



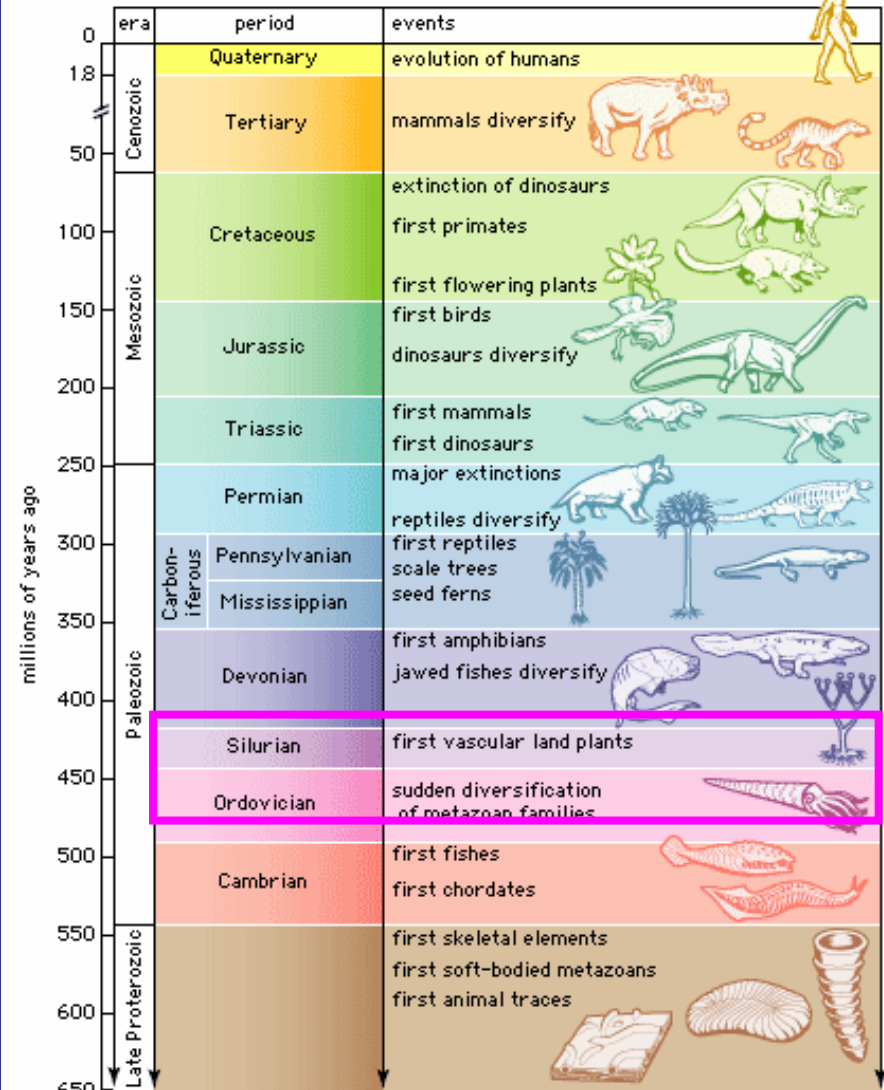
LOWER PALEOZOIC OIL POTENTIAL OF SE TURKEY, *DISTRICTS X & XI*

*GÜNEY YILDIZI PETROL
ÜRETİM, SONDAJ, MÜTH. VE TİC. A.Ş.*

PETFORM
ANKARA
January 11, 2010

GEOLOGIC TIME SCALE

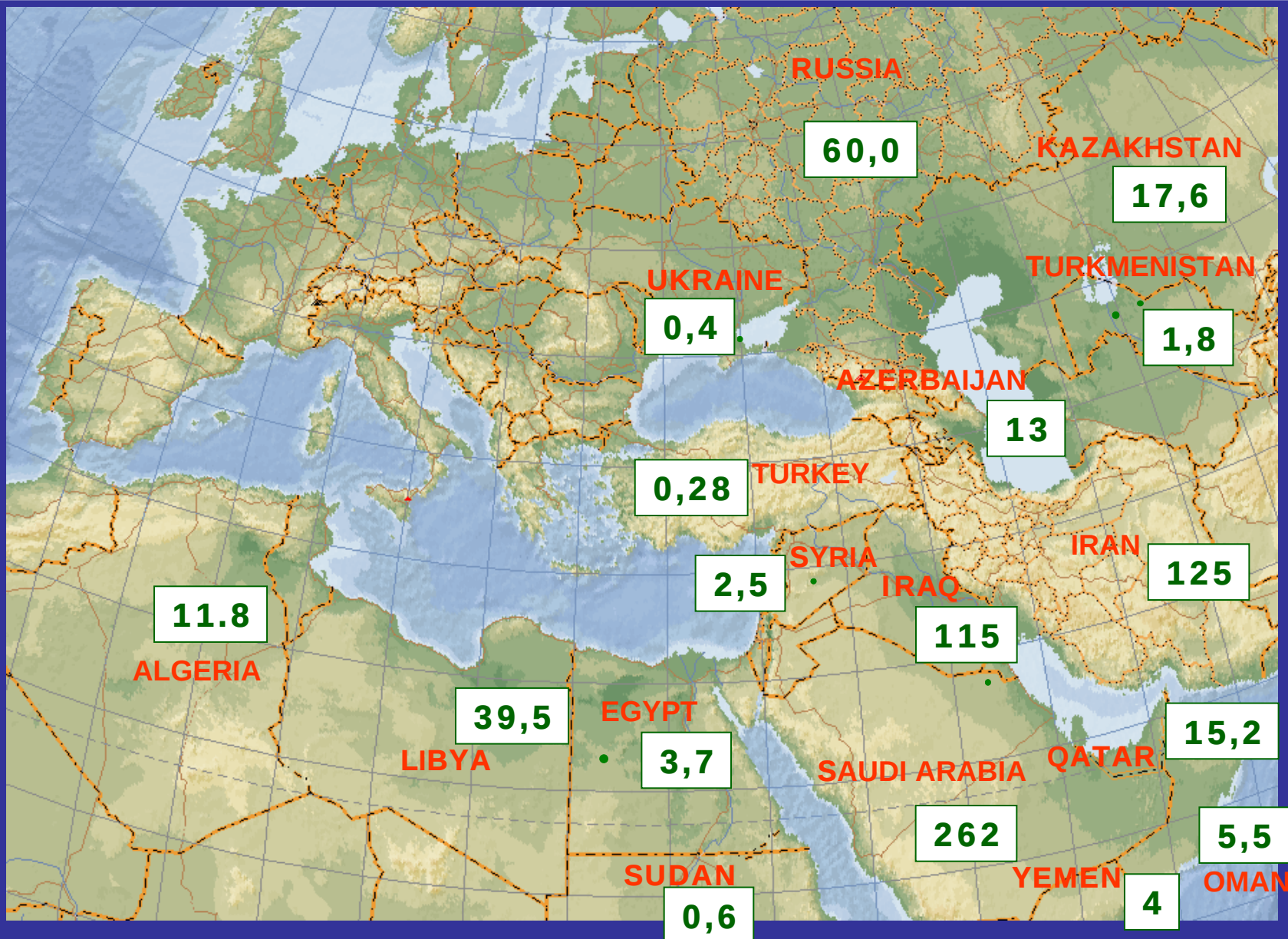
Geologic time scale, 650 million years ago to the present



PALEOZOIC OF SE TURKEY



OIL RESERVES (Billion Barrels)



MAJOR SOURCE ROCKS OF THE WORLD

➤ MORE THAN 90% OF ORIGINAL RECOVERABLE OIL AND GAS RESERVES IN THE WORLD HAS BEEN GENERATED FROM SOURCE ROCKS OF SIX STRATIGRAPHIC INTERVALS;

(1) MIDDLE CRETACEOUS (29 % OF RESERVES),

(2) UPPER JURASSIC (25 % OF RESERVES),

(3) OLIGOCENE-MIOCENE (12.5% OF RESERVES)



(4) SILURIAN (GENERATED 9 % OF THE WORLD'S RESERVES), } LOWER PALEOZOIC

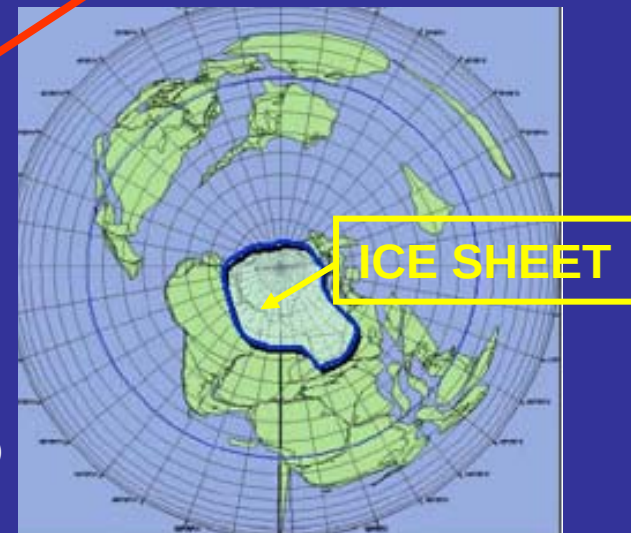
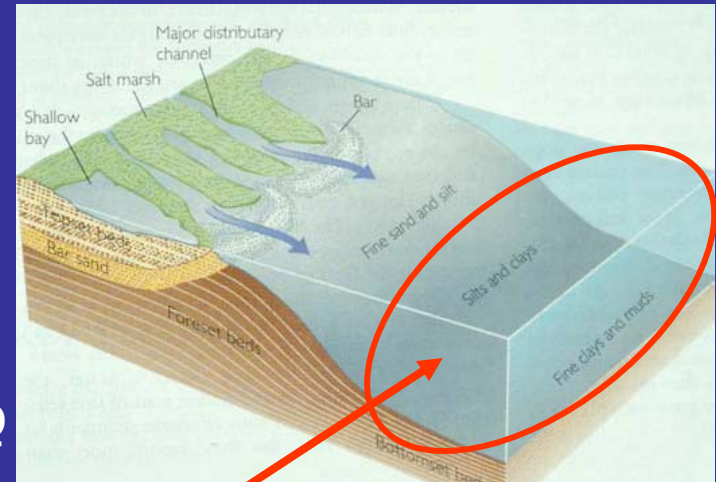
(5) UPPER DEVONIAN-TOURNAISIAN (8 % OF RESERVES),

(6) PENNSYLVANIAN-LOWER PERMIAN (8 % OF RESERVES),

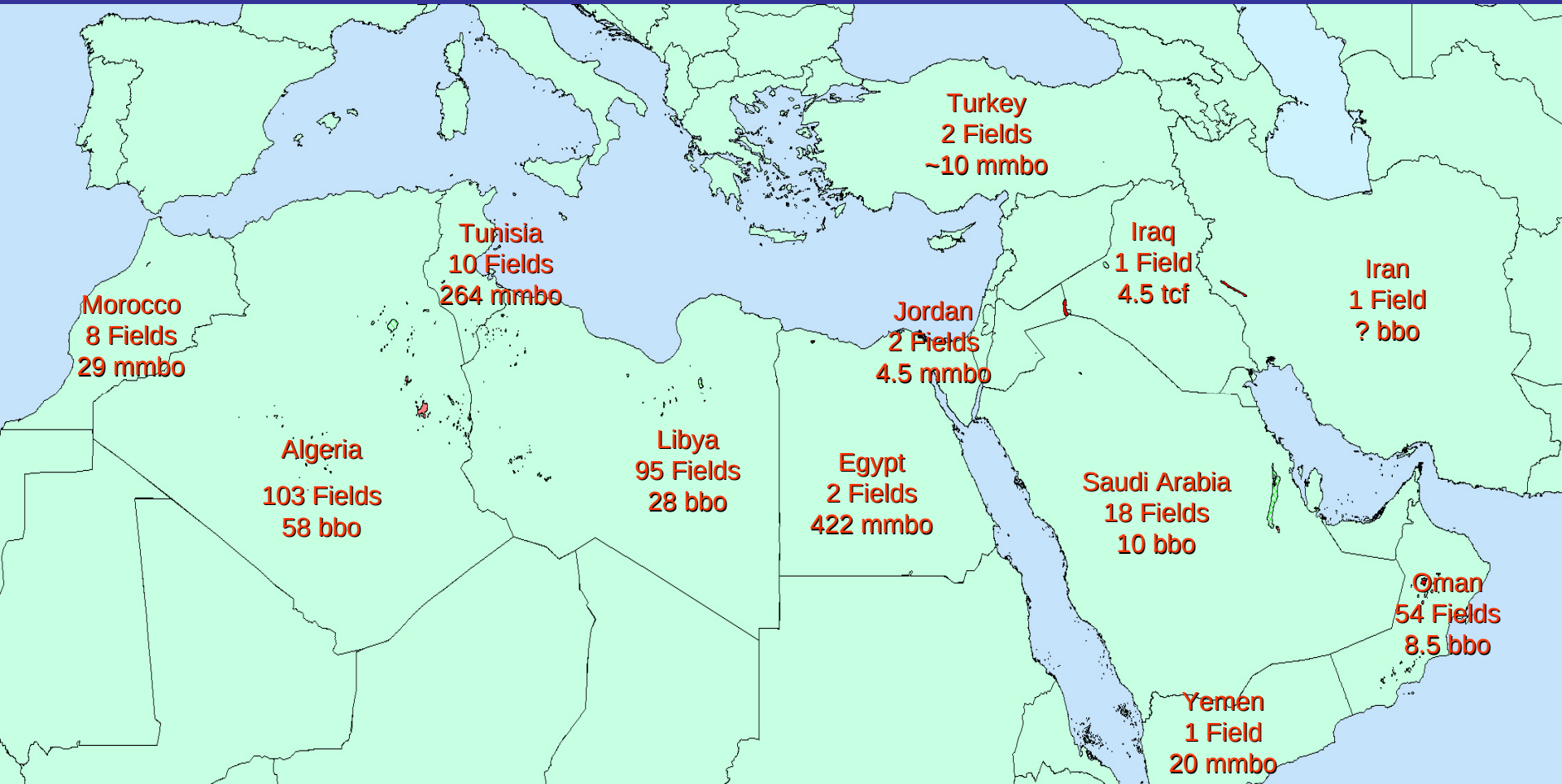
} UPPER PALEOZOIC

WHY ARE SILURIAN SHALES SO IMPORTANT?

- ORIGIN OF 80-90% OF PALEOZOIC SOURCED HYDROCARBONS IN NORTH AFRICA & MIDDLE EAST
- ONLY THE LOWERMOST PART (HOT SHALES OF DADAS I, 100-200 FT) IS ORGANIC-RICH
- TOC'S ARE IN THE RANGE OF 2-8 %; HOWEVER, UP TO 17 % IS REPORTED IN IRAQ
- DEPOSITED IN A SHORT PERIOD (1-2 M.Y) IN AN OXYGEN-DEFICIENT DELTA TOE AREA AND/OR LOCAL SAGS OR BASINS DURING A MAJOR SEA-LEVEL RISE FOLLOWING THE MELTING OF LATE ORDOVICIAN GLACIAL ICE
- SILURIAN HOT SHALES OF NORTHERN GONDWANA ARE LATERALLY DISCONTINUOUS AND THEIR THICKNESS AND DISTRIBUTION WERE CONTROLLED BY THE EARLY SILURIAN PALEORELIEF WHICH WAS SHAPED BY LATE ORDOVICIAN GLACIATION (*South Pole Were At Present Day W. Africa*)

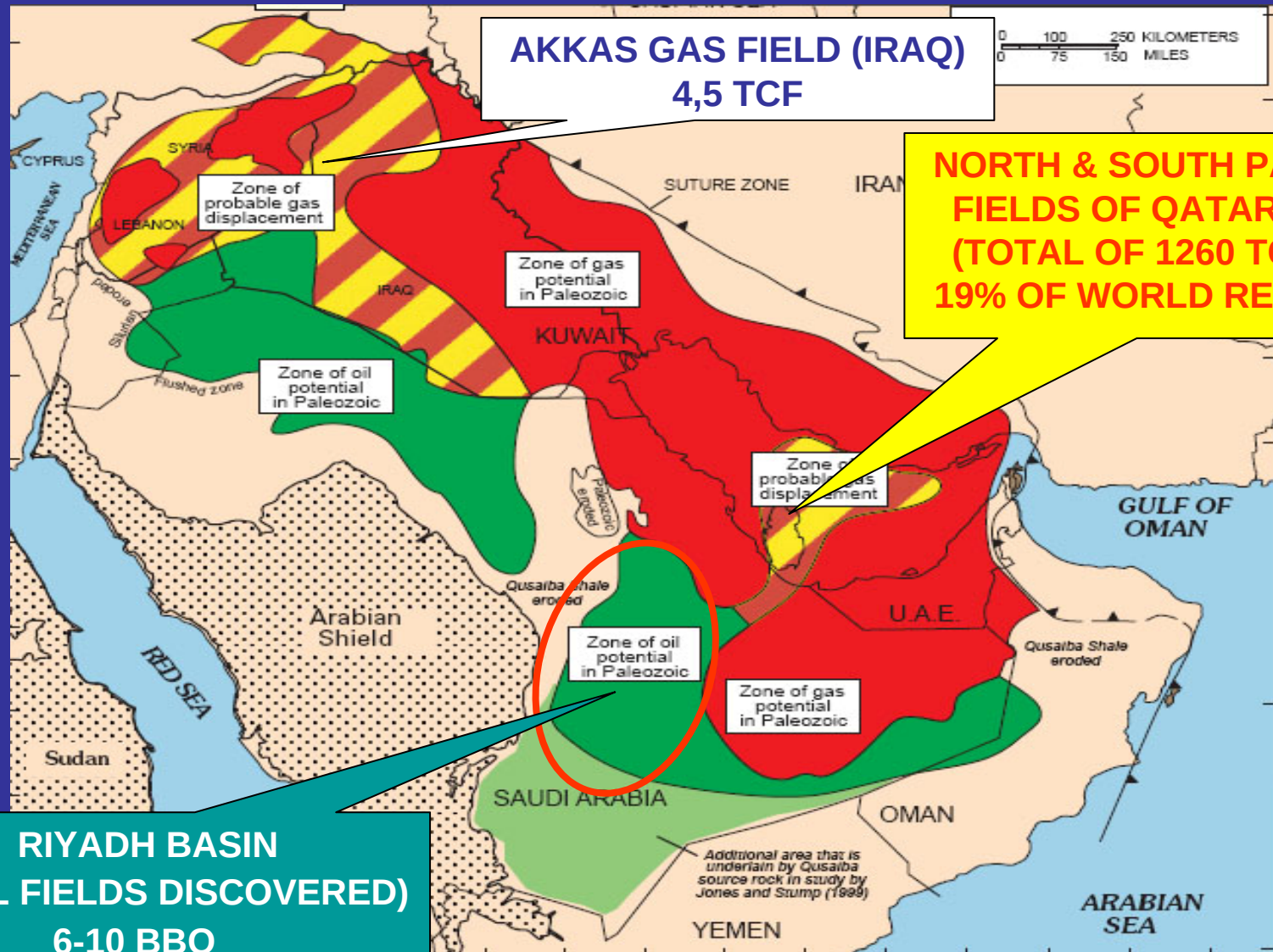


PALEOZOIC ANALOGS ANALYSIS



North Africa and Middle East
297 fields

SILURIAN HC AREAS OF ARABIAN PENINSULA

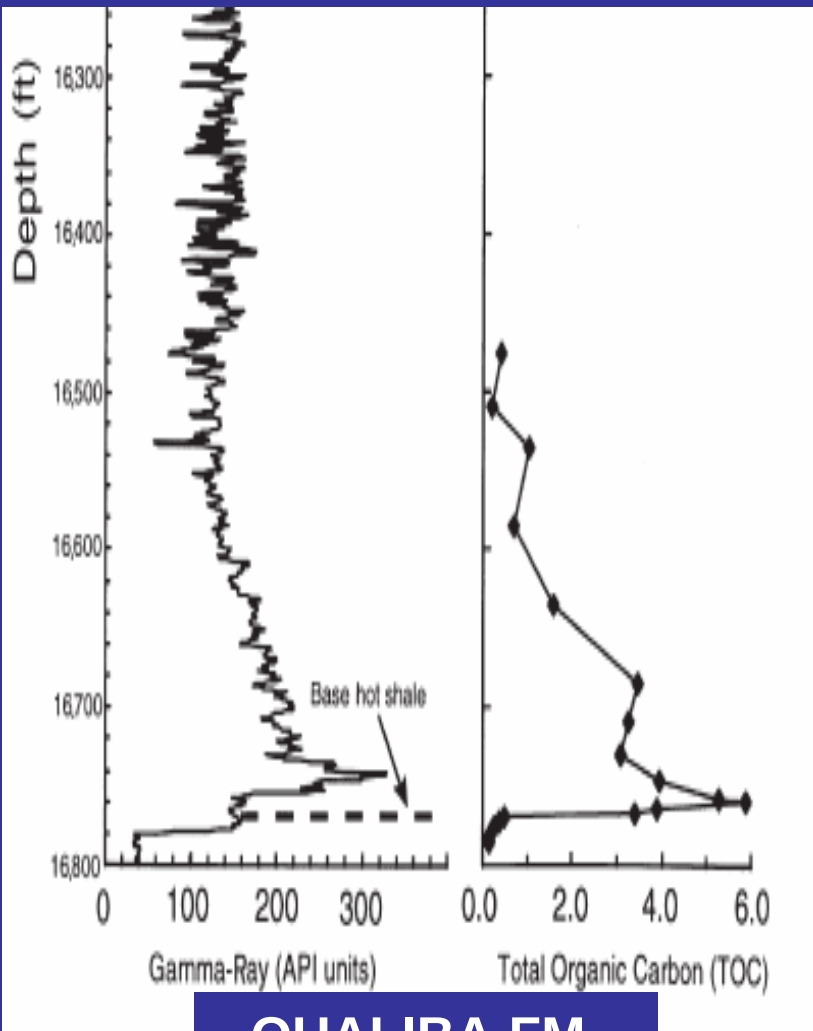


LOWER SILURIAN HOT SHALES (QUALIBA vs DADAS)

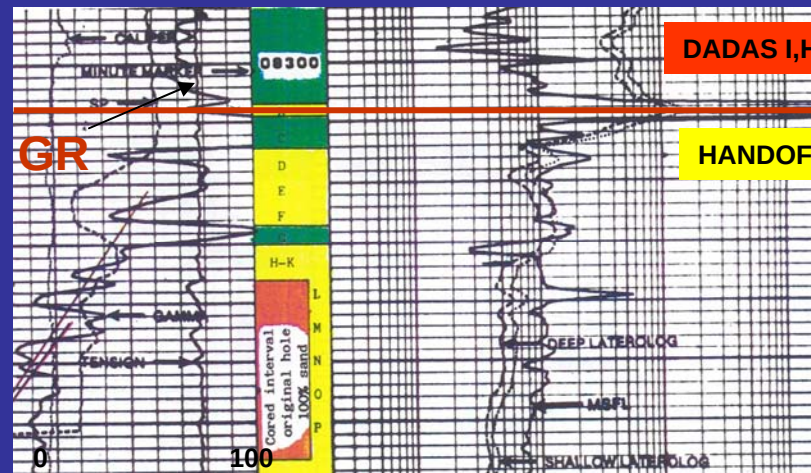
QUALIBA: 165 FT, TOC 6-8%, SOURCE OF 18 NEW DISCOVERED PERMIAN RESERVOIRS OF S. ARABIA AS WELL AS GIANT KUFF GAS RESERVOIR IN THE PERSIAN GULF

DADAS I: 150 FT, TOC 5-6%, SOURCE OF Creta. OIL FIELDS OF KURKAN-KARAKOY AND ORDOVICIAN RESERVOIR OF ARPATEPE OIL FIELD; POSSIBLE SOURCE OF DEEP BARBES DEVONIAN GAS-CONDENSATE FIELD.

SOURCE OF BULGURDAG OIL IN ADANA IS ALSO THOUGHT TO BE AS LOWER PALEOZOIC SHALES.



**QUALIBA FM.
(SAUDI ARABIA)**



**DADAS FM.
(SE TURKEY)**

SE TURKEY STRATIGRAPHY, DISTRICTS X & XI

	AGE	BASIC LITHOLOGY	FORMATION	PLAY ELEMENTS		
				RESERVOIR	SEAL	SOURCE
TERTIARY	PLIOCENE- PLEISTOCENE		SELMO FM			
	OLIGOCENE- MIOCENE		GERMIC FM			
	EOCENE		MIDYAT FORMATION			
			GERCUS FORMATION			
	PALAEOCENE		SINAN REEF COMPLEX			
CRETACEOUS	MAASTRICHTIAN		GERMAV SHALES			
	TURONIAN		MARDIN FORMATION	*		
	ALBIAN					
	TRIASSIC		OLUDERE FM			
	? PERMIAN ?		KAYAYOLU FM	*		
	DEVONIAN		HAZRO FM			
	SILURIAN		DADAS FM	$\phi = 15\%$		
			HANDOE MEMBER	**		
	ORDOVICIAN		SINAN FORMATION			UNIT I TOC'S 1.75-5%
	CAMBRIAN			$\phi = 25\%$ $K = \text{UP TO } 250 \text{ mD}$		
			SOSINK FM			

SE TURKEY OIL PRODUCTION COME FROM;

- CRETACEOUS CARBONATES, 95%
- TRIASSIC-JURASSIC, 4%
- ORDOVICIAN, 1%

&

MAINLY SOURCED BY;

- LOWER SILURIAN DADAS SHALES
IN DISTRICTS X & XI

ARPATEPE OIL DISCOVERY (APRIL 21, 2008)

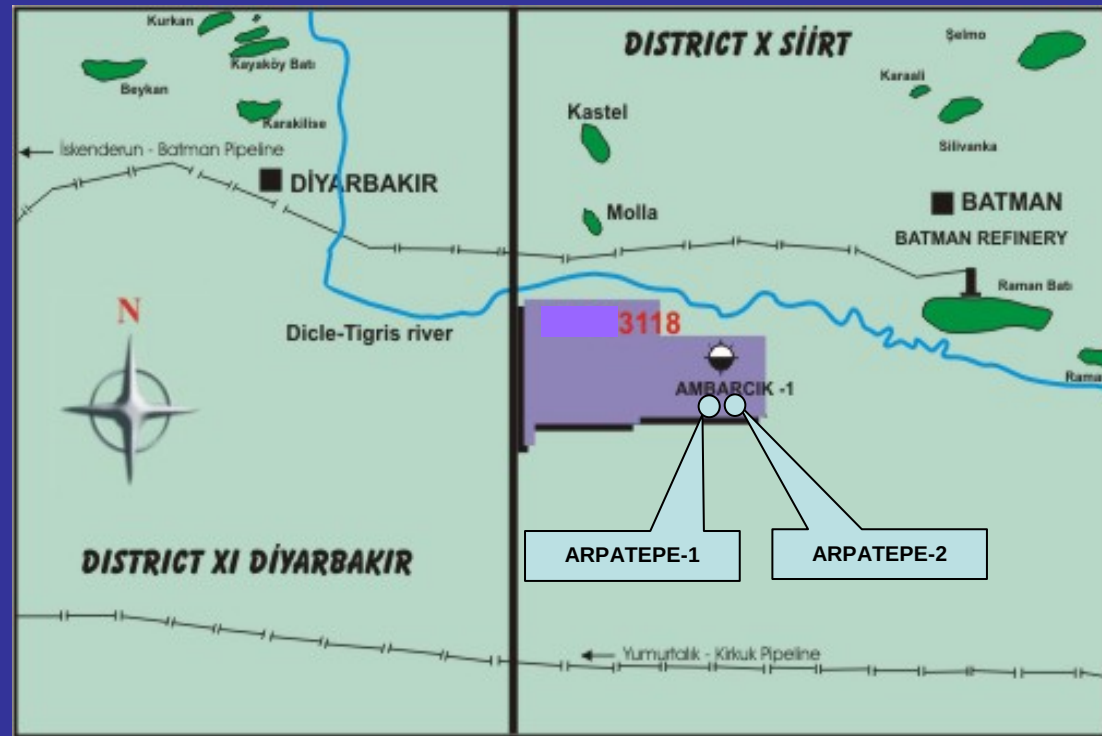
- ✓ **DISCOVERED BY:**
ALADDIN MIDDLE EAST LTD.
GÜNEY YILDIZI PETROL A.Ş.
ENERGY OPERATIONS TURKEY
- ✓ **LICENSE AREA: 388 KM2**

ARPATEPE-1

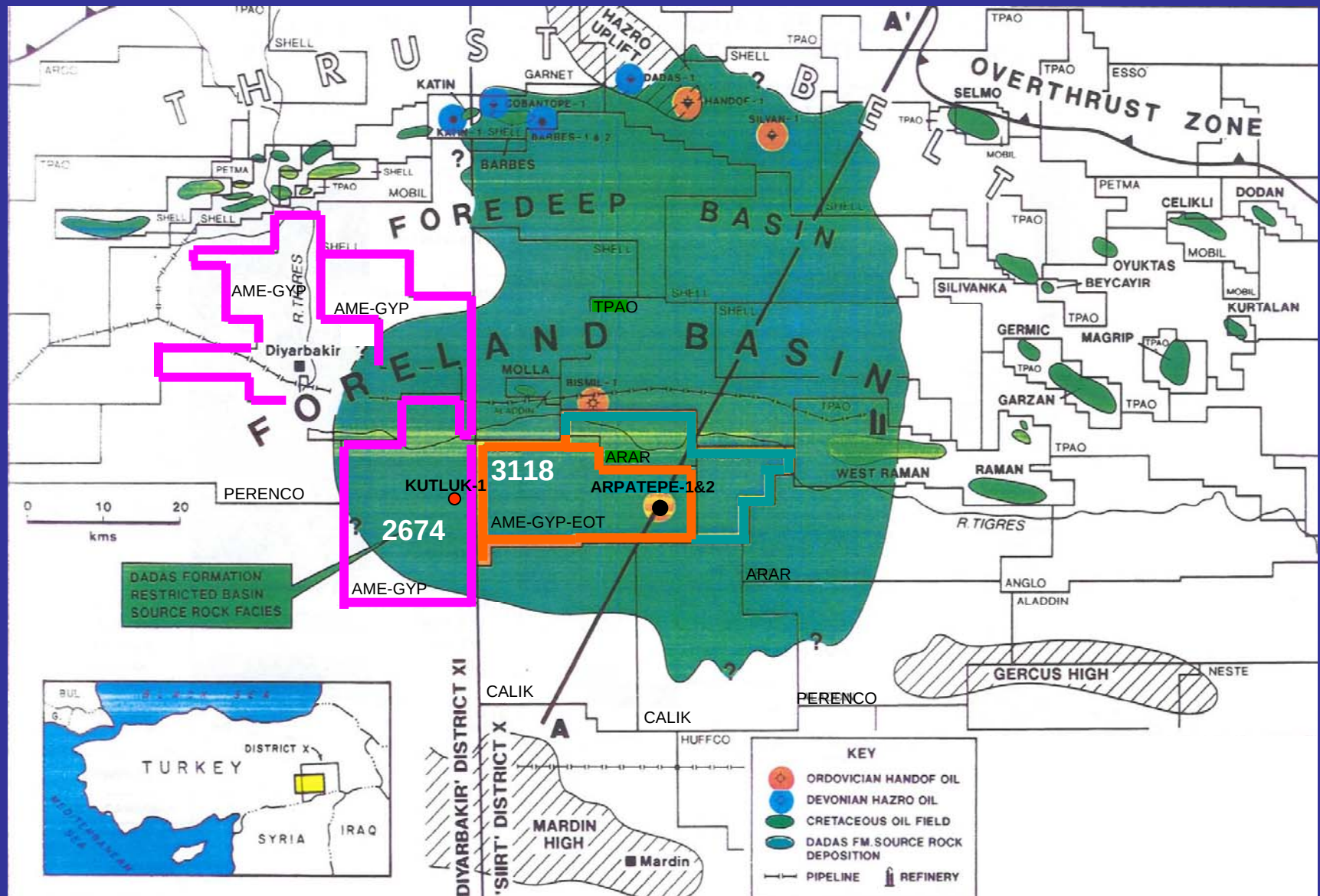
- SPUD: 23.12.2007
- DRILLING END: 24.04.2008
- COMPLETION END: 01.07.2008
- TD: 8055 FT. (2455 M)
- FORMATION: BEDINAN
- STATUS: OIL PRODUCER

ARPATEPE-2

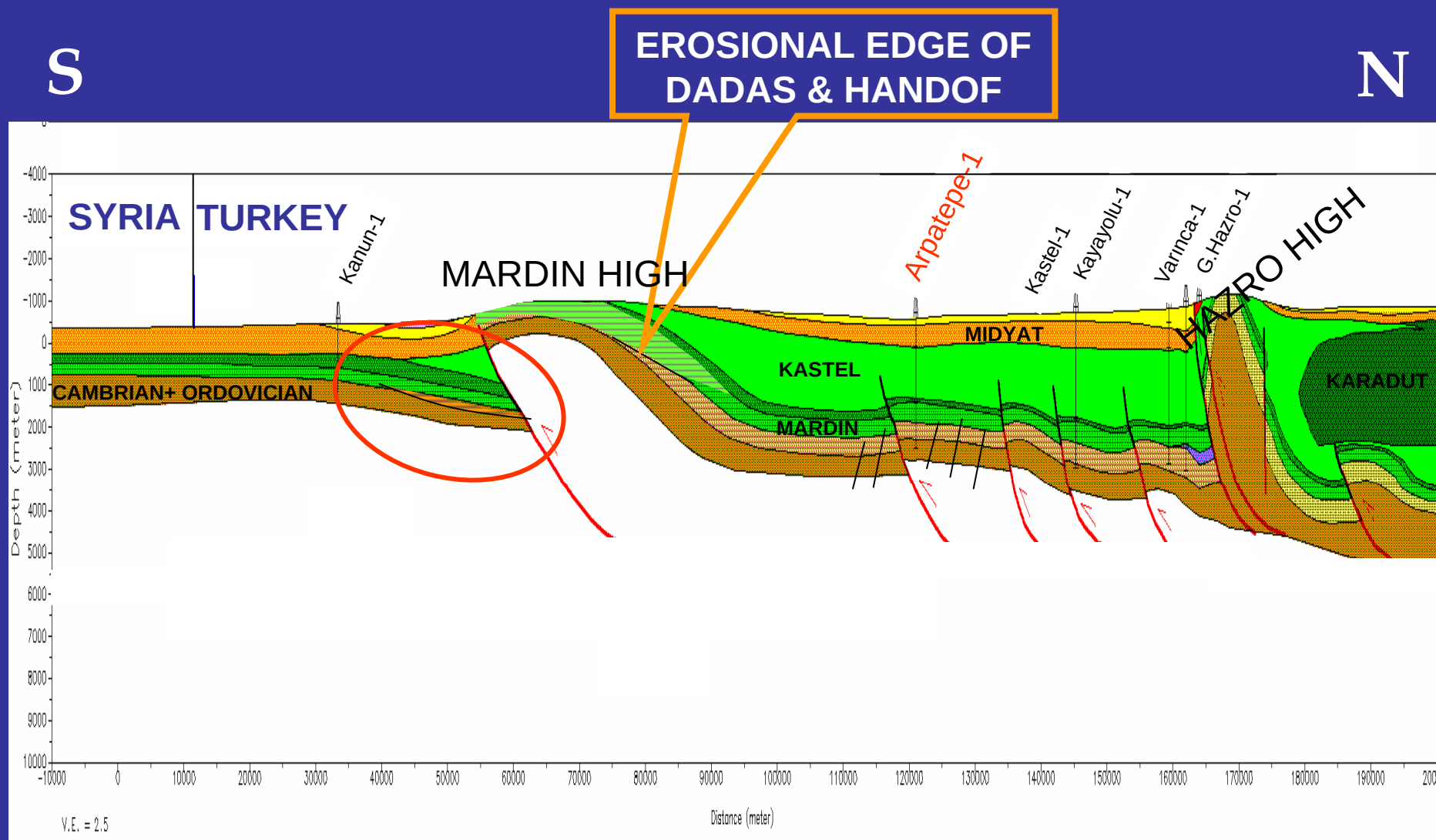
- SPUD: 15.09.2008
- DRILLING END: 11.12.2008
- COMPLETION END: 28.12.2008
- TD: 8218 FT. (2504 M)
- FORMATION: BEDINAN
- STATUS: OIL PRODUCER



GÜNEY YILDIZ
PETROL ÜRETİM, SONDA
MÜEAAHİTLİK VE TİC. A.Ş.



REGIONAL GEOLOGICAL MODEL



BEDINAN FM. EXPLORATION MODEL

RESERVOIR: BEDINAN (HANDOF) SANDSTONES (U. ORDOVICIAN)

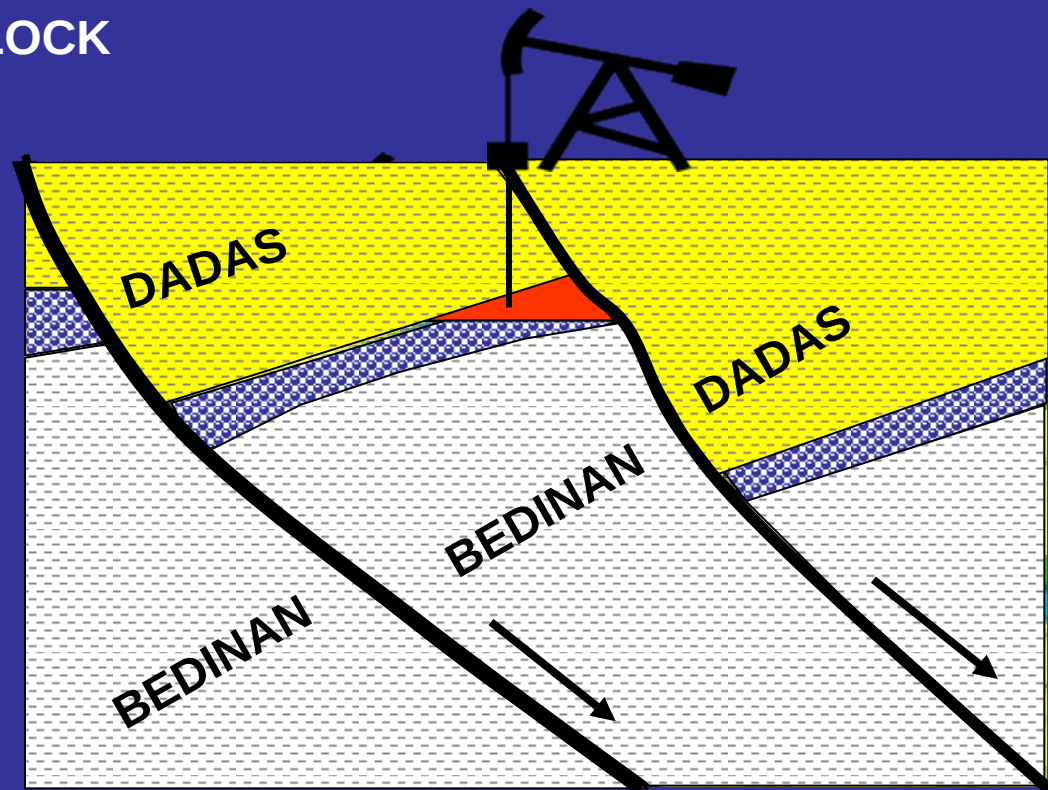
SEAL: DADAS SHALES (LOWER SILURIAN)

SOURCE ROCK: DADAS I SHALES (LOWER SILURIAN)

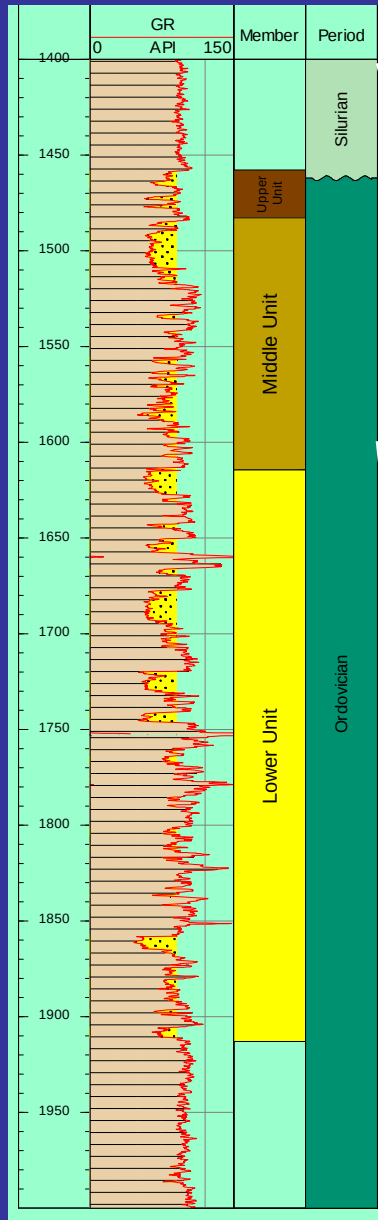
TRAP TYPE: TILTED FAULT BLOCK

CRUDE OIL PROPERTIES:

- ❖ API: 40
- ❖ GOR: 560 SCFT/BBL
- ❖ SULPHUR: NONE

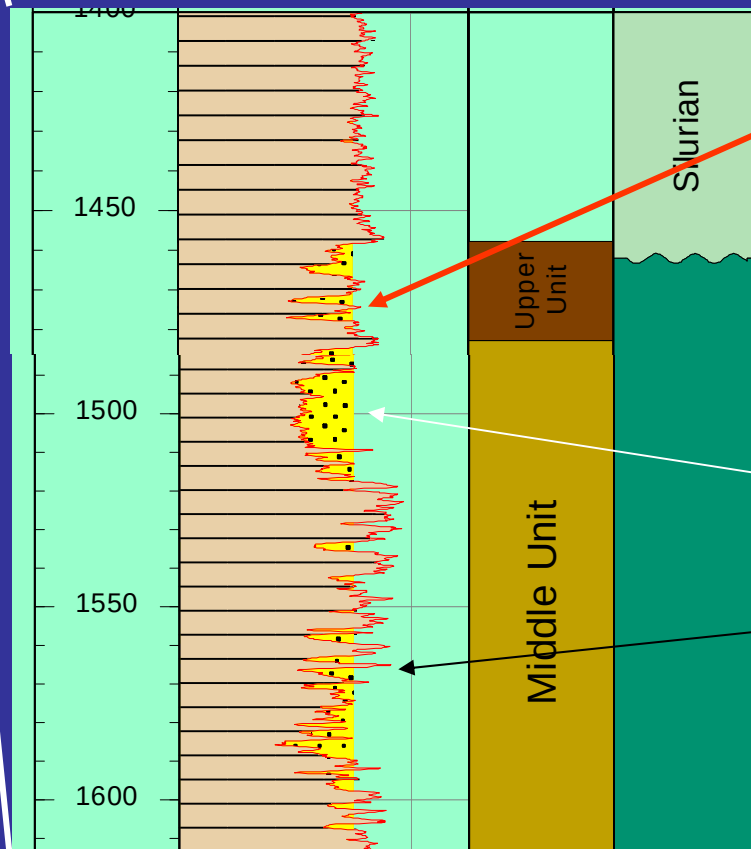


BEDINAN (HANDOF MEMBER) RESERVOIR

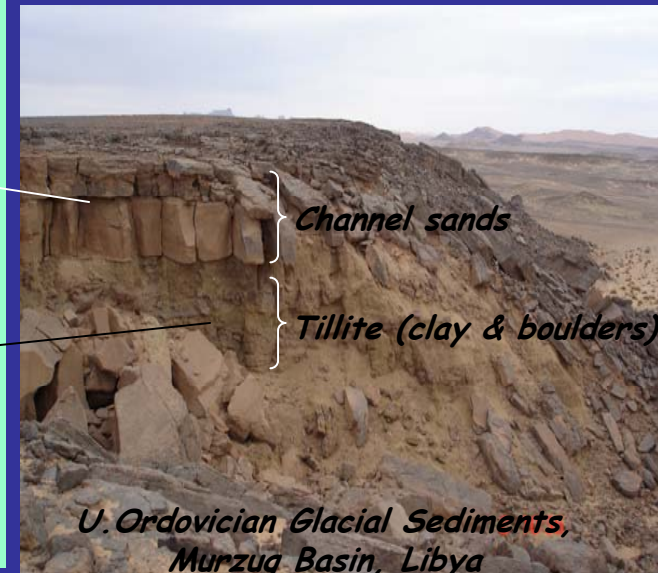


➤ FINE TO MEDIUM GRAINED QUARTZ SANDSTONES DEPOSITED DURING UPPER ORDOVICIAN GLACIATION;

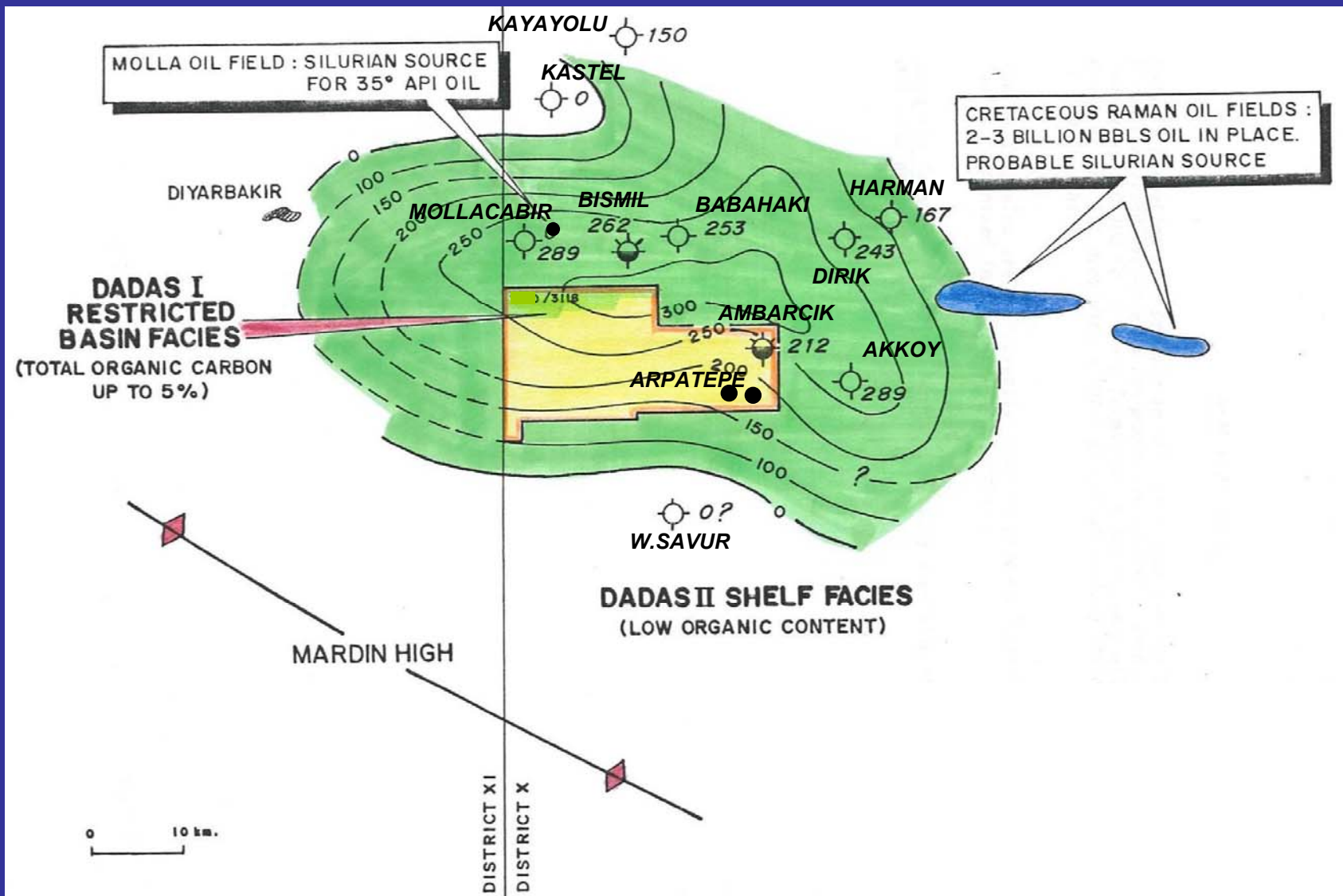
- POROSITY: 7-18 %
- PERMEABILITY: 2-21 mD
- GROSS THICKNESS: 350 FT (107 M), N/G: 40%



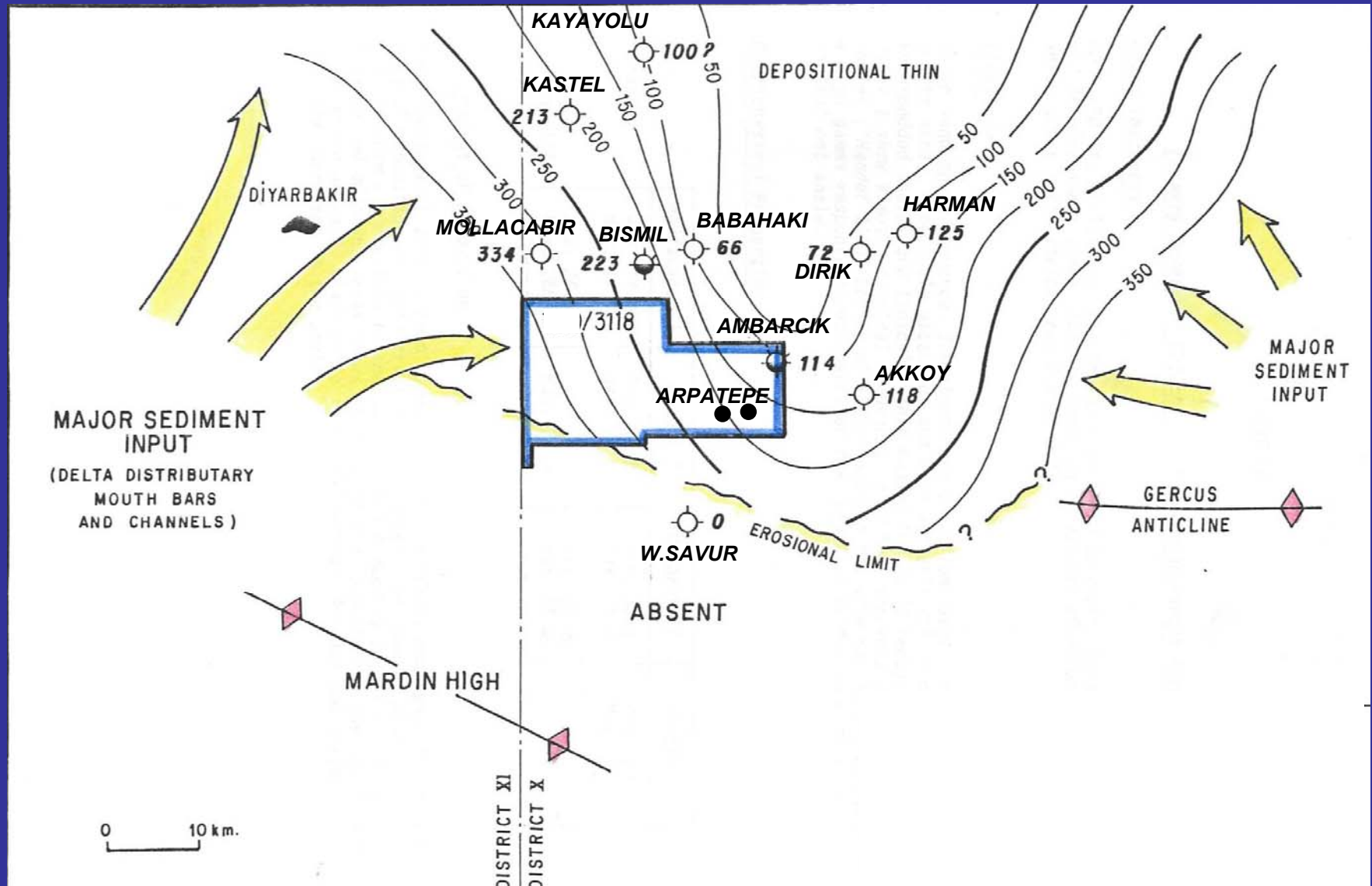
LATE ASGILL
DISTAL GLACIER DOMINANT,
CHANNEL & SHORELINE SANDS



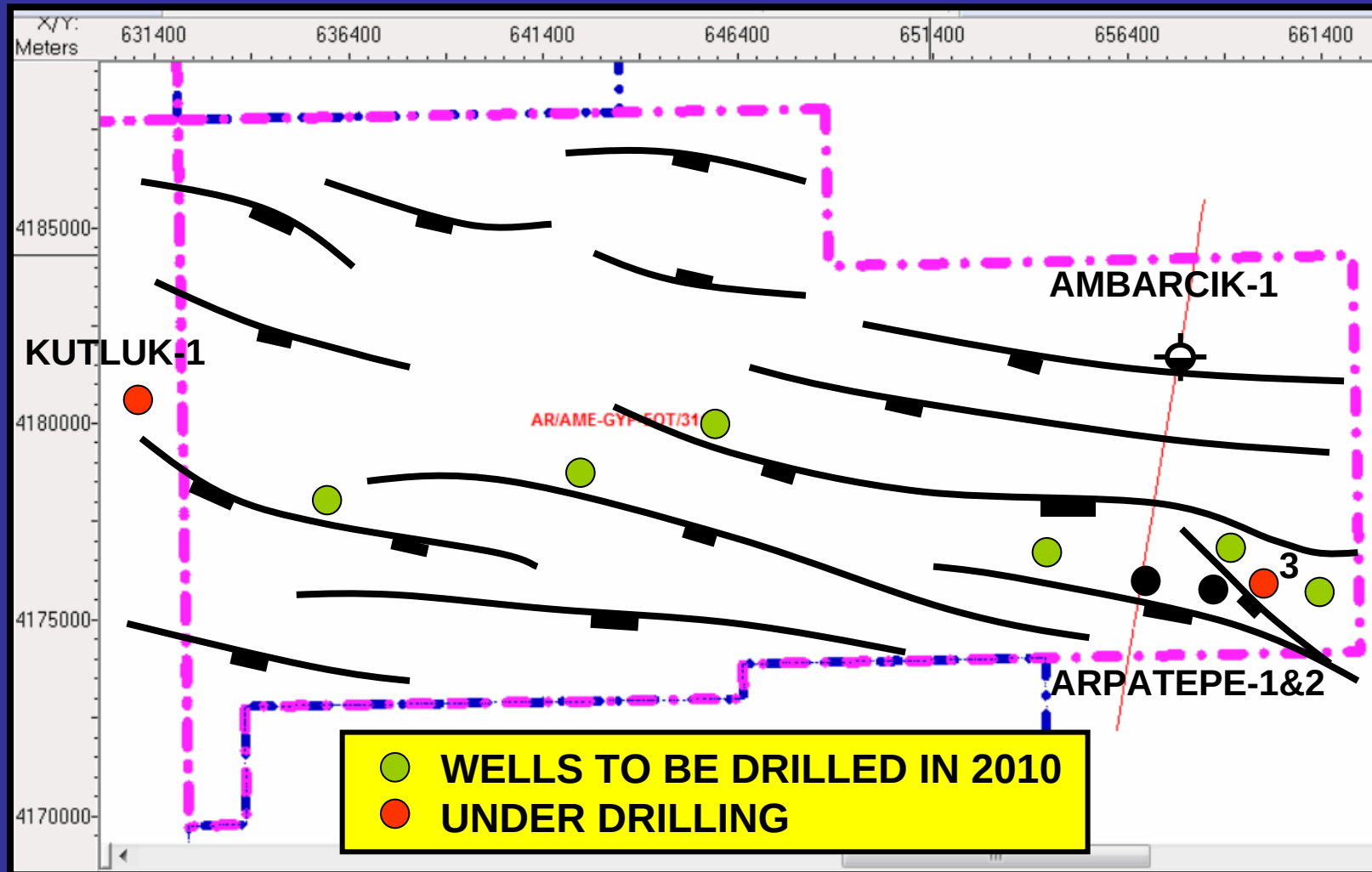
DADAS I, SOURCE ROCK ISOPACH (FT)



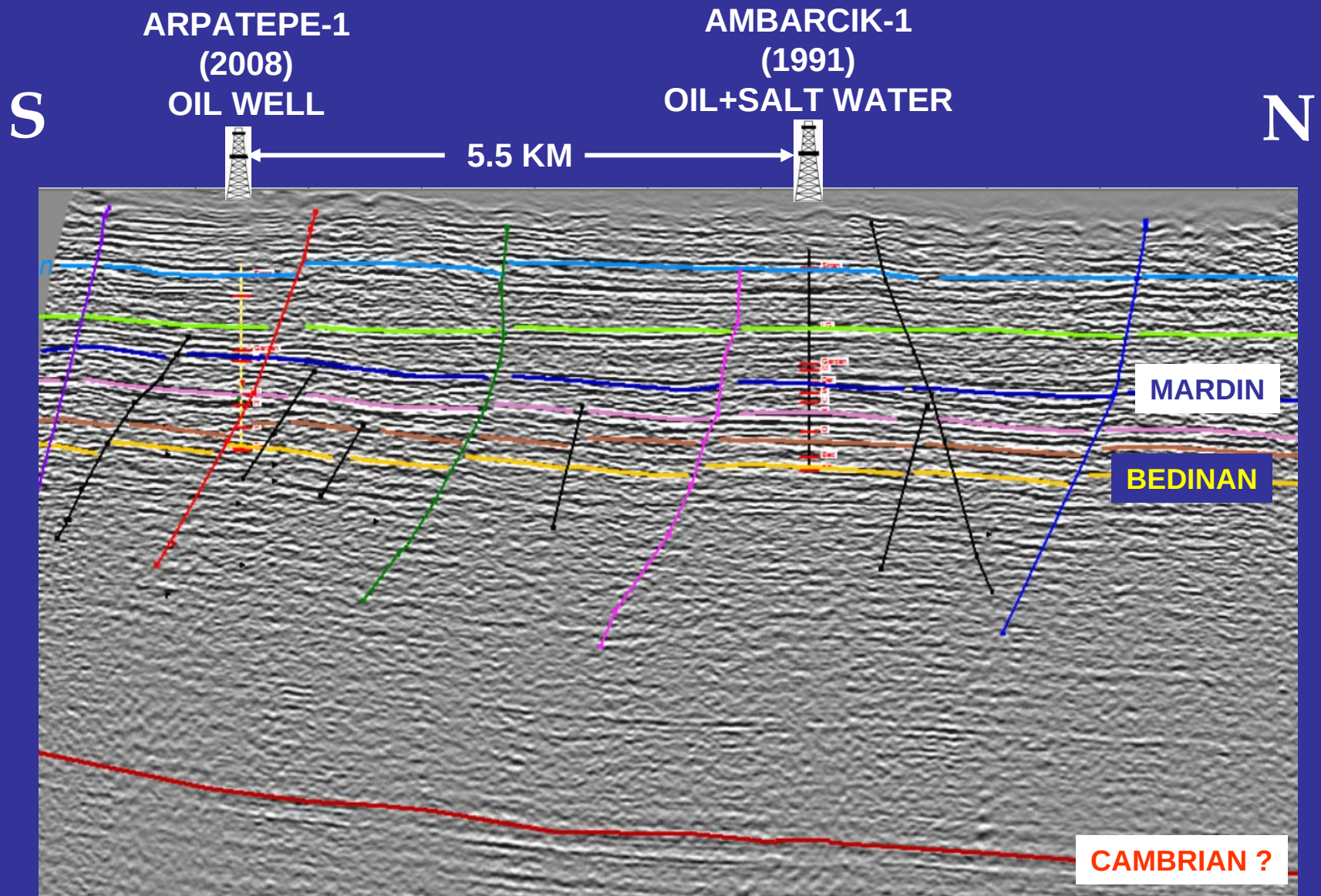
HANDOF FORMATION ISOPACH (FT)



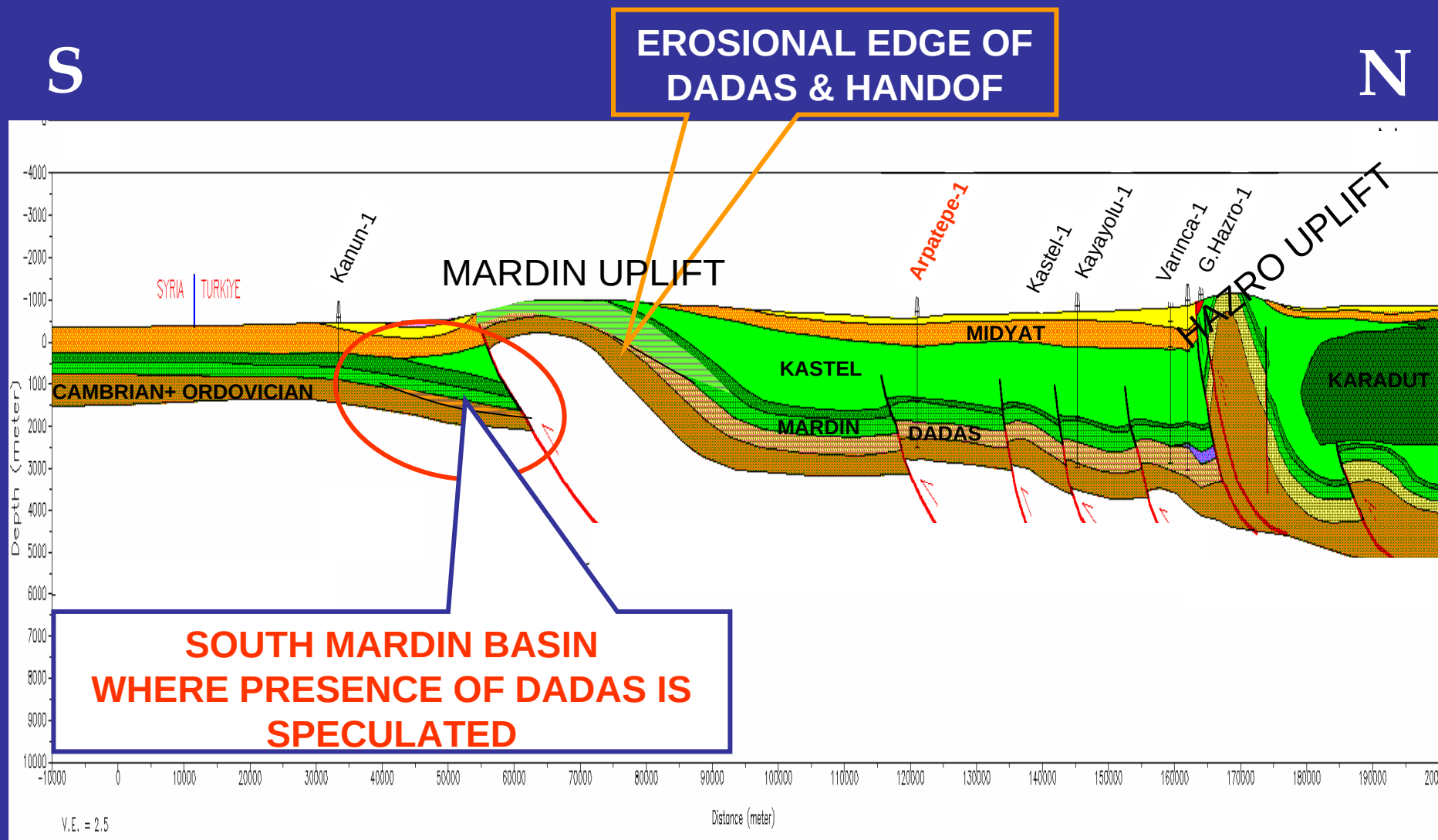
TOP BEDINAN FAULT MAP (ARPATEPE LICENSE)



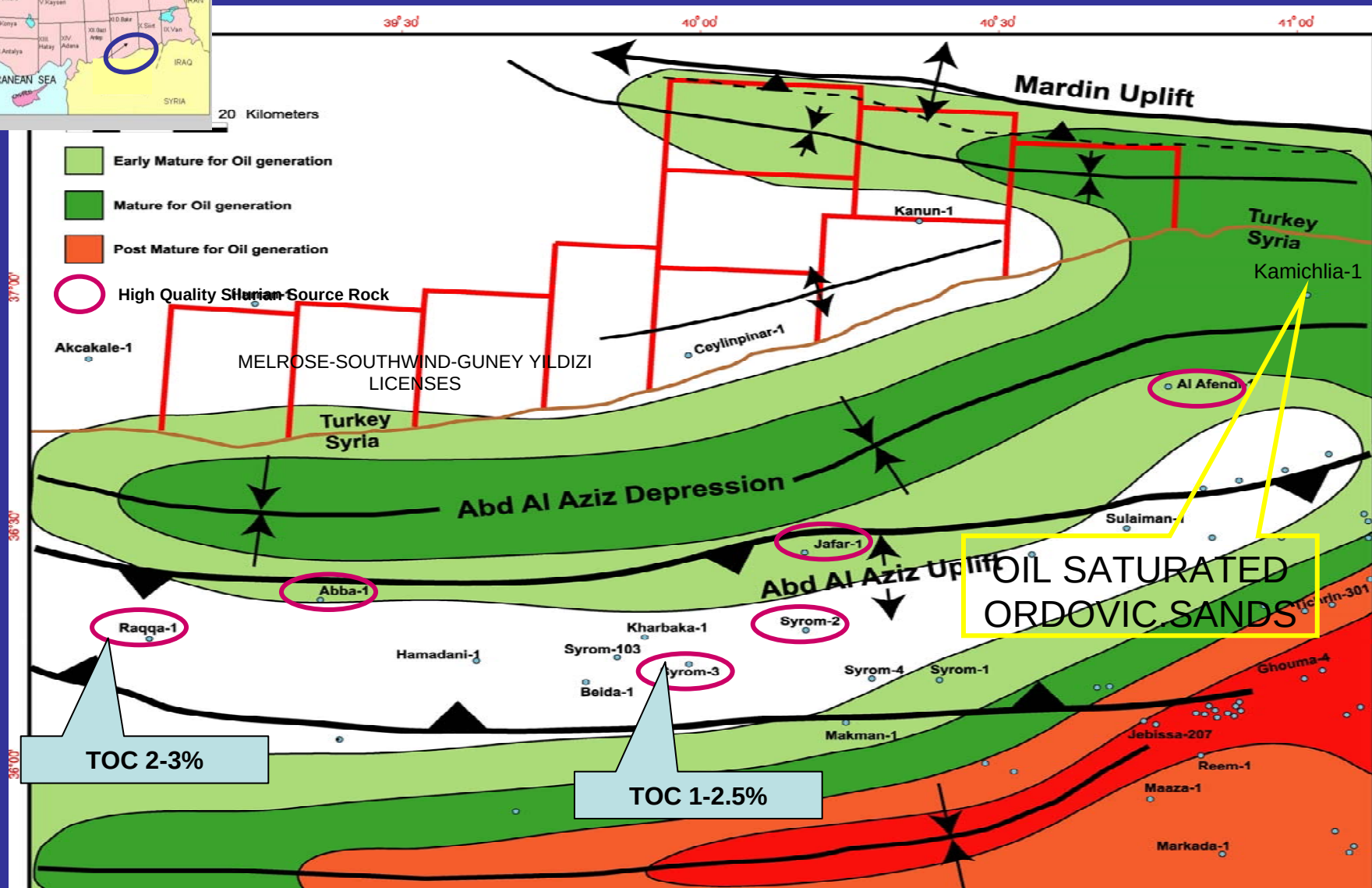
N-S SEISMIC SECTION



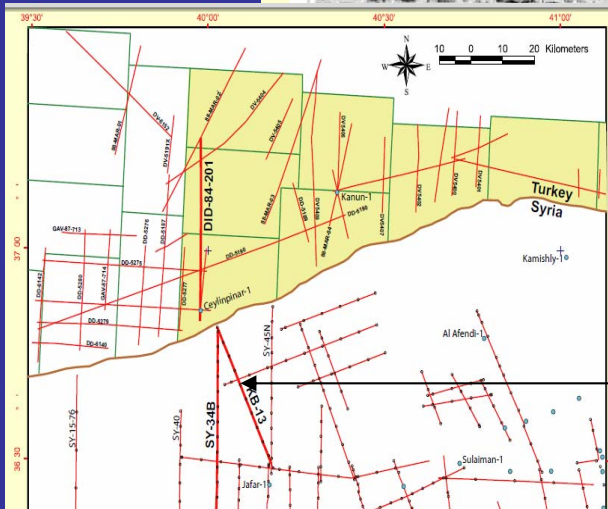
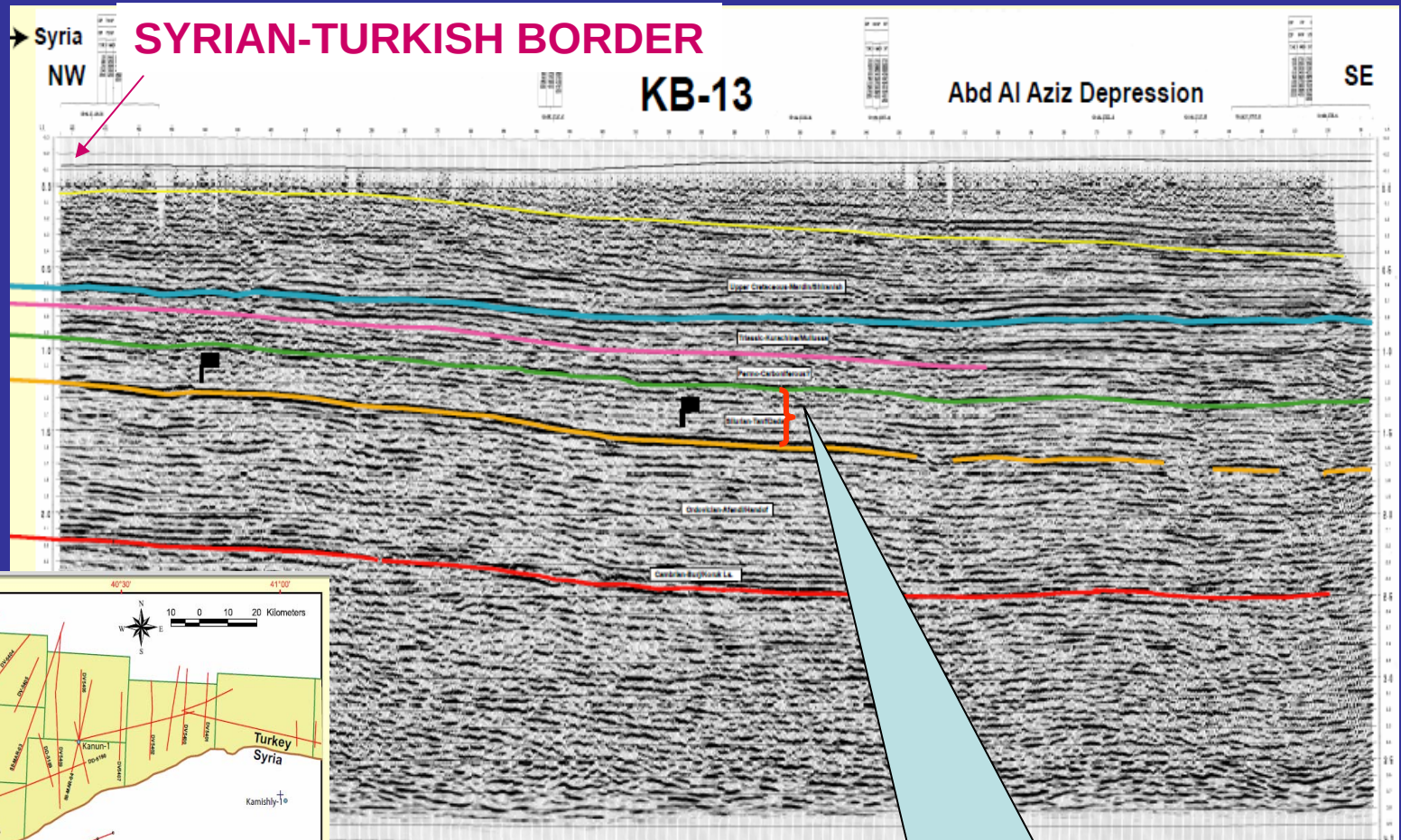
REGIONAL GEOLOGICAL MODEL



DADAS FM. OIL & GAS GENERATION NEAR TURKISH-SYRIAN BORDER



NORTHERN SYRIA SEISMIC SECTION

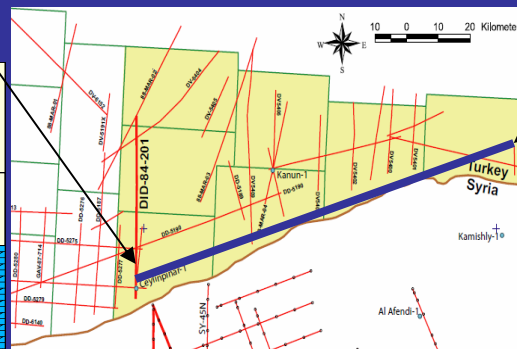
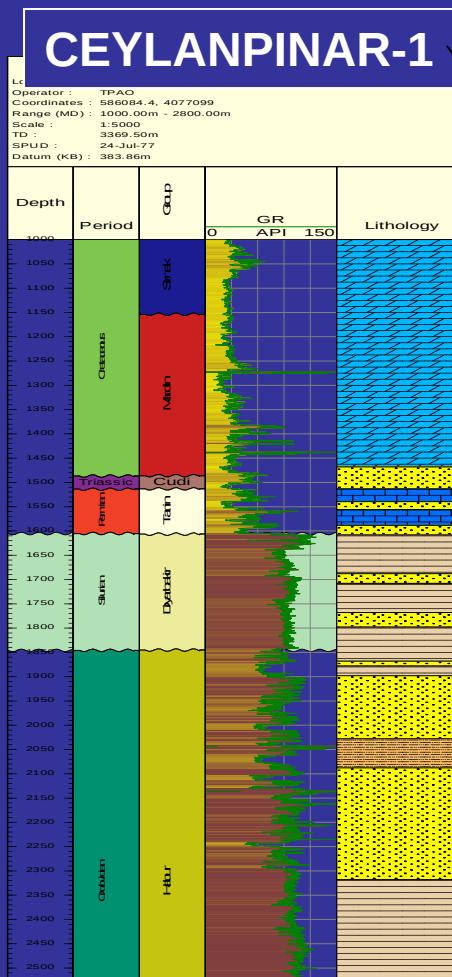


KB – 13 LINE

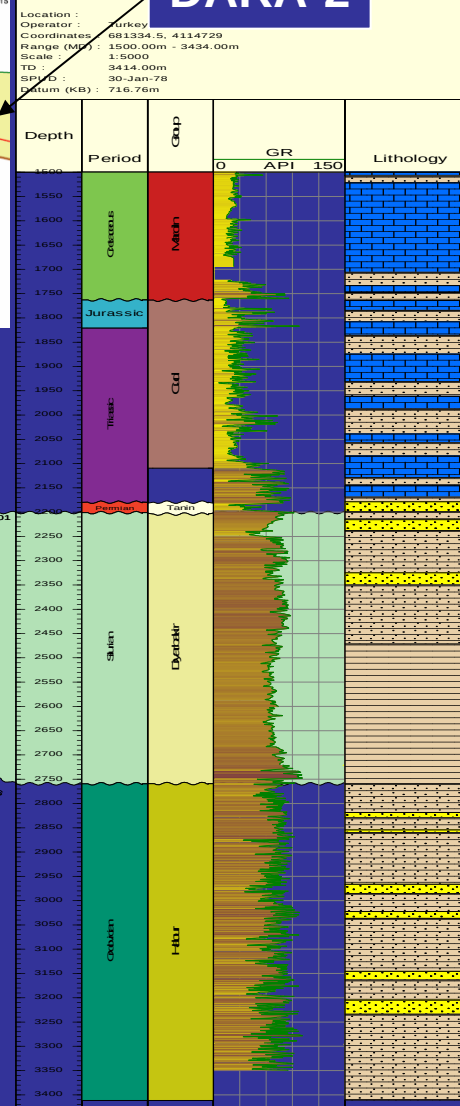
SILURIAN CONTINUES
FROM SYRIA TO TURKEY

CEYLANPINAR-1 DARA-2 CORRELATION

W



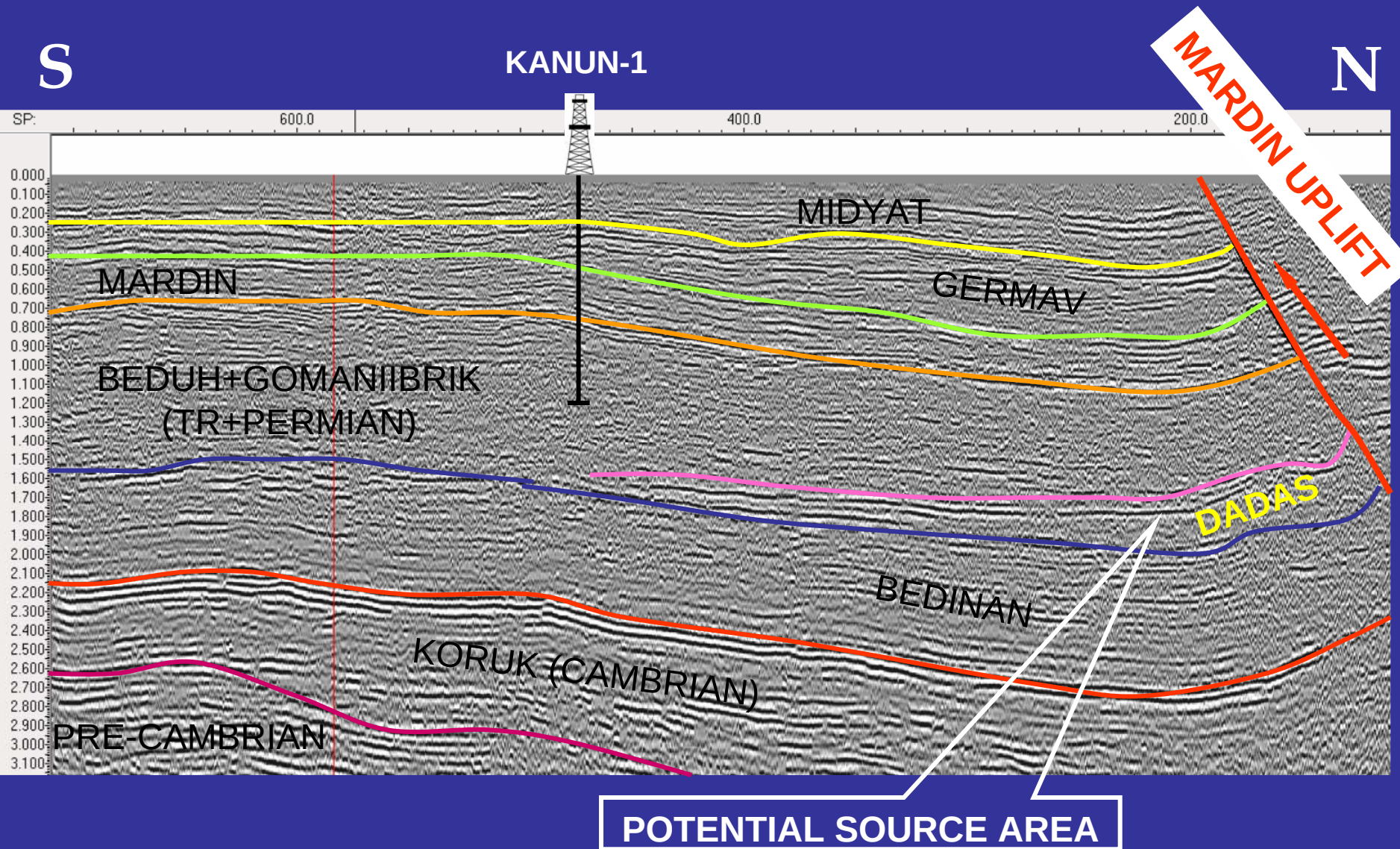
DARA-2



E

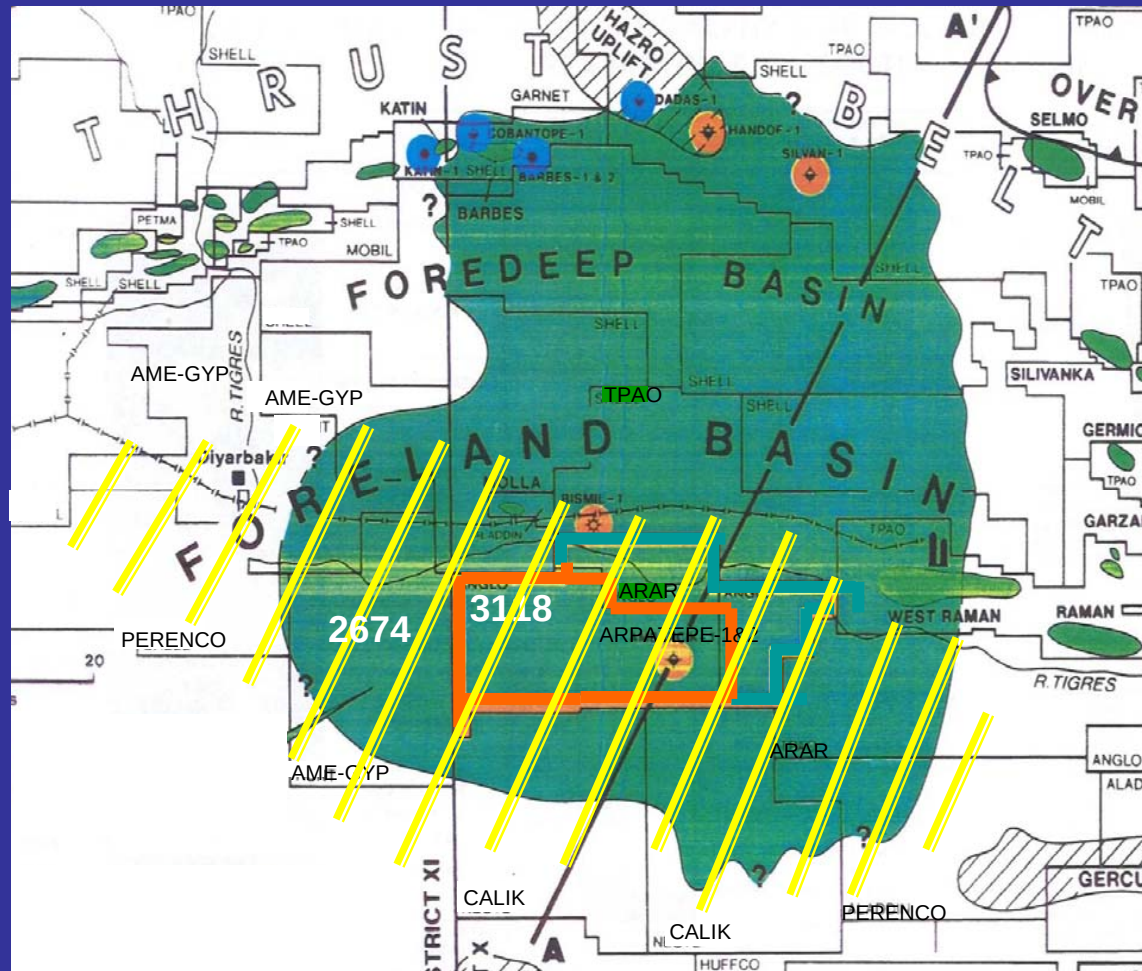
**SILURIAN PRESENCE IN LOG APPEARANCE;
NO STRONG BIOSTRATIGRAPHIC CONTROL**

INTERPRETED DADAS WEDGE IN FRONT OF MARDIN UPLIFT



GÜNEY YILDIZI
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MÜTEAHHİTLİK VE TİC. A.Ş.

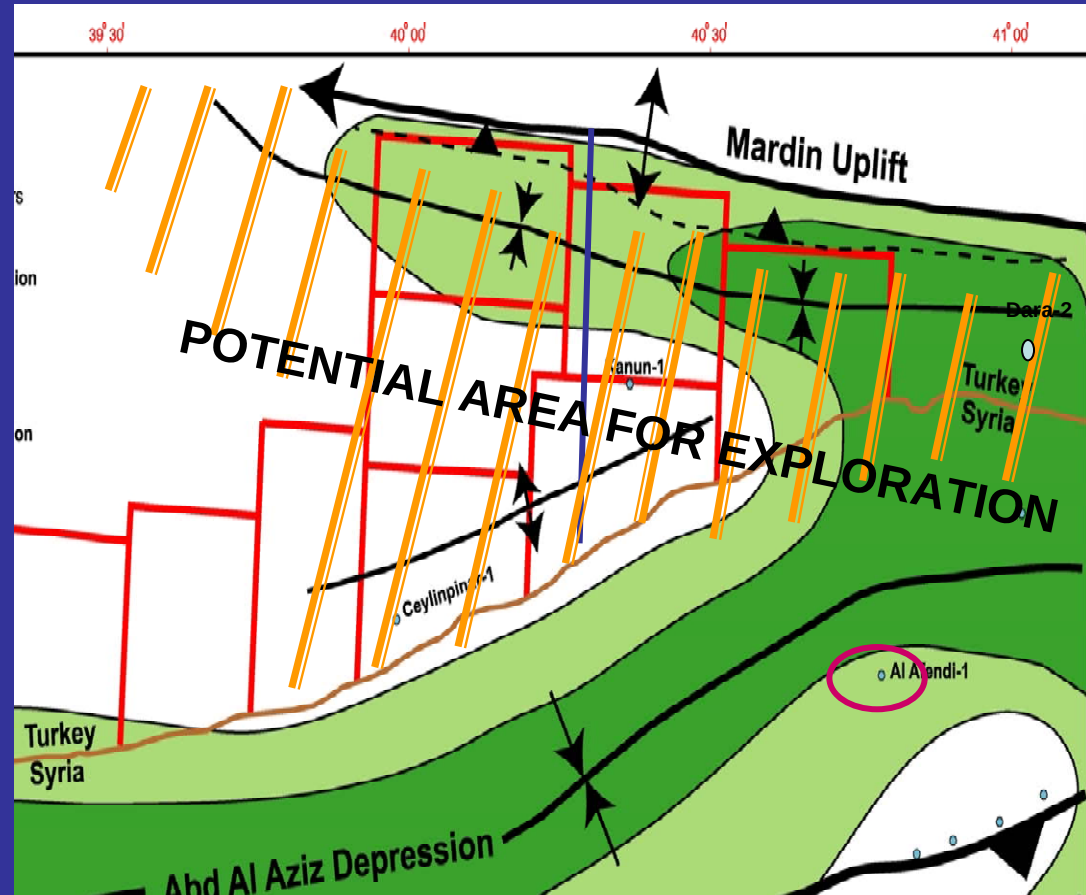
❖ **NO WELLS DRILLED TO THE SOUTH AND WEST OF ARPATEPE LICENSE IN AN AREA COVERING NEARLY 3000 KM²; AND SPECULATIVE RESERVES IN THE SHADED AREA COULD BE IN THE RANGE OF 300 - 400 MILLION BBLS RECOVERABLE**



WHAT COULD BE THE POTENTIAL ??? (II)

❖ IF WE ADD SOUTH MARDIN AREA, THIS POTENTIAL CAN BE INCREASED TO **450-500 MILLION BBLs**

❖ COMPARING TO THE REMAINING RESERVES OF TURKEY, THIS IS AN APPRECIABLE AMOUNT OF OIL THAT **DESERVES A LOT MORE ATTENTION**



THANK YOU!!!