



LATERAL DISTRIBUTION OF SERRAVALLIAN-TORTONIAN CHANNELIZED BODIES IN TEMSAH CONCESSION AND ITS IMPACT ON THE EXPLORATIVE POTENTIAL, OFFSHORE NILE DELTA, EGYPT

By

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" GPC 2023 Workshop "



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Outline

1. Main Idea
2. Geological Background
3. Tamsah Structural Setting
4. Seismic Interpretation
5. Future HC Potentiality

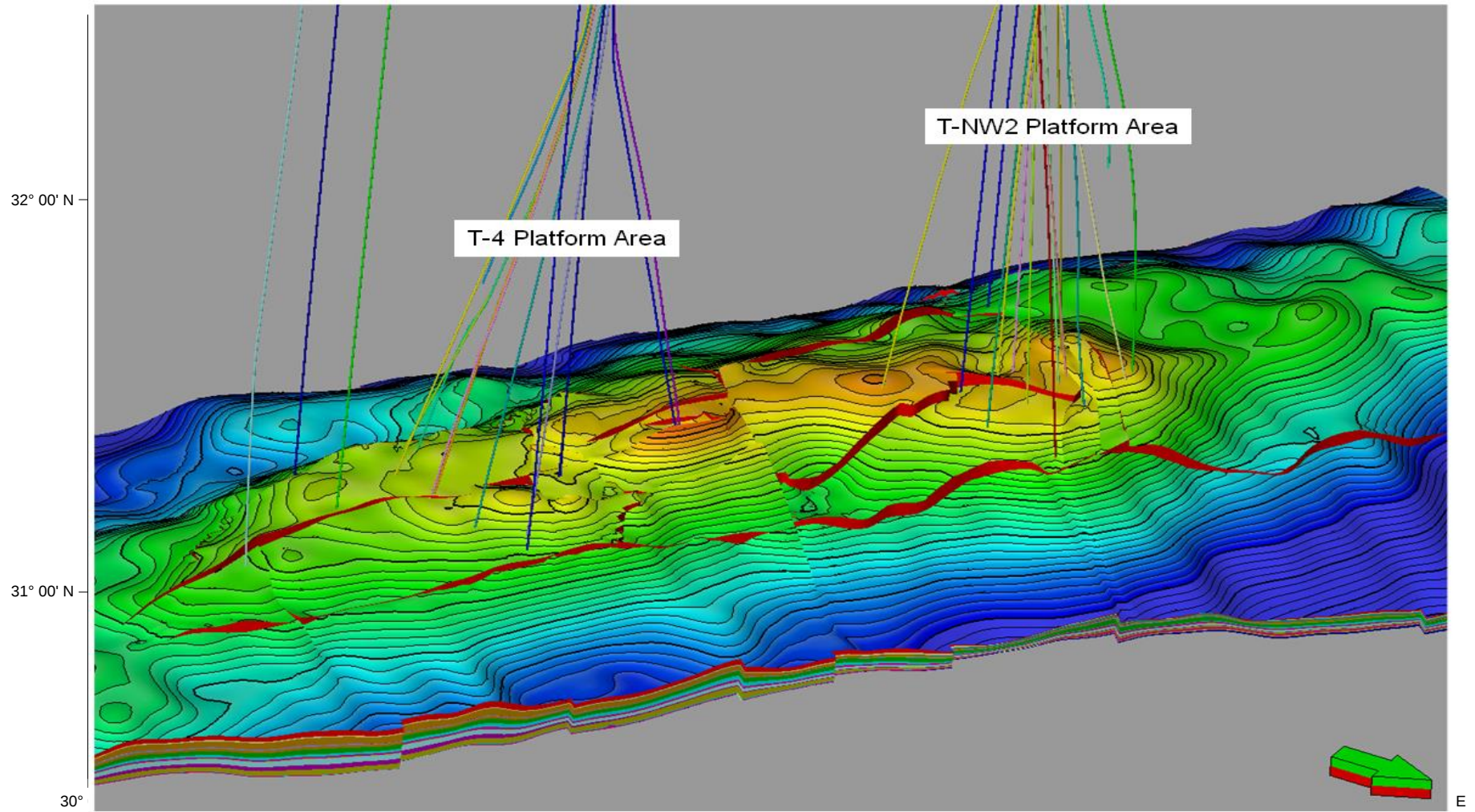


Outline

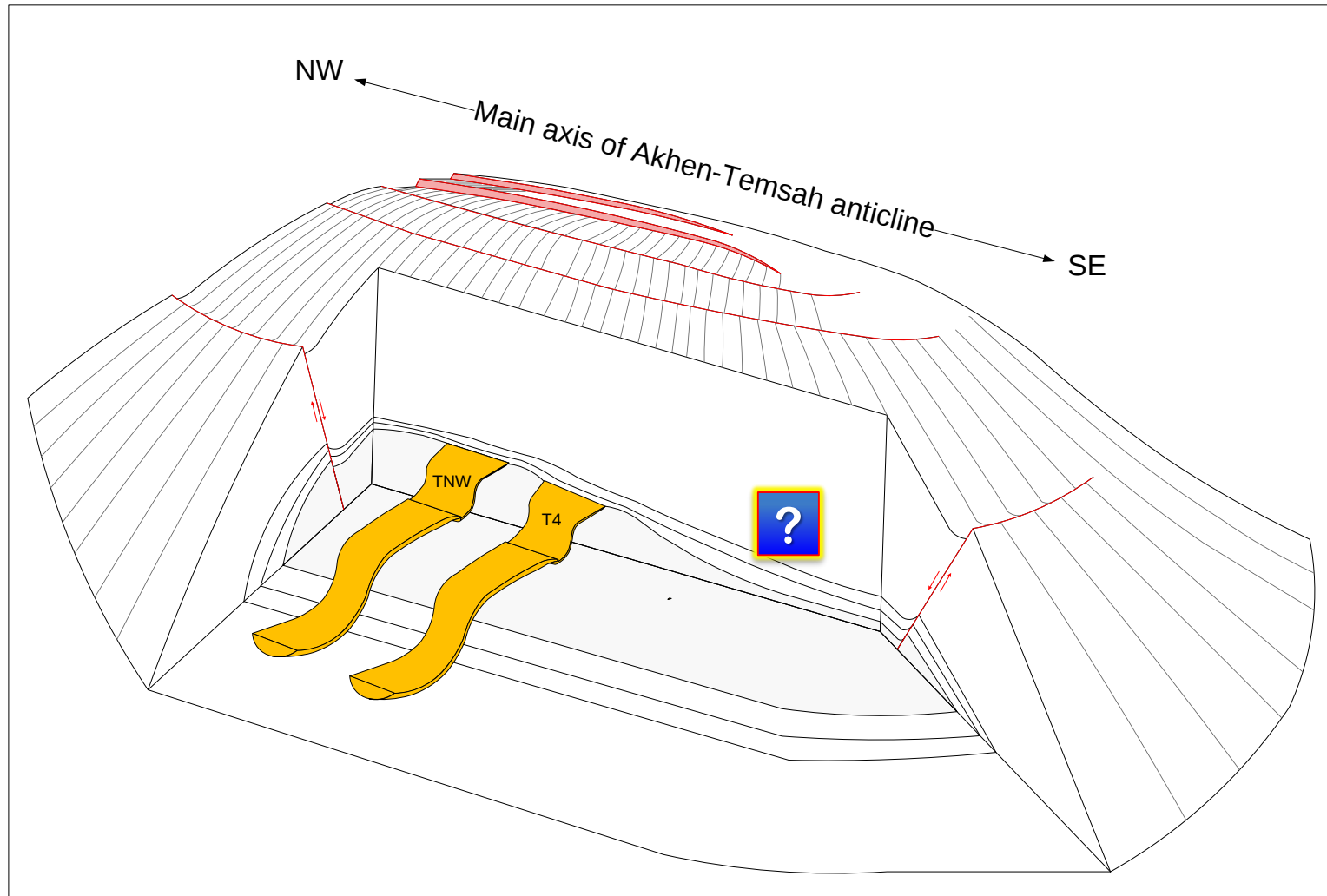
- **Main Idea**
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Study Area - Location & Geological Background

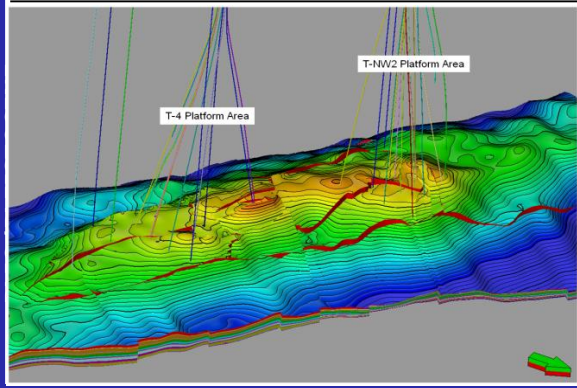


Main Idea

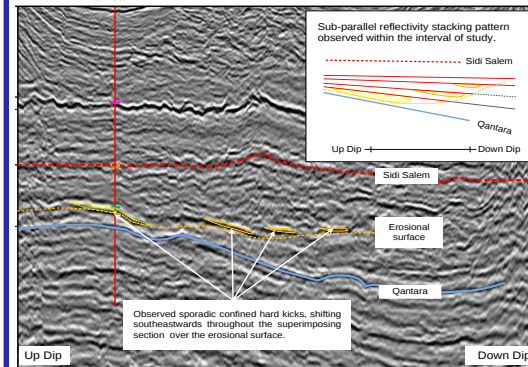


Integrated G&G Workflow

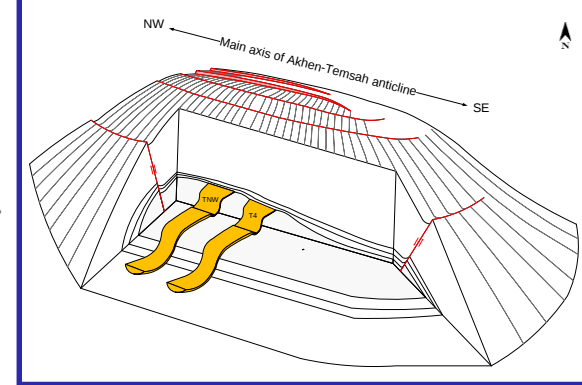
Data Review



Seismic Observation

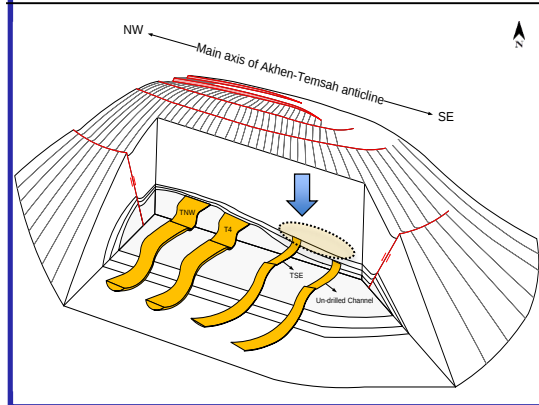


Geological Model

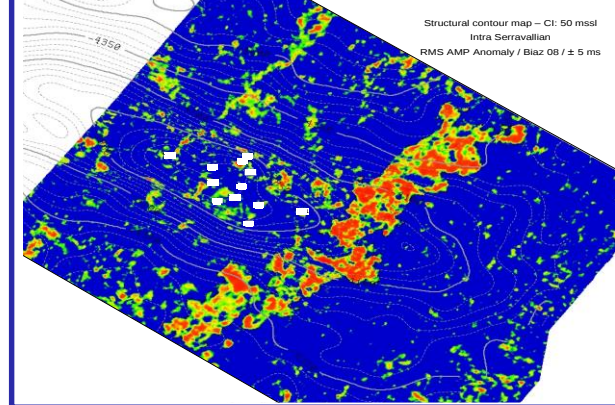


PROSPECT Identification

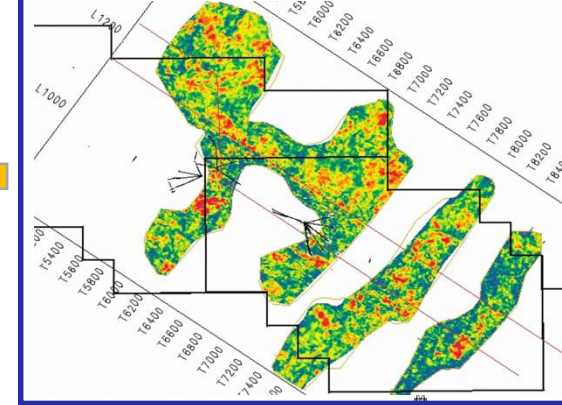
Future HC Potentiality



Model Validation



Attribute Extraction



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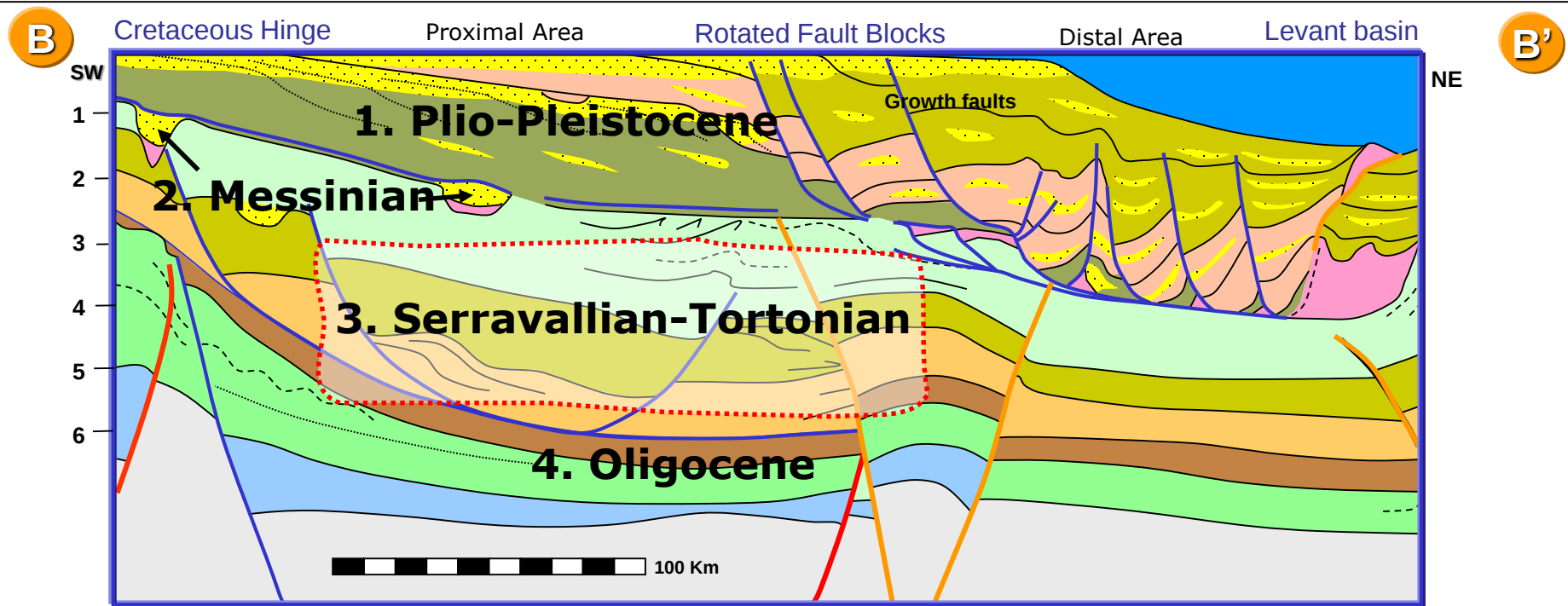


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Nile Delta Plays - Regional Overview

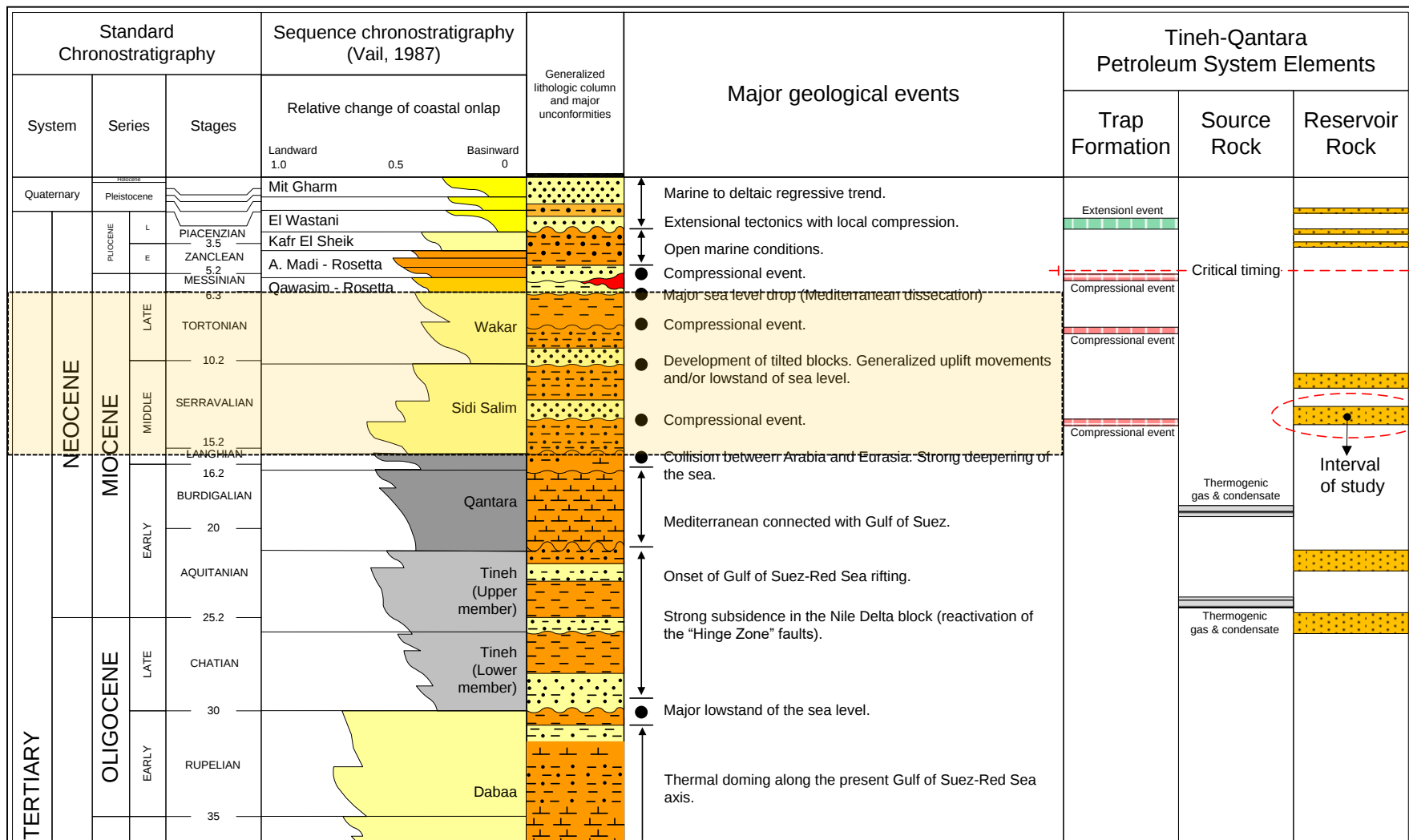


(After Dolson et. al., 2005)

PROVEN PLAYS

1. Plio-Pleistocene
2. Messinian
3. **Serravallian-Tortonian**
4. Oligocene

Chronostratigraphic Chart and Petroleum System



Interval of study



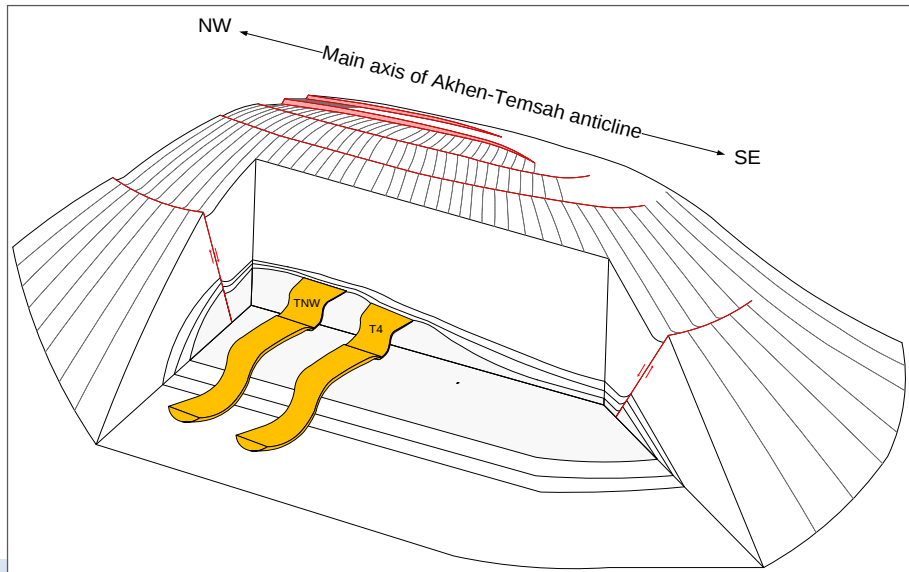
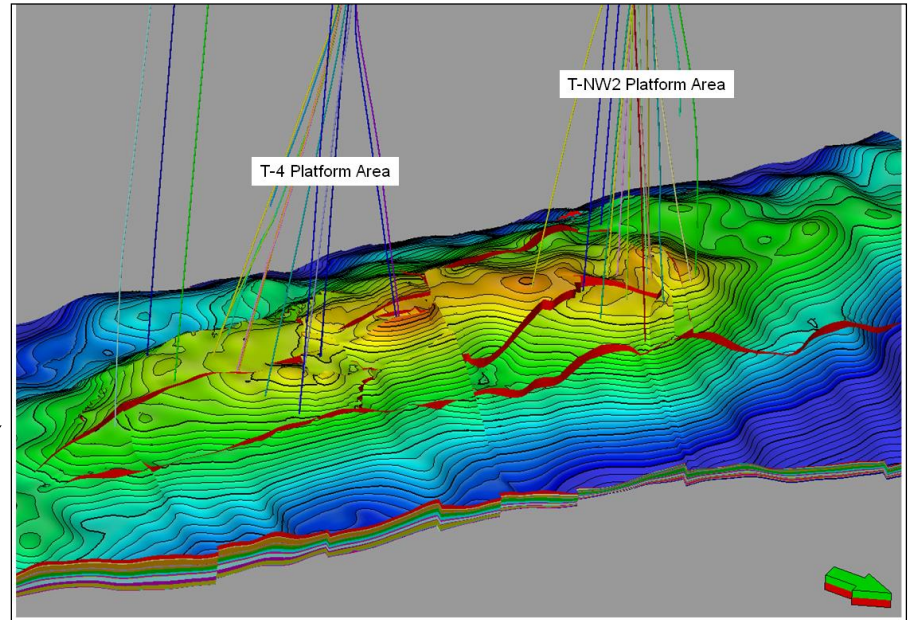
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Miocene Sequence – Traditional HC Play Concept

Standard Chronostratigraphy			Sequence chronostratigraphy (Vail, 1987)		Generalized lithologic column and major unconformities	Major geological events
System	Series	Stages	Relative change of coastal onlap			
			Landward 1.0	Basinward 0		
Quaternary		Pleistocene	Mit Gharm			Marine to deltaic regressive trend.
TERTIARY	NEOGENE	Pliocene	L	El Wastani		
			E	Kafr El Sheik	Open marine conditions.	
			5.2	A. Madi - Rosetta	Compressional event.	
			6.3	Qawasim - Rosetta	Major sea level drop (Mediterranean dissection)	
					Compressional event.	
		Miocene	LATE	TORTONIAN	Wakar	Development of tilted blocks. Generalized uplift movements and/or lowstand of sea level.
				10.2		Compressional event.
			MIDDLE	SERRAVALIAN	Sidi Salim	Collision between Arabia and Eurasia. Strong deepening of the sea.
				15.2		
			16.2			
	OLIGOCENE	EARLY	BURDIGALIAN	Qantara	Mediterranean connected with Gulf of Suez.	
			20			
			AQUITANIAN	Tineh (Upper member)	Onset of Gulf of Suez-Red Sea rifting.	
			25.2		Strong subsidence in the Nile Delta block (reactivation of the "Hinge Zone" faults).	
		LATE	CHATIAN	Tineh (Lower member)	Major lowstand of the sea level.	
			30			
Eocene	EARLY	RUPELIAN	Dabaa	Thermal doming along the present Gulf of Suez-Red Sea axis.		



➤ **All Wells** drilled on **four dip closure** of **Akhen-Temsah anticline**.

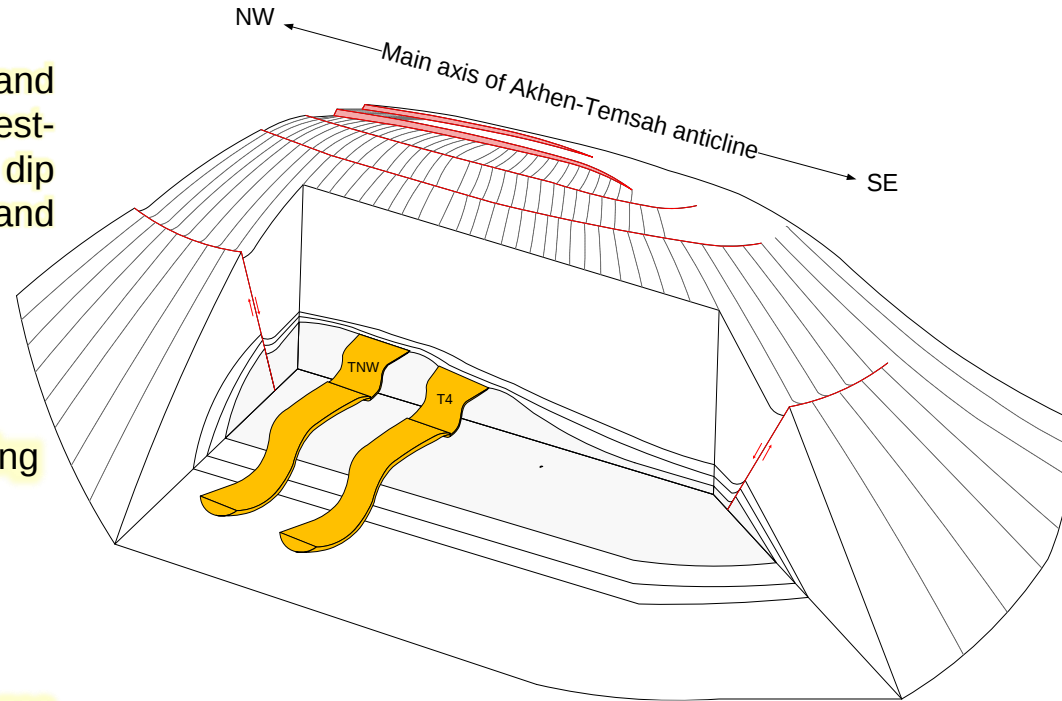
3D Geological Sketch - Aken-Temsah Anticline

Miocene-Serravallian target

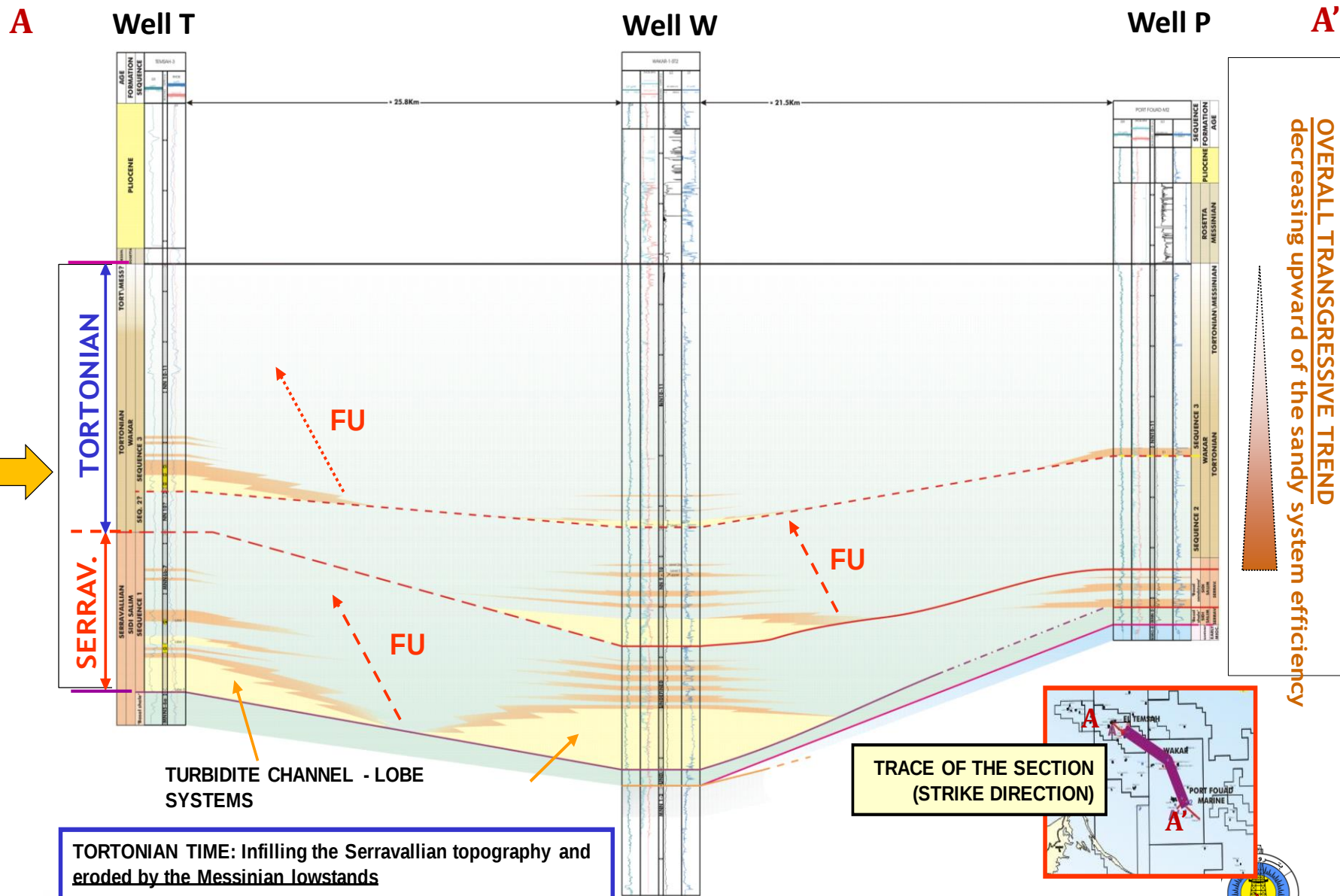
The Miocene-Serravallian Play is related to sand rich turbiditic deposits trending Southwest-Northeast, perpendicular to the four-way dip elongated anticlines (Akhen-Temsah, Wakar and Port Fouad) along the Bardawil shear zone.

Top seal is provided by thick over laying Serravallian and Tortonian section.

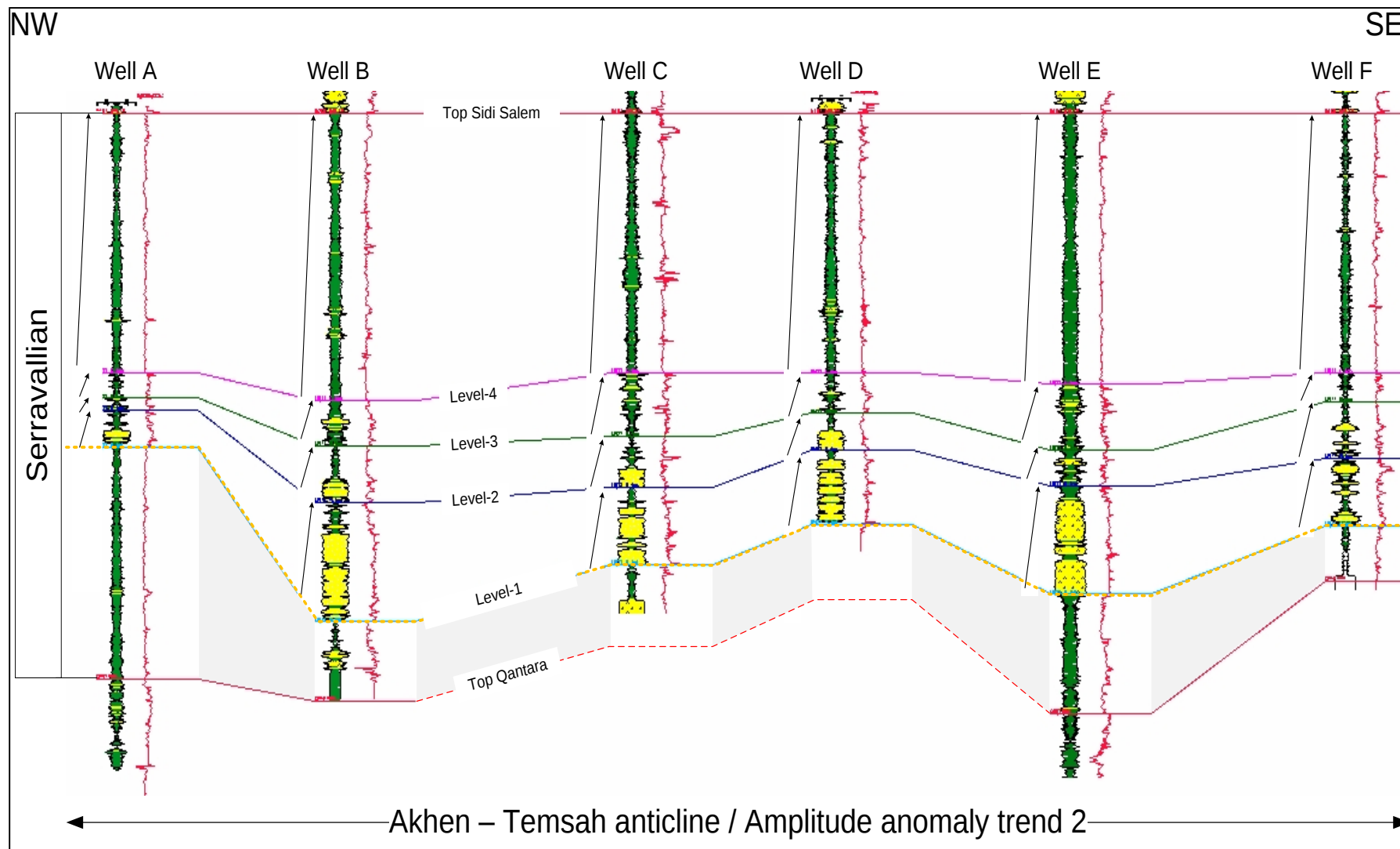
The expected hydrocarbon is thermogenic gas and condensate generated from under-laying Oligocene source rock.



Basin Scale - Well correlation



Field scale - Reservoir Stacking Pattern



➤ **Finning upwards GR log pattern / AI (red) shows** ● → High AI SST embeded in Low AI Shales

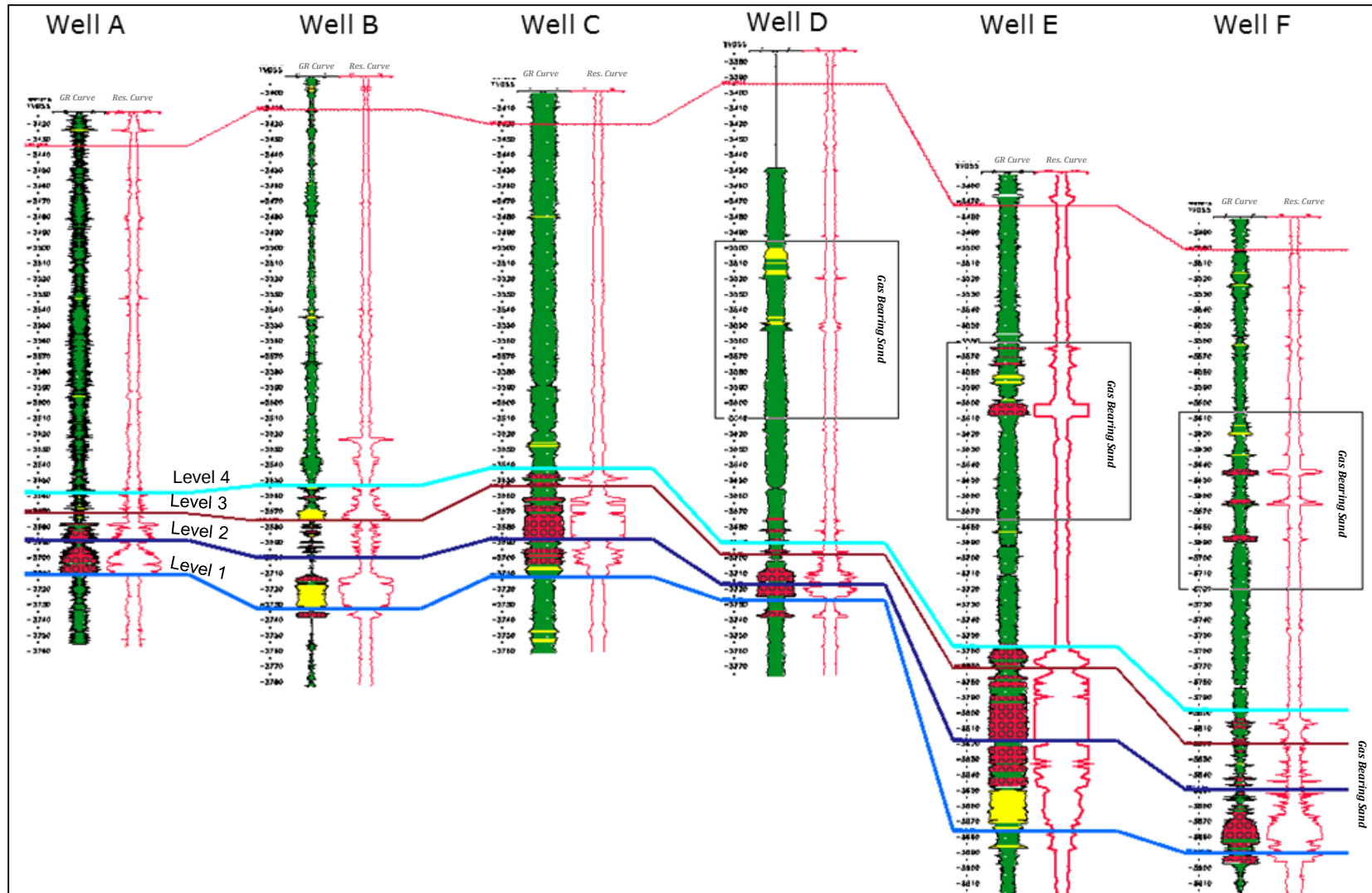


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Structural well correlation – Reservoir zonation



Serravallian
Reservoirs



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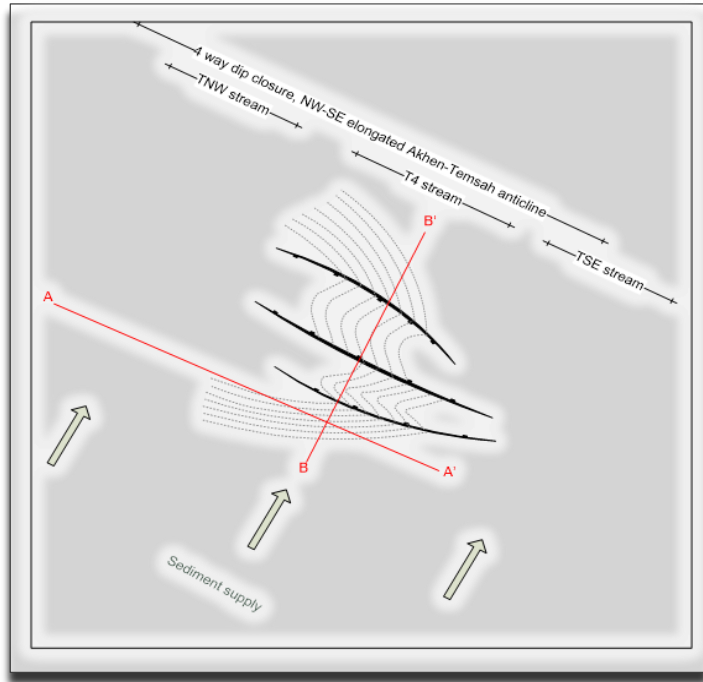
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Outline

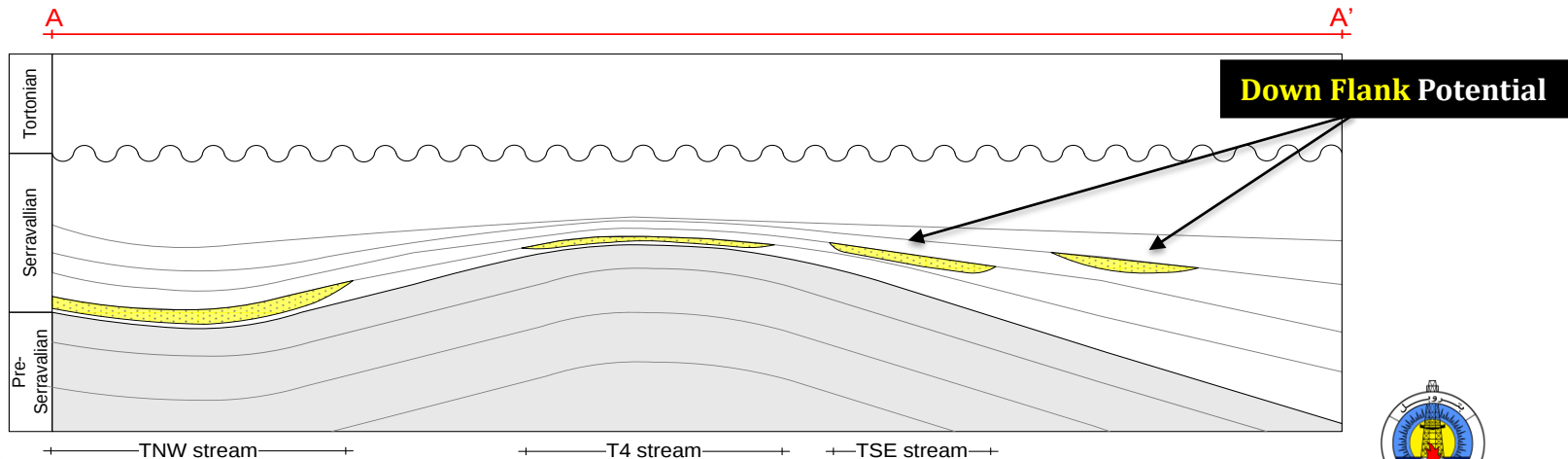
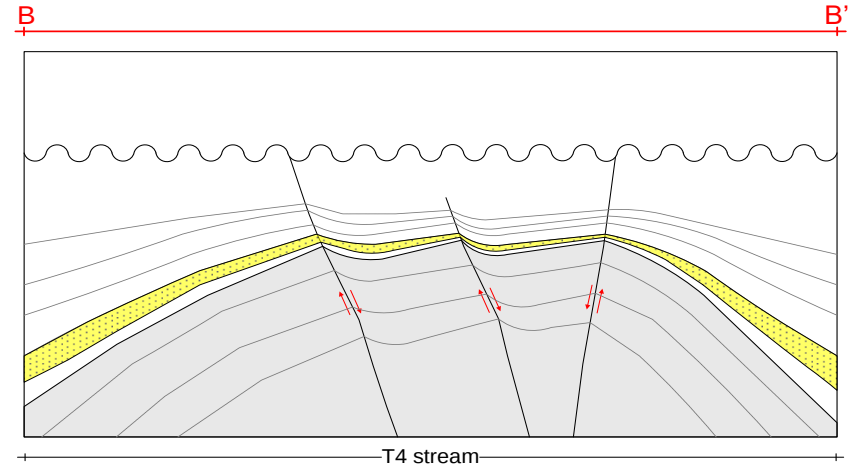
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- **Temsah structural setting**
- Seismic Data Interpretation
- Future HC Potentiality



Aken-Temsah Geological & Structure Setting



- The **Miocene-Serravallian HC Play** consists of syn-kinematic turbiditic deposits **accommodated** within the **Akhen-Temsah anticline**.
- Deep marine **Clastic Deposits** bypass the **NW-SE** elongated Akhen-Temsah stronghold through potent transverse **streams** identified as **TNW, T4 and TSE**



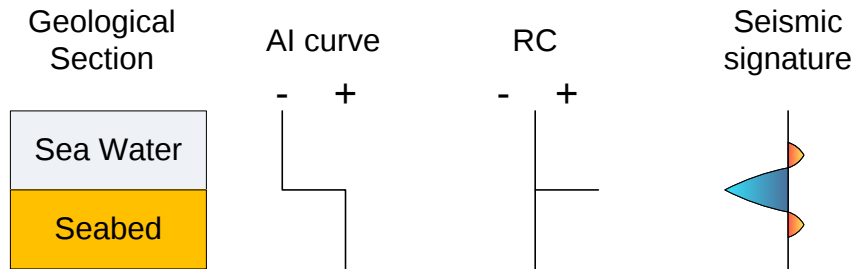
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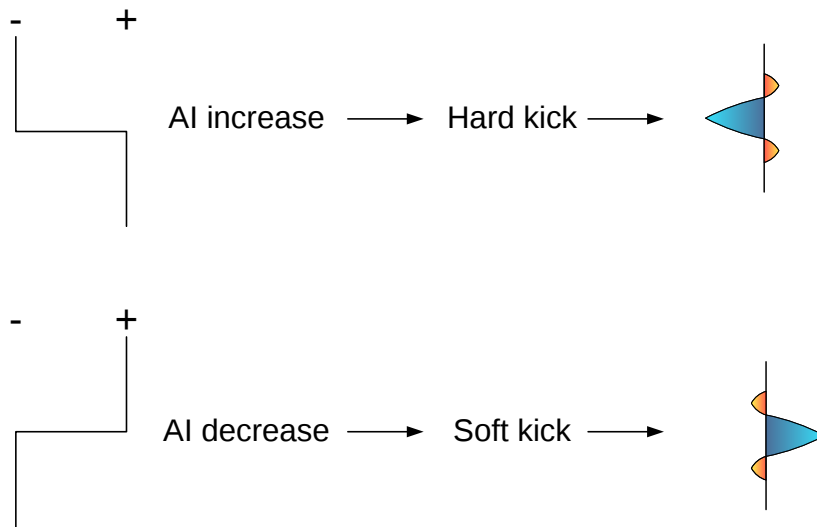


Seismic Phase & Polarity conventions

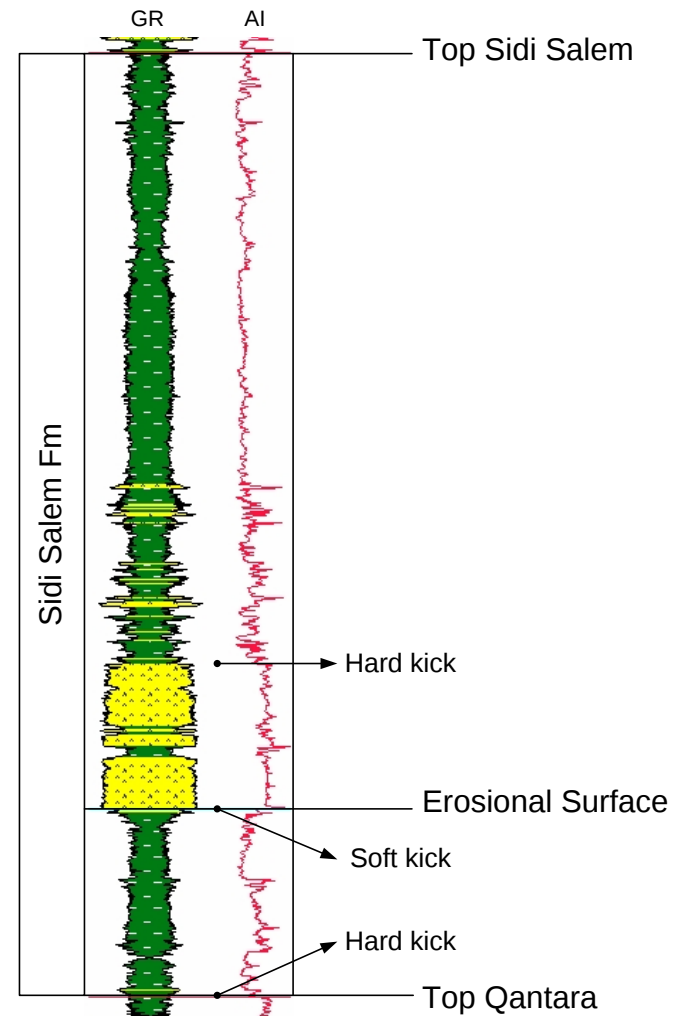
Seismic phase and polarity convention



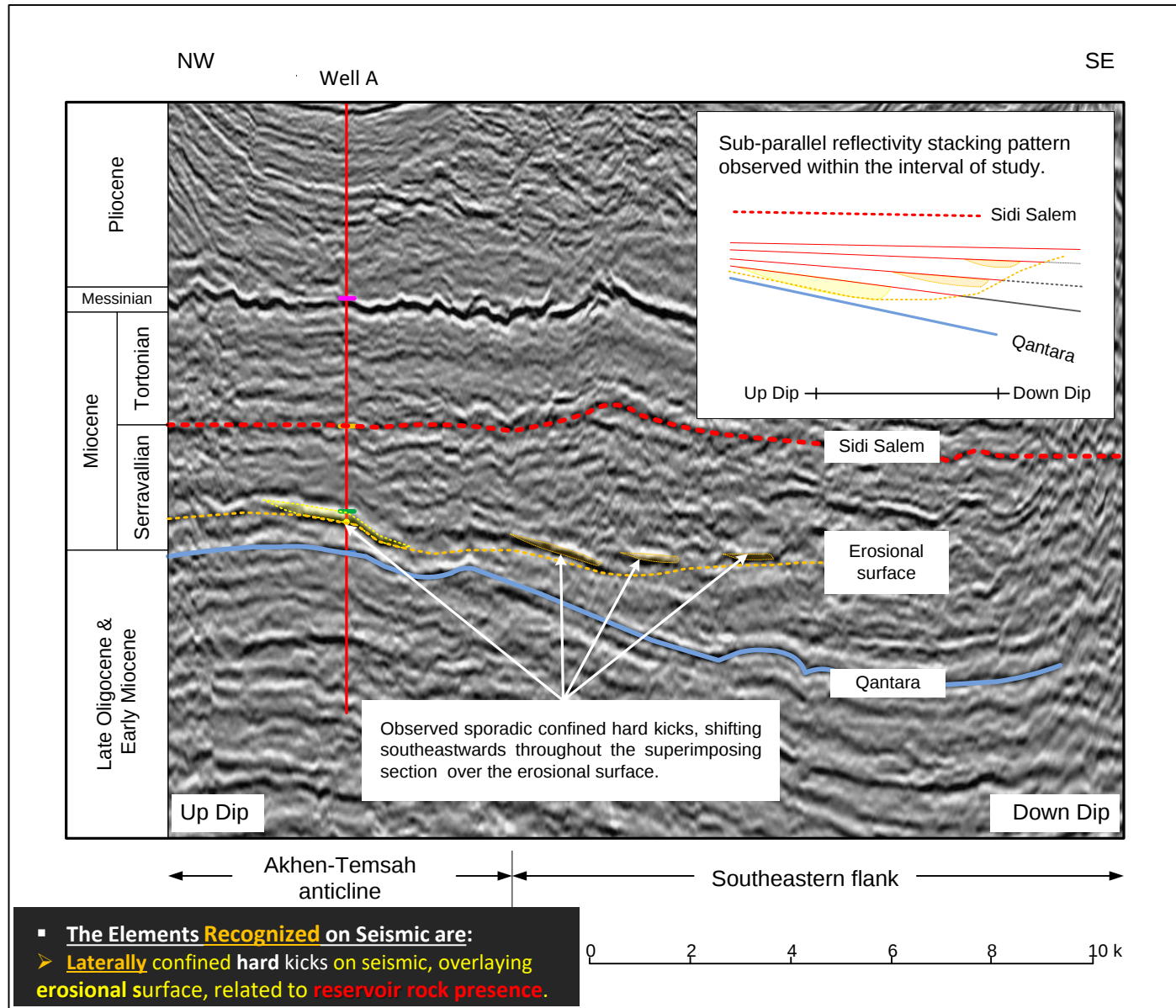
General seismic conventions



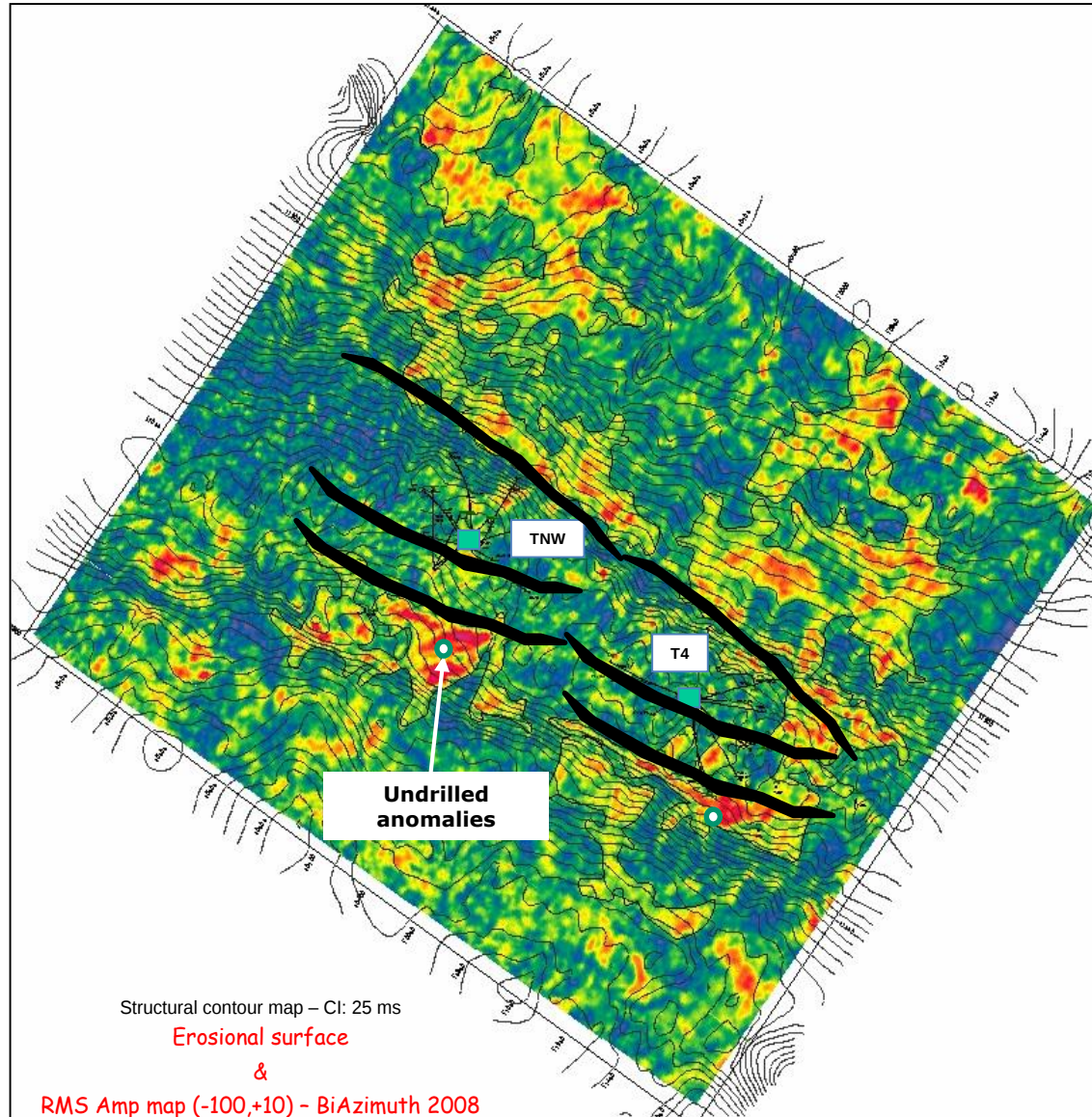
AI within the interval of study



Serravallian Reservoir – Lateral Distribution Phenomena

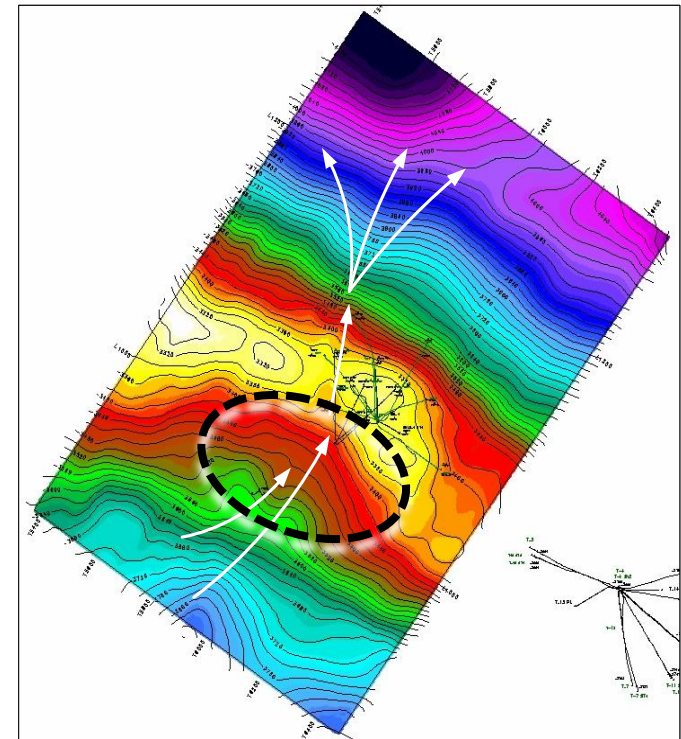


Seismic Observation

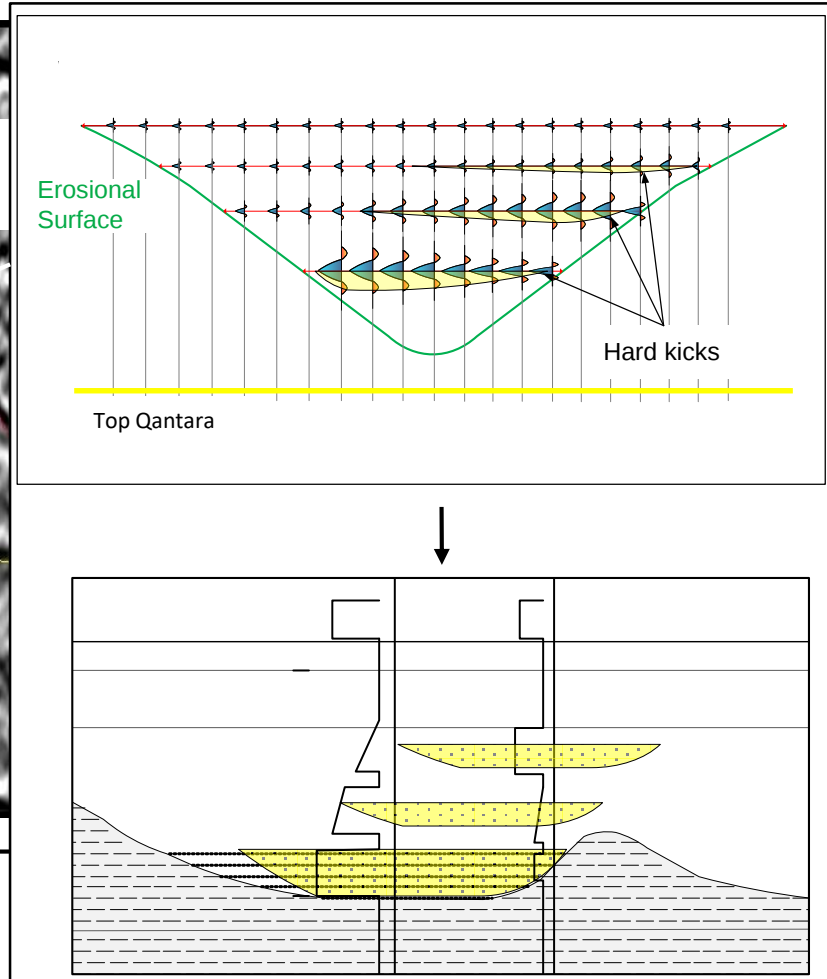
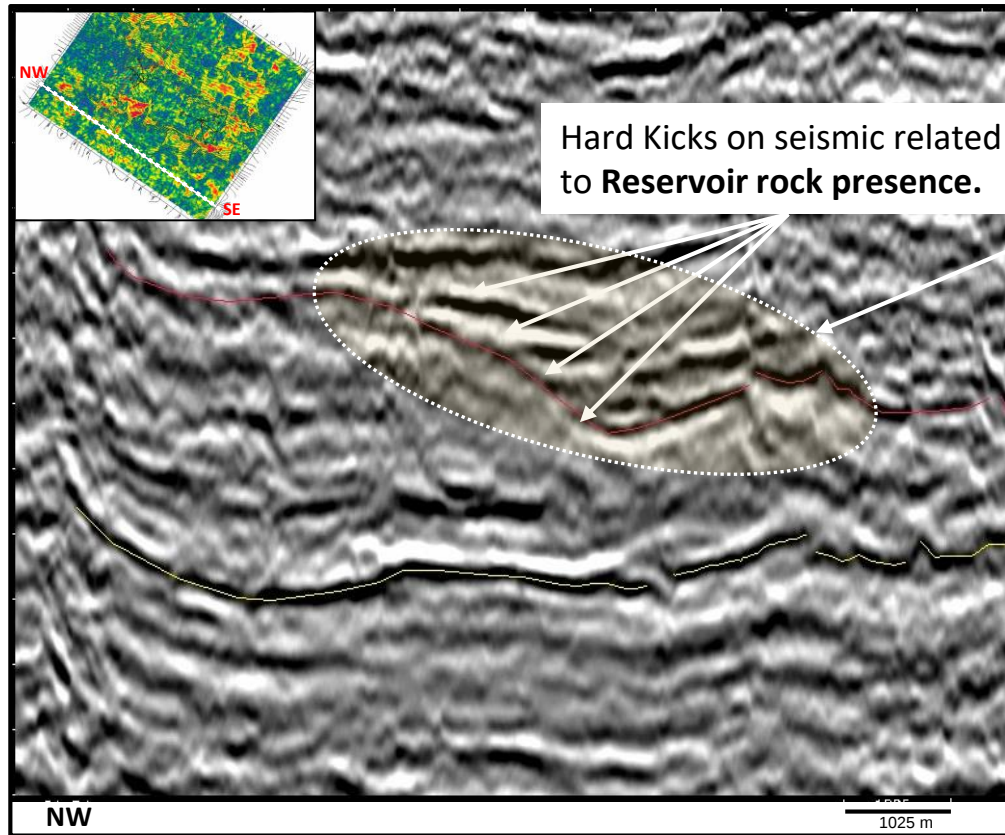


Observation:

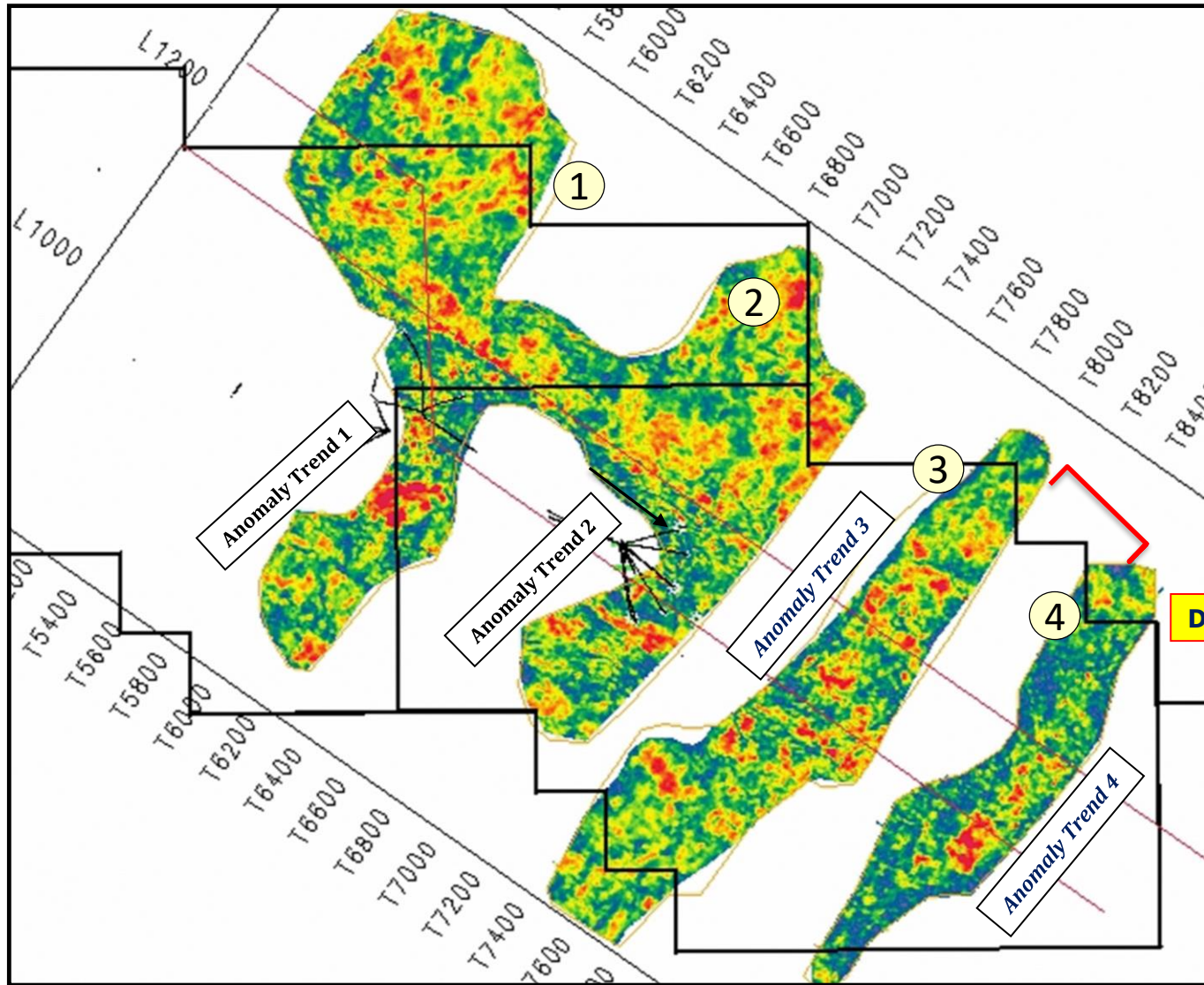
New **Seismic data**, BiAzimuth volume, and **dynamic** behavior from **Temsah wells** **suggest** the possibility of **remaining** **Un-drained areas** within **Southern flank** of the **Akhen-Temsah anticline** at the **Miocene Reservoir levels**.



(NW-SE) Seismic line Located @ Southern flank



Intra-Serravallian Channels - Amplitude anomaly trends



Down Flank Potential

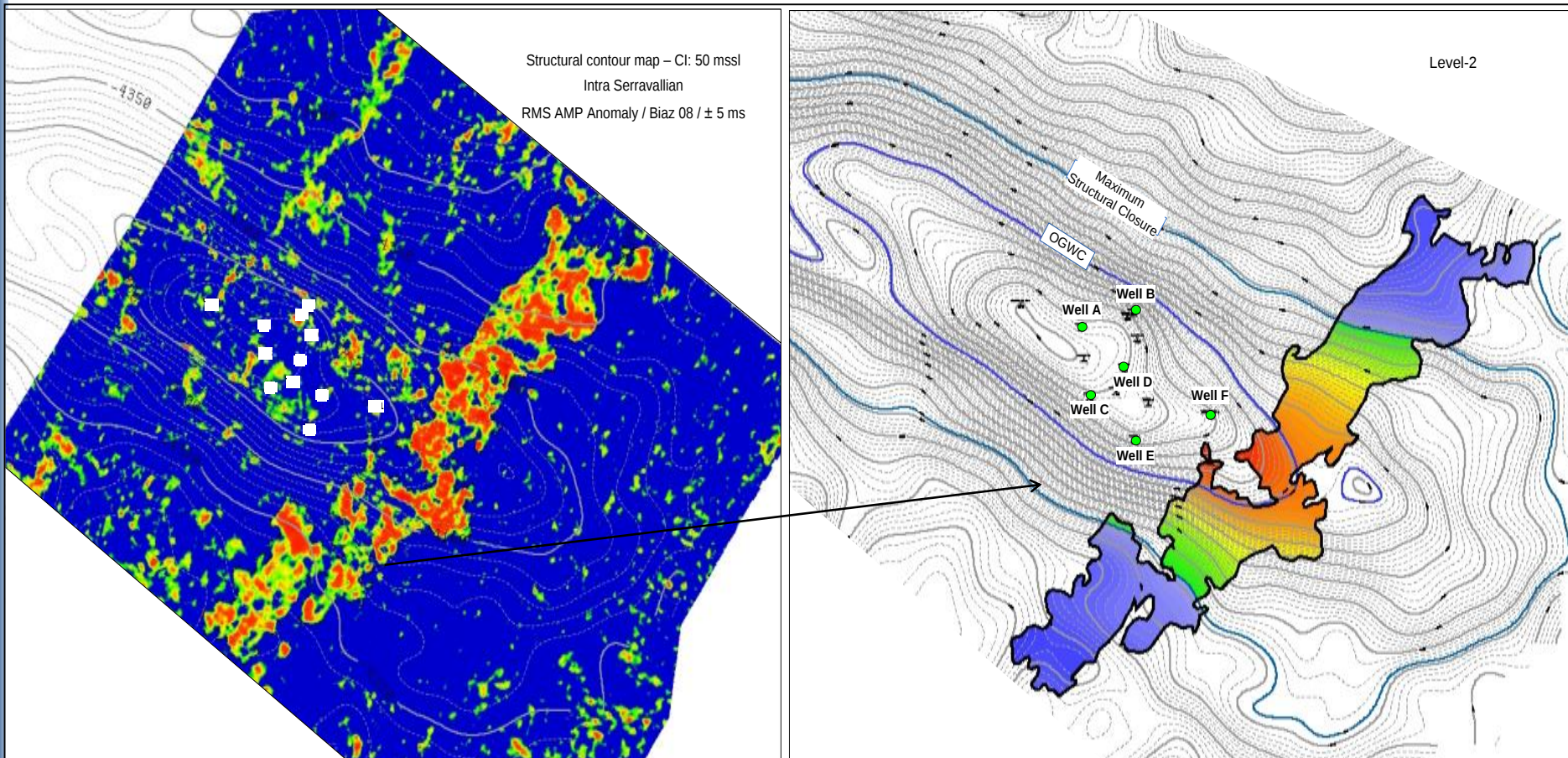


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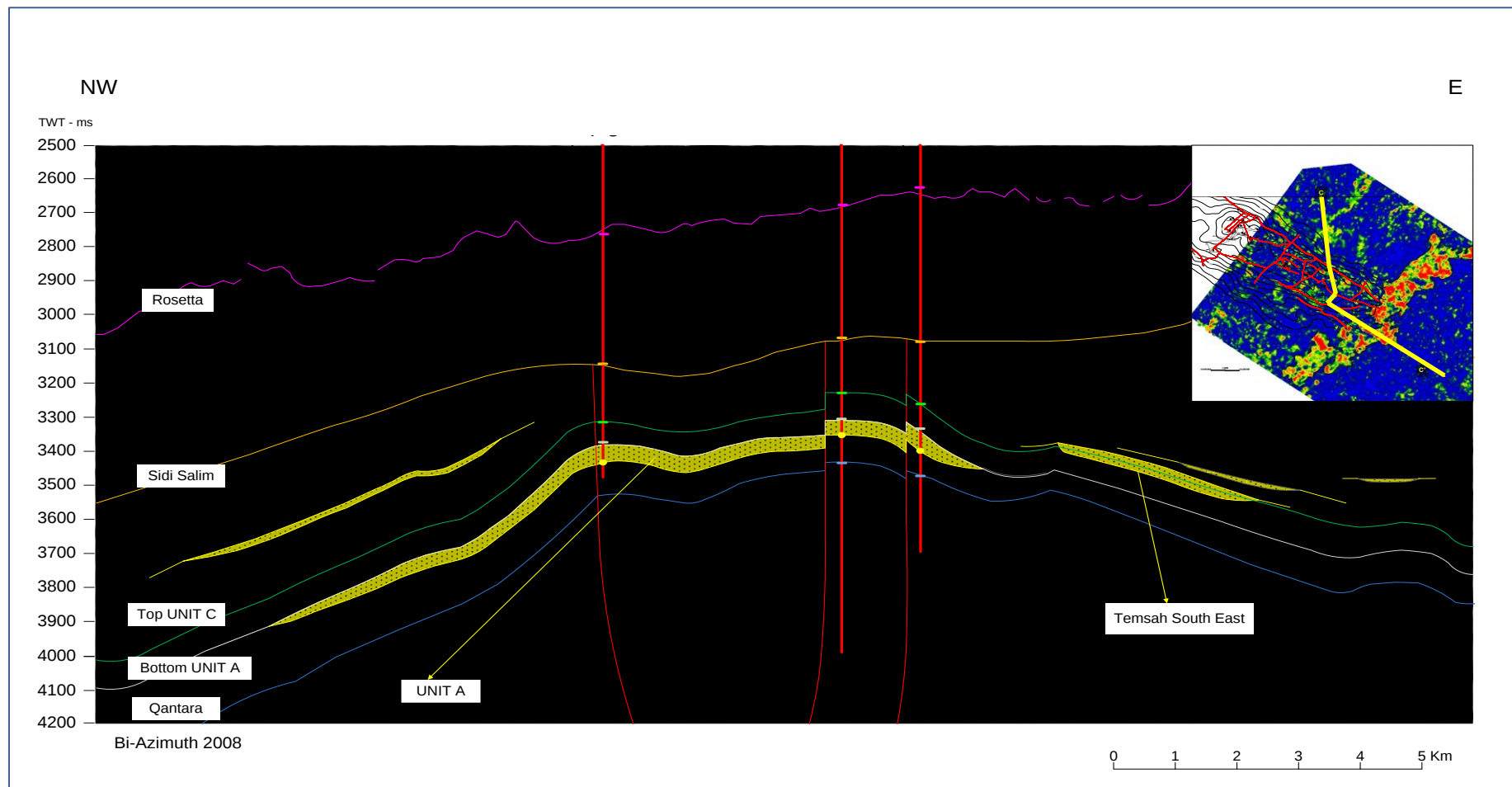
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Validation of the New Play Concept

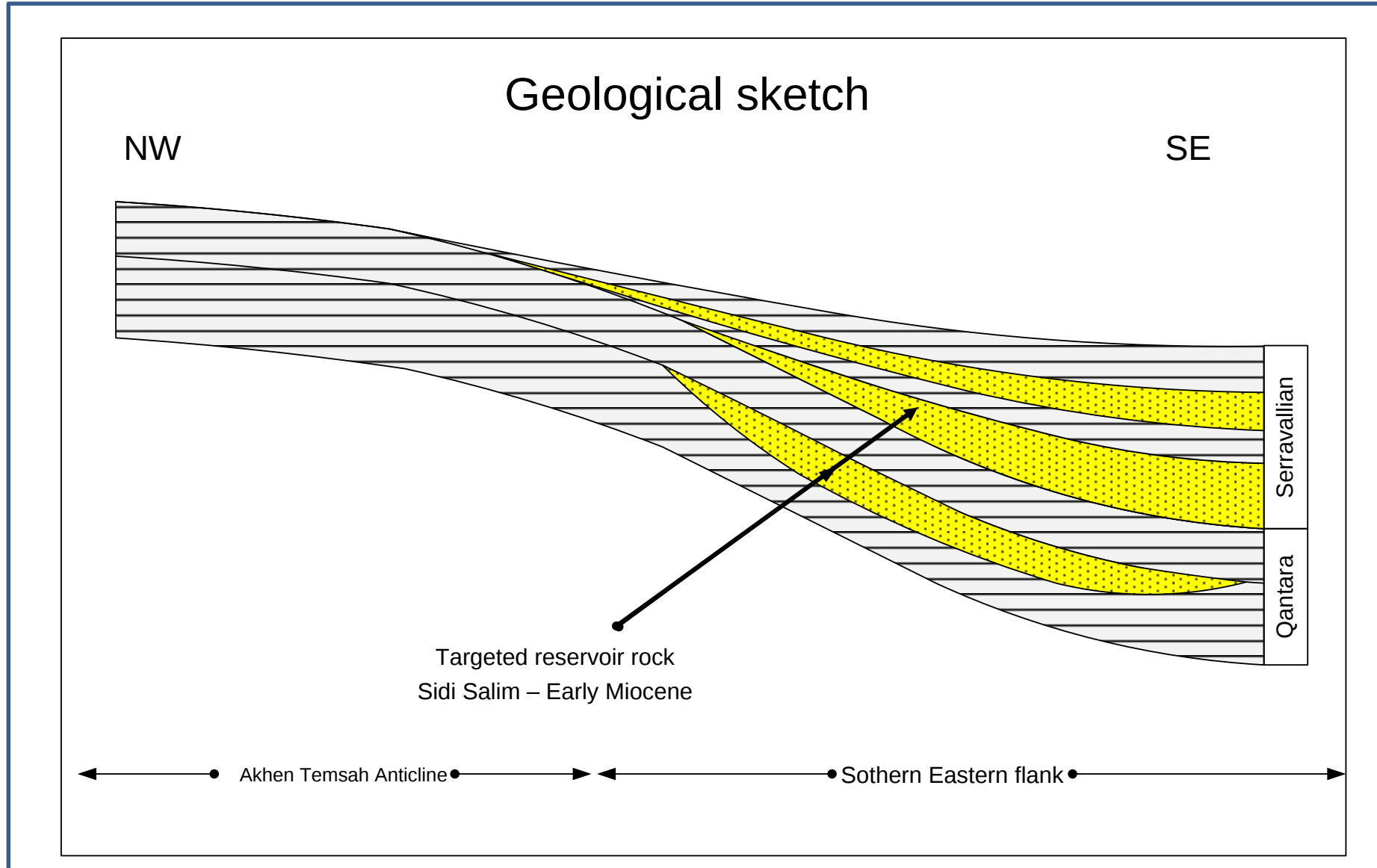


*Intra-Serravallian Depth Map Overlain by Amplitude **Anomaly Trend 3***

Lateral Distribution of Serravallian Turbiditic Reservoir Bodies



Geological Section - Downflank HC Play Concept

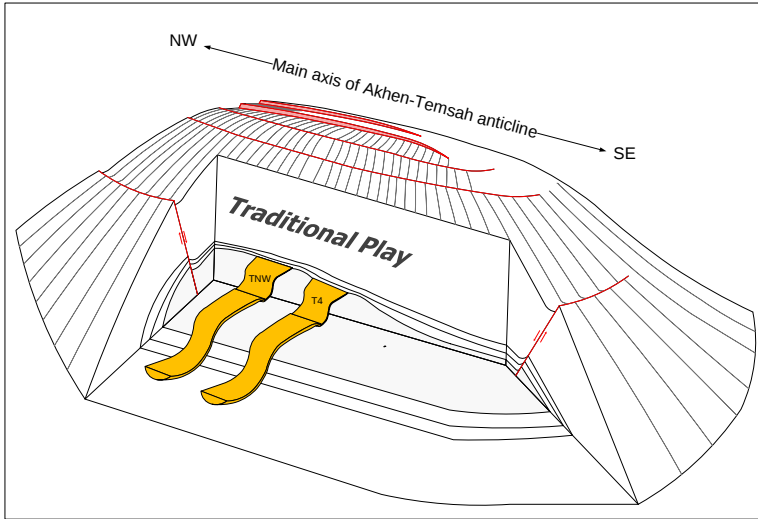


Outline

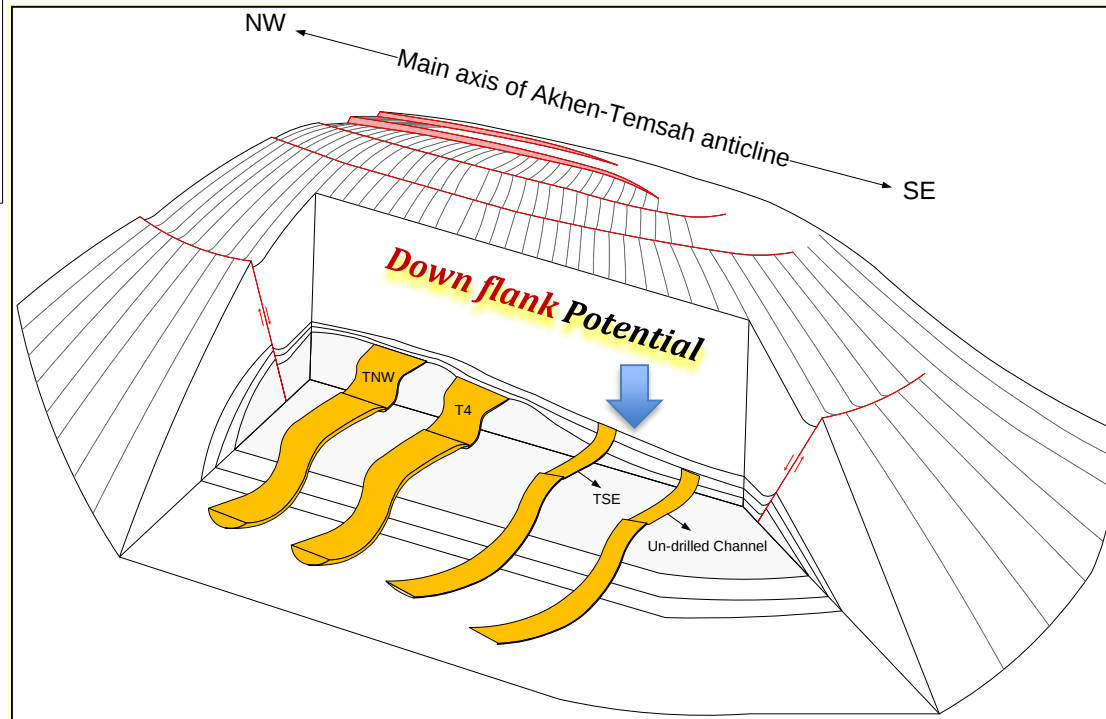
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(New vs Old) - HC Play Concepts

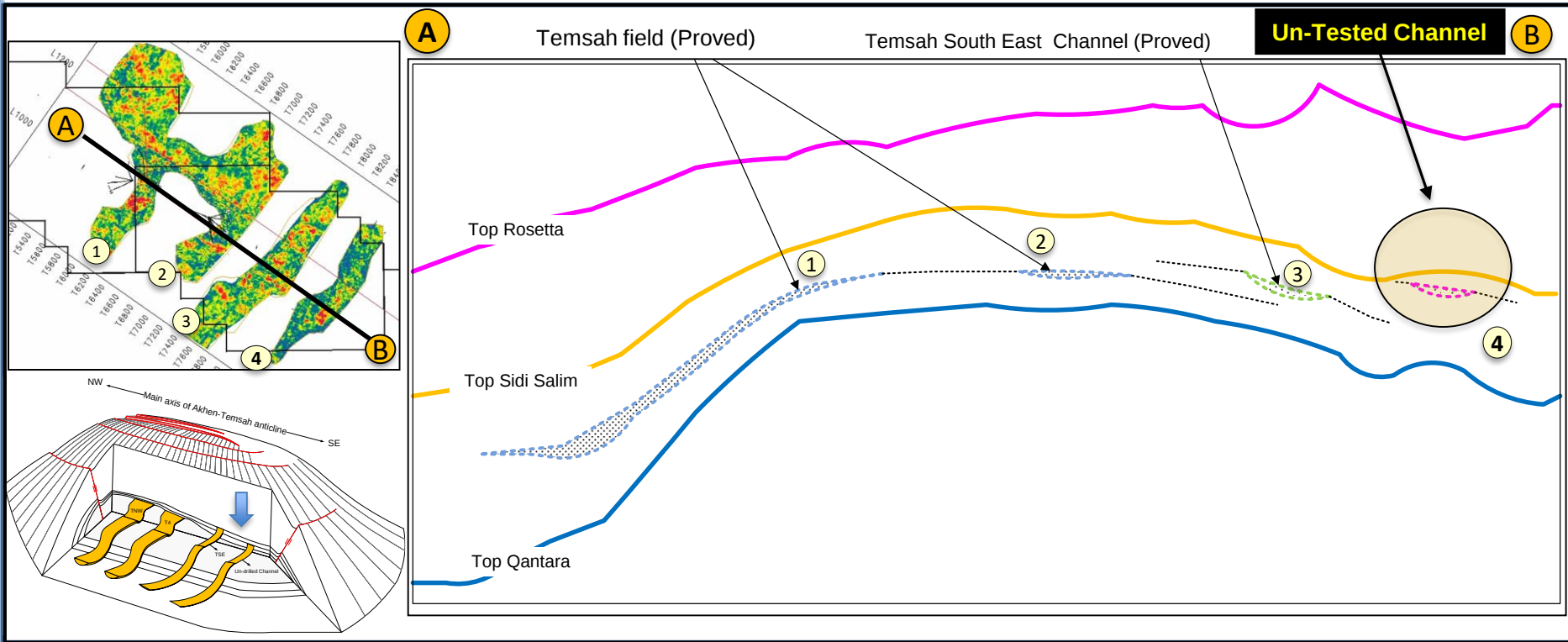


Old Prospectivity HC Model



New Prospectivity HC Model

Future HC Potential - Showing Undrilled Channel



➤ Intra-Serravallian Lateral **South Eastward Distribution** of Turbidite Channelized bodies in Temsah field

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- Main Idea
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- **Summary & Conclusion**



Summary & Conclusion

- A general **fining upwards** in the GR log pattern throughout the interval of study suggests a relative rising of sea level and proved channel fill deposits.
- Sub-parallel **stacking reflectivity pattern** & amplitude anomaly trends shifting upwards to the southeast, advocates the possibility of syn-kinematic deposition.
- **Amplitude trends mapped** along the Serravallian section, suggest **Temsah reservoir architecture** is not layer cake type, but reservoir rock presence confined to the maximum incisions of the erosional surface.

Finally, based on the New Play Concept;

- The first **proposed well** targeted Anomaly trend-3 (intra-serravallian turbiditic reservoir bodies) based on such assumption (Down-flank concept) **concluded gas and condensate** discovery and it is opening a **new room to explore** the other trends.
- The authors are recommending to test and explore the other un-drilled channel anomaly fairway (intra-serravallian channel bodies), located in the **Southeastern flank** of Temsah Structure.





THANK YOU



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