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[PS]Stratal Slicing Uncovers Complex Depositional Architectures in the Northern Kutei Basin*

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Abstract

A methodology is described that allows for fast and efficient screening of 3D seismic datasets for the understanding of depositional environments and reservoir architectures.

Salamander Energy Plc has recently acquired a 3D seismic dataset in its SE Sangatta PSC in the Northern Kutei Basin. In order to quickly evaluate and high grade this complex acreage Salamander adopted a seismic screening approach. This approach involved the construction of proportional stratal slices using a framework of mapped regional horizons. The regional seismic horizons were first created based on an established stratigraphic framework tied to the available well data. Windowed seismic amplitude extractions were then performed on the stratal slices. Sequential animation of the slices provided an excellent visual tool for understanding the depositional system and its development through geological time. The slices reveal the development of complex Miocene to Recent canyon geomorphologies on the paleoslope from upper to mid and lower slope settings. From this screening process, quick construction of paleogeographic maps was made possible along with mapping of the shelf break position through time. The stratal slices show how the canyon scale and morphology, as well as degree of amalgamation vary with geological time and position on the paleoslope. The effect of local tectonism is also revealed.

Analysis of amplitude variations within the canyons and integration with structural mapping have revealed complex internal depositional architectures and have allowed for the identification and high grading of prospective areas. This methodology has been a powerful tool in the early exploration of this underexplored region.

Stratal slicing

uncovers complex depositional architectures in the

Northern Kutei Basin

Roger White, Ari Subekti, Yudhi Rizal, Anom Prasetya, Jo Reader

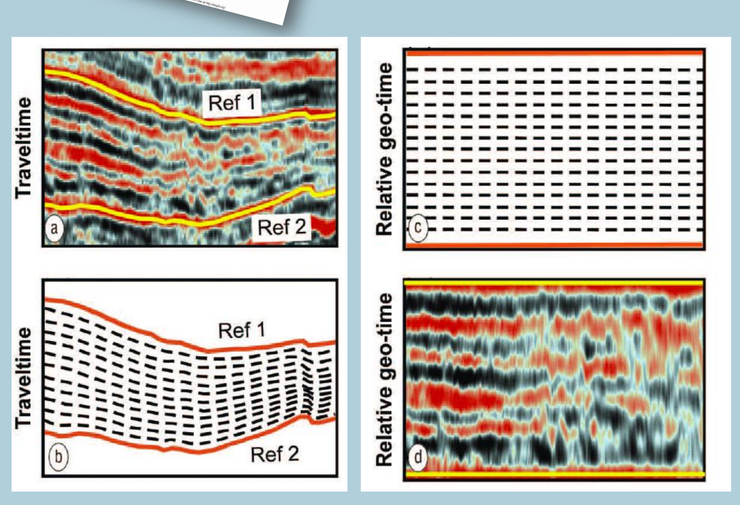
What is stratal slicing?


SPECIAL SECTION: SEISMIC INTERPRETATION

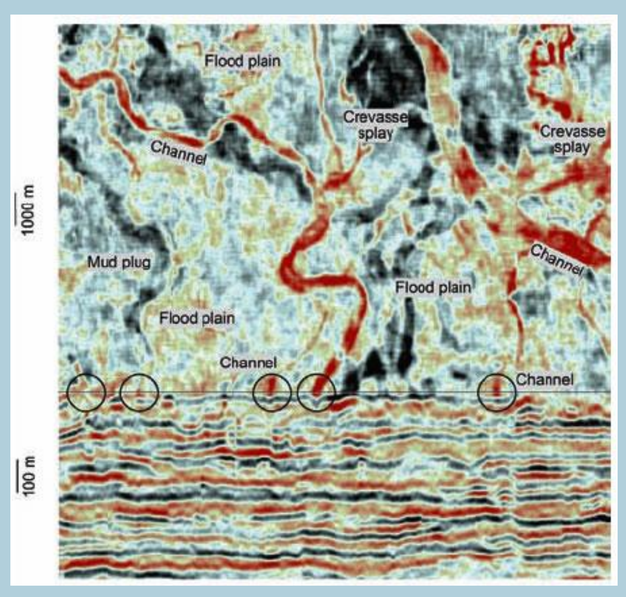
Stratal slicing: Benefits and challenges

HongLui Zeng, Bureau of Economic Geology

Stratal slicing: Benefits and challenges
HongLui Zeng
The Leading edge, 2010



a) Data cube with two geologic time parallel reference events
b) Stratal time cube created by linearly slicing between reference events
c) Flattened stratal time volume labeled with relative geologic-time scale
d) Amplitude stratal slice cube



Chair display through amplitude stratal slice cube with interpretation of geomorpholgies labeled

The challenge

Exploration of the structurally complex Northern Kutei basin is further complicated by discrete reservoir distributions typical of deep water sedimentary process. The application of stratal slicing to the newly acquired 3D seismic is key to understanding the prospectivity of the area.

Conventional stratal slicing, relies heavily on the quality of the picked guide horizons and therefore picking suitable horizons can be a time consuming process.
This paper describes a modified approach to stratal slicing that has been applied to a recently acquired 3D sesimic dataset in the northern Kutei which has allowed a very quick, holistic screening of the area.

The Solution

1. **Overlapping, horizon based , windowed Attributes**
2. **Animation of the slices.**

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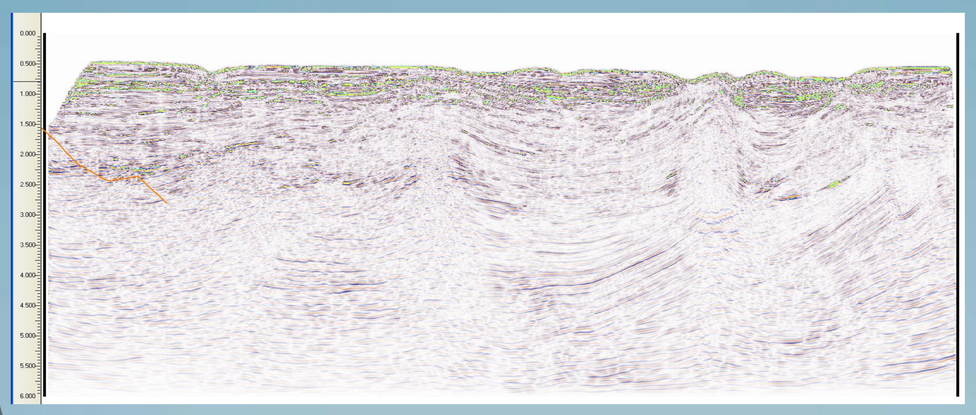
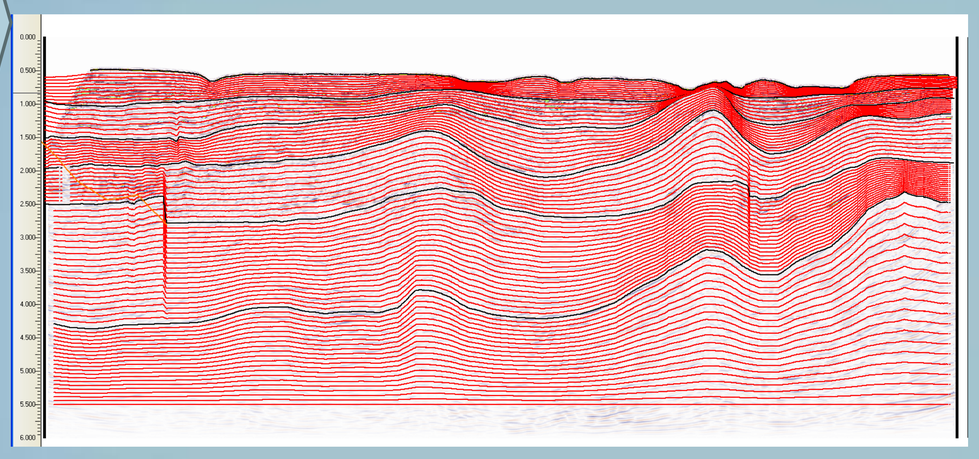
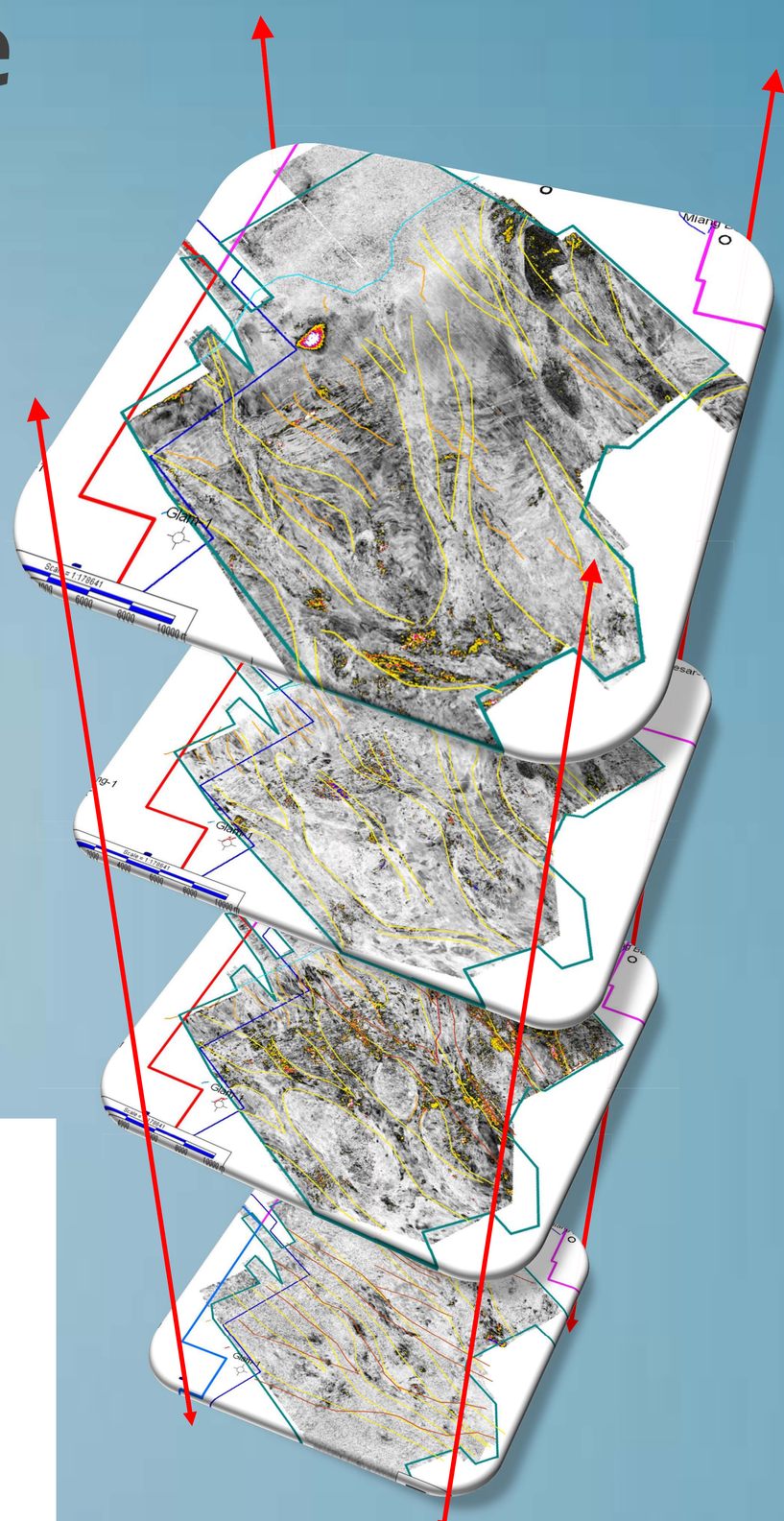
Northern Kutei example

Slice Construction

1. Guide horizons (black) need only be broad and smooth to capture the gross structural form.
2. Construct intermediate horizons (red) to adequately sample the vertical scale of your target geology.
3. Exact attributes based on your intermediate horizons that over lap with the windows above and below.







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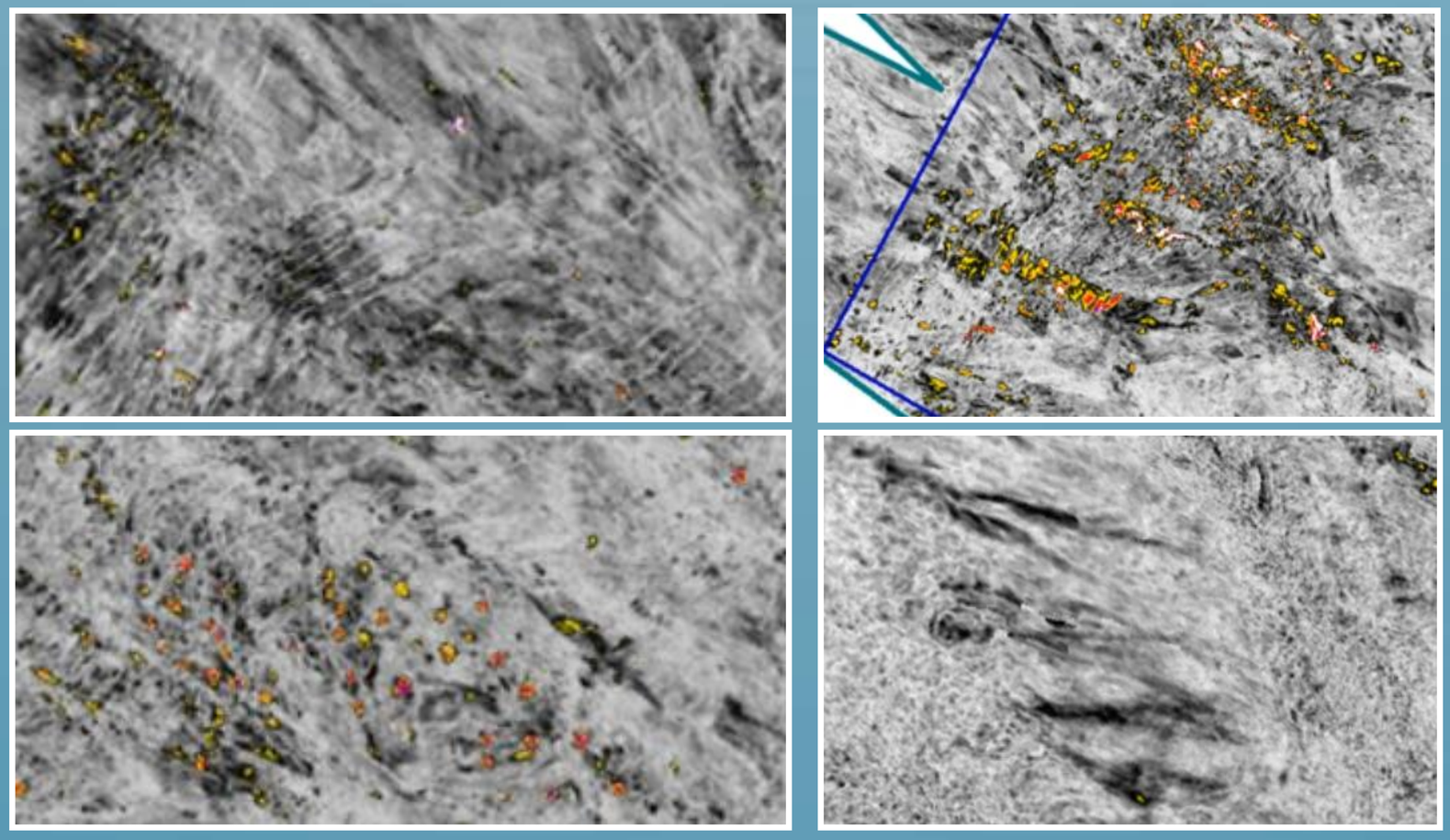
Animation

4. Load the extracted attribute maps/volume into an animation tool.
5. Pan smoothly up and down through your maps/volume
6. The animation allows the human eye to quickly identify and capture the underlying geomorphologies from slice to slice.

What is this video?

The animation 80 stratal slices of maximum amplitude over a 100ms window.



Special Features

Can you recognised these morphologies in the video? What depositional processes can they be attributed to?

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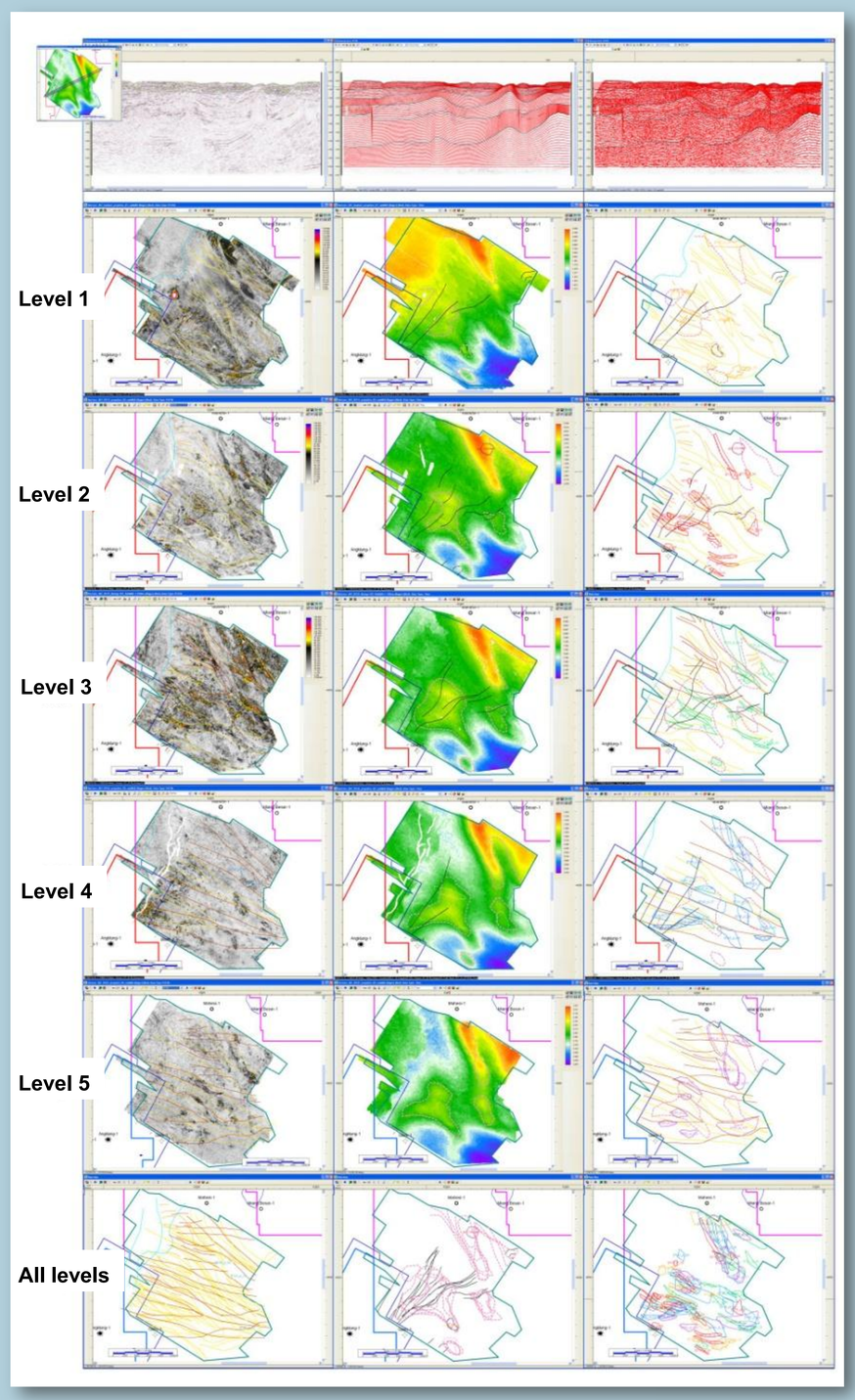
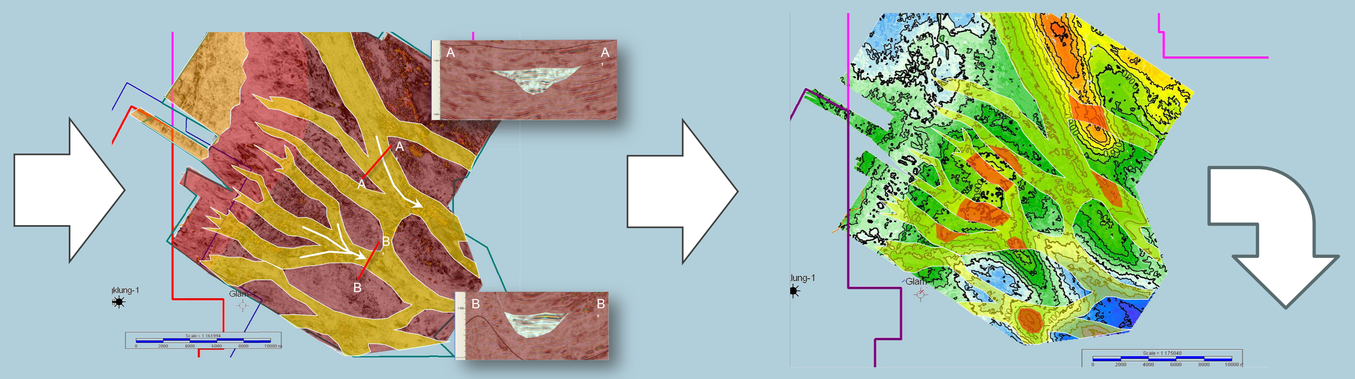
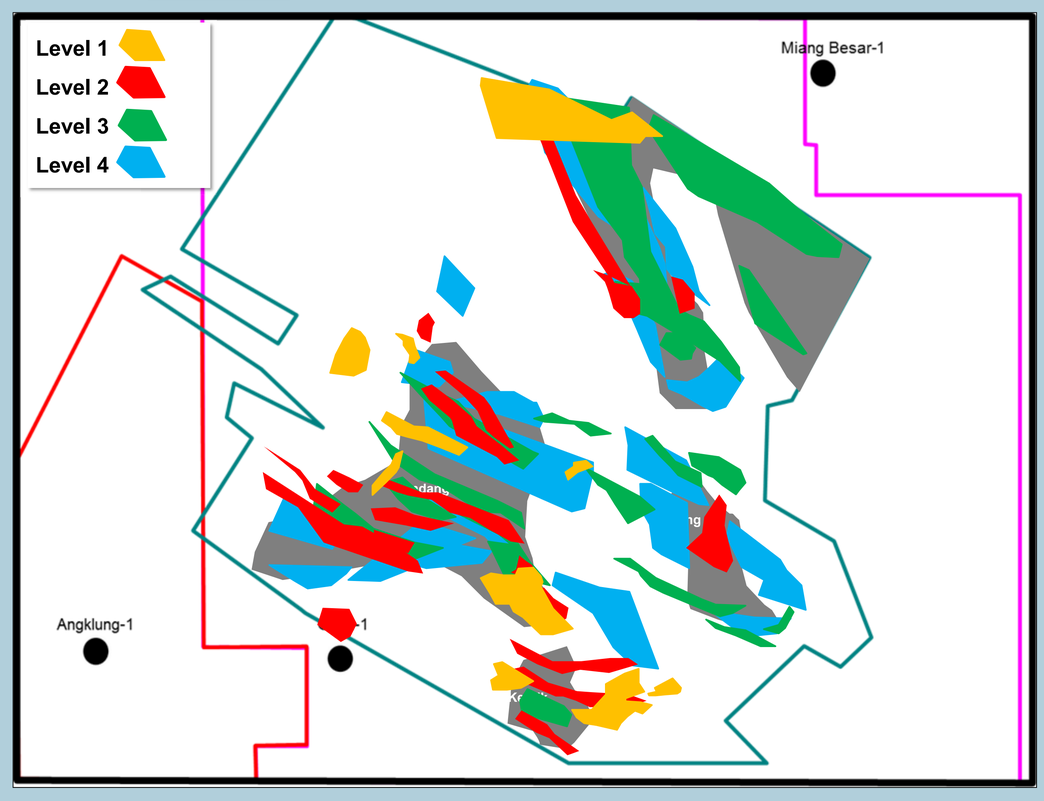
Lead and Prospect inventory population

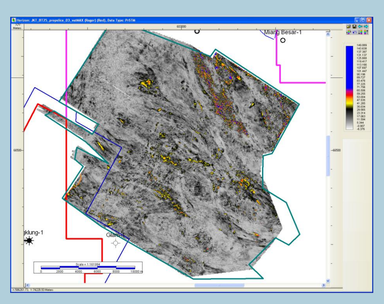


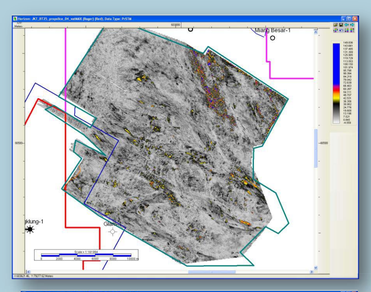
1. Sketch geomorphologies on each slice.
2. Compile / over sketches from interval of interest
3. Construct expected reservoir distribution map
4. Overlay with mapped structure
5. Define lead areas for detailed follow up interpretation

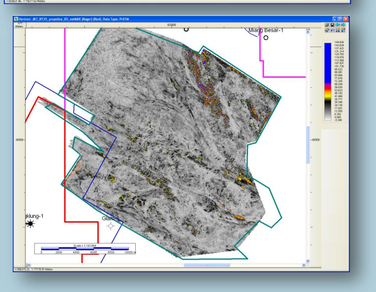


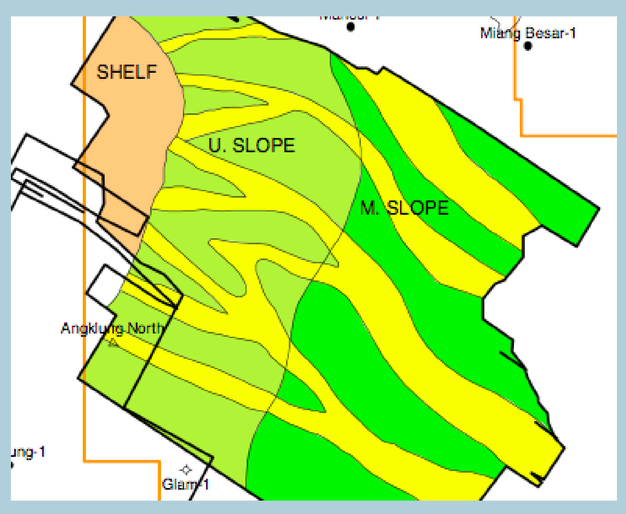


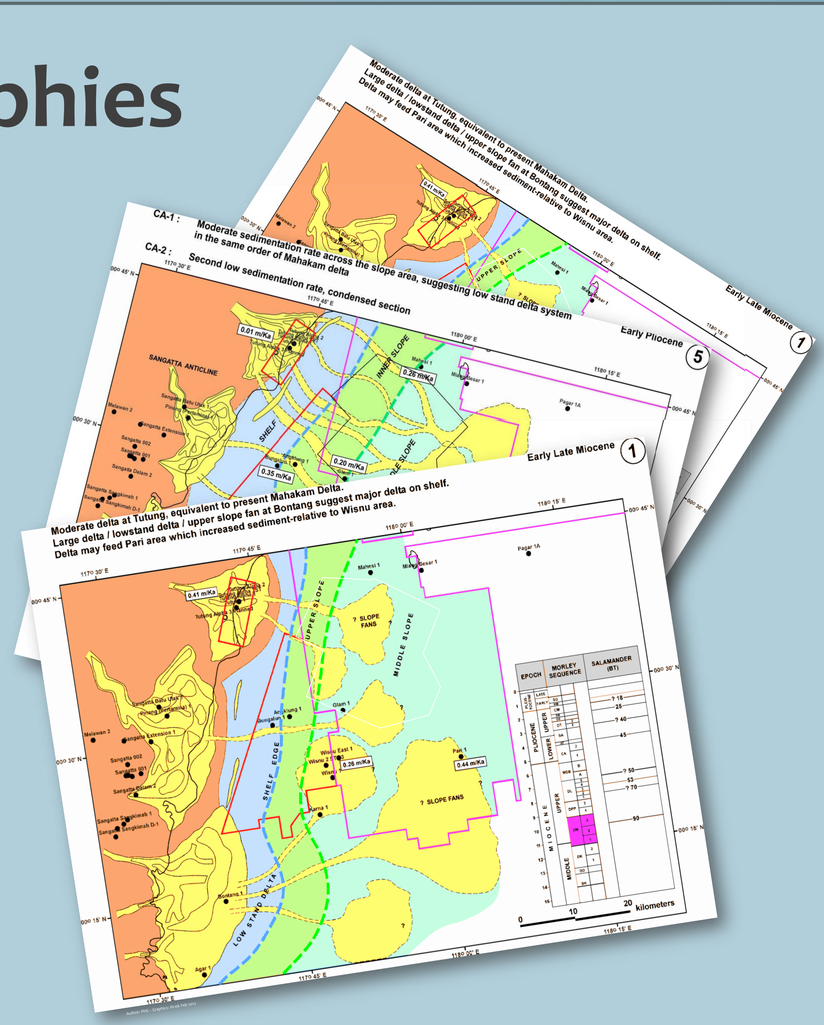
Constraining Paleo- Geographies











A quick, holistic method for screening your 3D seismic datasets

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