Western Desert, Egypt: Basin Evolution and Petroleum System

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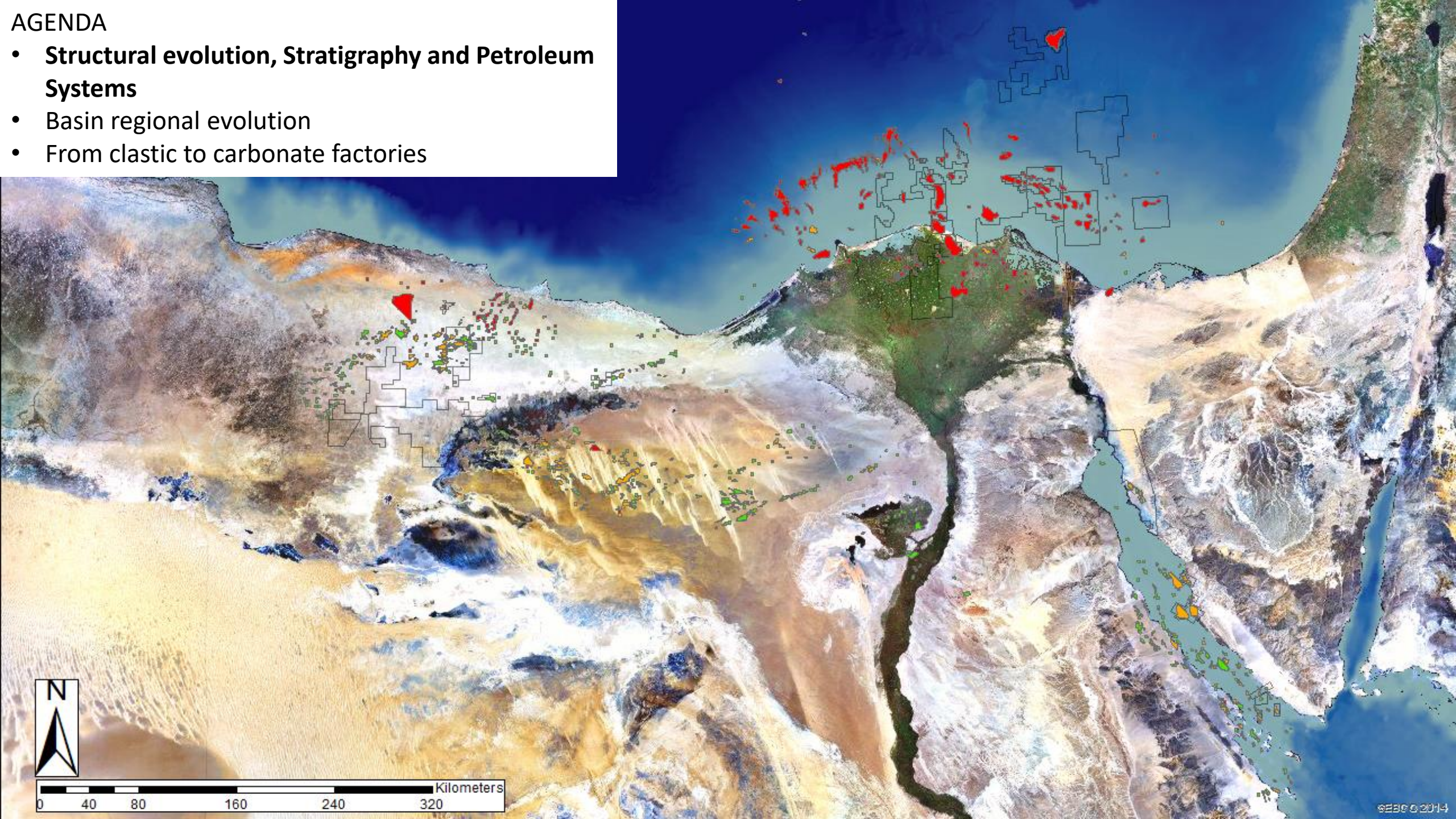
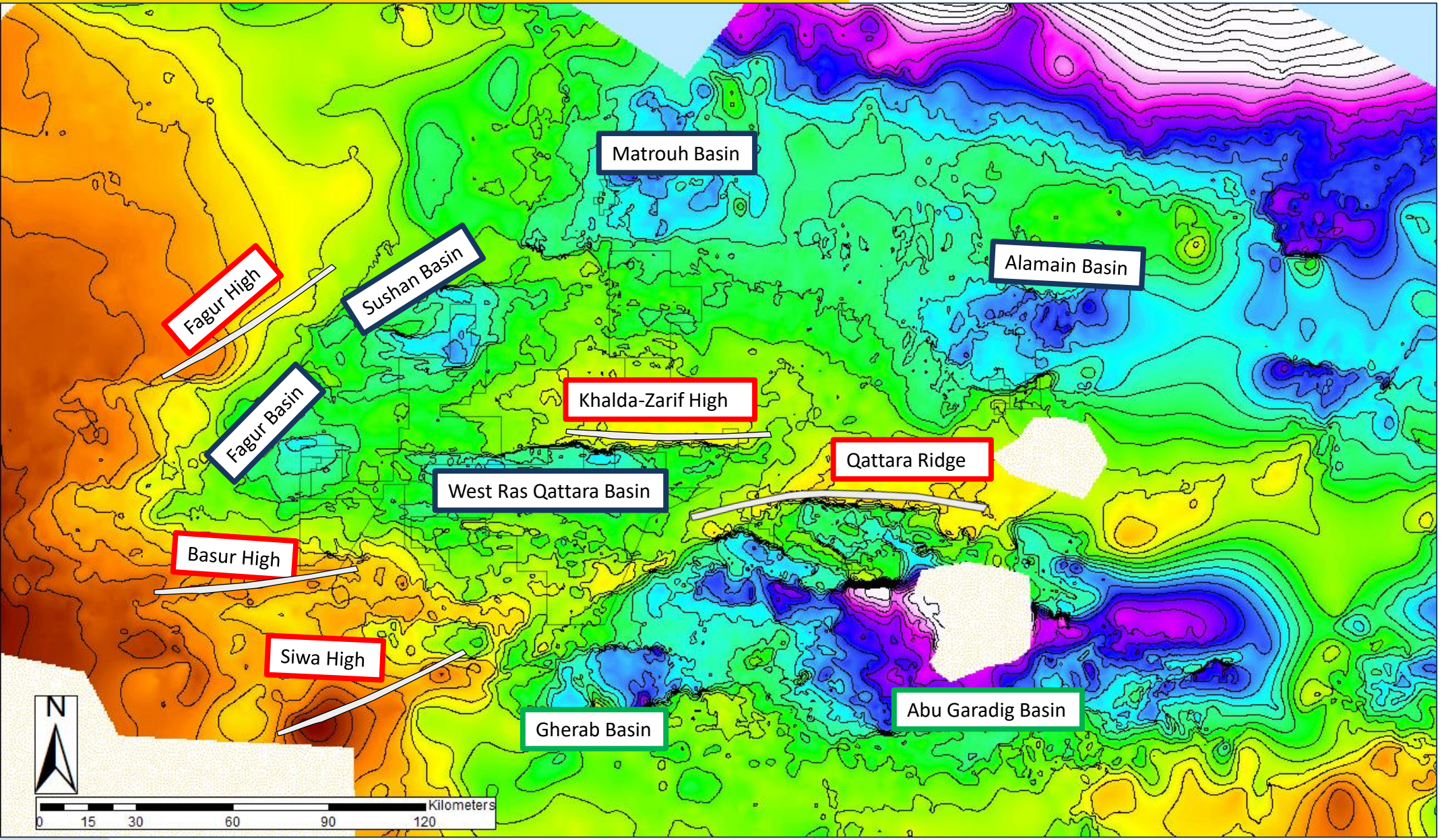
AGENDA

- **Structural evolution, Stratigraphy and Petroleum Systems**
- Basin regional evolution
- From clastic to carbonate factories



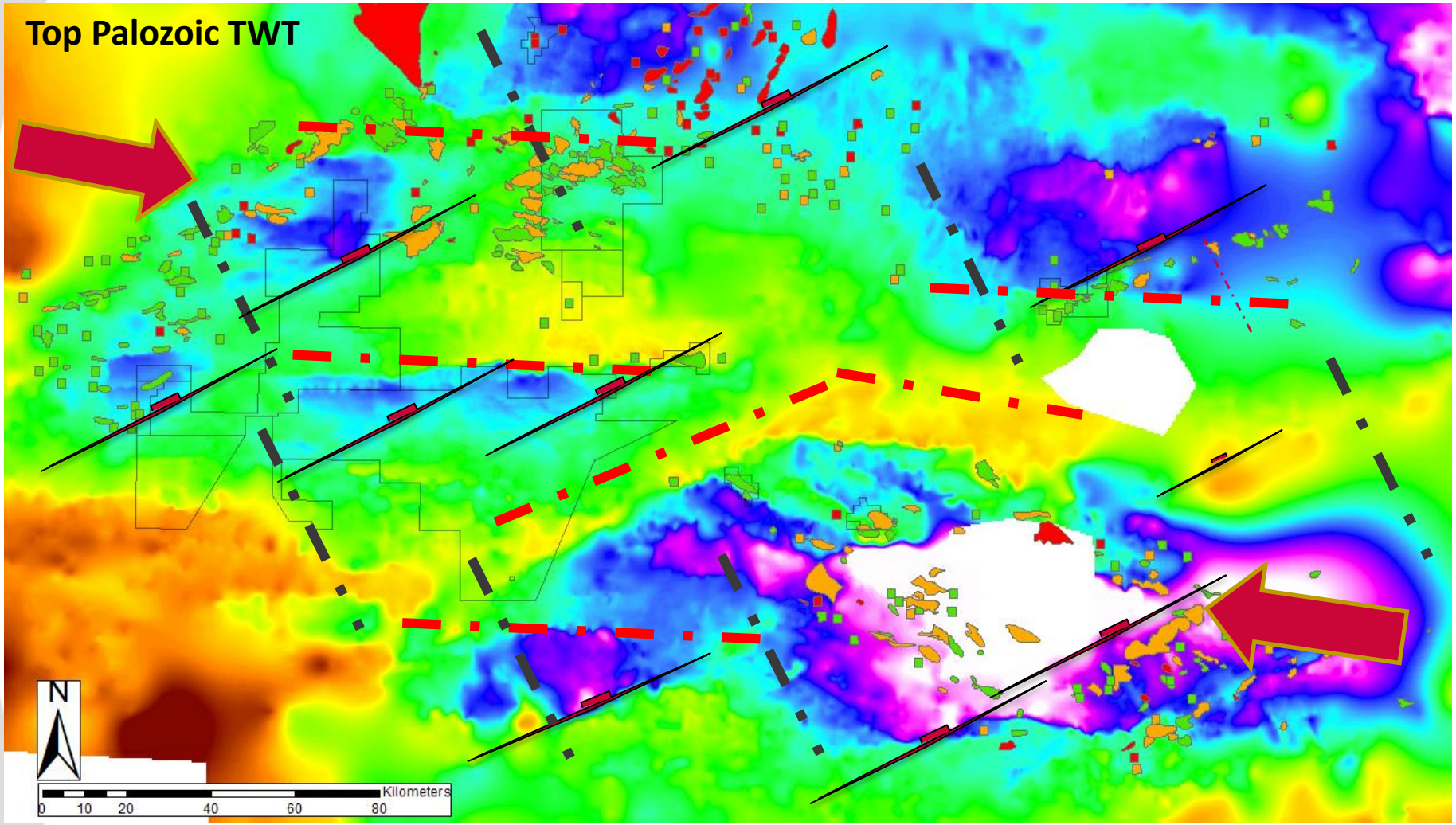
Western Desert macro-structural features (Top Palaeozoic TWT Regional Map)



Jurassic Basins

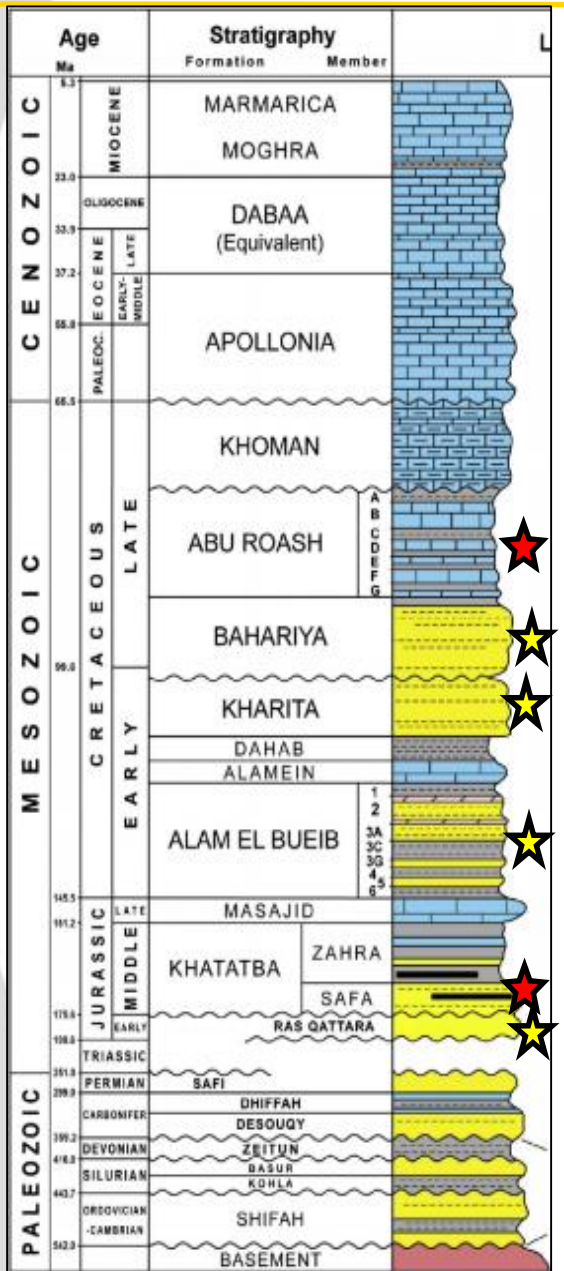
Cretaceous Basins

Abu Gharadig And Western Desert
Schematic tectonic evolution trough time



- **Cambrian to Devonian Orogenic Phase**
  NNW-SSE Trending Compressional Structures
- **Triassic to Jurassic Rifting Phase**
  NE-SW Trending Extensional Structures (Cretaceous extension in Abu Garadig Basin)
- **Jurassic\Tertiary Syrian Arc Traspressive Phase**
  SSE-NNW compression (local reactivation of pre-existing high angle faults)

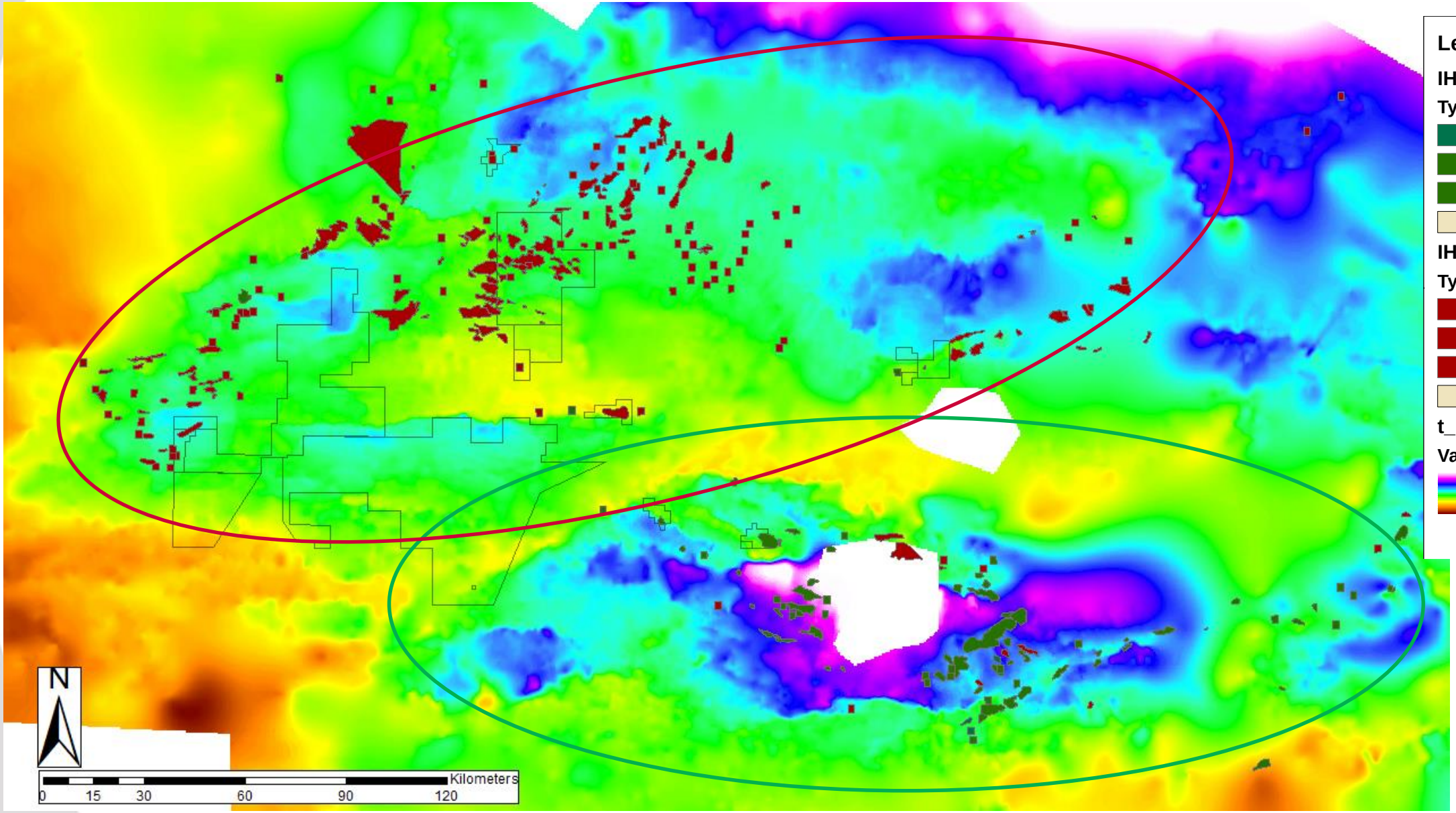
Abu Gharadig And Western Desert
Generalized Stratigraphic Series and Petroleum System evolution



Reservoir
Source

500	400	300	200	100	TIME
PALEOZOIC			MESOZOIC	CENOZOIC	
C O	S	D	C	P	Tr J K	Pc N	EVENTS
	Kohla ?	Zeitoun ?	Dhiffah ?		Khatatba	AEB ?	AR	Source
Shifah	Basur	Dessouky	Safi	Khatatba Clastic and Carbonate)	, AR Carbonate Bahryia, Kharita, AEB and AD	Reservoir
						Seal
						Uplift / Erosion (E) / non deposition (W)
		Hercynian fault blocks		Jurassic Rifting	Cretaceous Rifting and Inversion	Trap Formation
IF PRESENT	Kohla	Zeitoun	JJ	Dhiffah	Generation, Migration, Accumulation

Abu Gharadig And Western Desert
Hydrocarbon distribution and Source Rocks Age



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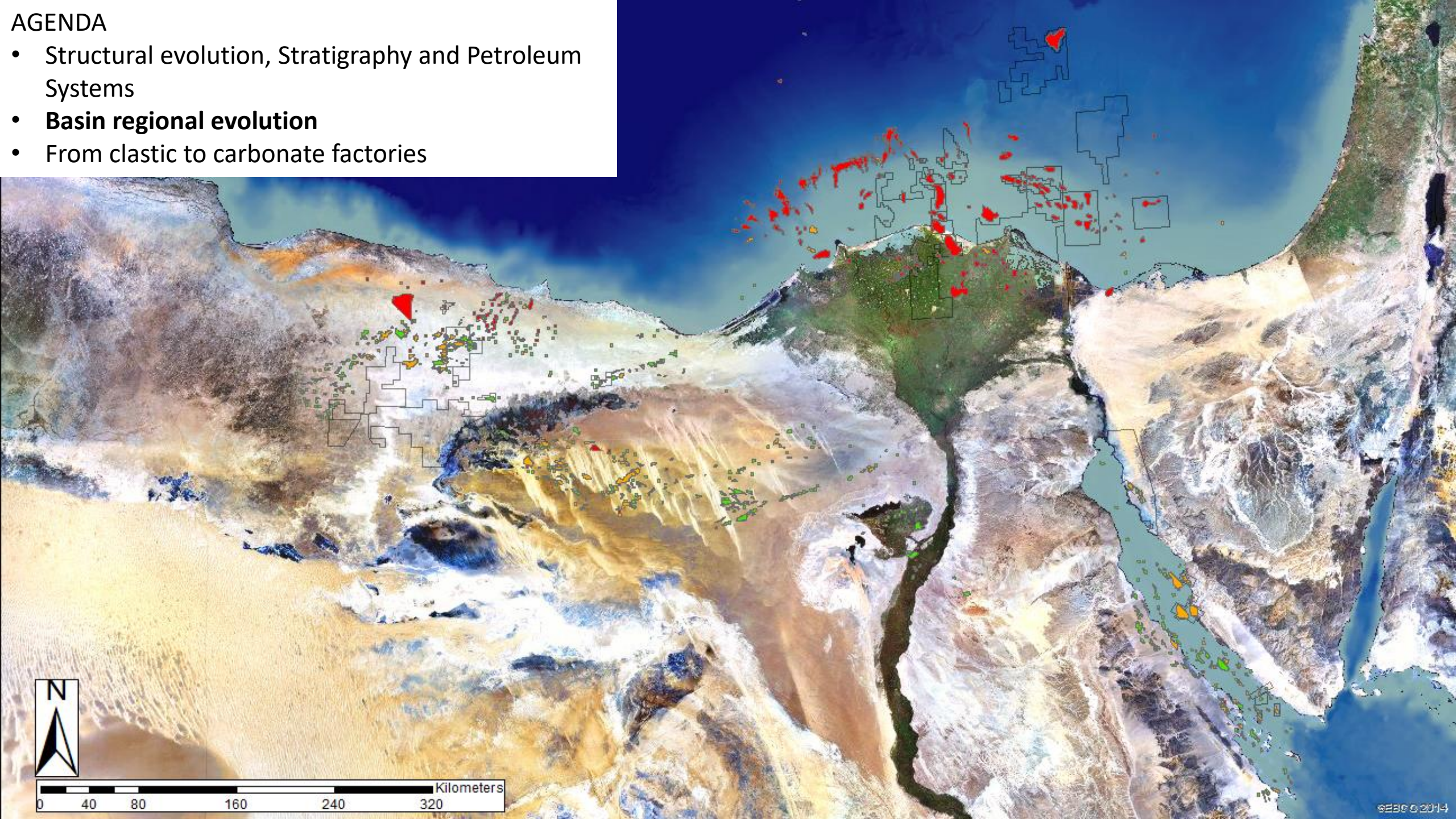
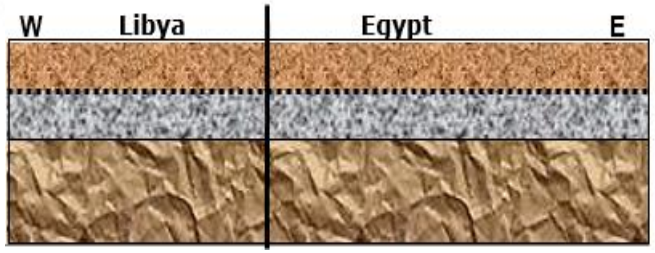
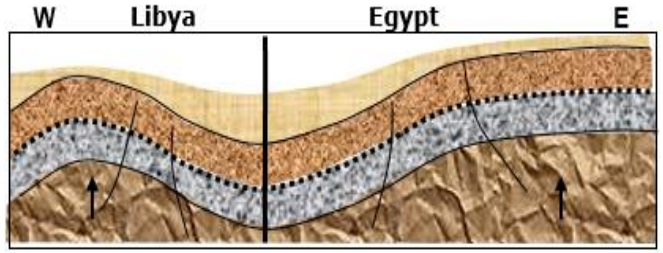


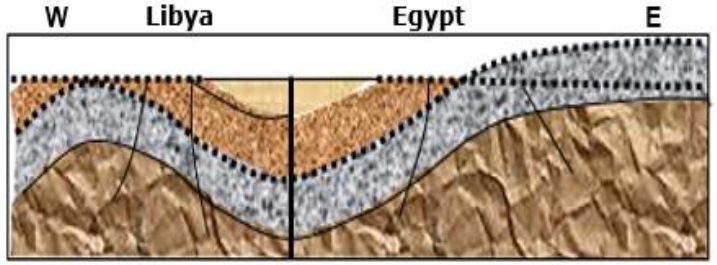
Regional Basin Evolution E-W cross-section & NE-SW Regional Geo-Seismic Cross Section



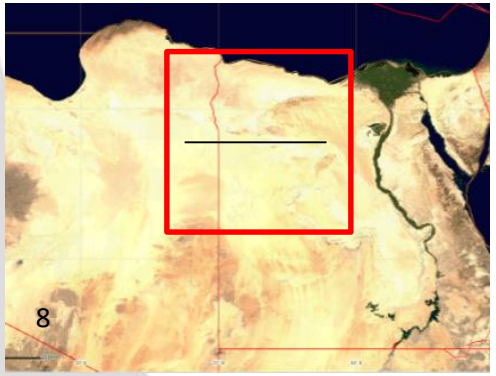
Paleozoic Basin

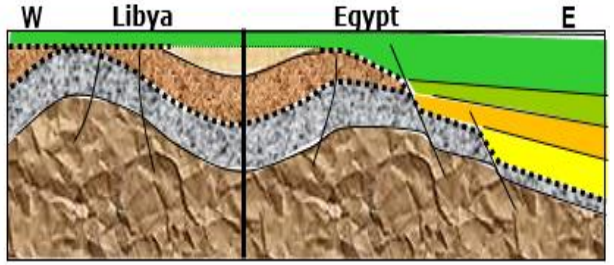


Hercynian tilting & Uplift

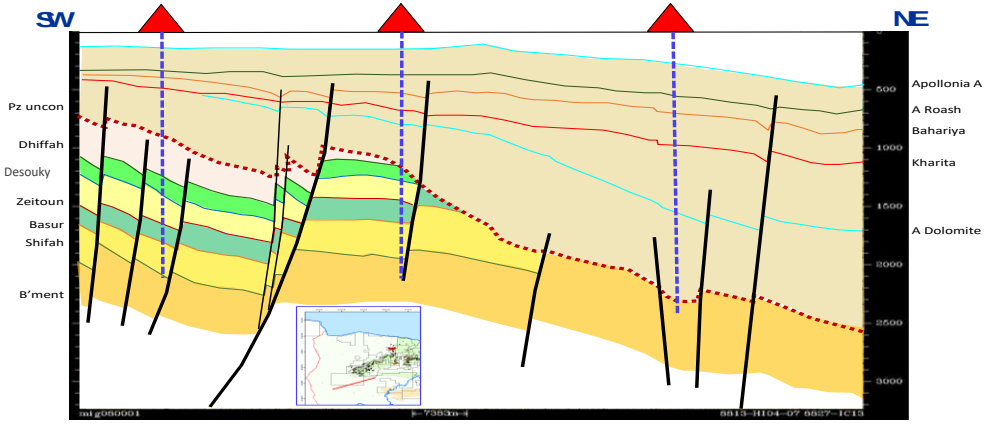


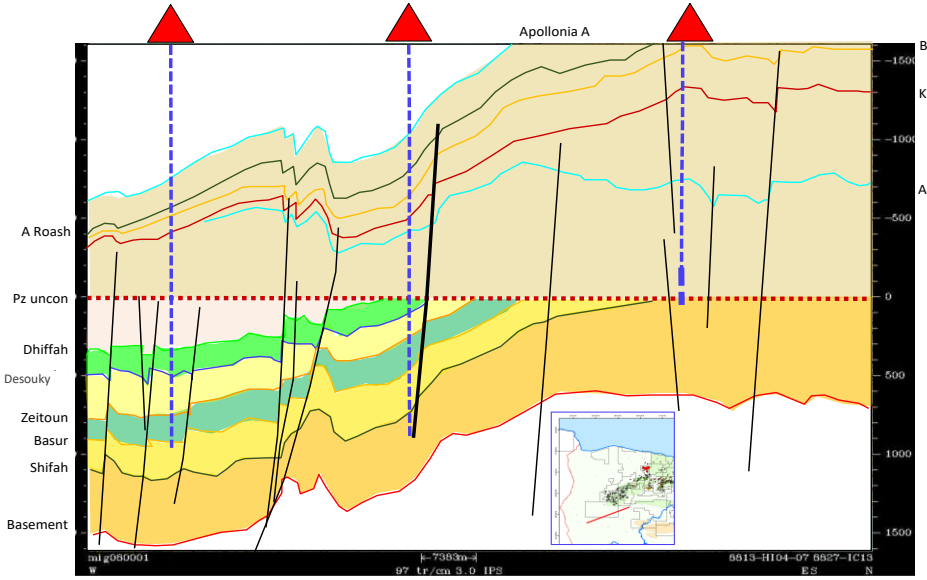
Erosion



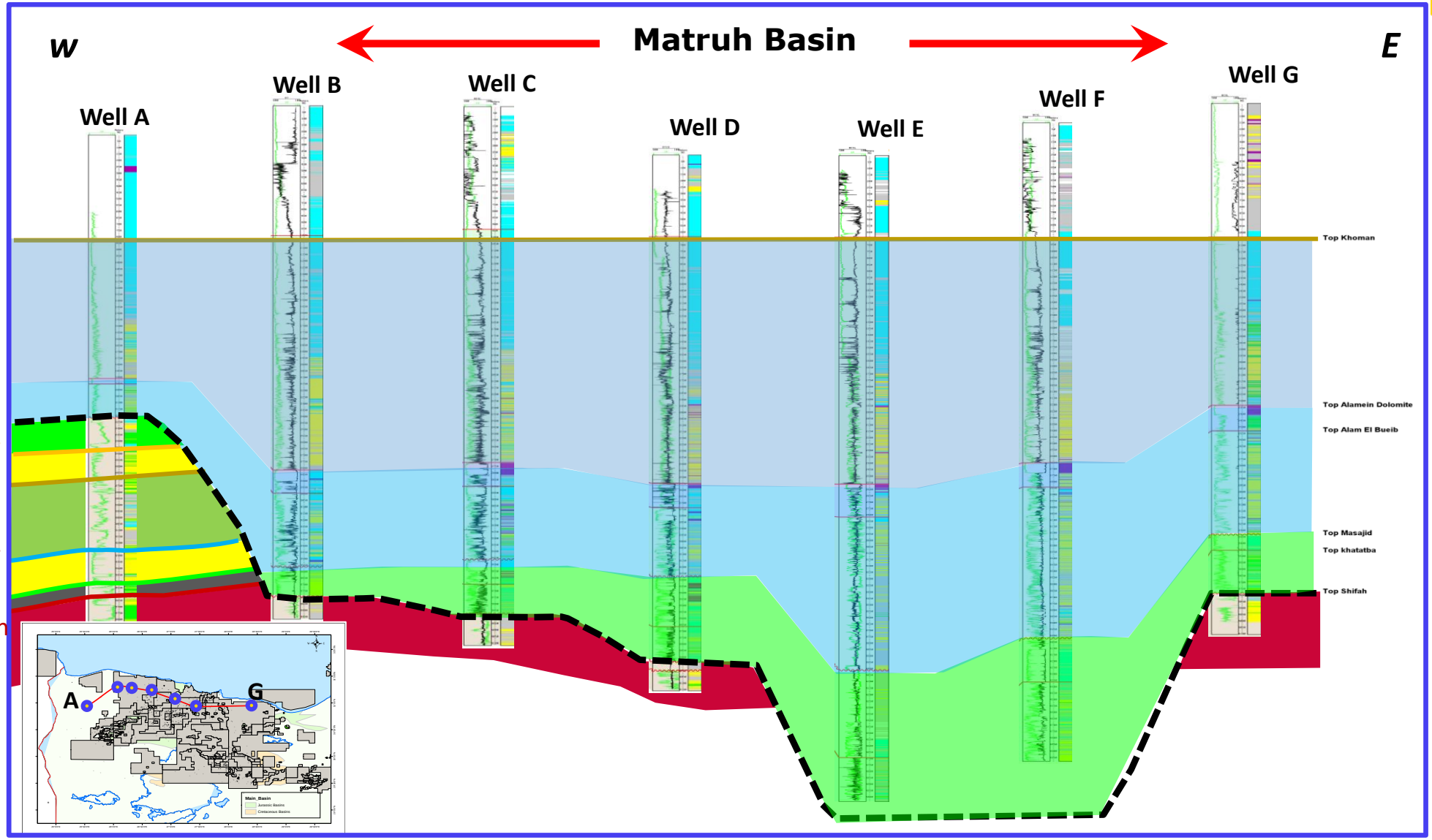


Syn-Deposition Subsidence JJ Rifting & Mesozoic Wedges



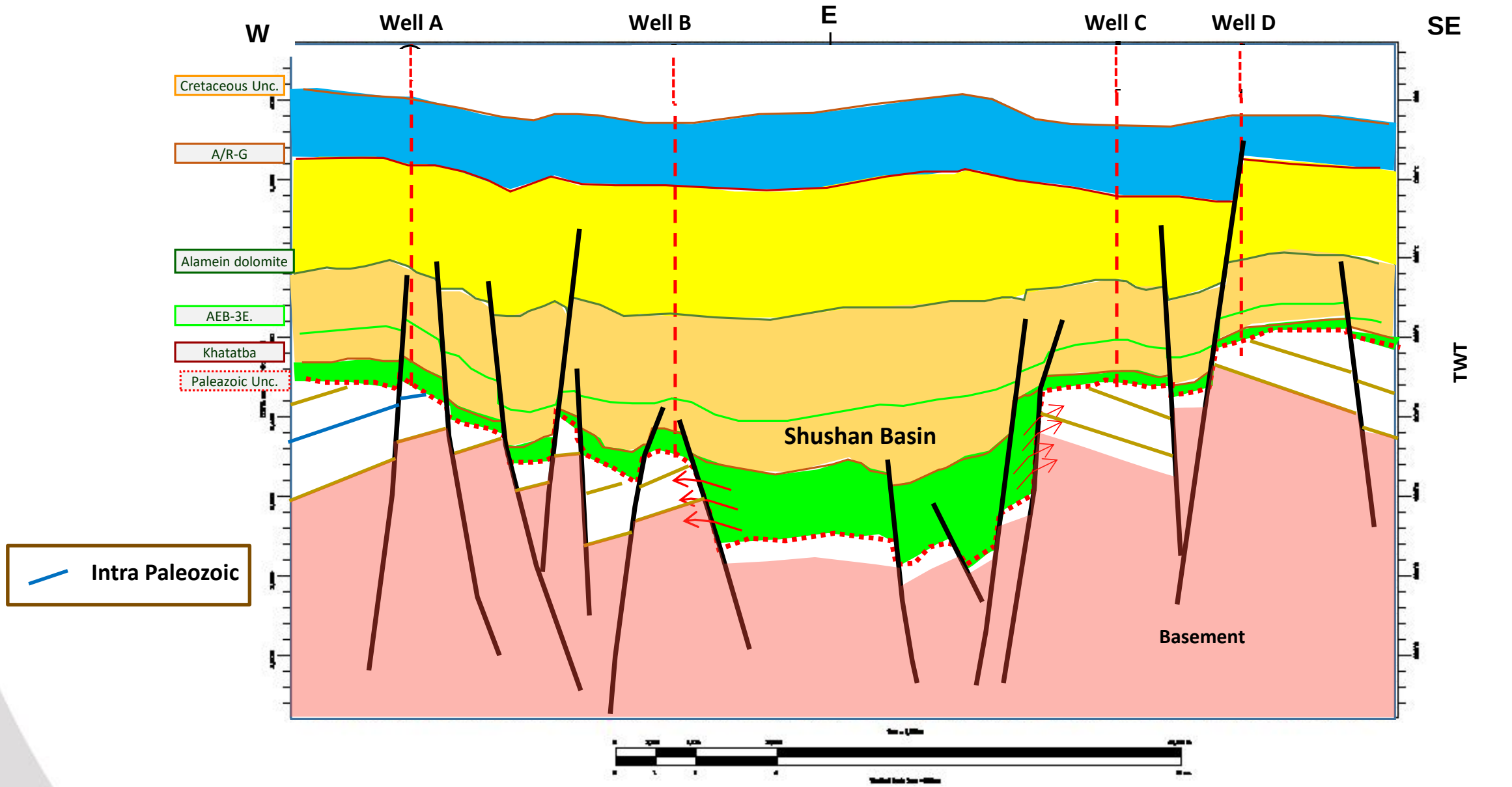


Northern Western Desert
E-W regional wells correlation through Matruh Basin

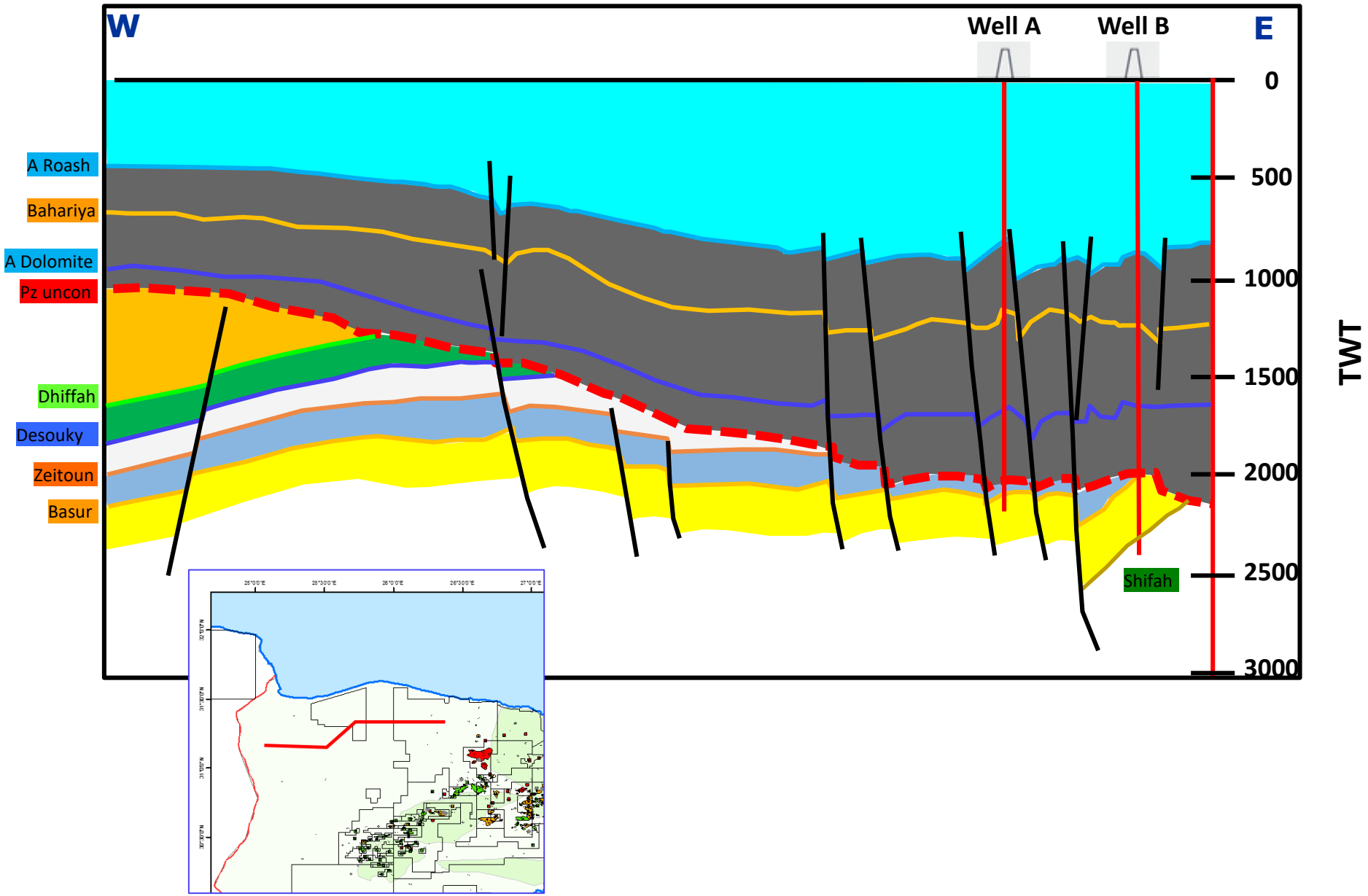


Both Jurassic and E. Cretaceous (AEB) syn-Rift sediments thin out westward. AEB is completely missing in the westernmost area

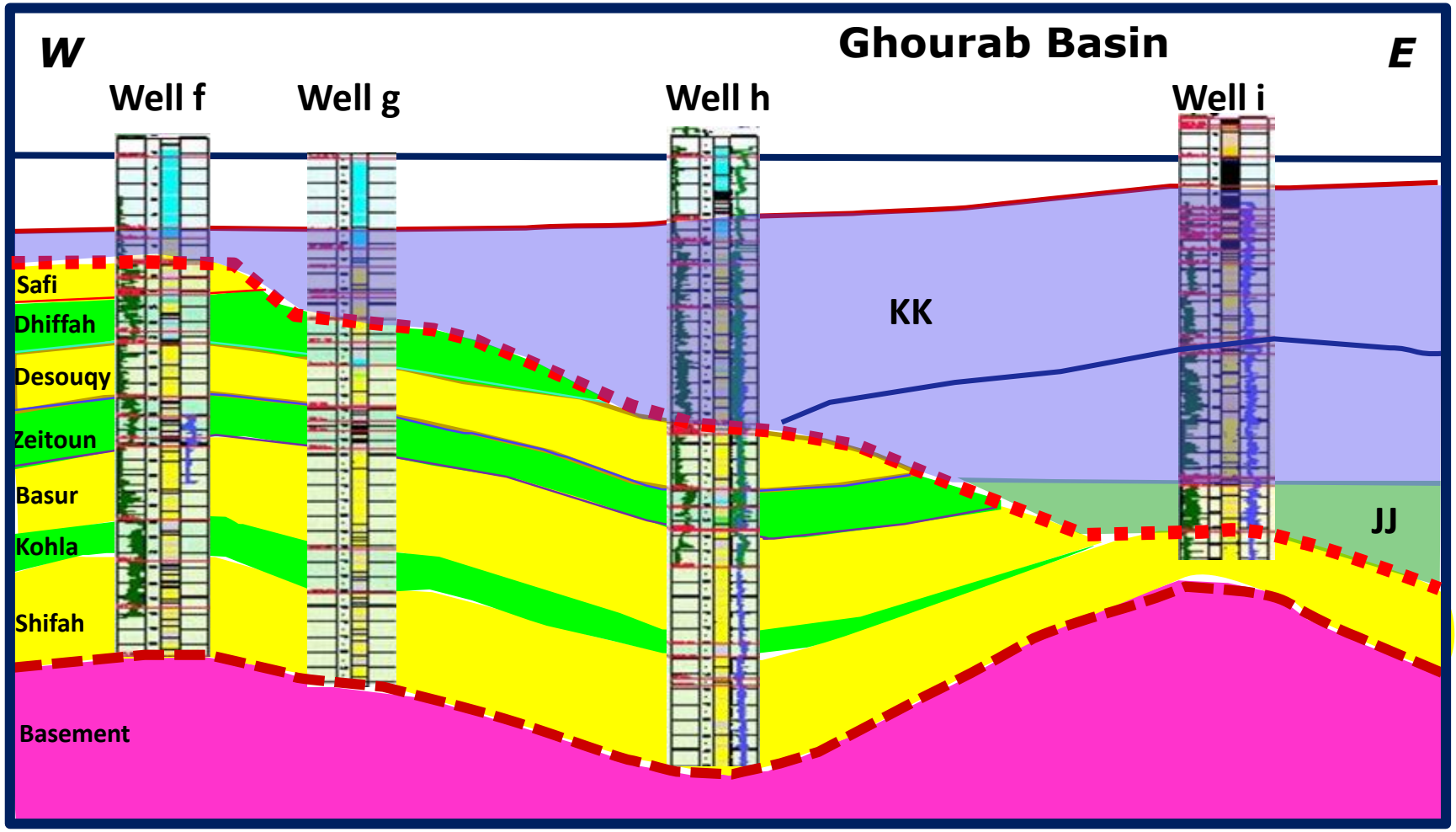
Northern Western Desert
Geo-Seismic cross section trough Sushan Basin

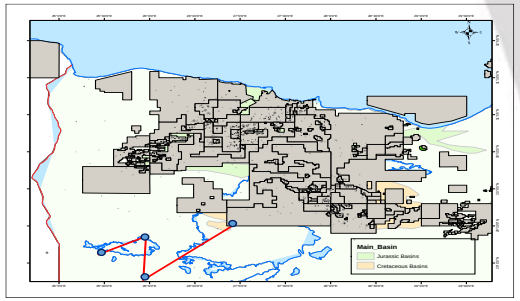


Northern Western Desert
E-W regional cross section



Southern Western Desert
E-W regional wells correlation through Ghourab Basin





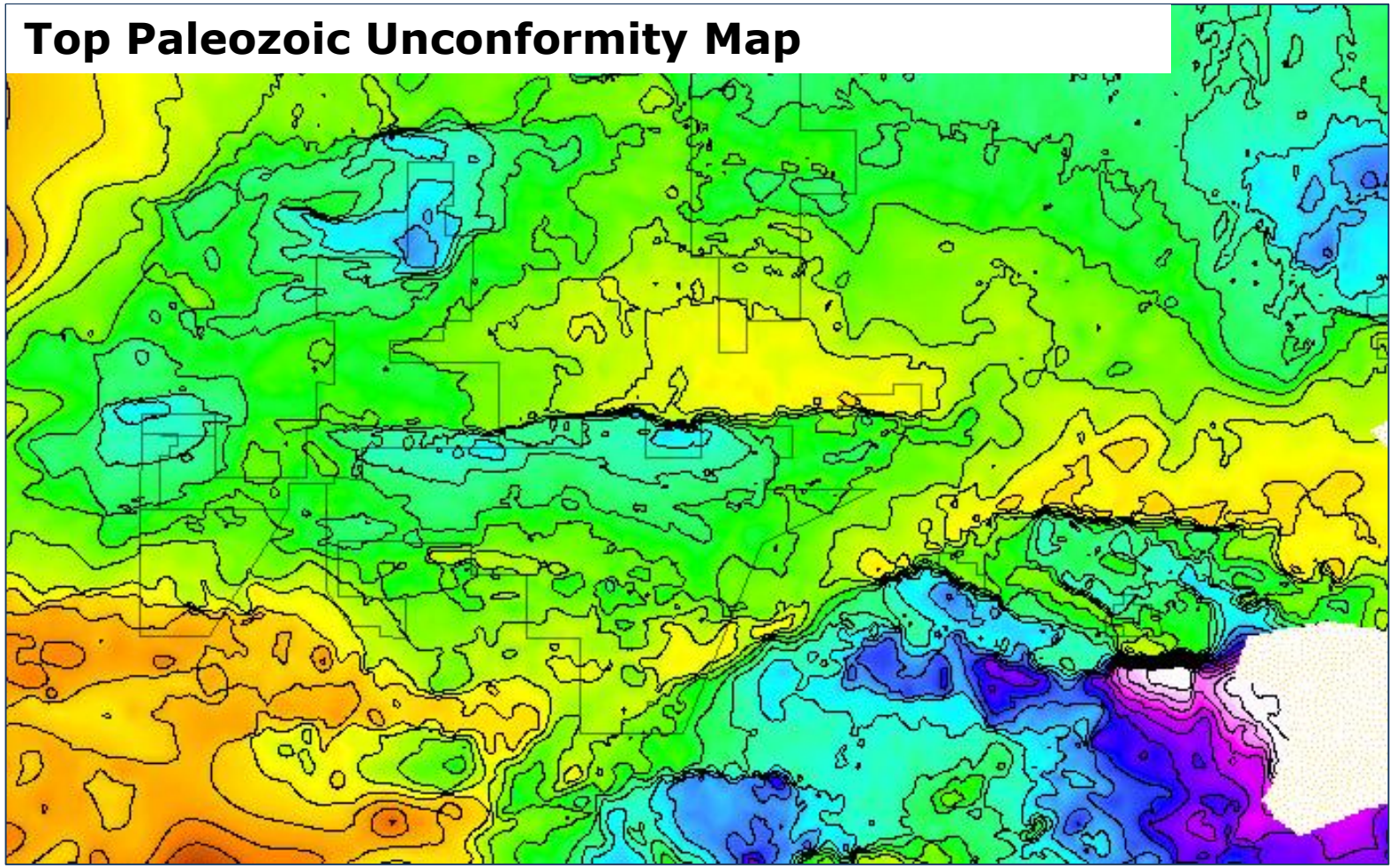
E-W well correlation panel showing the stratigraphic relationships between Paleozoic and Mesozoic successions. Paleozoic strata thins eastward due to a Top Paleozoic erosional unconformity. Above, the Mesozoic deposits show a marked reduction in thickness from east to west

Western Desert
Relationship between Top Paleozoic Unconformity and Palozoic sub-crop map

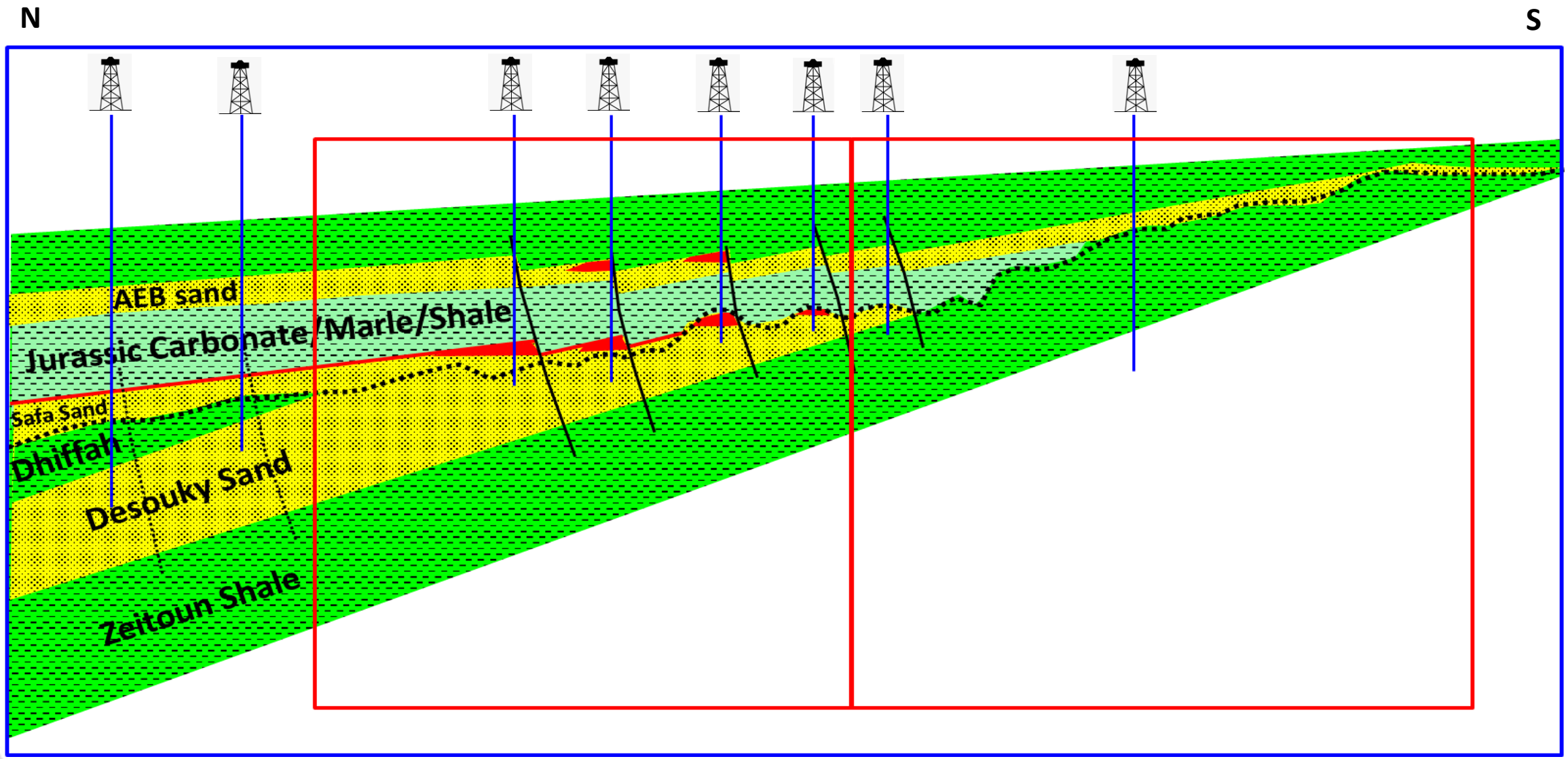
Mapping of the Paleozoic Formations below the Top Paleozoic unconformity is based on Seismic and Wells data.

This map is a key factor to de-risk the drilling of Paleozoic reservoir sealed by the unconformity

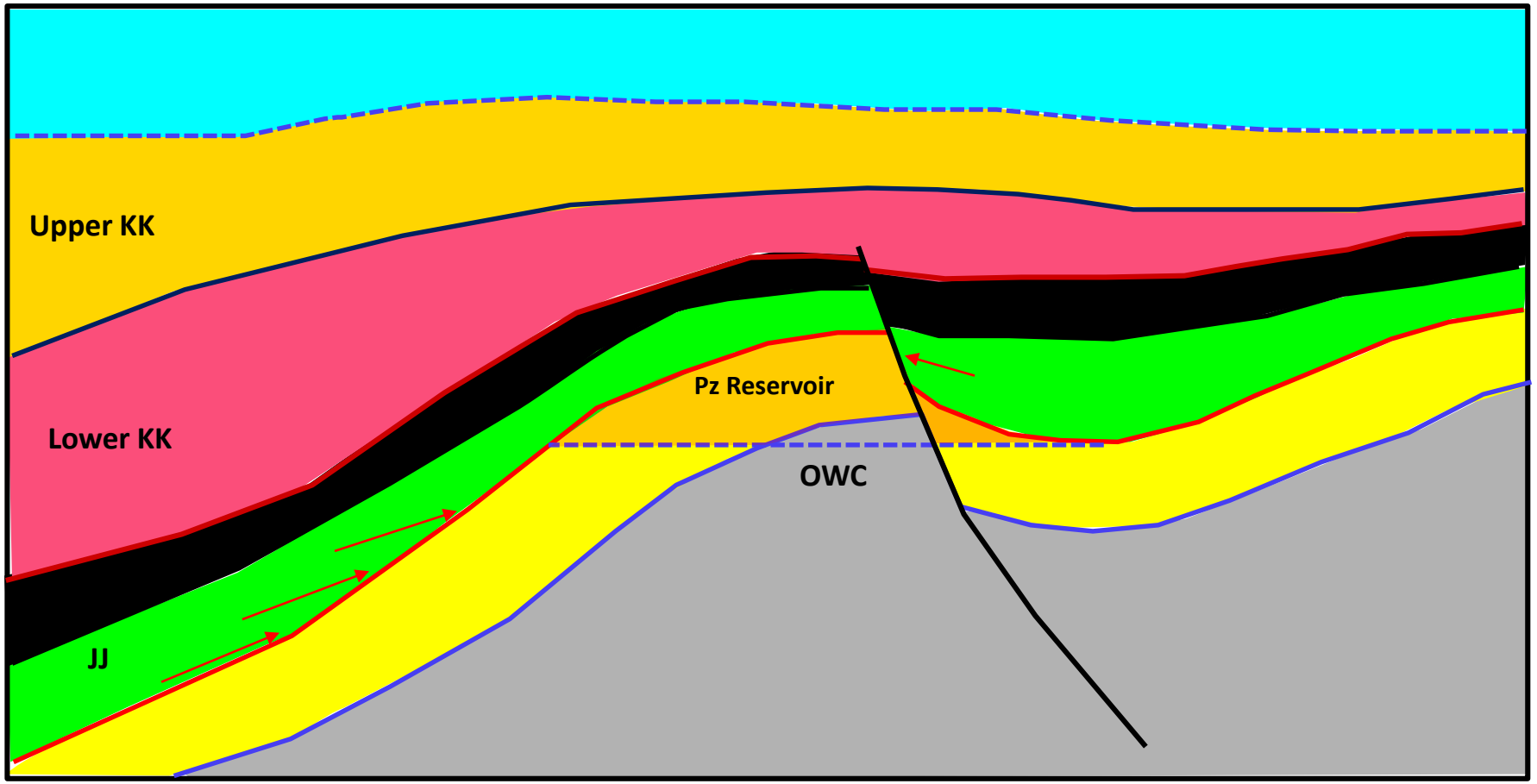
Top Paleozoic Unconformity Map



Western Desert
N-S sketch Showing the Mesozoic/Paleozoic Relationship and Trap Integrity



Western Desert
Fault just apposition and charge mechanism of older reservoir from younger source



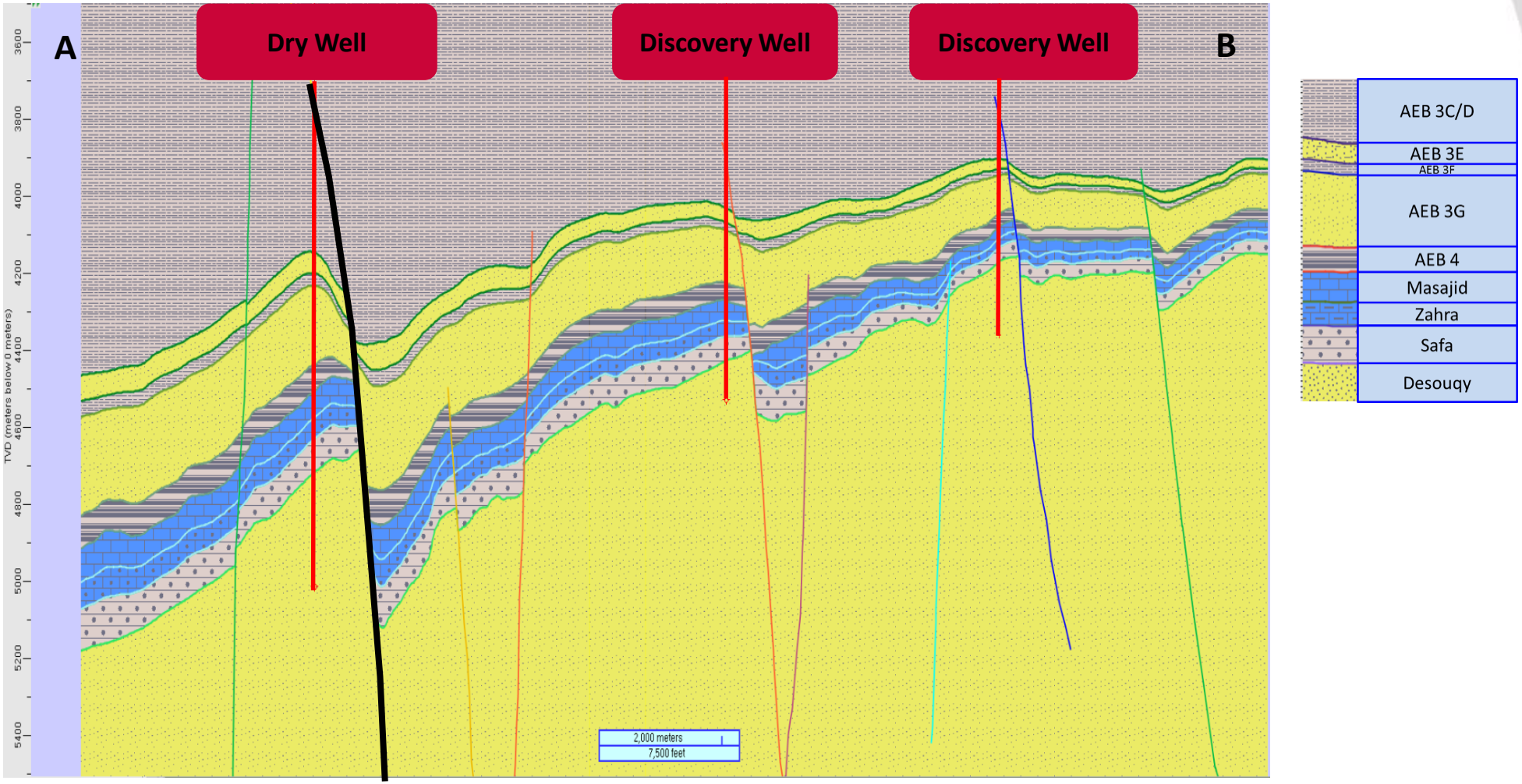
Stratigraphically trapped oil in the Paleozoic reservoir structures where such reservoir can be charged either by juxtaposition and or located proximal to the source rock.

Fault behavior and stratigraphy is of paramount importance!

Western Desert
N-S sketch Showing the Mesozoic/Paleozoic Relationship and Trap Integrity

A real case from Seismic of previous slide sketch:

Fault juxtaposition (sand to sand) was the ROF for the Dry Well to the left, while the two discovery wells proved the lateral fault sealing effect thanks to Sand on Carbonate juxtaposition



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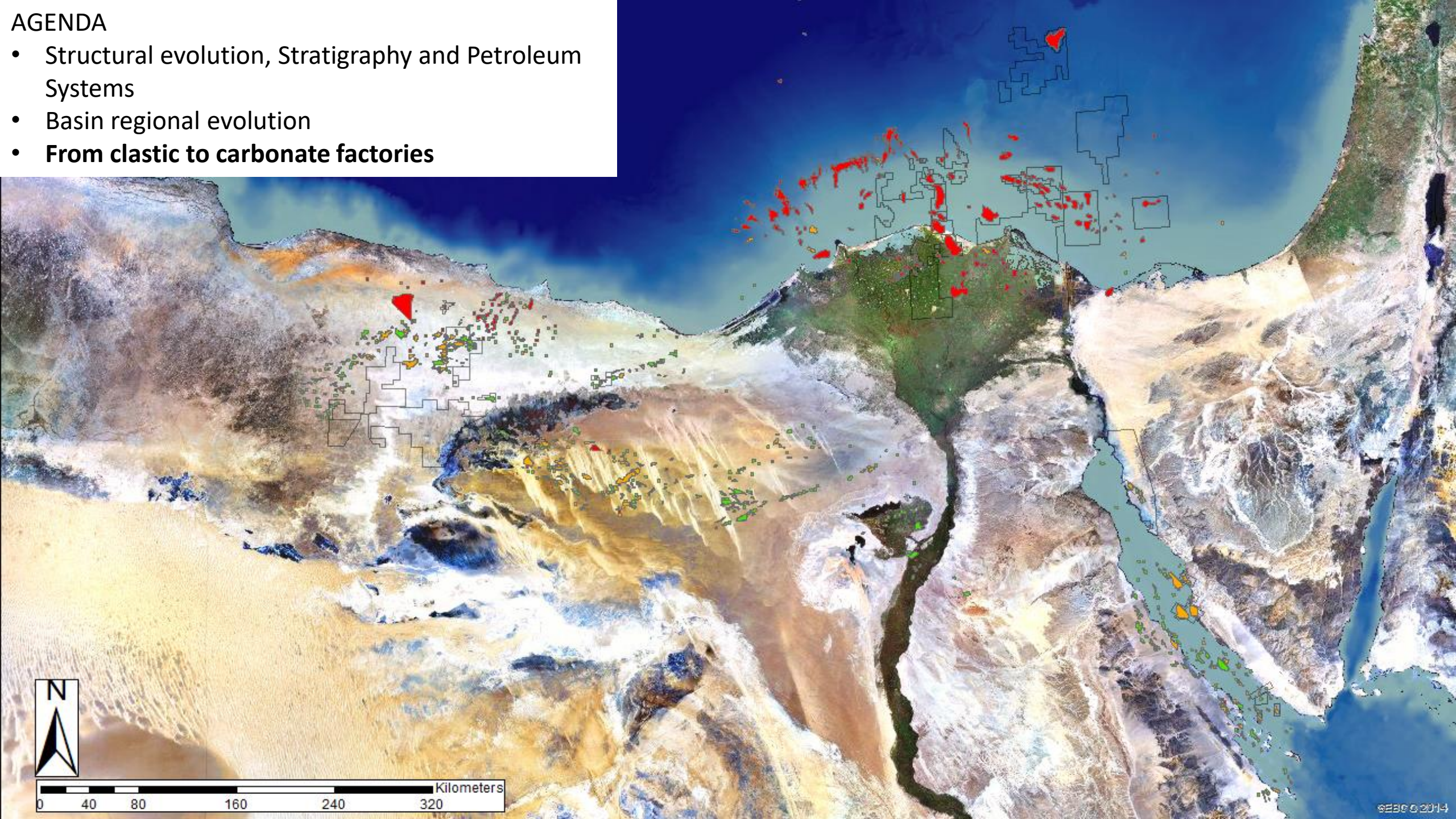
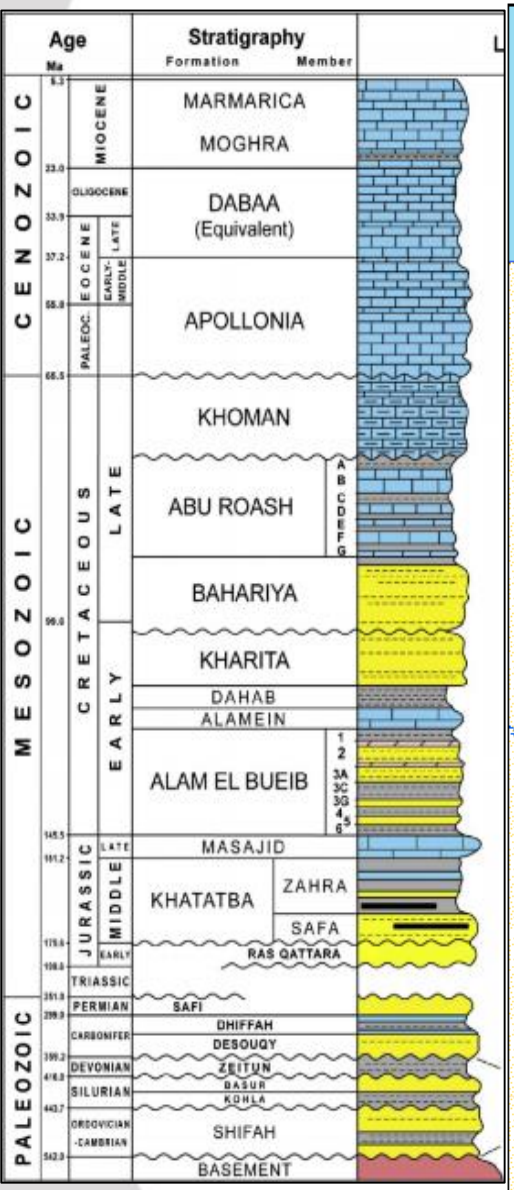
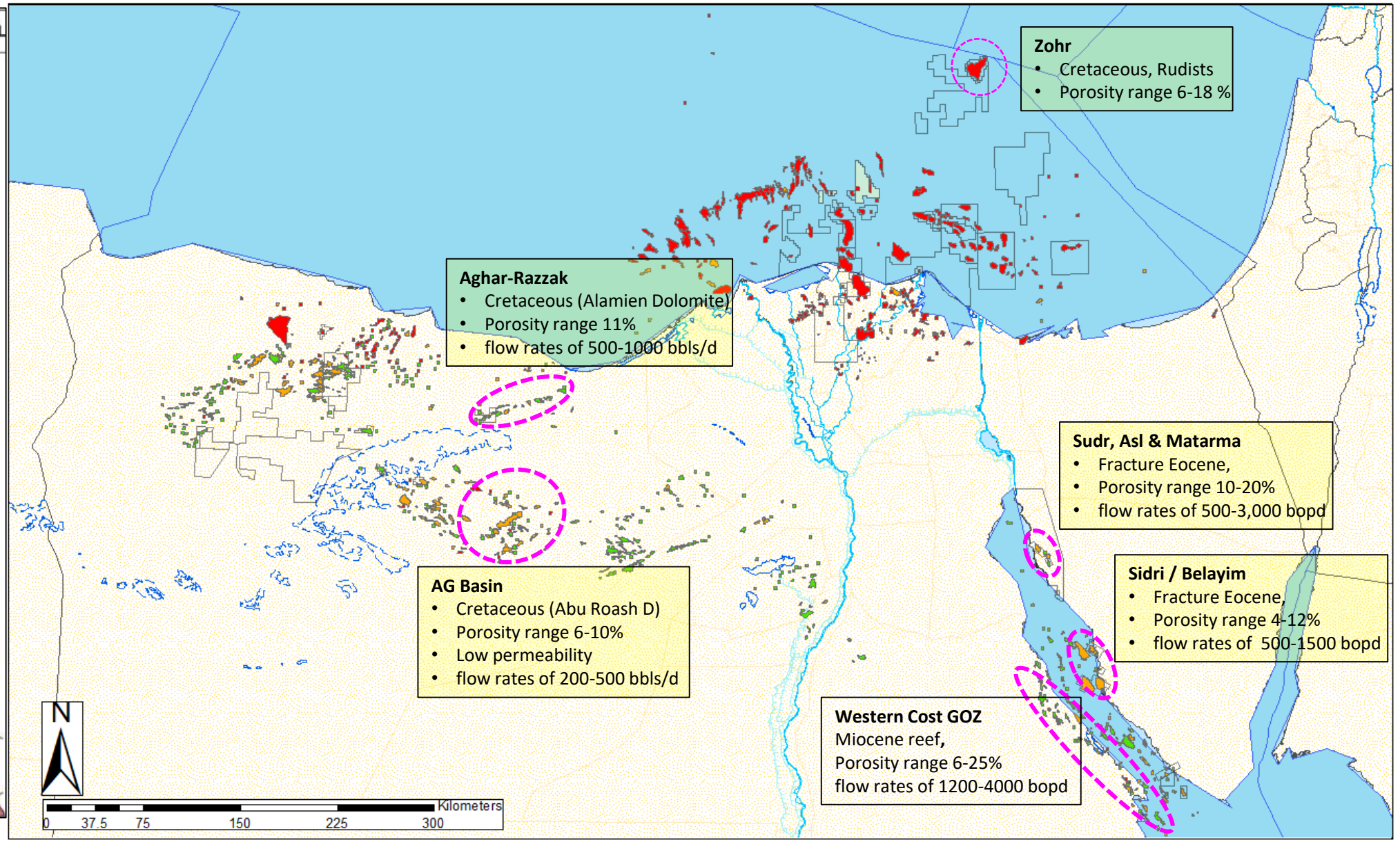


Commercial Production from Carbonate Reservoir Fields in Egypt





THANK YOU