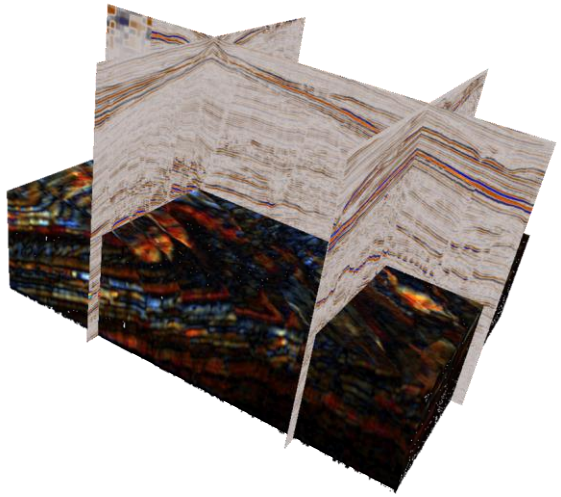
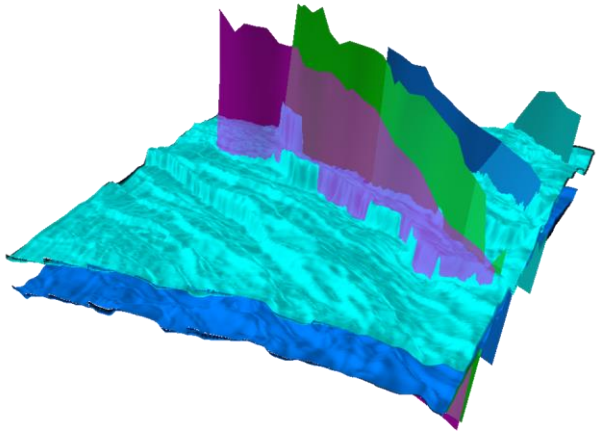
Teric

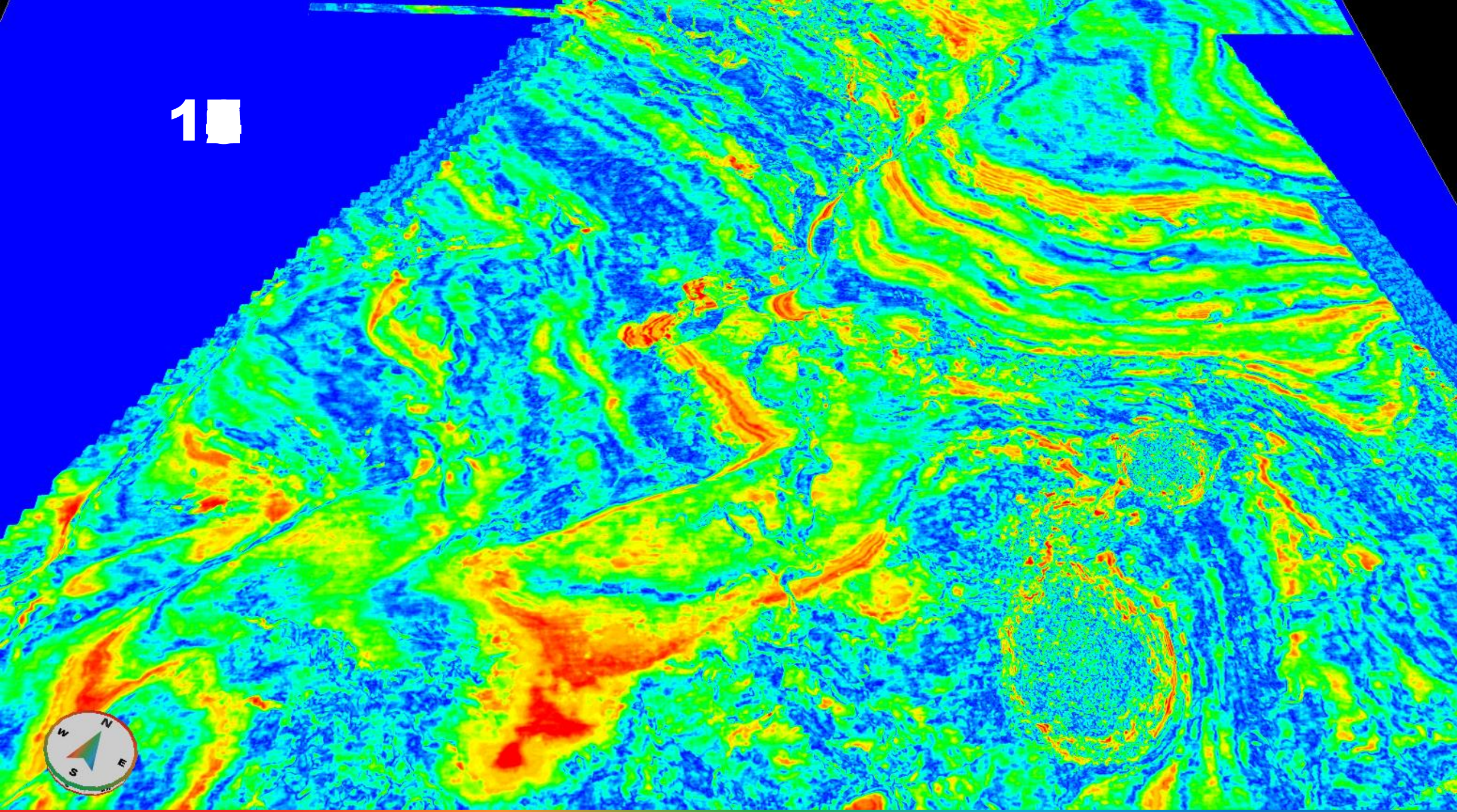
from ffA

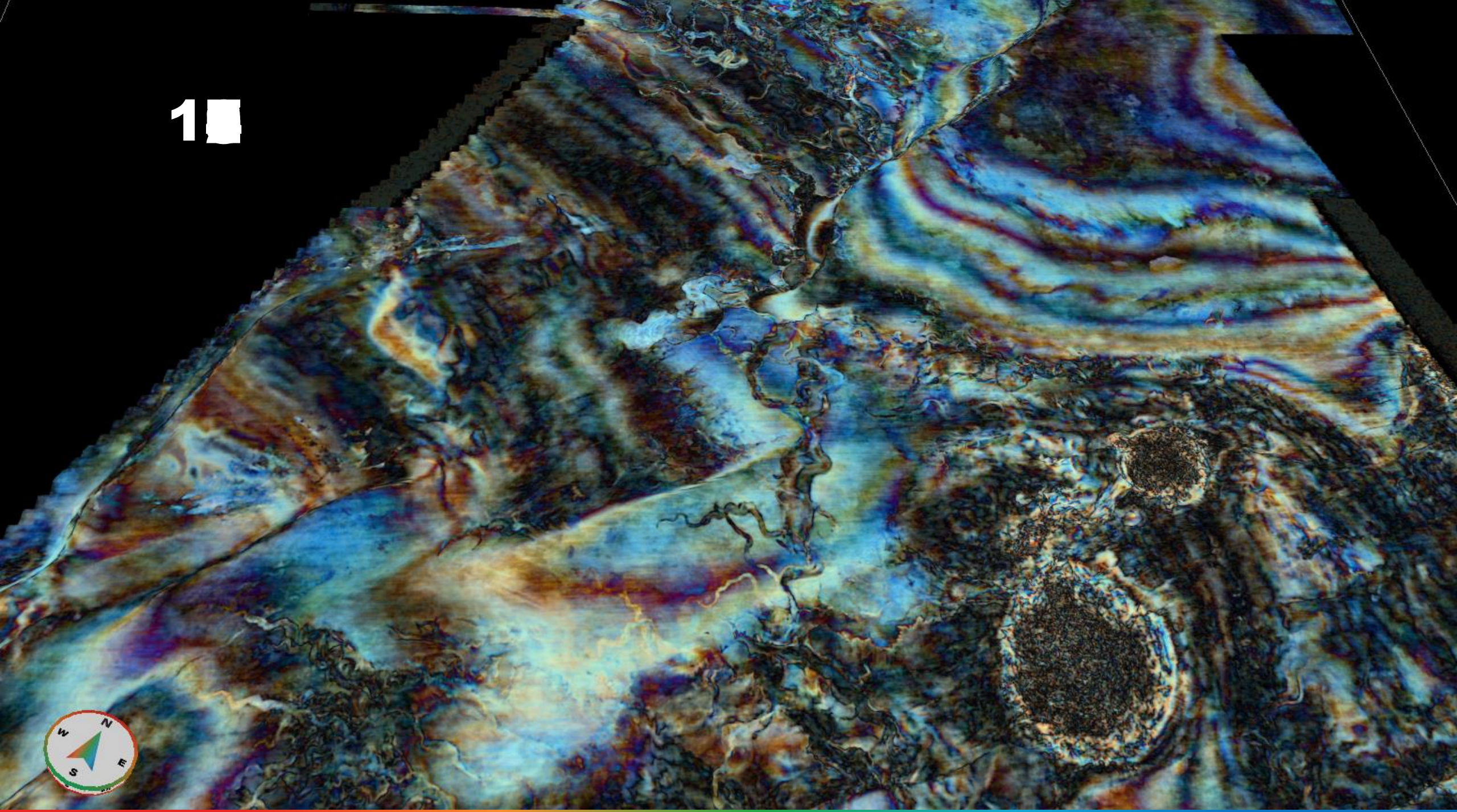
?

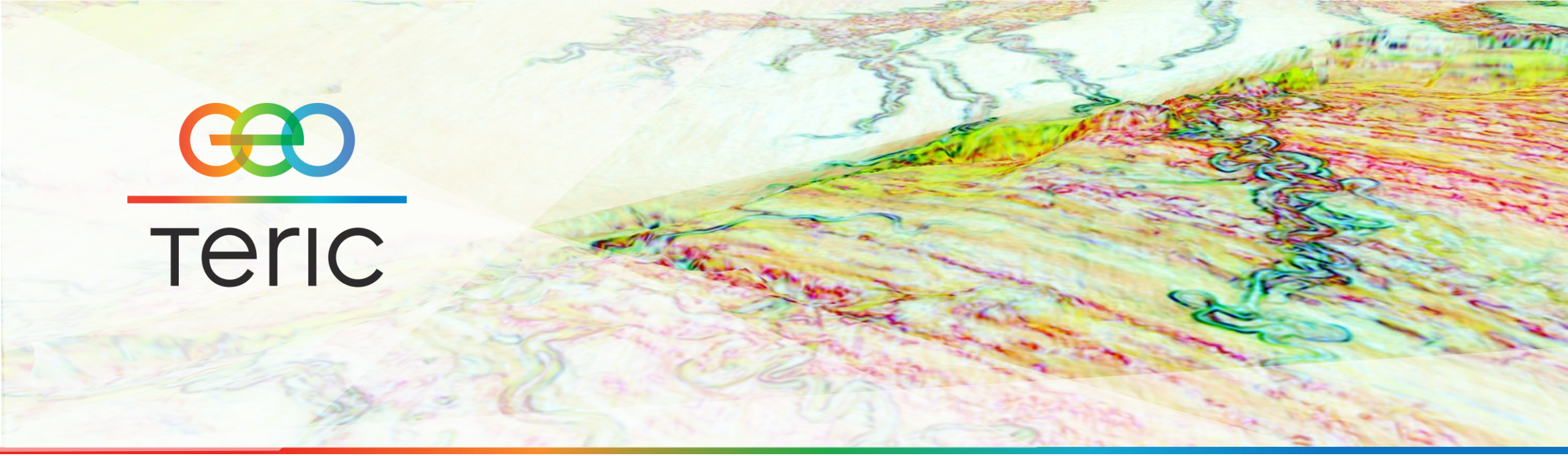




?


1
N
W
E
S

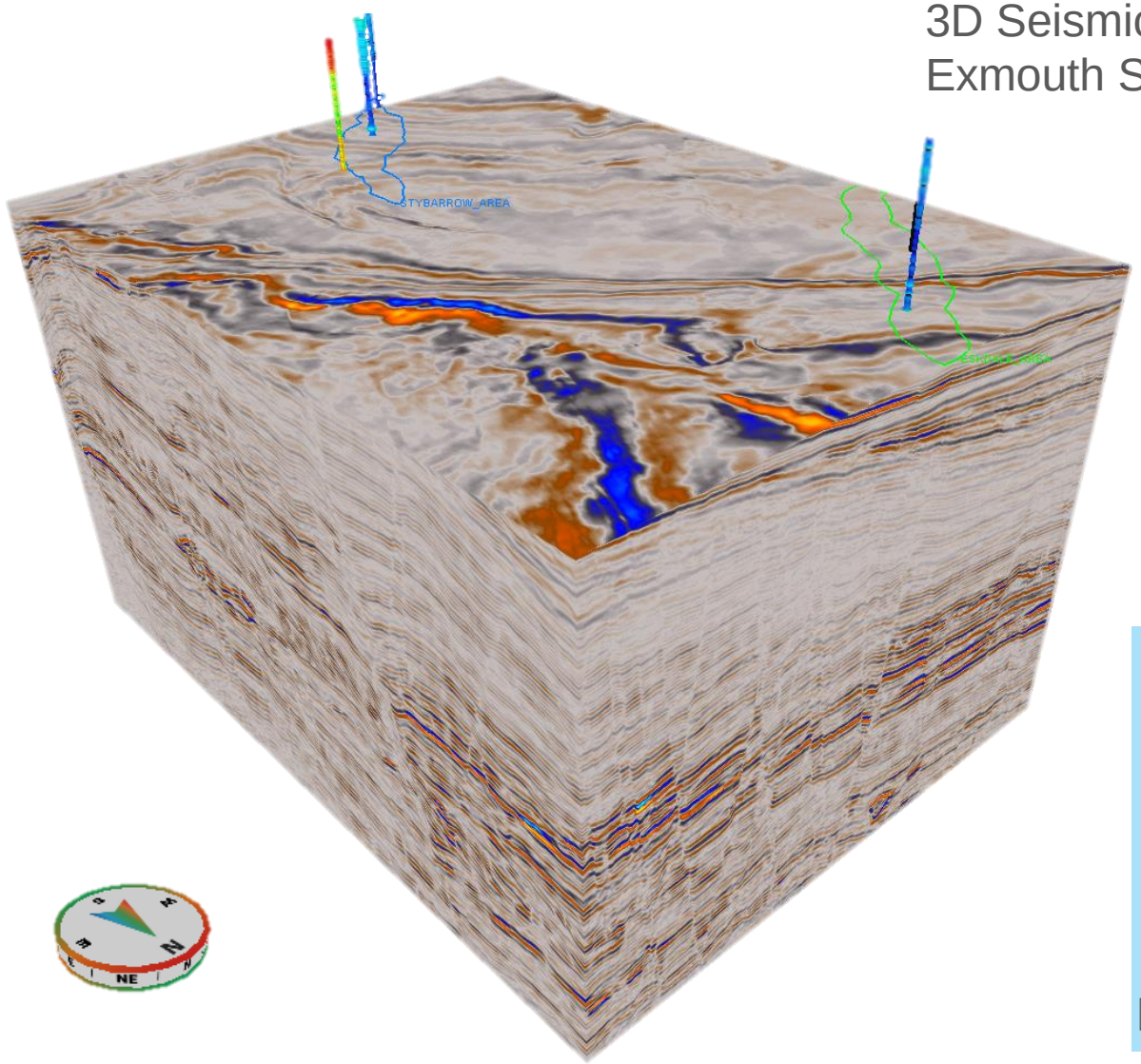

1



Increasing the Reliability of Geological Models Using Spectral Decomposition and Seismic Facies Analysis

H. Yadav (ffA), V. Cybulskij* (ffA) & G. Paton (ffA (Foster Findlay Associates Ltd))

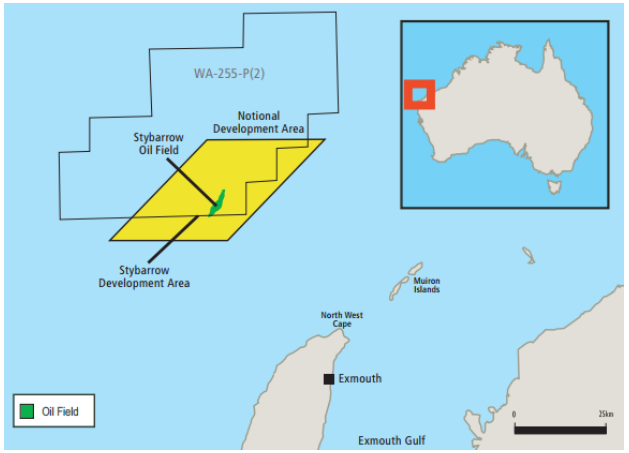
Dataset



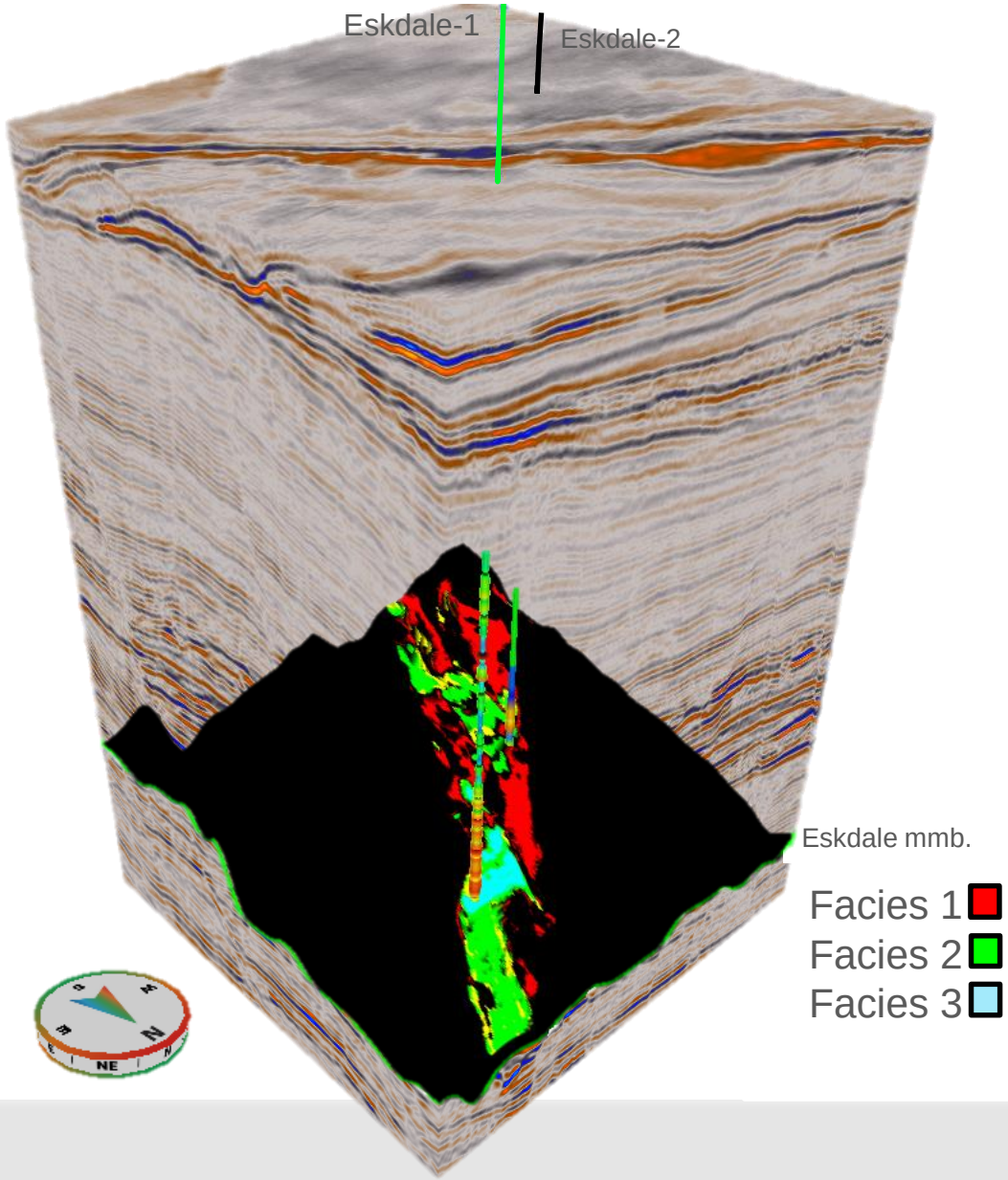
3D Seismic volume from NW Australia, Exmouth Sub-basin.

- Stybarrow Oil Field with four wells.
- Eskdale Oil Field with two wells.

Limited well data availability is a typical situation for majority of exploration scenarios.



The technical challenge



How to rapidly reproduce subsurface complexity in geological model?

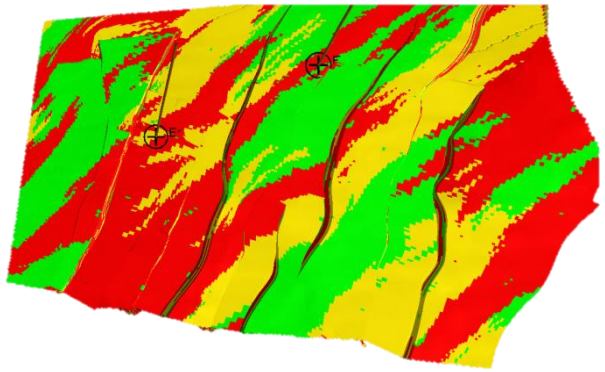
Traditional approaches:

- Statistical modelling;
- Object modelling.

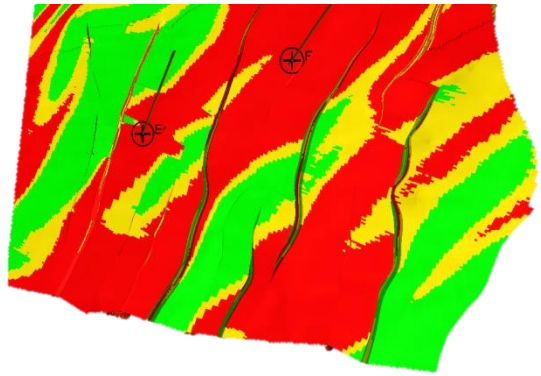
Geological Expression approach:

- Reveal intra channel heterogeneity;
- Constrain channel geometry;
- Classify internal heterogeneity.

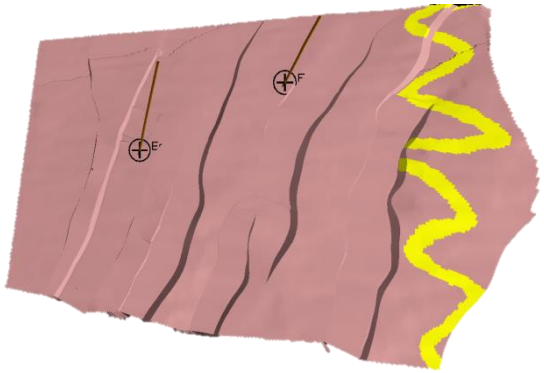
The solution



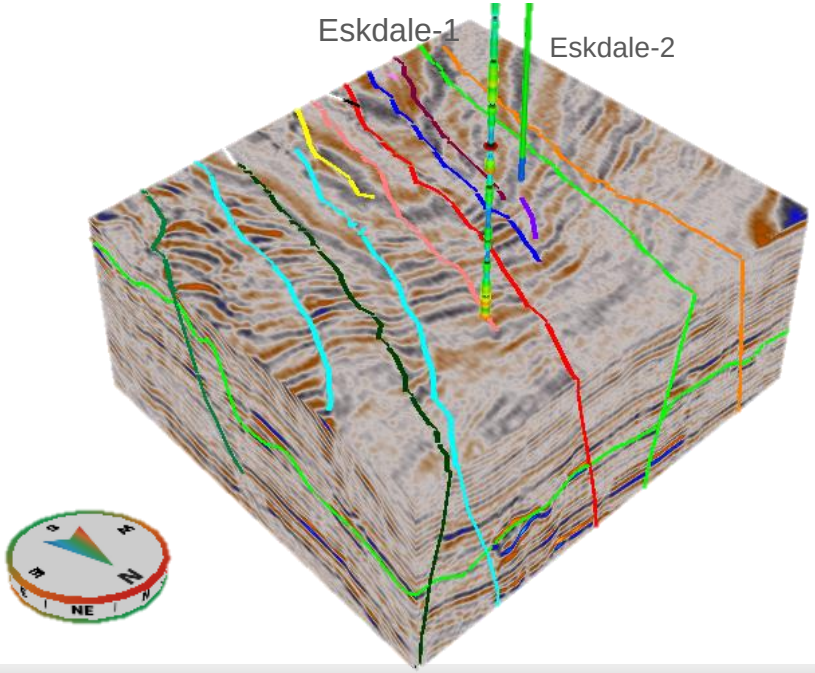
Kriging



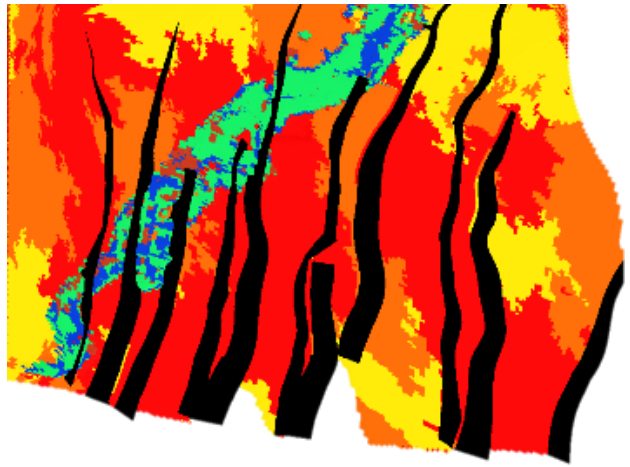
Sequential Indicator Simulation



Shape Modelling

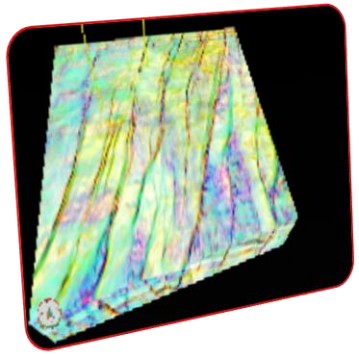


Using Geological Expression workflows

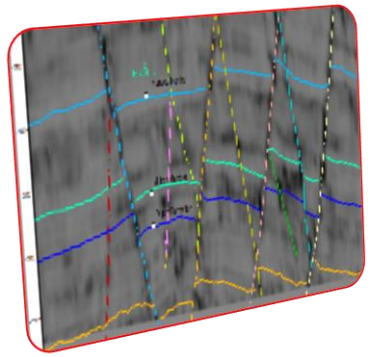


Spatially accurate facies to drive distribution of well logs

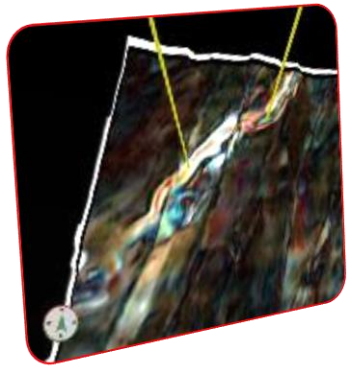
Workflow overview



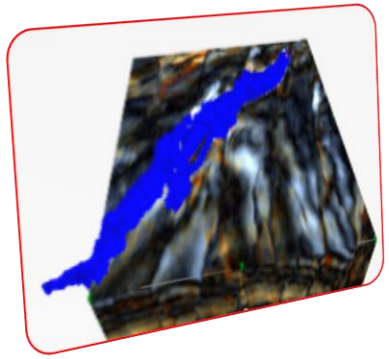
Structural analysis



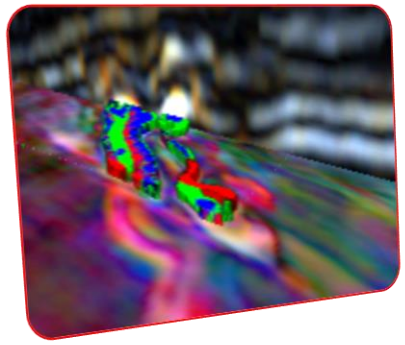
Fault interpretation



Frequency decomposition

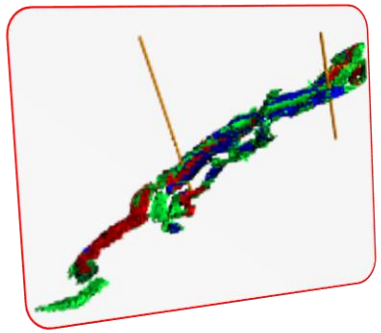


Geobody interpretation

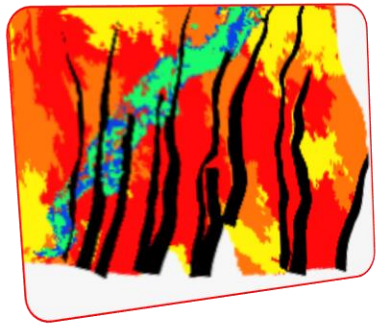


Facies interpretation

Integration

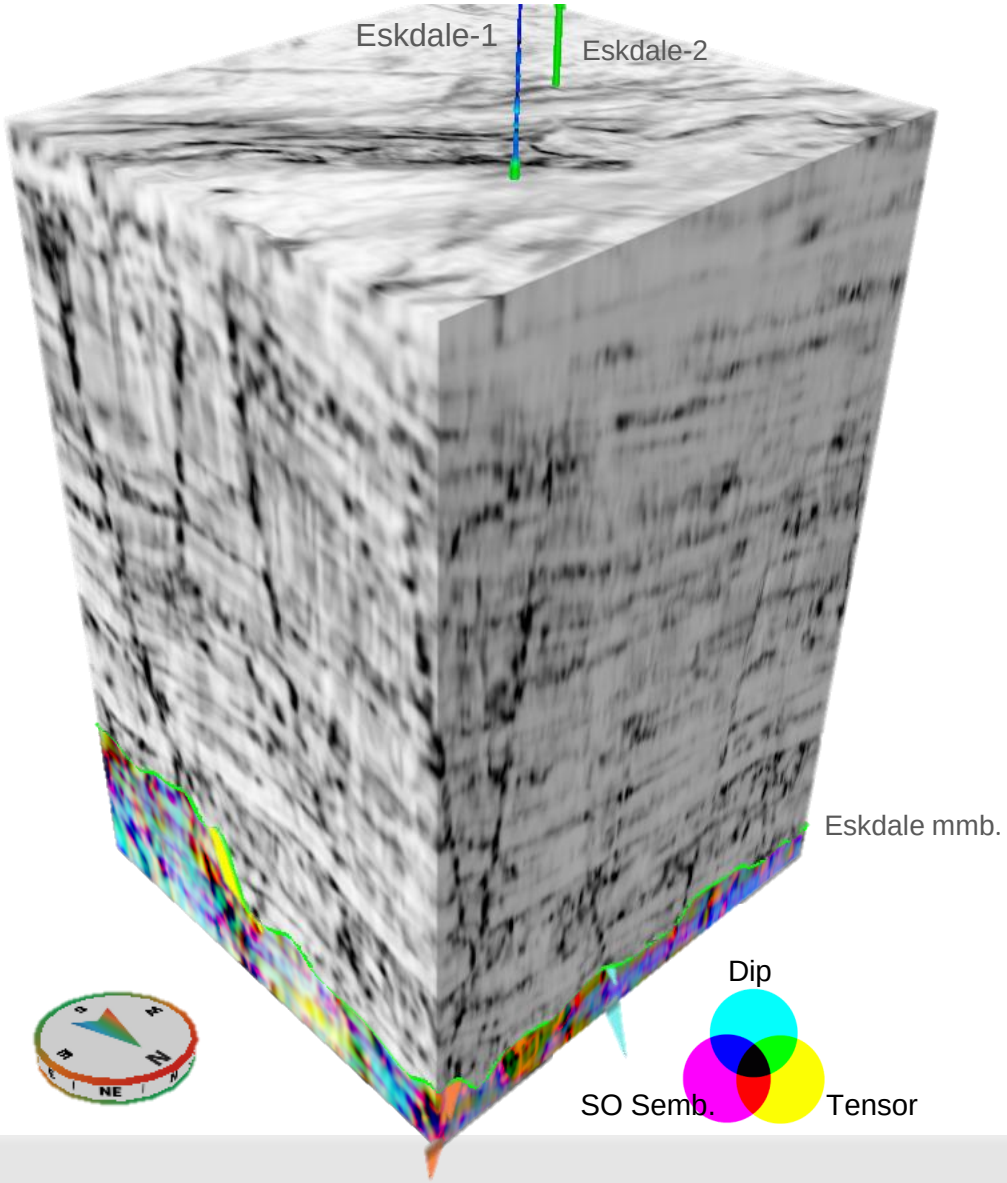


Geocellular Model



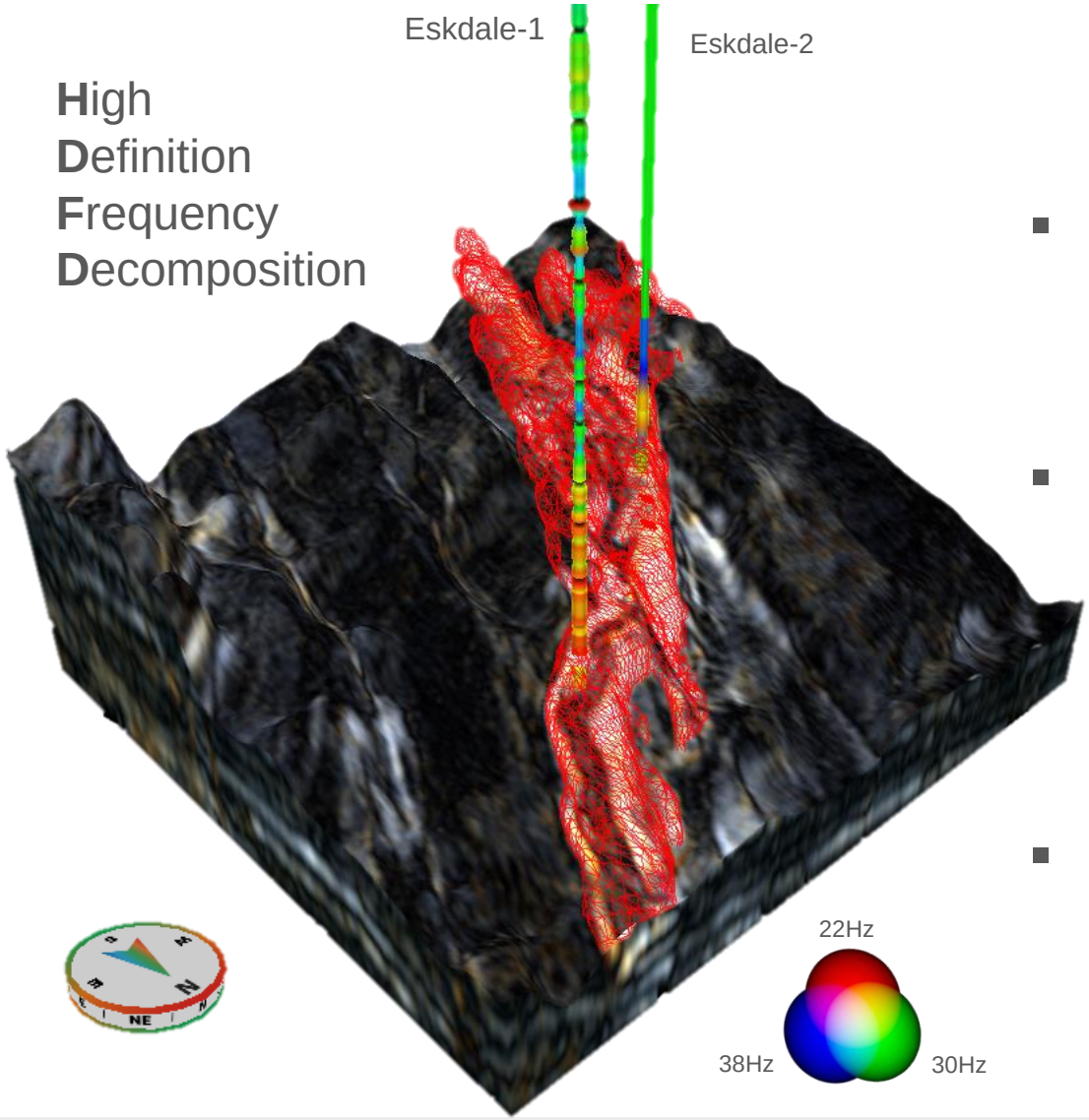
Property distribution

Structural analysis



- SO Semblance, Dip and Tensor edge attributes were used for complex fault analysis;
- CMY blends of 3 edge attributes shows the complete fault network;
- As a result detailed fault system was interpreted and implemented in to Eksdale geological model.

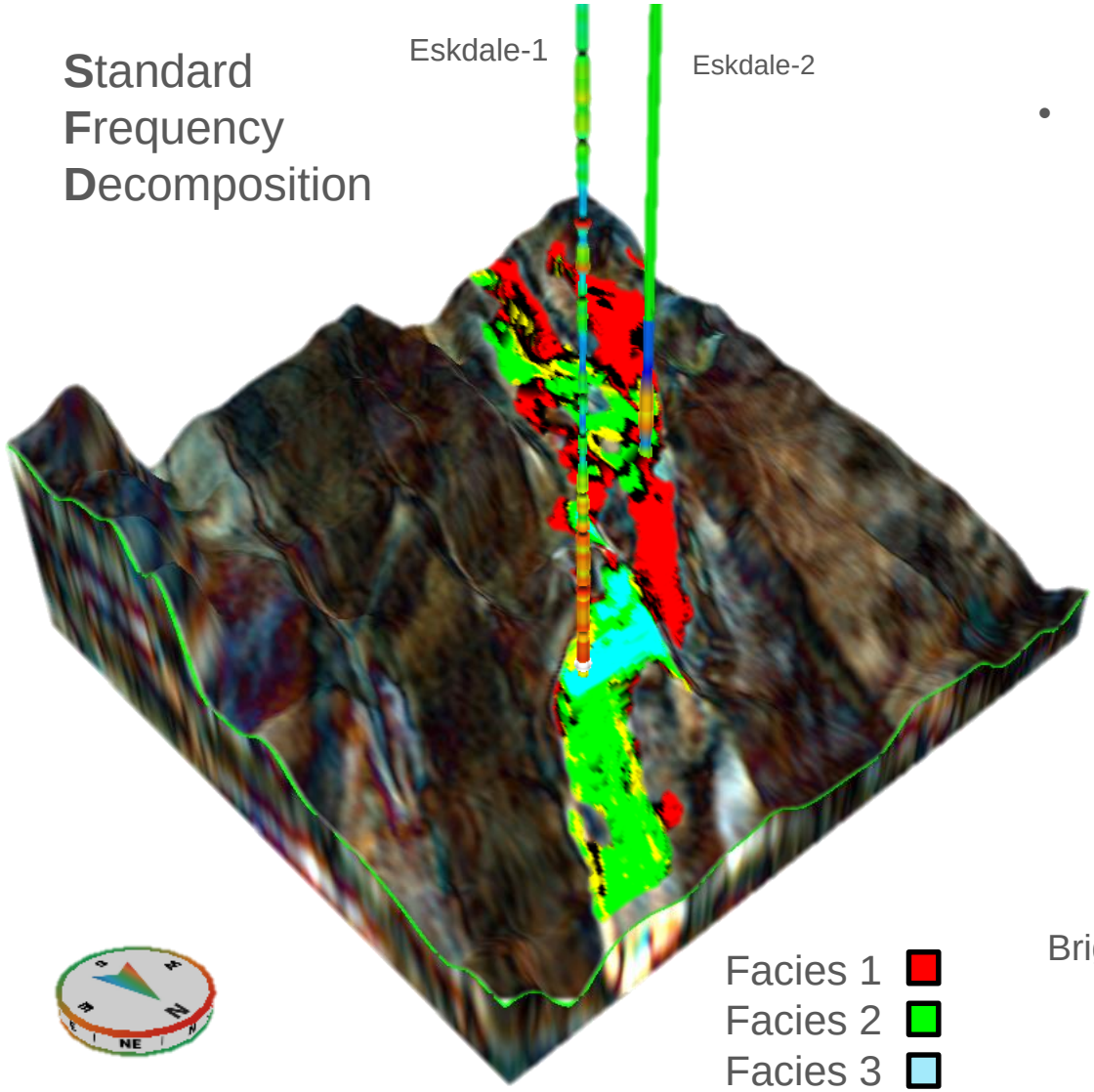
Adaptive Geobodies Interpretation



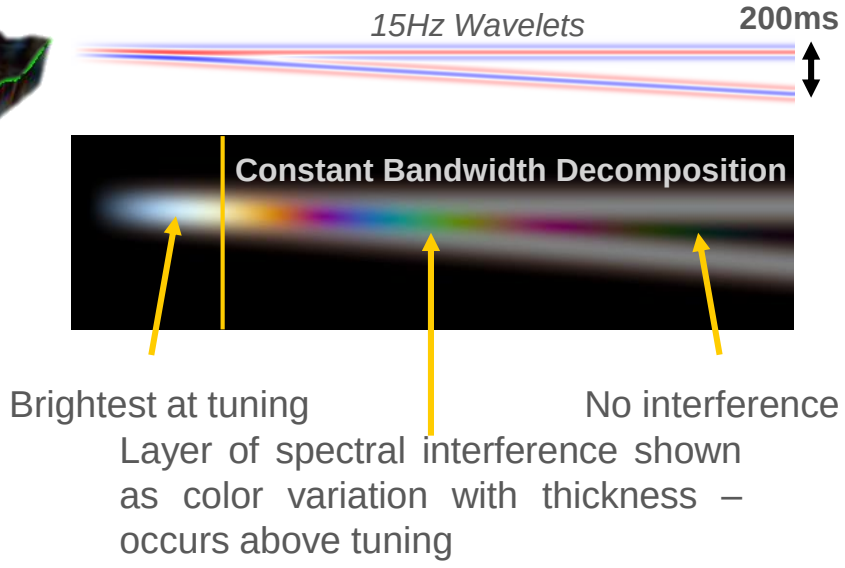
- Adaptive Geobodies were used to track the channel directly from the RGB blend;
- Manual manipulation of the geobody surface ensured the interpreted geobody matched the data and was geologically meaningful;
- The geobody was used as a container to describe the extents of the channel system.

Facies Classification

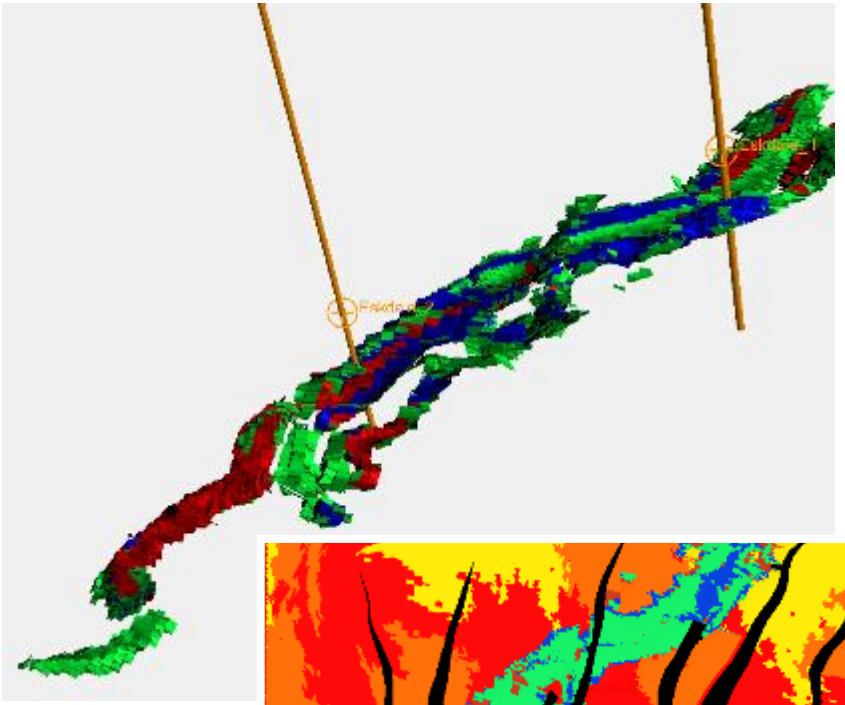
Standard
Frequency
Decomposition



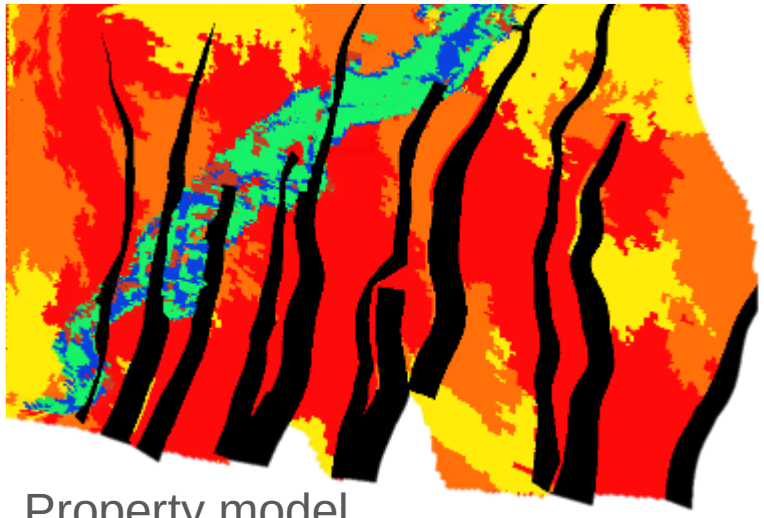
- Interactive Facies Classification (IFC+) enabled a multi-attribute classification of the RGB blend constrained by the Adaptive Geobody which delineated the different facies in the reservoir.



Geocellular model



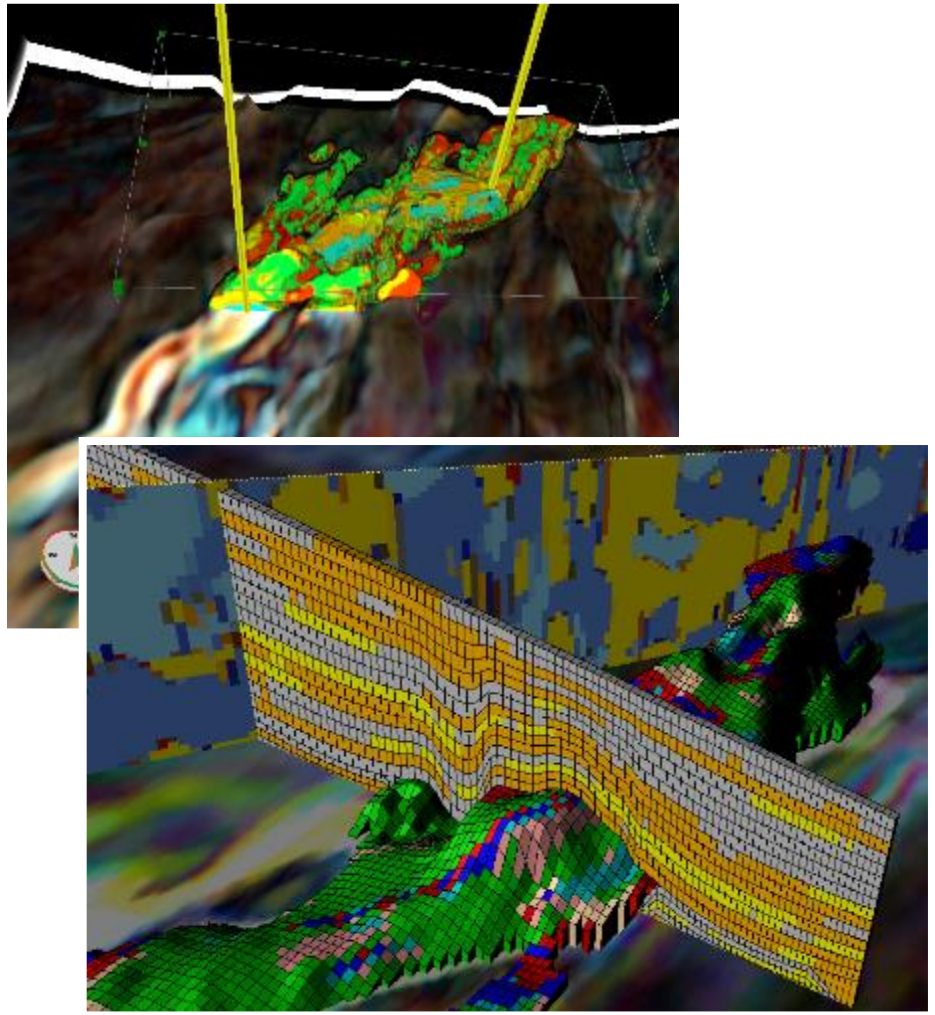
Geocellular model



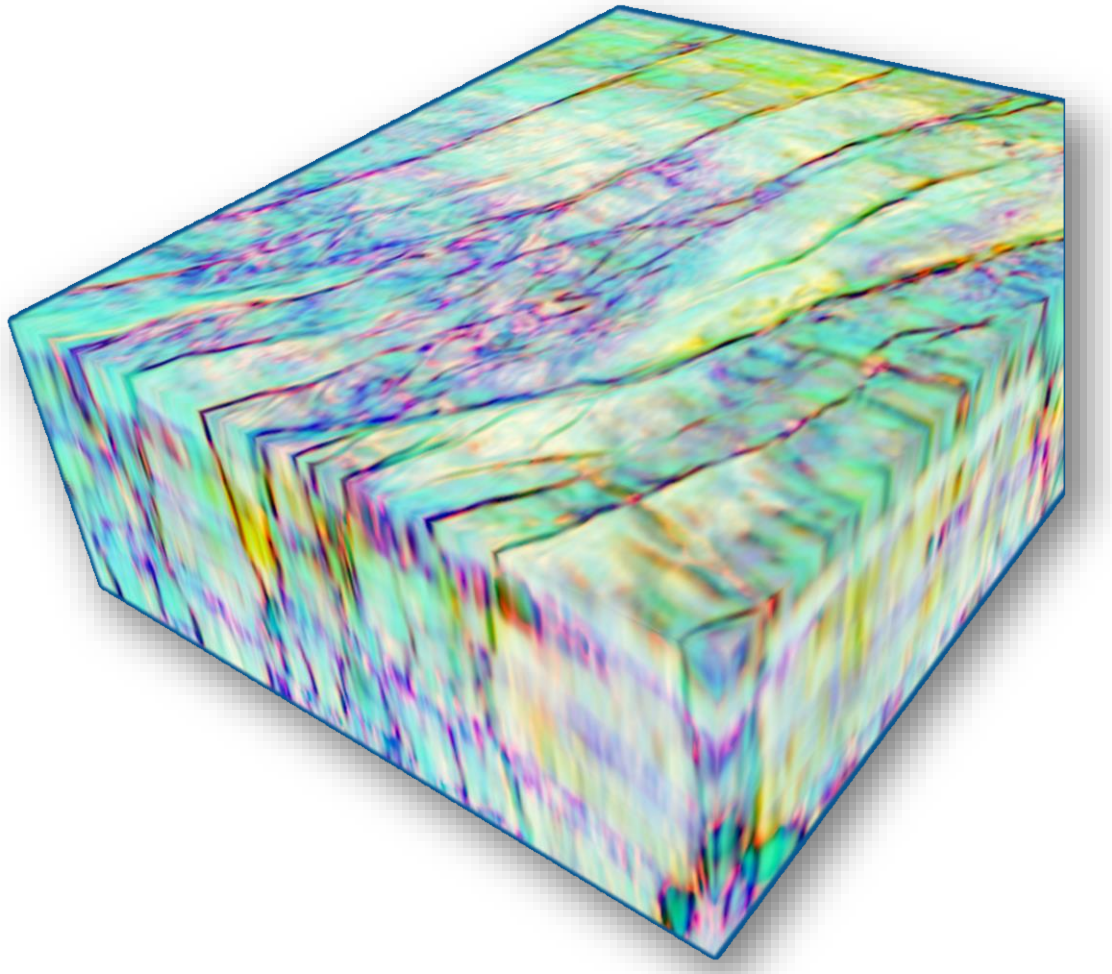
Property model

- The IFC+ classification volume was imported into the model maintaining the discrete facies descriptions;
- This gave the ability to rapidly build facies models with limited well data.

Summary



- Multi-attribute seismic colour blends **reveal** the geometries and depositional facies in the data;
- This information can be **rapidly** brought into the reservoir model and used to propagate petrophysical information **accurately** away from the well location;
- The workflow enable us to produce geological aesthetics model of subsurface features.

Q&A

Thank you for attention