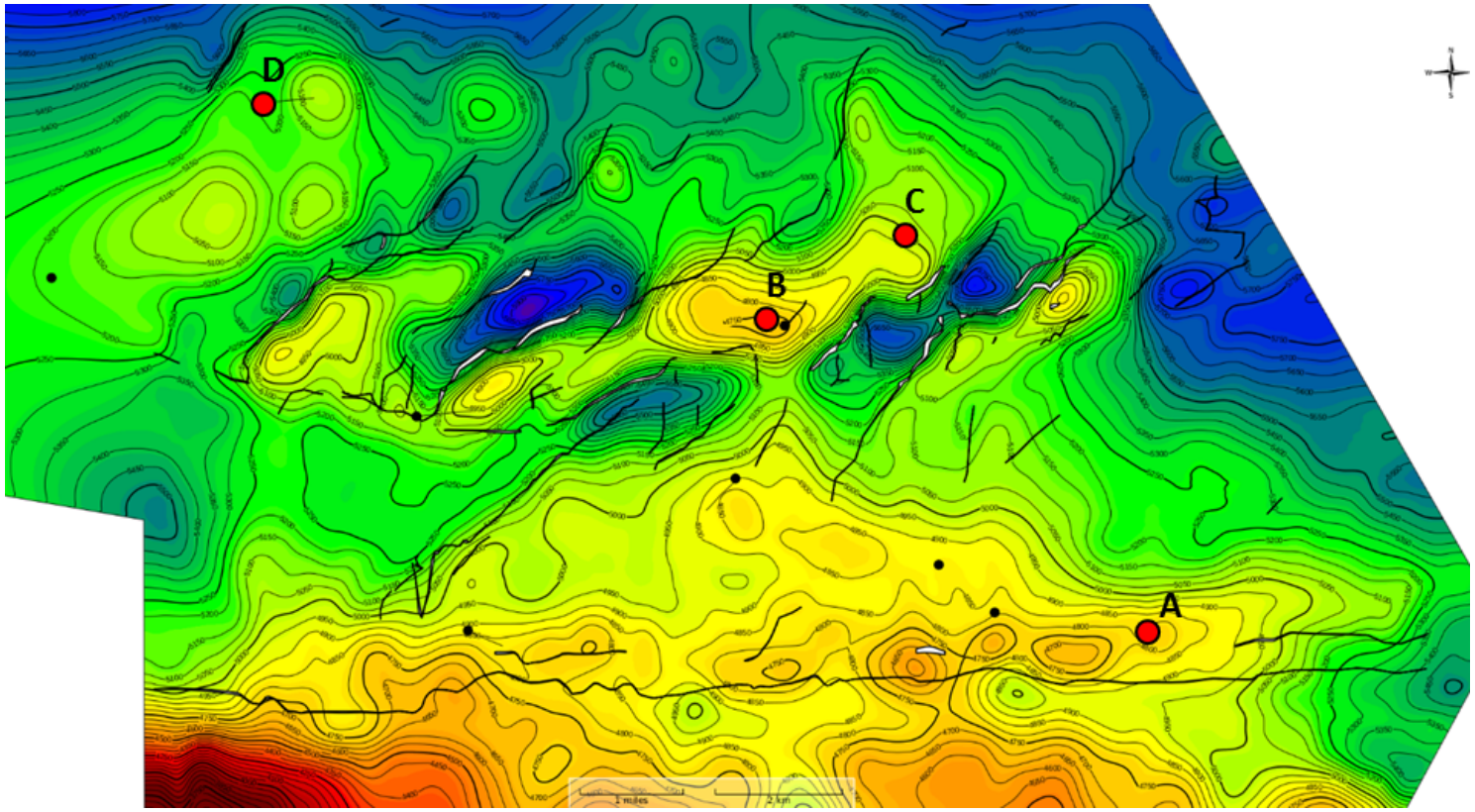
Stratigraphic Forward Modeling for Step-out Potential of Kujung I Early Miocene Carbonate, North Gresik, East Java, Indonesia

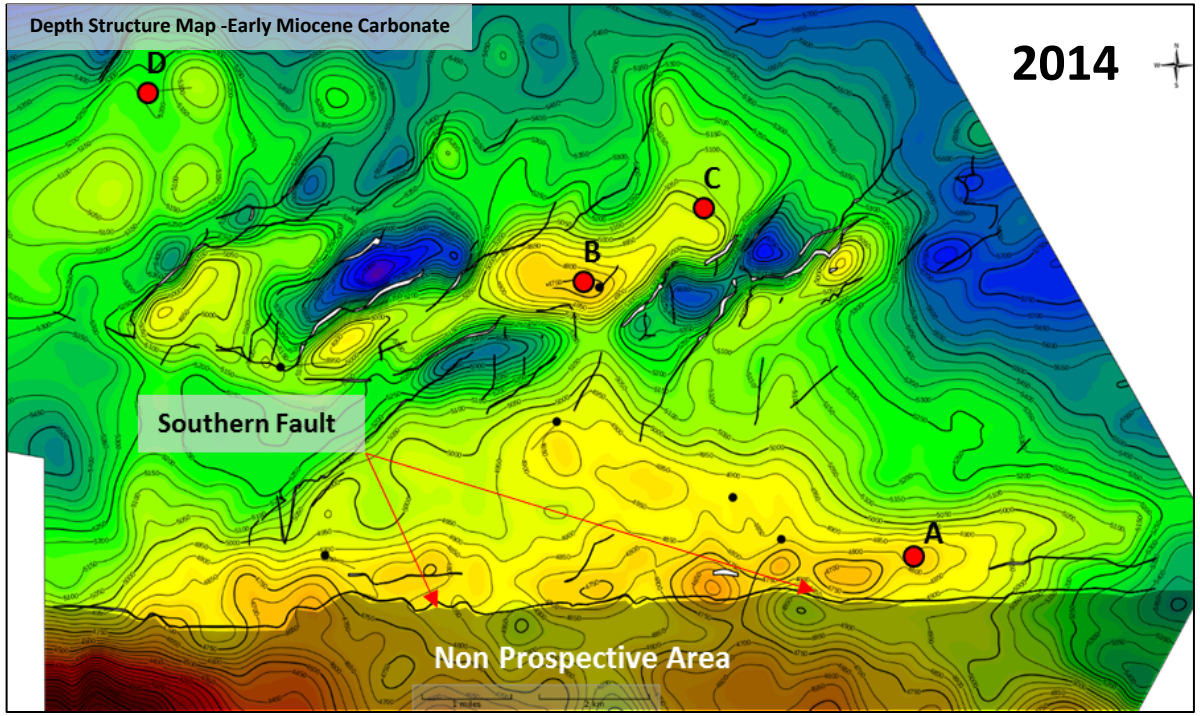


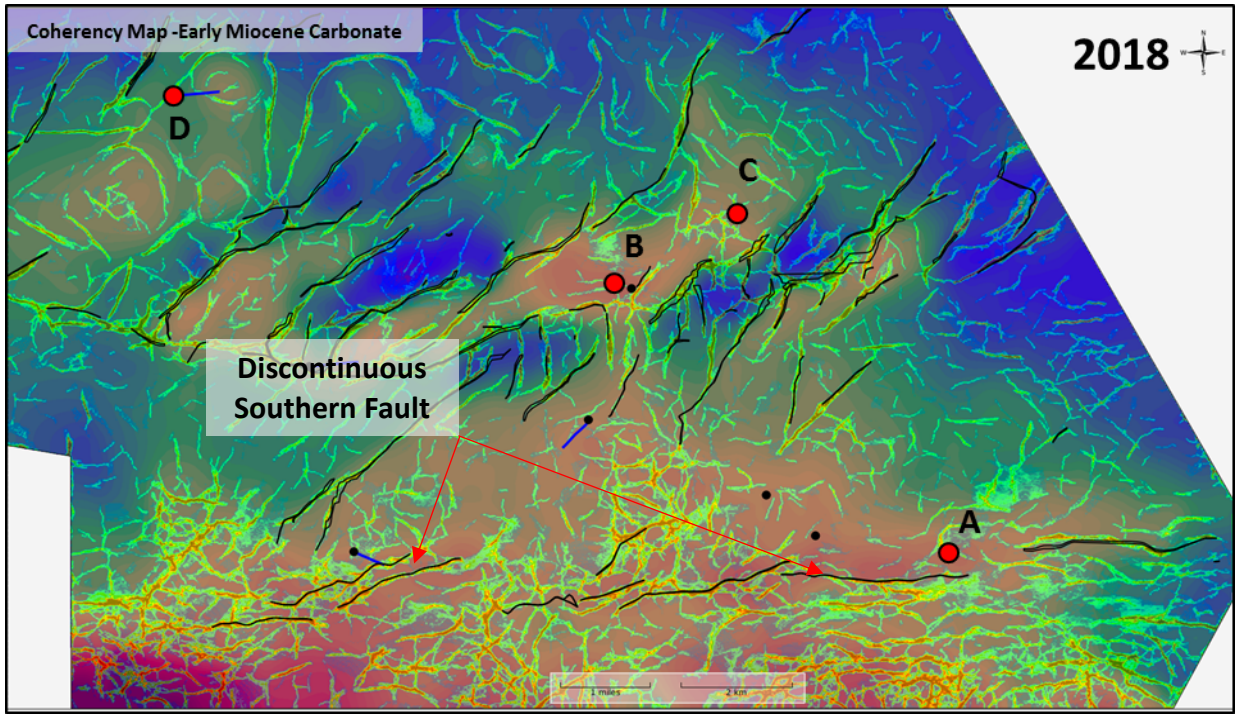
Faisal Muhammad*, Anom Seto Murtani*, Wisnu Widiatmoko**, Lutfi Nugrahadin**, Mostfa Lejri**

***Saka Indonesia Pangkah Limited**

****Schlumberger**

Discontinuous Southern Fault

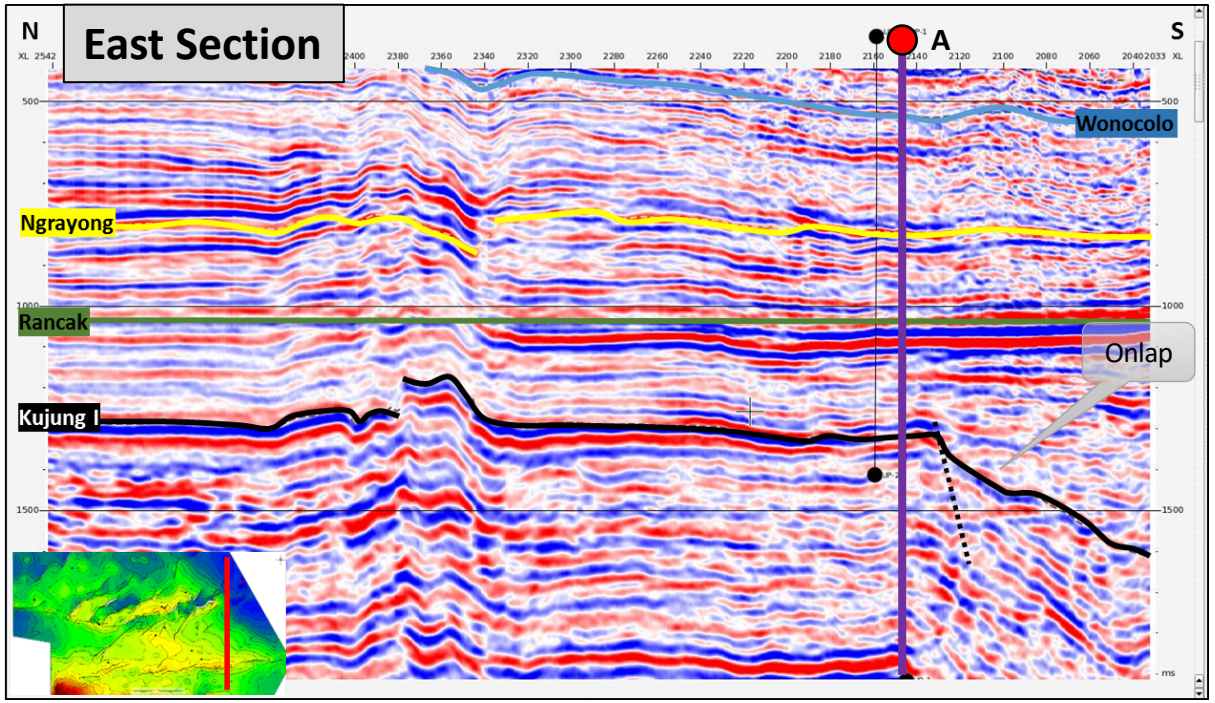


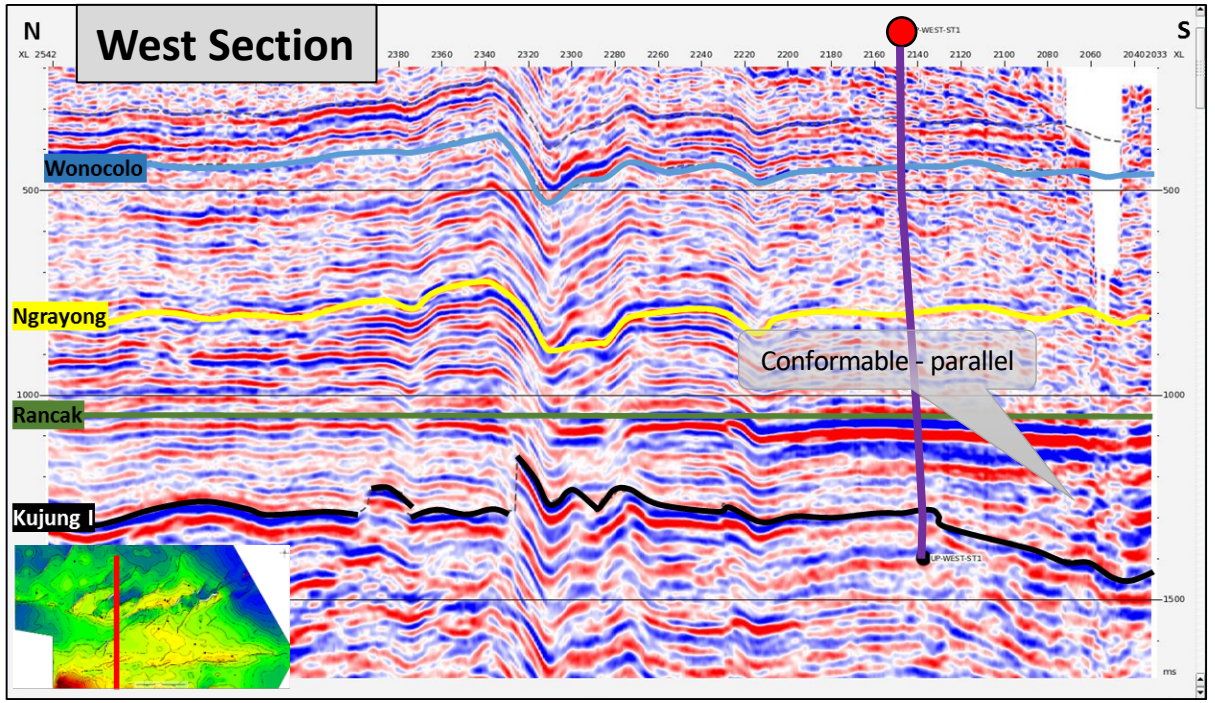


- Straight east-west fault reflecting a shelf edge line
- The southern part becomes a non-prospective area

- Coherency attribute showed discontinues southern fault.
- Southern boundary is possibly not confined by fault.

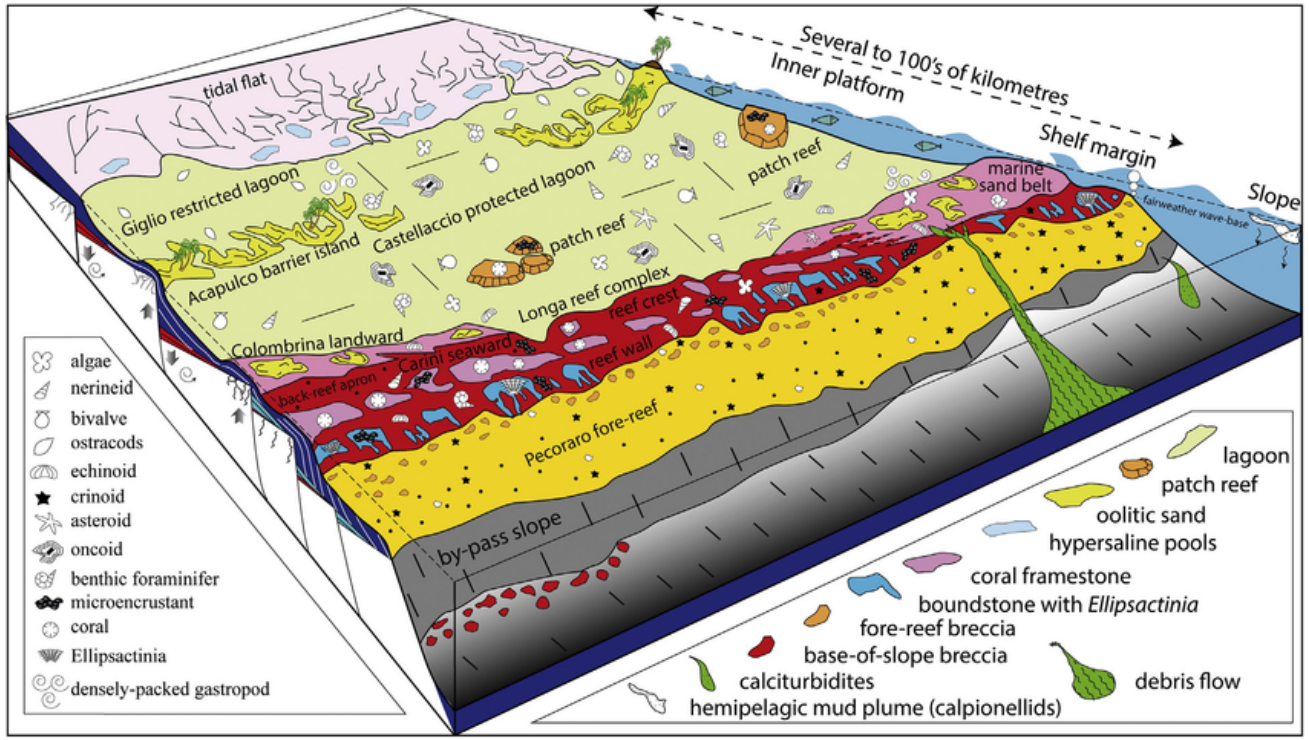
Paleo Shelf Edge – Southern Slope

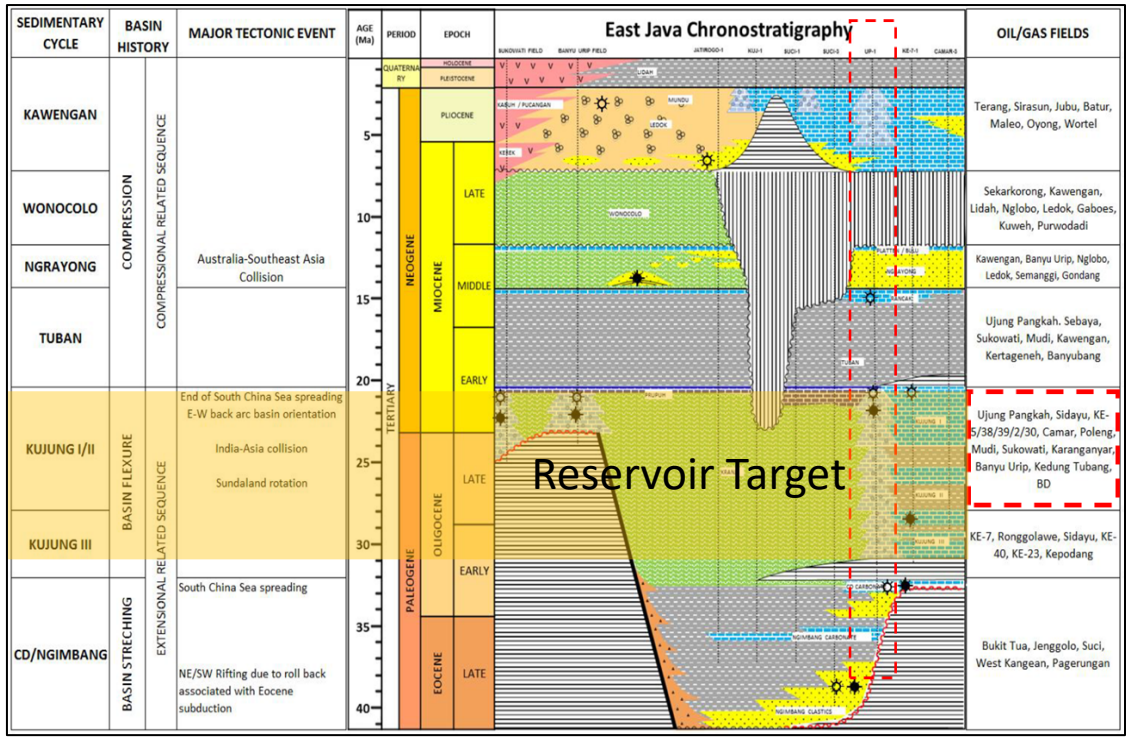




- **Paleo shelf edge** from seismic lead into shelf edge line definition
- **East section** showed a steep southern slope and onlap seismic features (Strong justification for shelf edge line)
- **West section** showed a gentle southern slope and conformable – parallel seismic features

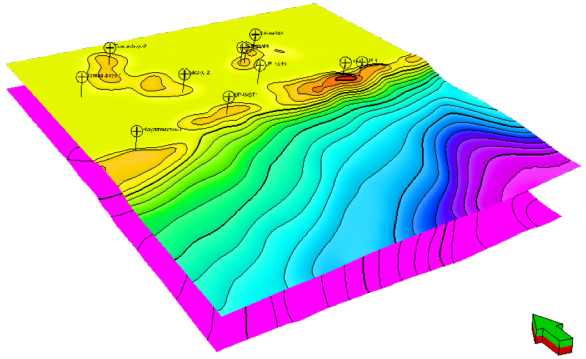
Stratigraphic Forward Modeling



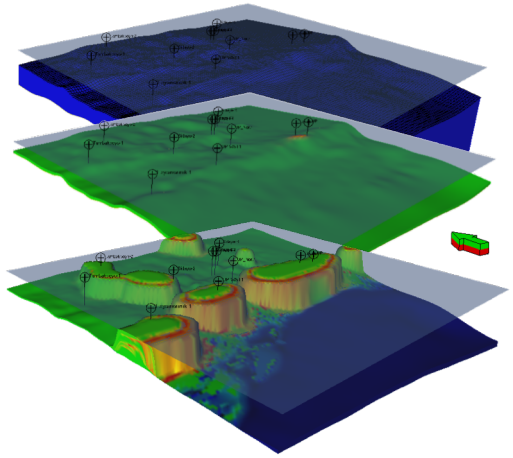


Stratigraphic forward modeling should be run to get better understanding about shelf edge environment (platform edge, reef, and reworked distribution) beyond southern fault

Methodology



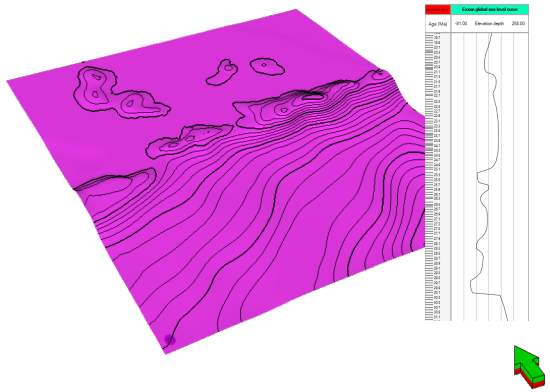
Wave Source
Sea level curve
Subsidence Rate



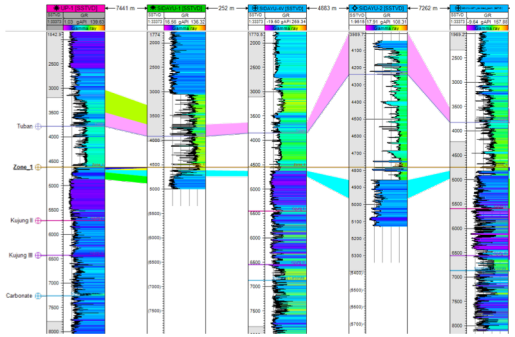
Thickness calibration
Petrography analysis

Palaeotopography → **Initialization** → **Simulation** → **Calibration**

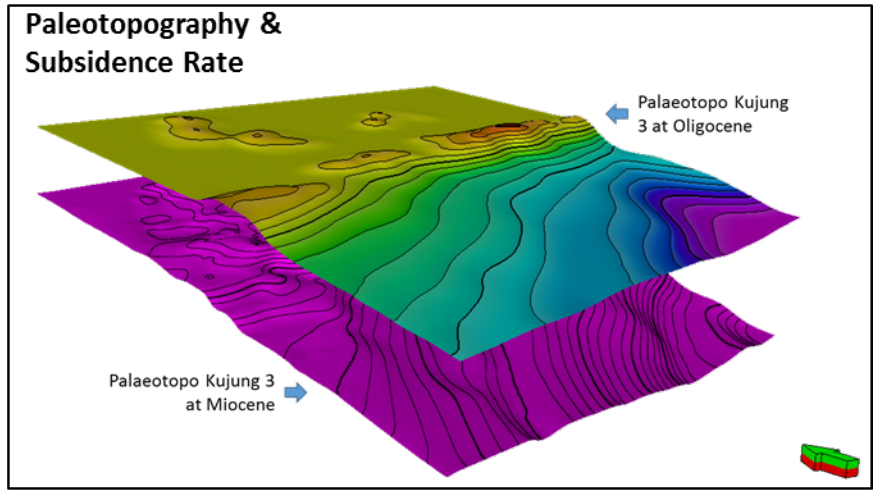
Palaeo K3 Oligocene
Palaeo K3 Miocene

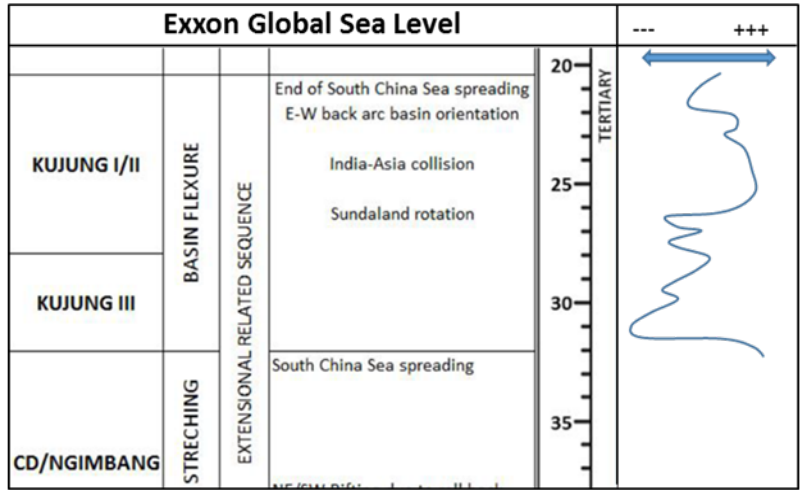


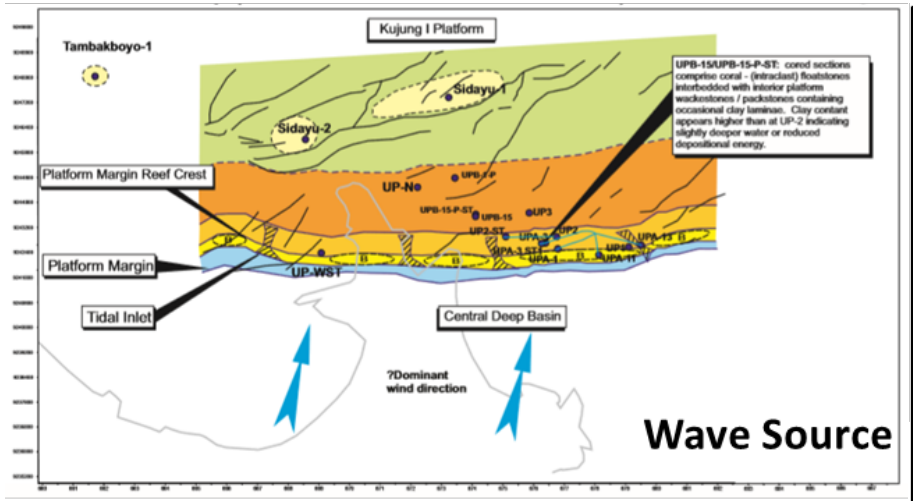
Iteration for accommodation space & reef distribution

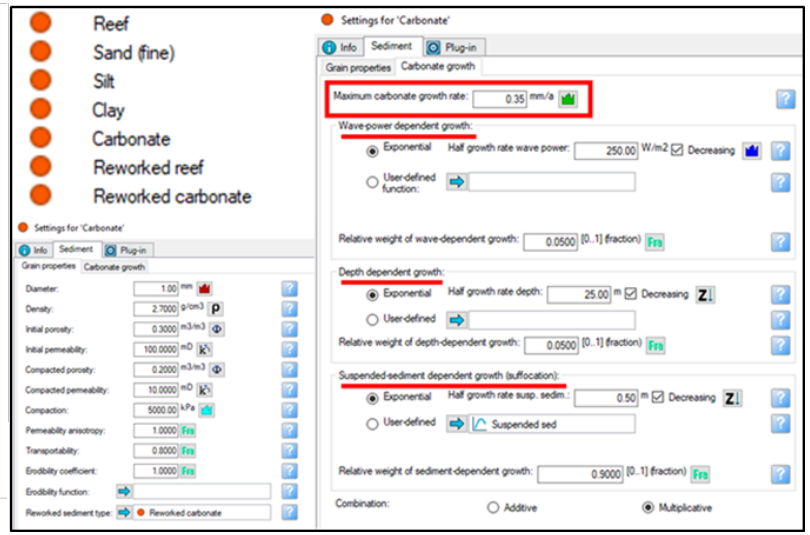


Input Data









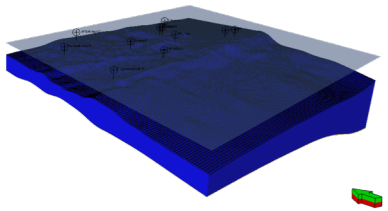
- Paleo Kujung III at Oligocene time Initial condition of Kujung cycle and Paleo Kujung III at Miocene time as the final condition of Kujung cycle
- The sea level curve controlled carbonate development based on water depth.
- Wave direction controlled the nutrition for carbonate development
- Lithology parameter for modeling (Grain Size, Density, Initial porosity & permeability)
- Specific parameter for carbonate development (Growth rate, Depth Dependent, Suffocation)

Paleotopography → Initialization

Simulation and Calibration

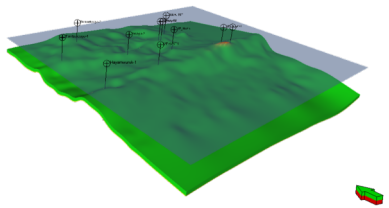
- **Simulation**

1st Pass Simulation



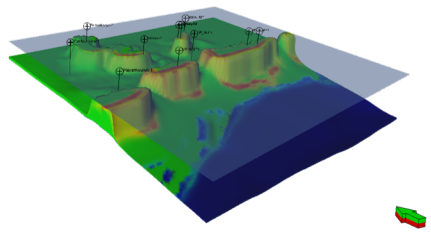
The first pass simulation is run to achieve the accommodation space based on the subsidence rate (without running lithology simulation).

2nd Pass Simulation



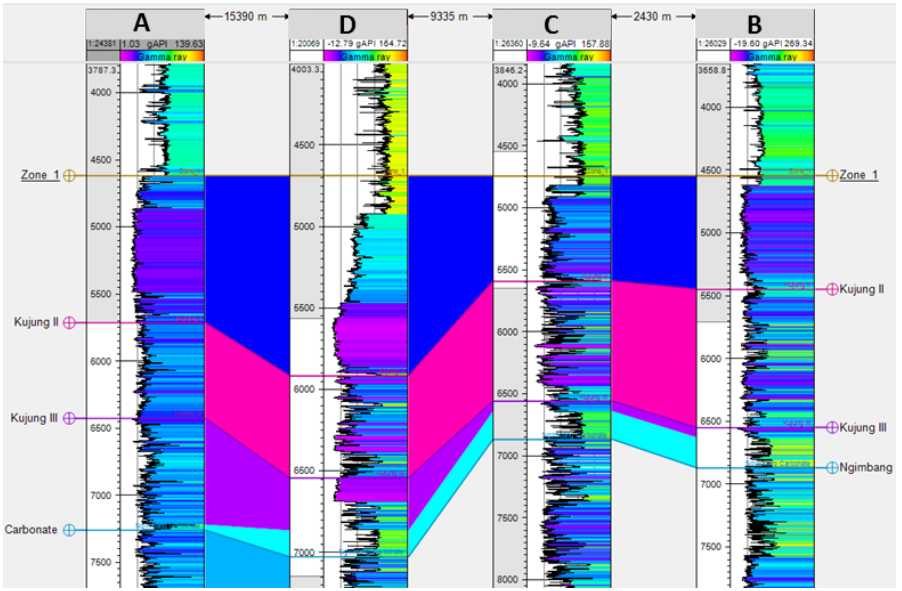
2nd pass simulation is to see the behavior of carbonate growth and distribution.

3rd Pass Simulation



3rd pass simulation for full simulation

- **Calibration**

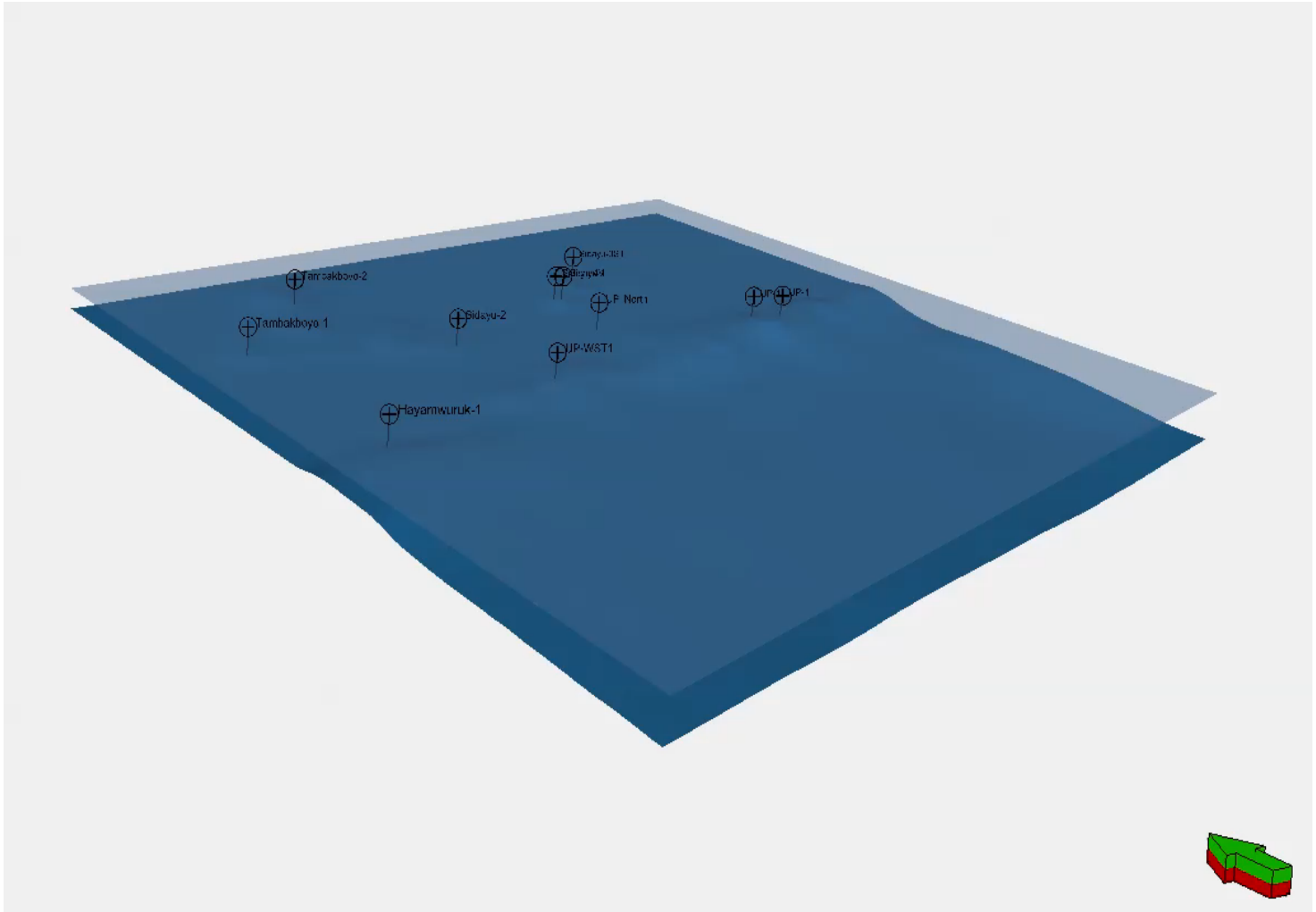


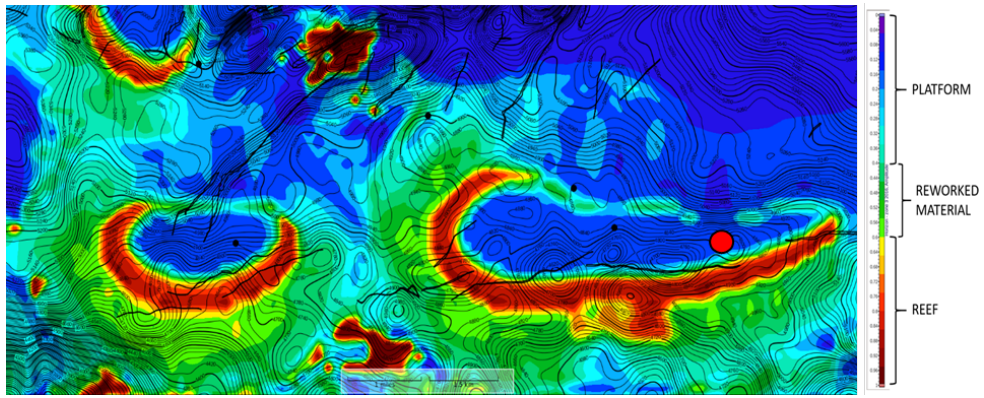
Well	Thicknes (m)	
	Well	Simulation
A	795.52	799.75
D	664.43	702.66
C	578	274.21
B	632.46	690.53

Calibration is taken place by comparing the thickness of Kujung Formation on 4 wells

Simulation → Calibration

Result

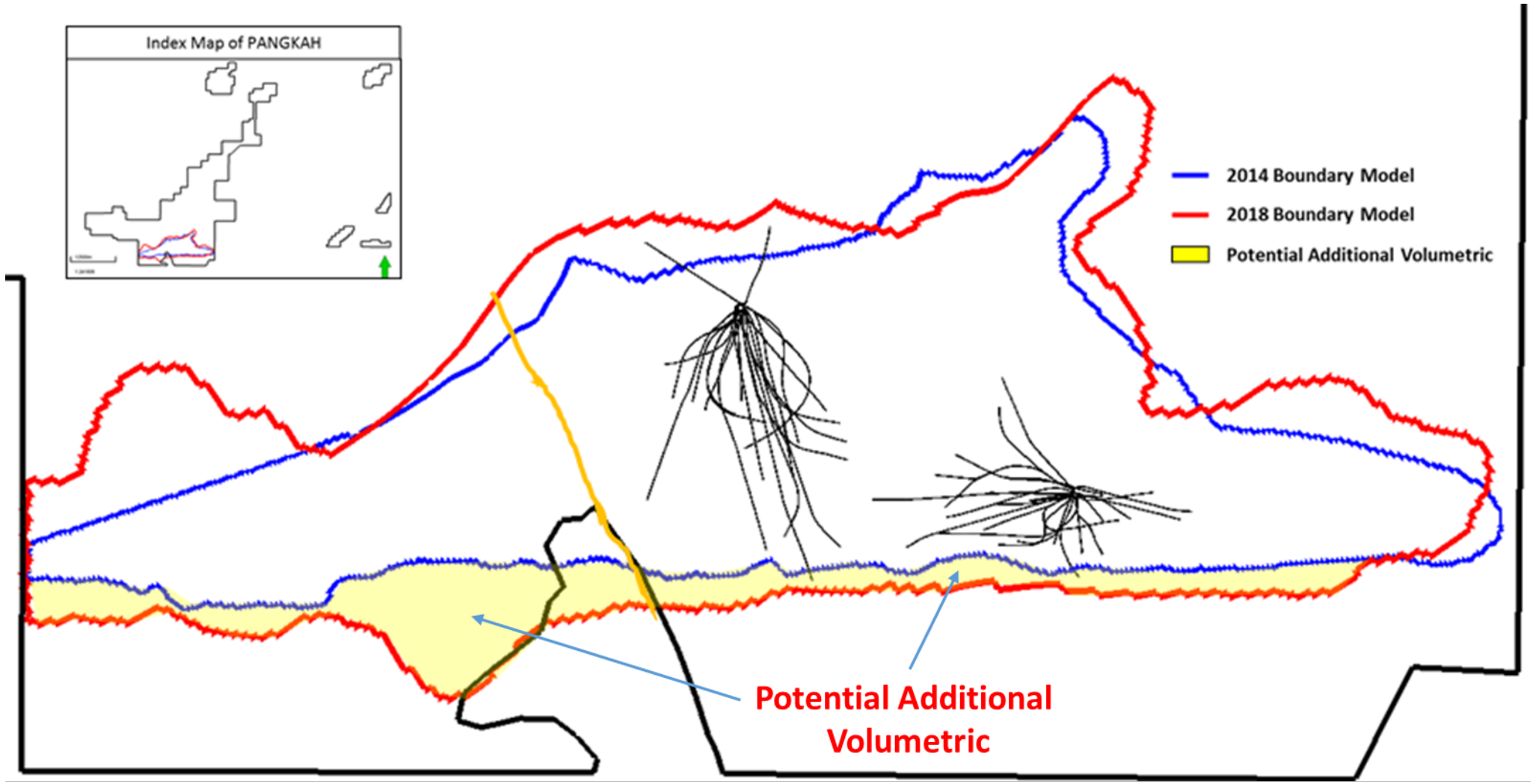




- Showed shelf edge line is moved toward south of the previous interpretation
- Reworked carbonate material (green) distributed approximately as far as 1.3 km from the main reef area (red).

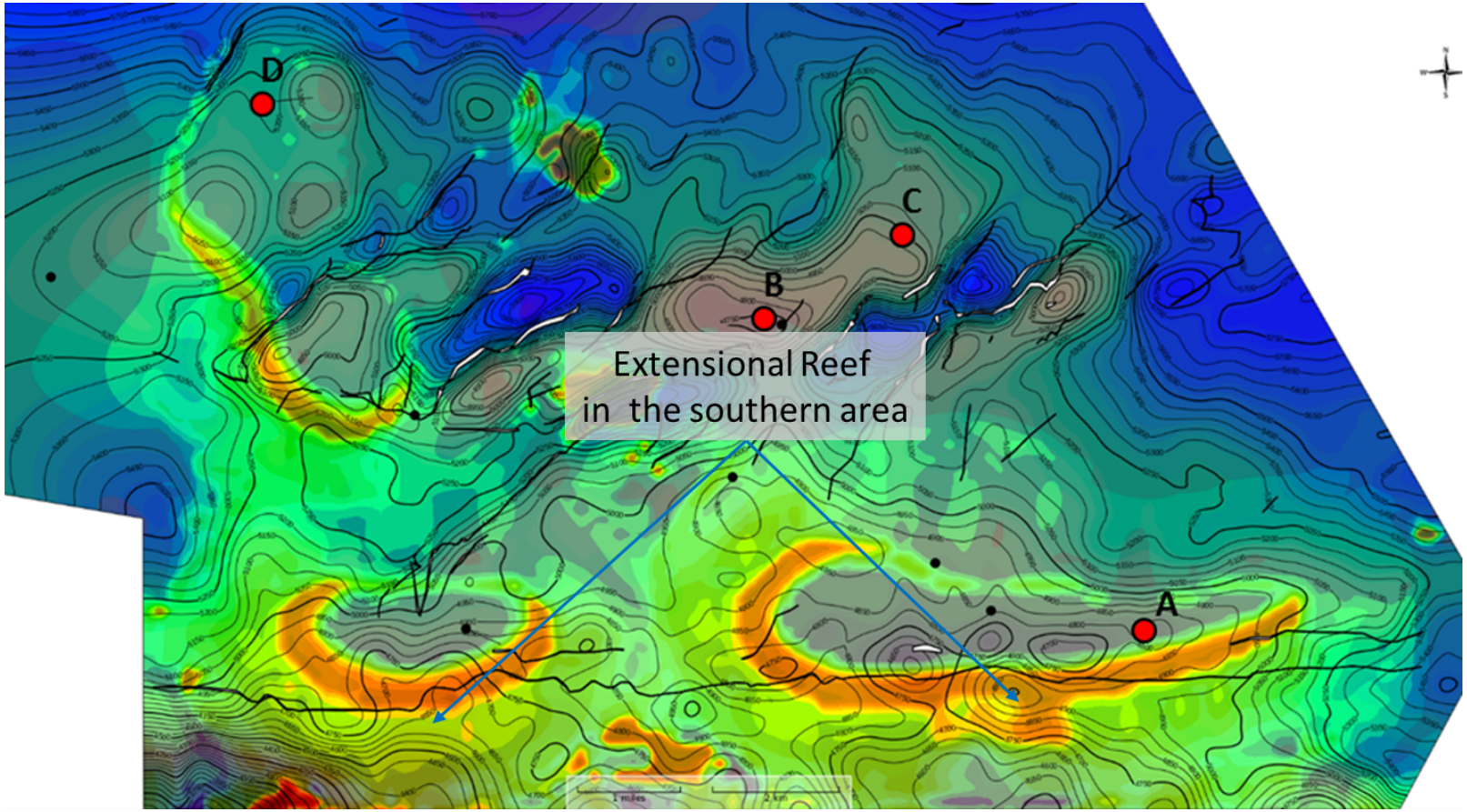
Reef
Carbonate Platform
Fine Sand & Silt
Clay

Potential Additional Volumetric



Conclusions

- **Stratigraphic Forward Modeling** (SFM) helped to reconstruct carbonate rocks development
- This simulation result has **opened new insights** in the southern part of Ujung Pangkah.
- Stratigraphic Forward Modeling (SFM) can helped to construct several model scenarios that are very useful in **optimizing development strategy**.



Thank you