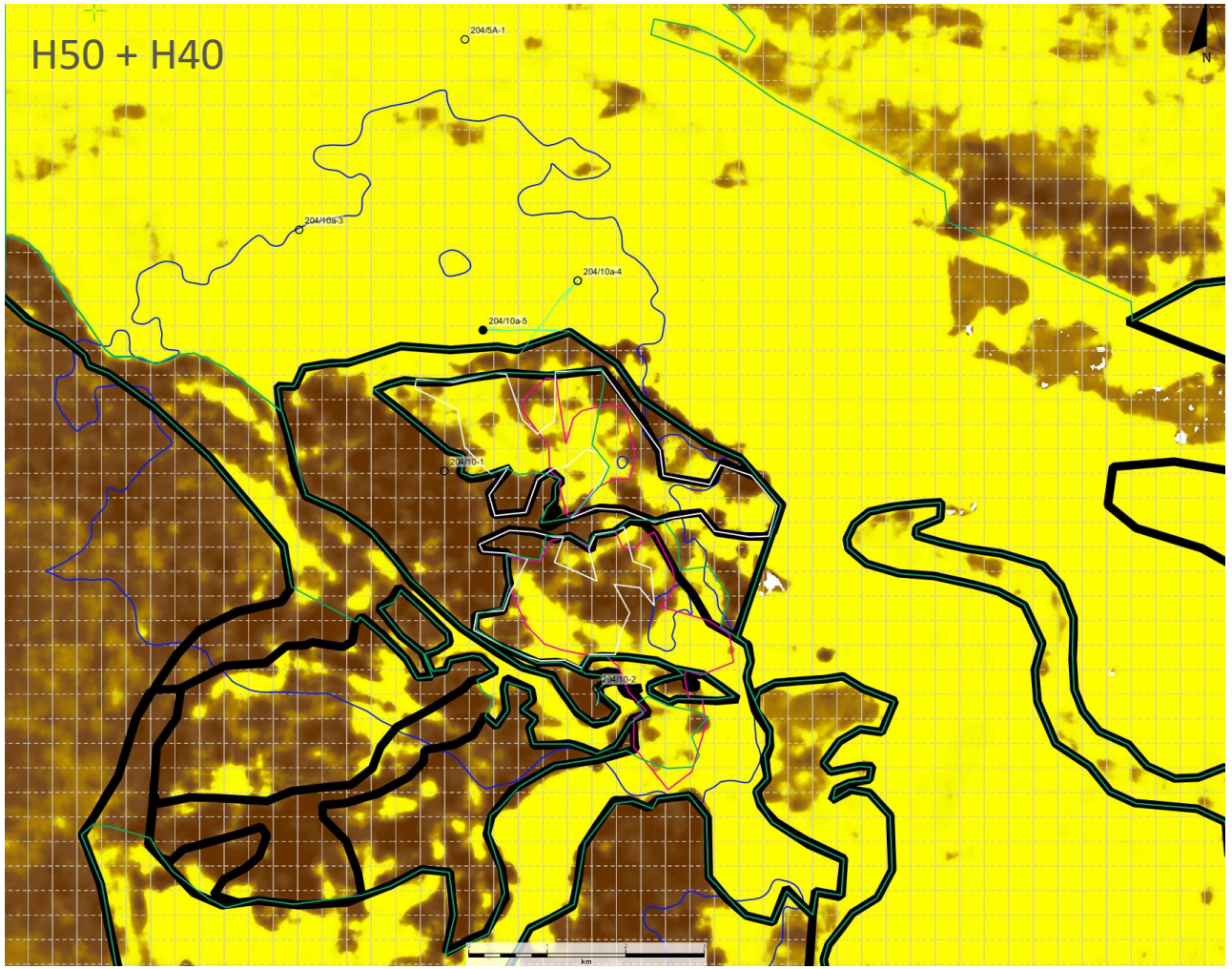




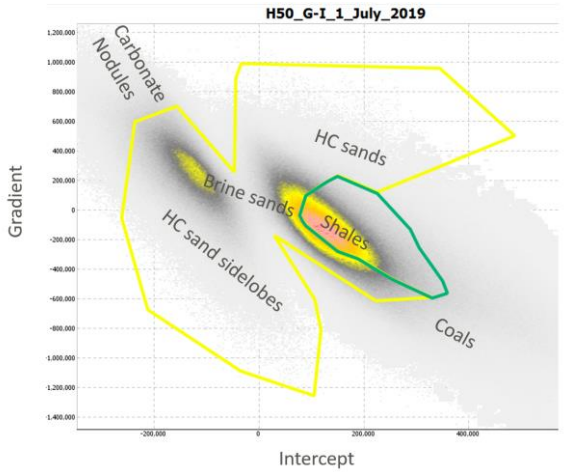


Hildasay Net Sand from Gradient Intercept

SICCAR POINT ENERGY

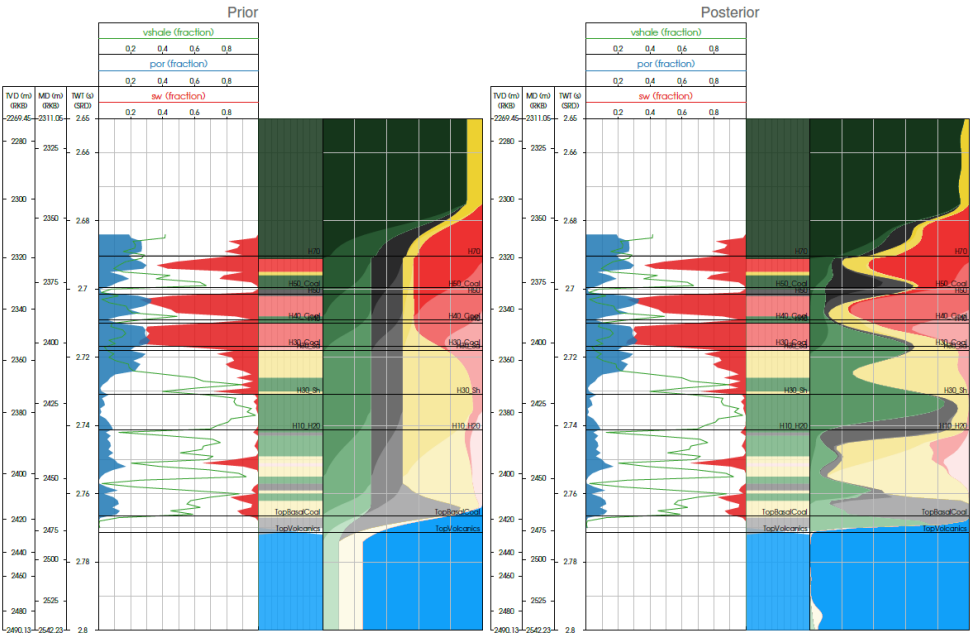


GI Cross Plot
Qeye (2014) P sand
Seismic Mounds
Best Synthesis



Q eye inversion

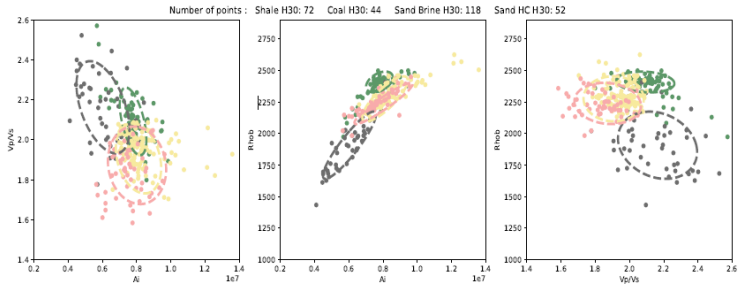
SICCAR POINT ENERGY

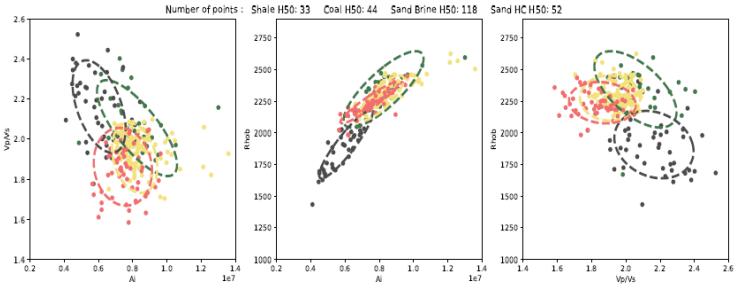


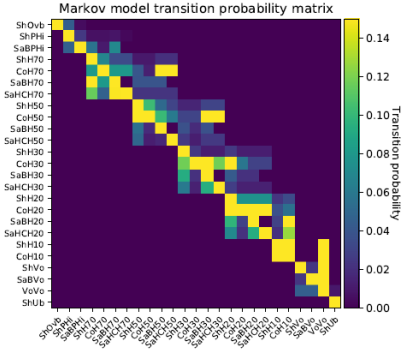
Step 1 – “Classic” elastic inversion and lithology classification. High end bandwidth improvement by wavelet removal.

Step 2 – (DPI) Simultaneous statistical infusion of probable rock sequence (Markov chain) and fluid sequence (HC vs water), and elastic probability (pdf) based inversion, gives further high end bandwidth improvement. 1ms sample interval.

Key to success: Close G&G and Inversion integration. In depth 1 hr weekly meetings over ca 3 months, and mid project 2 day workshop.

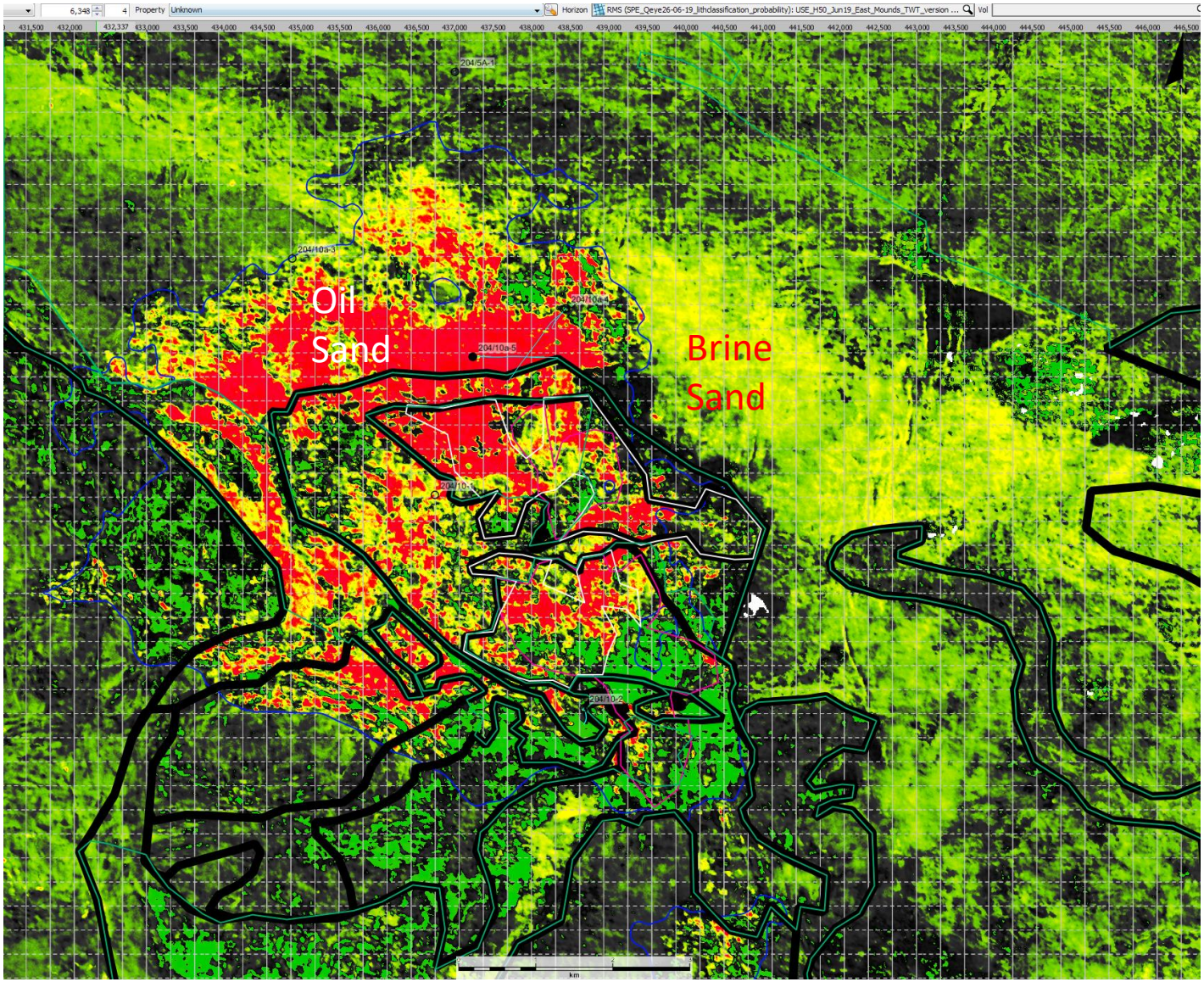






Hildasay Member, Q eye DPI inversion

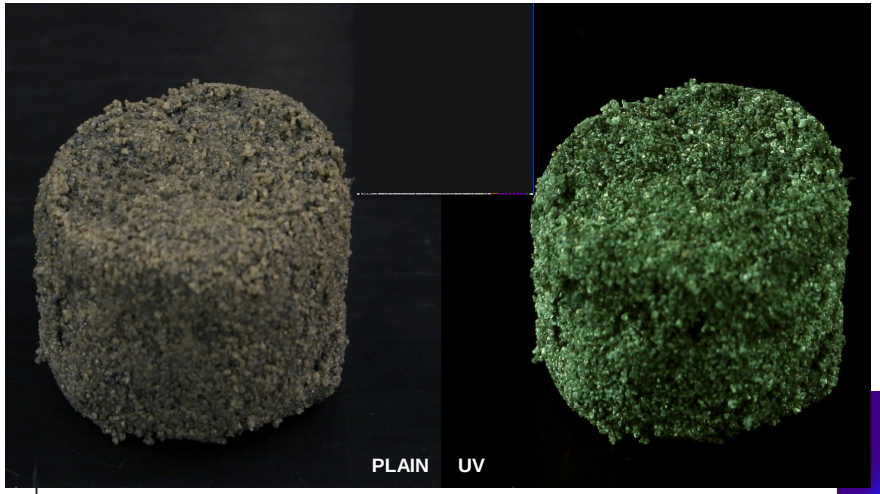
SICCAR POINT ENERGY



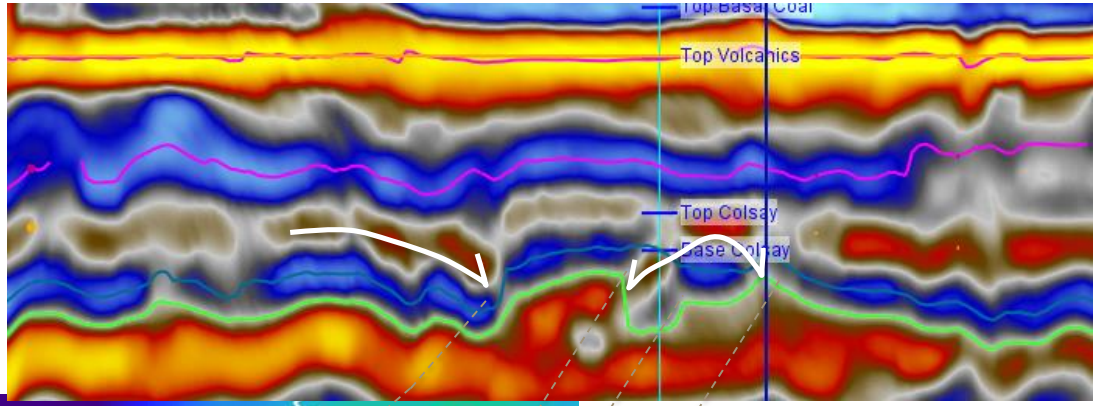
- GI Cross Plot
- Qeye (2014) P sand
- Seismic Mounds
- Best Synthesis

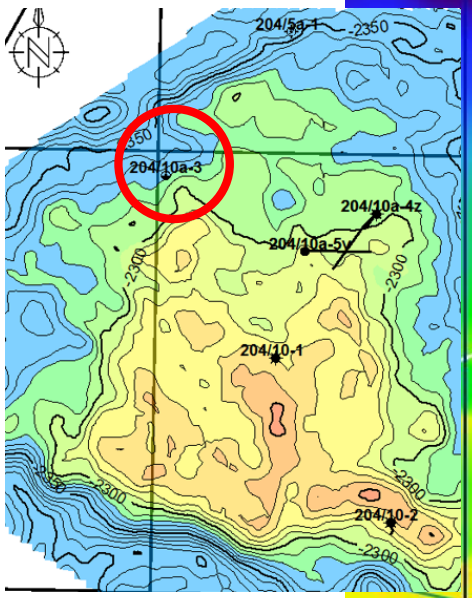
Colsay Reservoir – Deep Strat Trapped Upside

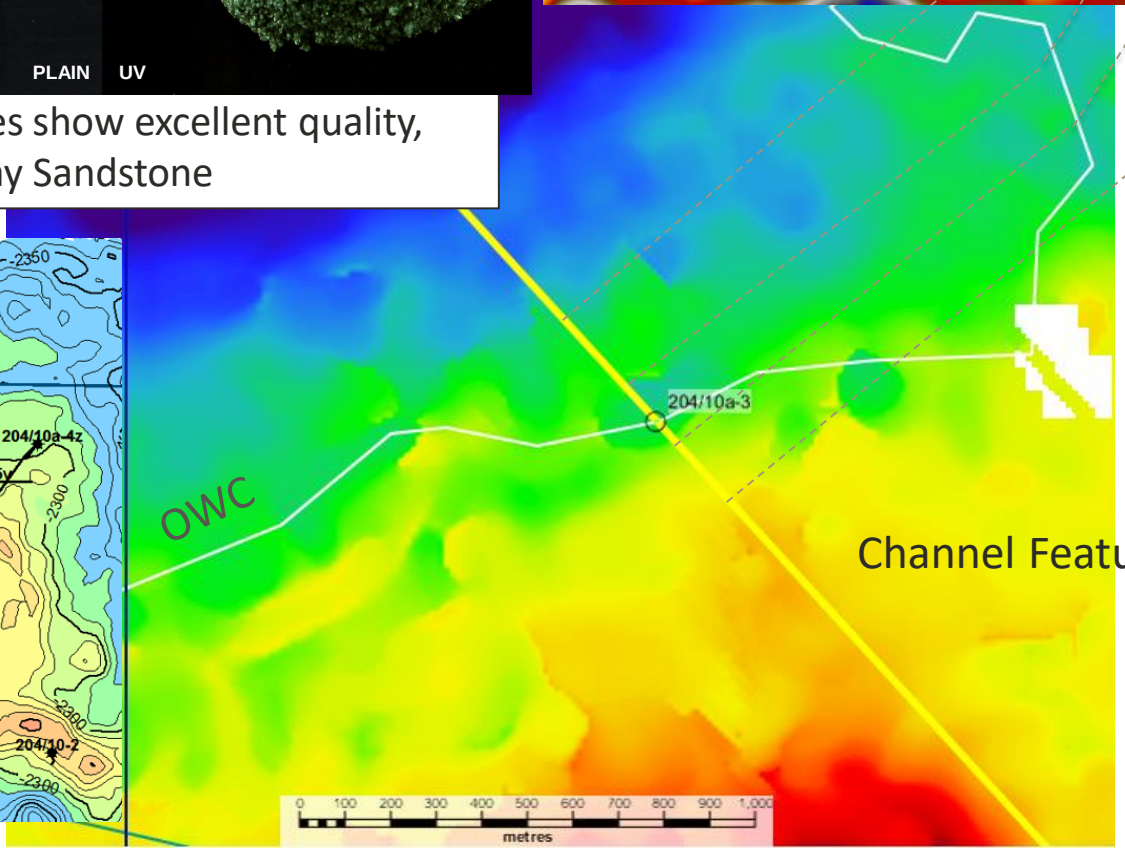
SICCAR POINT ENERGY

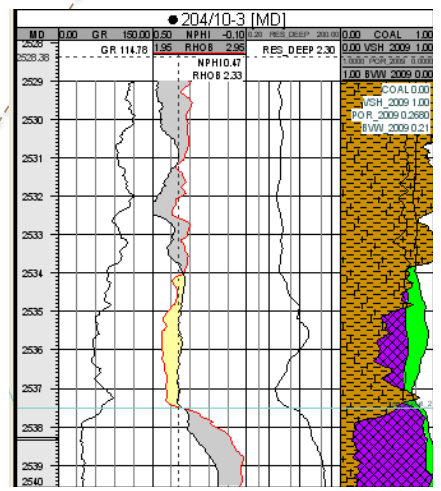


Side-wall samples show excellent quality, oil-bearing Colsay Sandstone





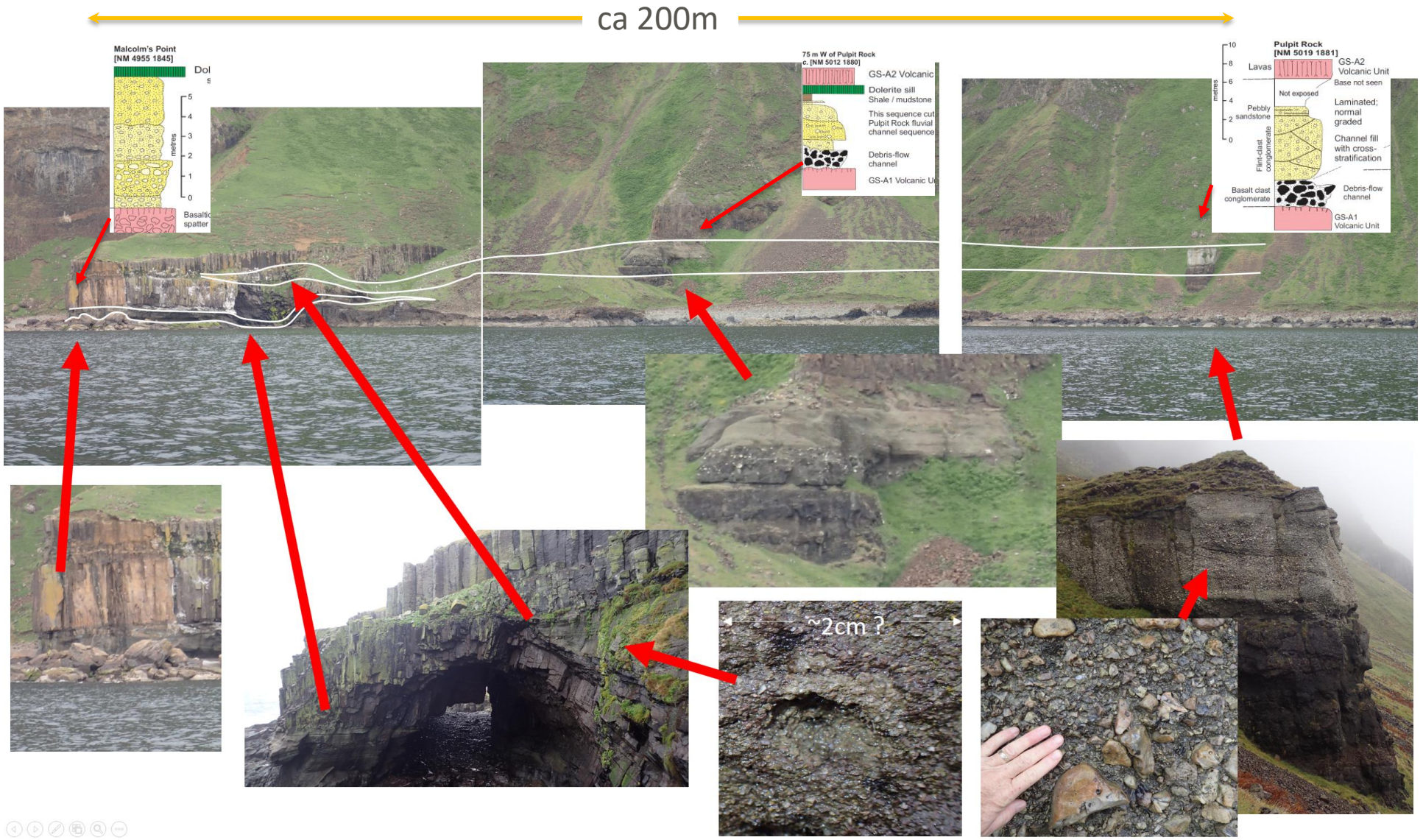




Channel Features, Top Mid Volcanics

Colsay equivalent intra volcanic clastics on Isle of Mull – Staffa formation

SICCAR POINT ENERGY



Strat columns from Williamson and Bell, 2012, Scot, J Geol 48/1. Photos Siccar Point Energy.

Conclusions

SICCAR POINT ENERGY

Tuned seismic system requires close integration with biostratigraphy and other well correlation methods for meaningful seismic interpretation

Seismic event scale interpretation combined with stratal geometry characterisation is suggestive of depositional settings and likely sand extents

Stepwise inversion characterisation of sand responses has independently corroborated the extent of high NTG regions

Seismic sequence stratigraphy integrated with inversion have complimented each other to optimise the location of the planned development wells