

# KINGDOM OF MOROCCO



المكتب الوطني للهيدروكاربورات و المعادن  
OFFICE NATIONAL DES HYDROCARBURES ET DES MINES

**MOROCCAN ATLANTIC MARGIN: NEWLY DEVELOPED  
OPPORTUNITIES FOR HYDROCARBON EXPLORATION**



**OIL & GAS  
COUNCIL**

**AFRICA ASSEMBLY 2016**

# MOROCCO: A STABLE POLITICAL ENVIRONMENT

## A continuing drive for openness and democratisation

- A monarchy established in the year 788 (12 centuries ago)
- The Constitutional Council reviews the constitutionality of all laws
- In July 2011, a referendum established a new Constitution, guaranteeing:
  - Human rights
  - The legality of the State and its institutions
  - Individual and collective liberty
  - Improved moral standards in public life
  - The plurality of the Moroccan identity

**Morocco, most  
stable country in  
North Africa in 2012**

*According to the Association  
For International Affairs*

**Morocco, most  
pacifist country in  
North Africa in 2013**

*According to Global Peace  
Index 2013*

**Morocco, most  
democratic country in  
Arab region in 2013**

*According to the Egyptian center  
Ibn Khaldoun*



# MOROCCO: A BUSINESS ENVIRONMENT FAVOURABLE TO INVESTMENT

## Investor Protection

- **51** Double Tax Avoidance Agreements
- **62** Investment Protection Agreements
- Member of **OECD Investment Committee**
- Member of **International Centre for Settlement of Investment Disputes (ICSID)**
- Member of **MIGA** (Multilateral Investment Guarantee Agency)

## Legal Reforms

- The creation of the **Business Environment National Committee (CNEA)** to facilitate procedures and access to information, and to carry out legal reforms
- The modernisation of business law
- The strengthening of intellectual property protection
- A new law on arbitration and mediation
- New banking regulations
- Administrative simplification

## An Incentive Tax System

- Reduction of tax burden
- The creation of funds specifically for investment promotion

## International Instruments

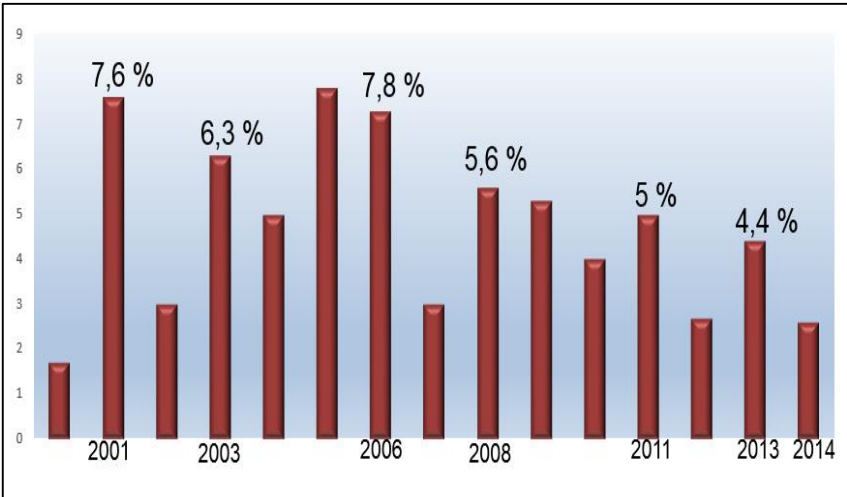
- Morocco adhered to the OECD Declaration on Propriety, Integrity and Transparency in the Conduct of International Business and Finance and to the OECD Declaration on Green Growth

# ENERGY STRATEGY

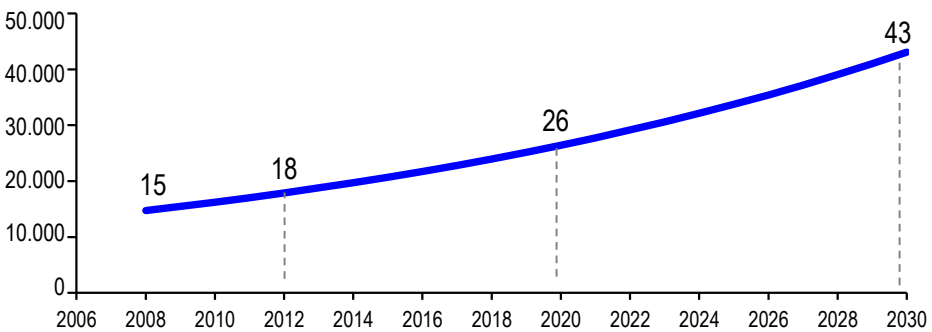
**Morocco's demand in:**

- **Primary energy : X2 BY 2020 AND X3 BY 2030**
- **Electricity: X2 BY 2020 AND X4 BY 2030**

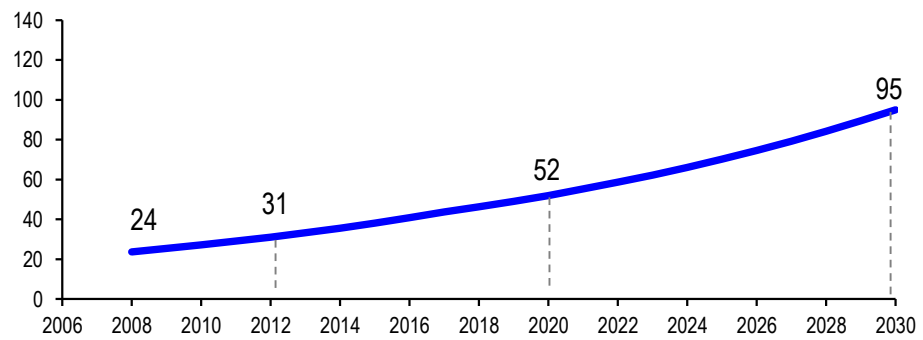
**GDP GROWTH : 5%/ YEAR**



**CONSUMPTION IN MILLIONS TEP**



**CONSUMPTION IN TWH**



**➡ Investments in domestic resources are crucial**





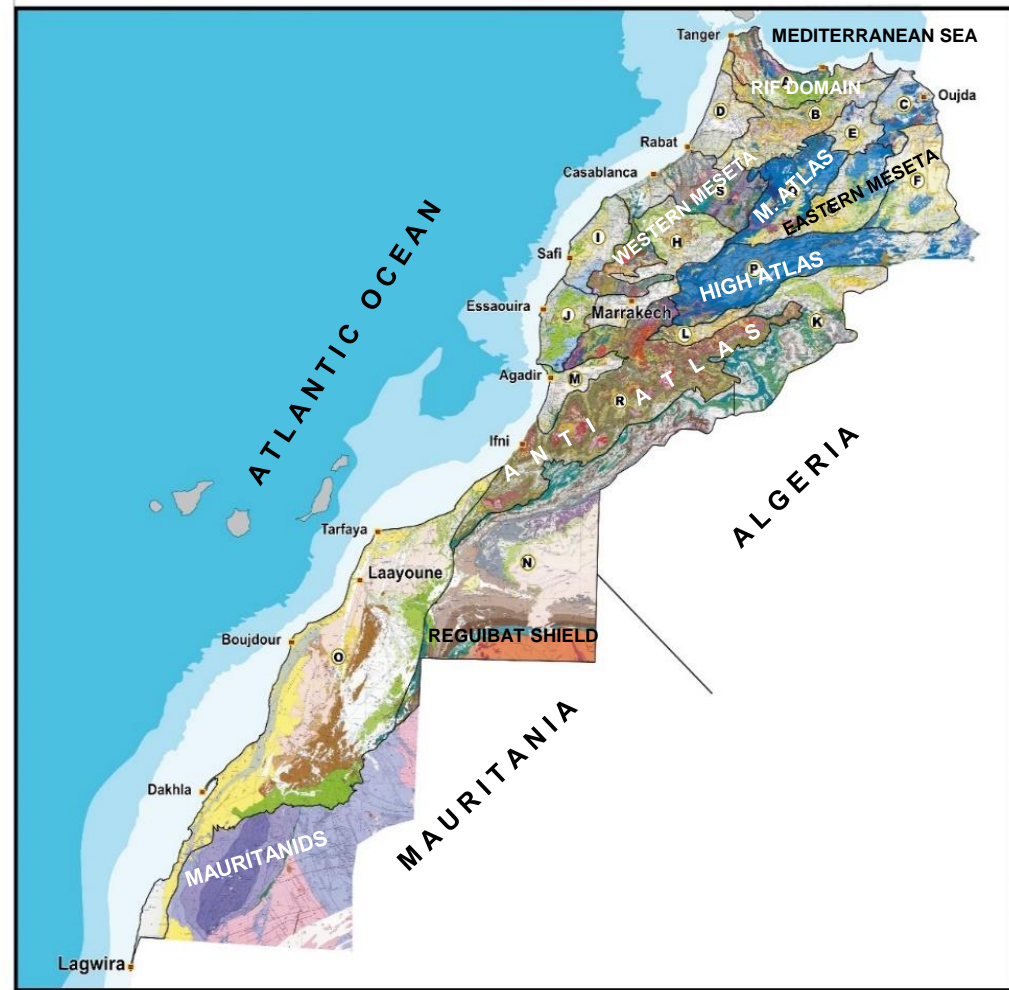
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# HYDROCARBON EXPLORATION OUTLOOK



# HYDROCARBON EXPLORATION: MOROCCAN SEDIMENTARY BASINS

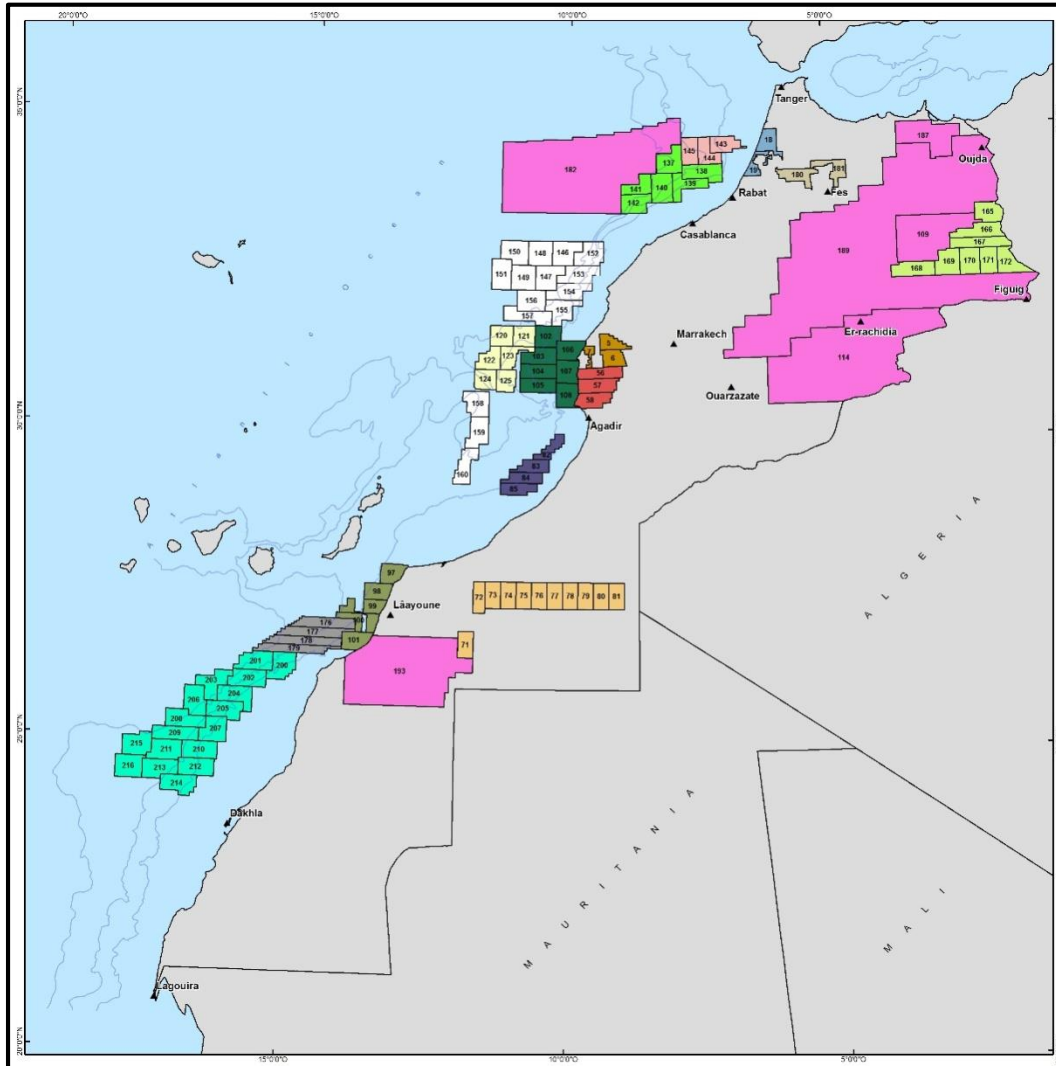
- **Large sedimentary basins of several geological and structural types** : Total surface area : **918 237 Km<sup>2</sup>**.
  - **A very extended offshore domain**: **3 000 km** coast line on the Atlantic and **500 km** on the Mediterranean sea.
- Total area: 300 000 Km<sup>2</sup> (to 4 000 m bathymetry), consisting of Mesozoic and Cenozoic sedimentary basins.**
- **A various onshore sedimentary basins**: Objectives ranging from Precambrian to Neogene





# HYDROCARBON EXPLORATION STATUS

## PERMIT MAP – JUNE 2016



## 32 ONHYM Partners on:

- 87 Exploration Permits
- 7 Reconnaissance Licenses
- 3 MOU for Oil Shale
- 10 Concessions
- Total : 336 058.75 km<sup>2</sup>



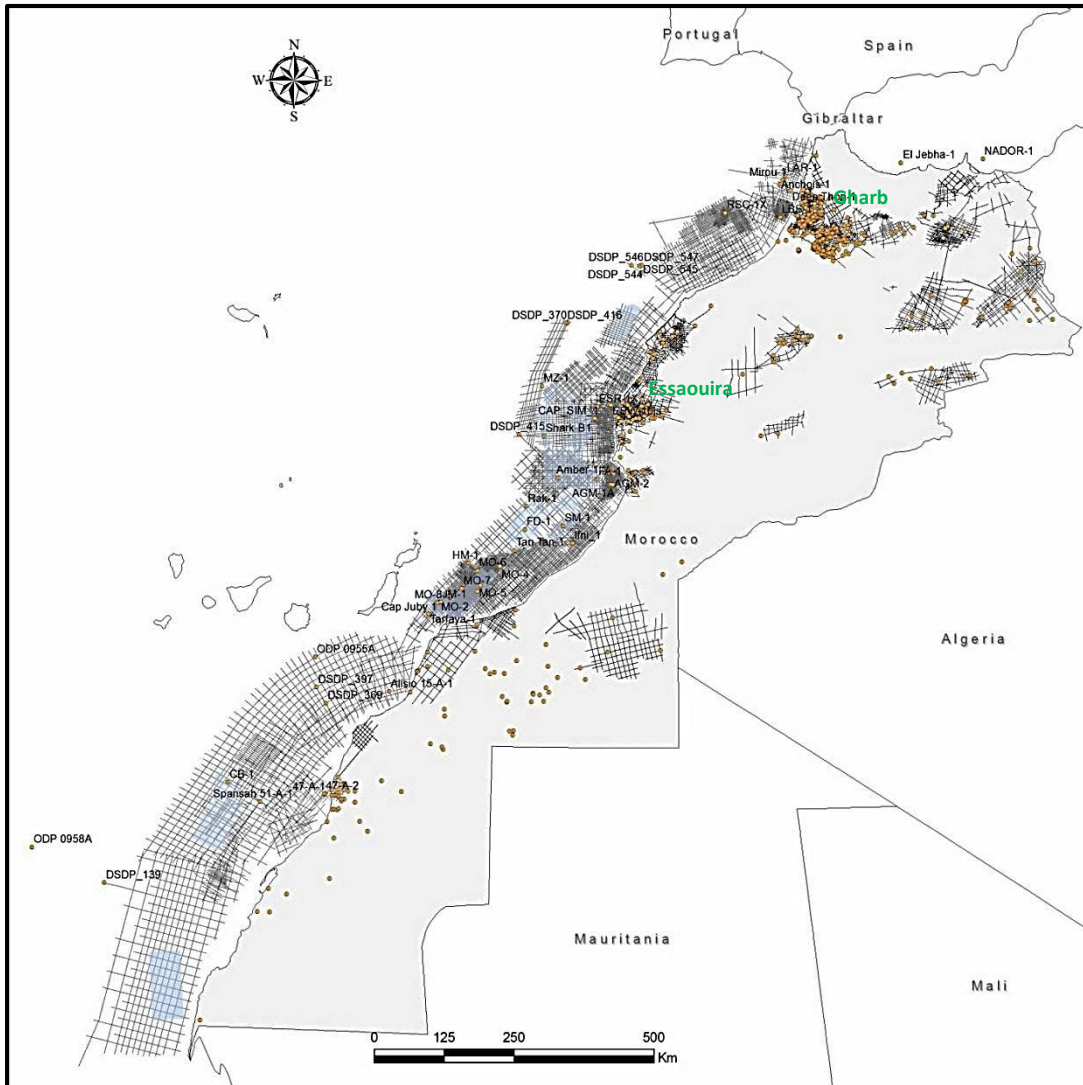
CHARIOT  
OIL & GAS



■ Partners Investment in 2015 : 3.18 billions dirhams (0.3 billion US\$)



# HYDROCARBON EXPLORATION STATUS



## SEISMIC & WELLS DATABASE

### Seismic (2000-2015) :

#### Onshore

- 2D Seismic: 9 150 Km
- 3D Seismic: 1 856 Km<sup>2</sup>

#### Offshore

- 2D Seismic: 79 784 Km
- 3D Seismic: 47 475 Km<sup>2</sup>

### Exploratory Wells:

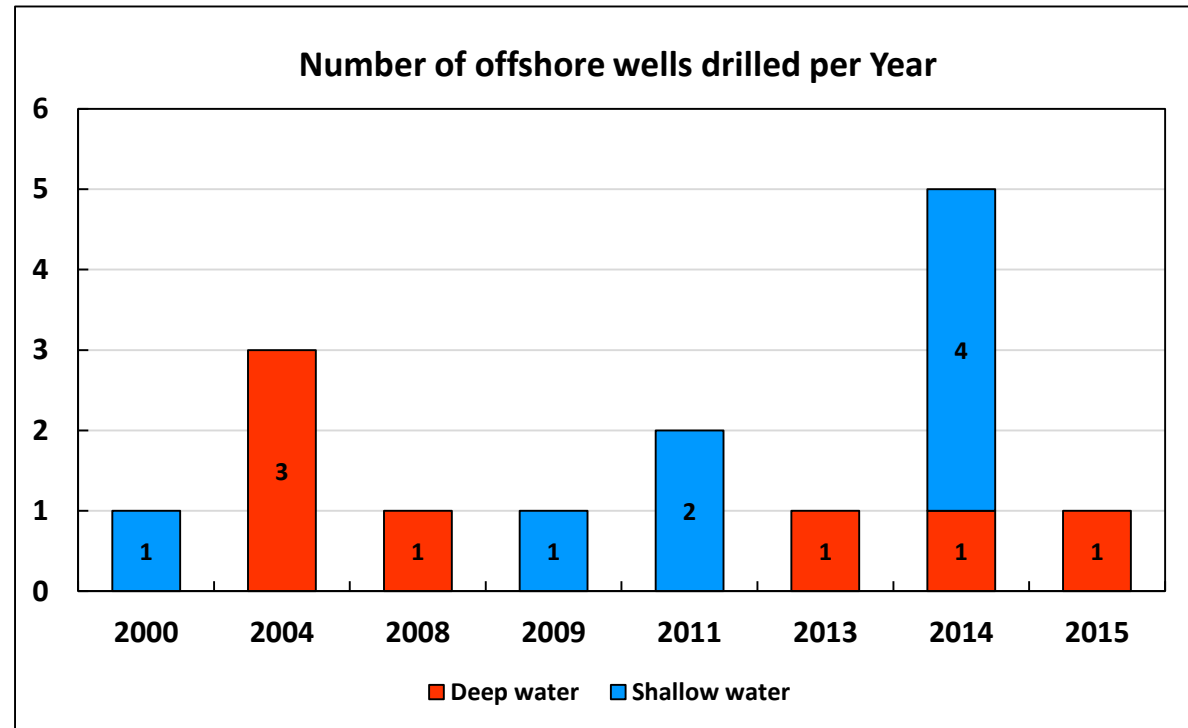
- 43 wells onshore (41 in the Atlantic & 2 in the Mediterranean)
- 293 wells Onshore



# HYDROCARBON EXPLORATION : OFFSHORE DRILLING ACTIVITIES

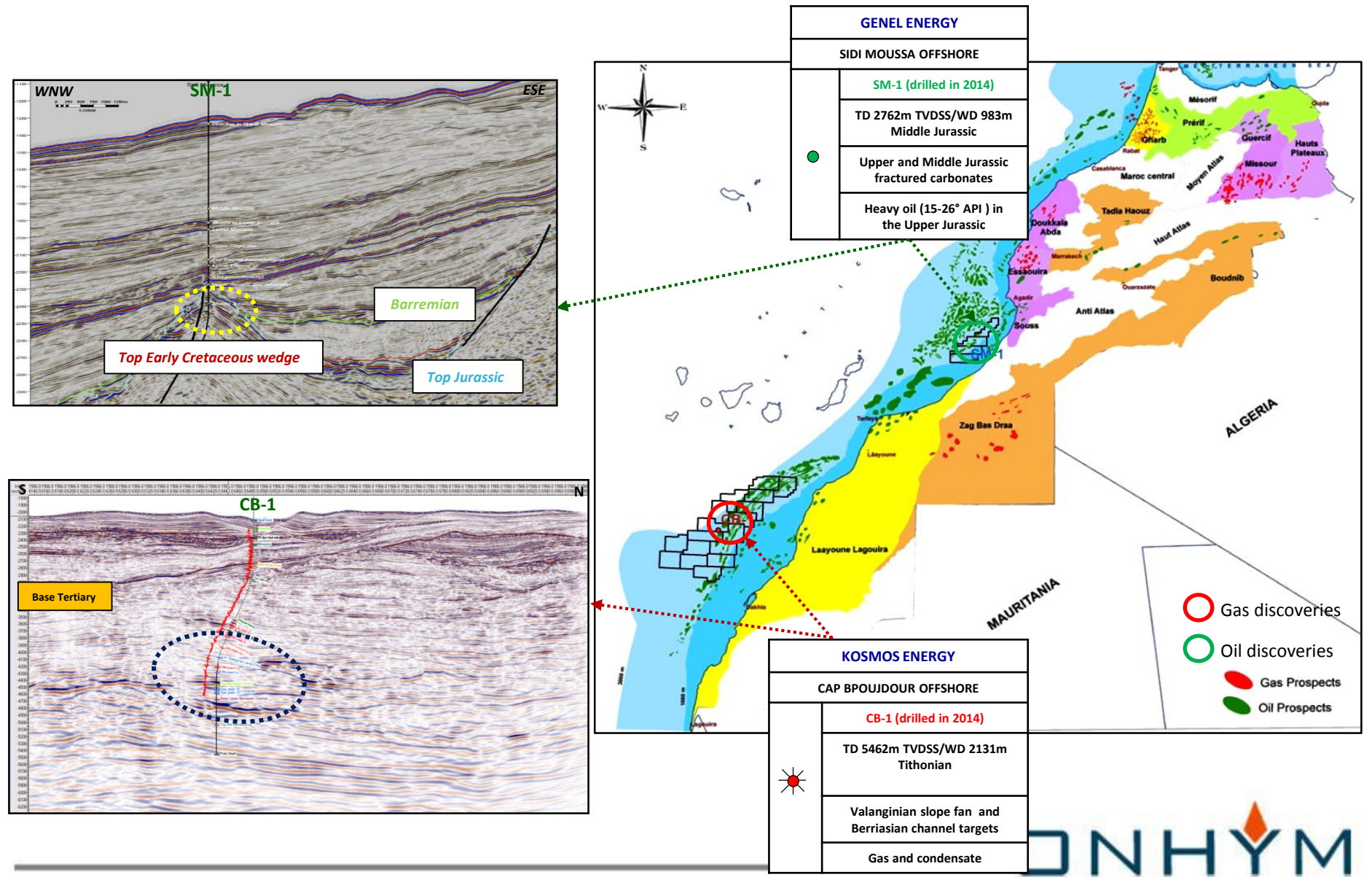
## Wells drilled in Morocco Atlantic Margin

- 15 wells drilled in the period 2000-2015 in a coast line of 3000 Km: 7/15 deep waters
- 5/7 wells drilled offshore in 2013-2015 encountered either oil or gas shows or heavy oil.



- Presence of **working petroleum systems in the Offshore Moroccan sedimentary basins (needs to be confirmed with more discoveries).**  
This requires, of course, an intensive exploration drilling effort.

# HYDROCARBON EXPLORATION : RECENT DISCOVERIES

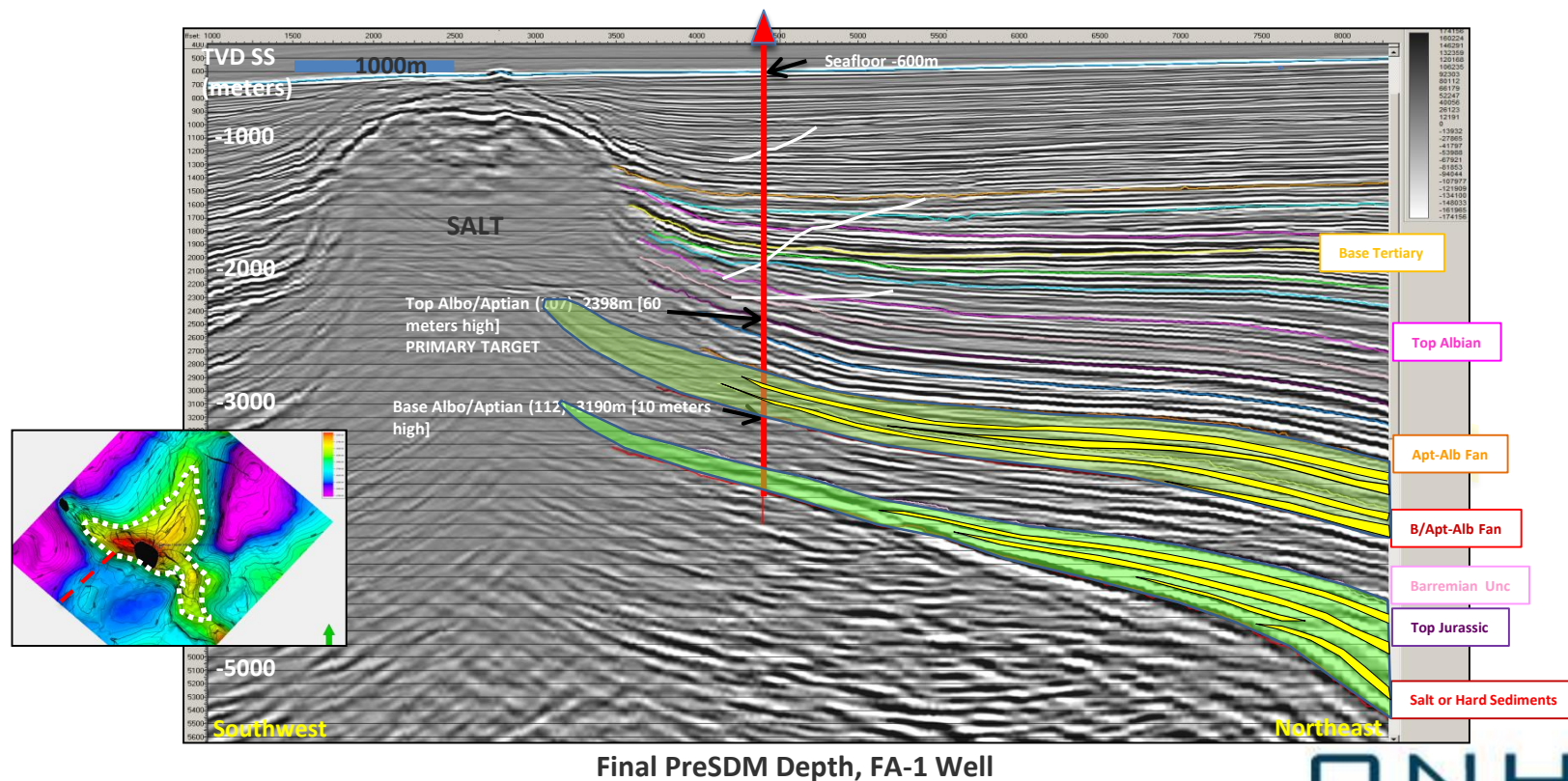


# HYDROCARBON EXPLORATION : OFFSHORE DRILLING ACTIVITIES

## Offshore Wells drilled in 2013/2015: Post mortem studies & learned lessons

### Salt related plays :

- Thick turbidite sands would be deposited in intra growing salt diapirs minibasins, and only thin bedded sands were tested by the recent wells, on the flanks of the diapirs.



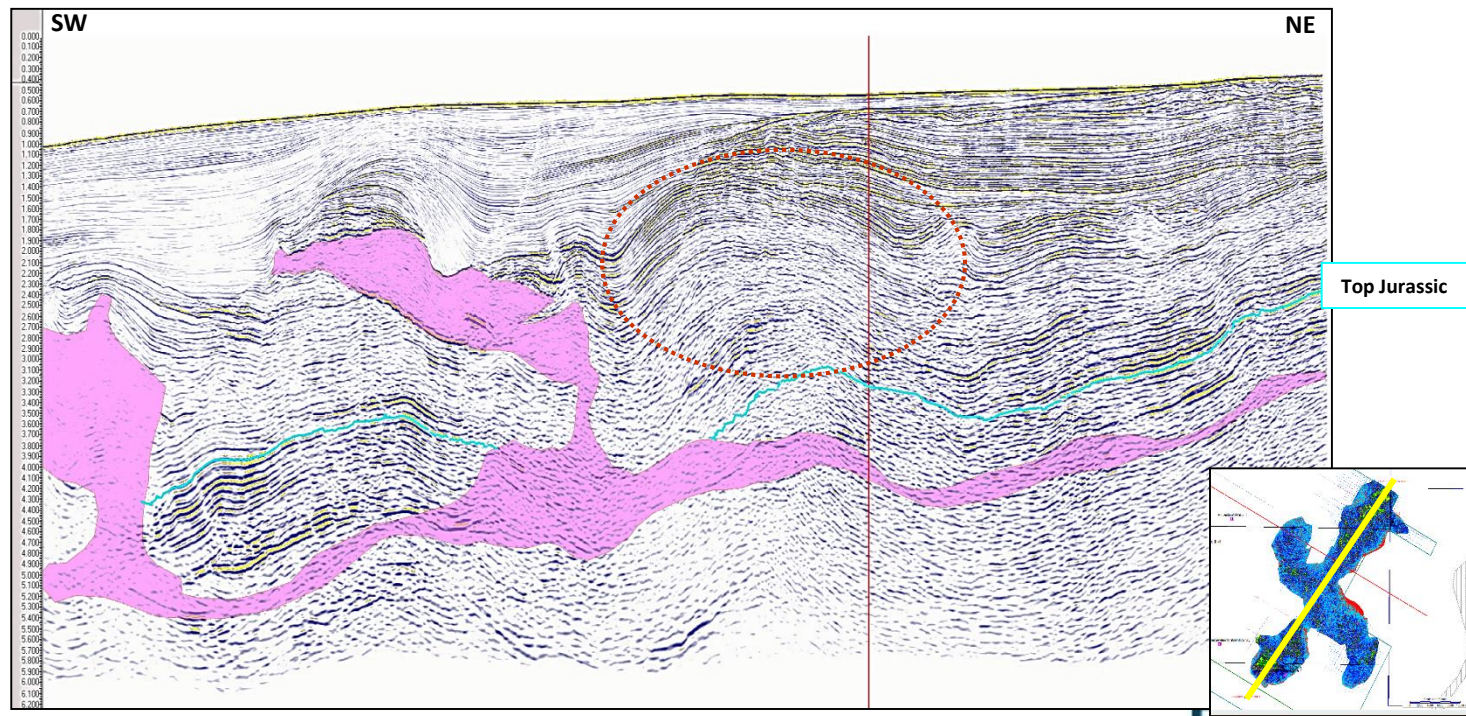


# HYDROCARBON EXPLORATION : OFFSHORE DRILLING ACTIVITIES

## Offshore Wells drilled in 2013/2015: Post mortem studies & learned lessons

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- Sand bearing Inverted minibasins would be the focus in the next phase of the exploration in the salt province.



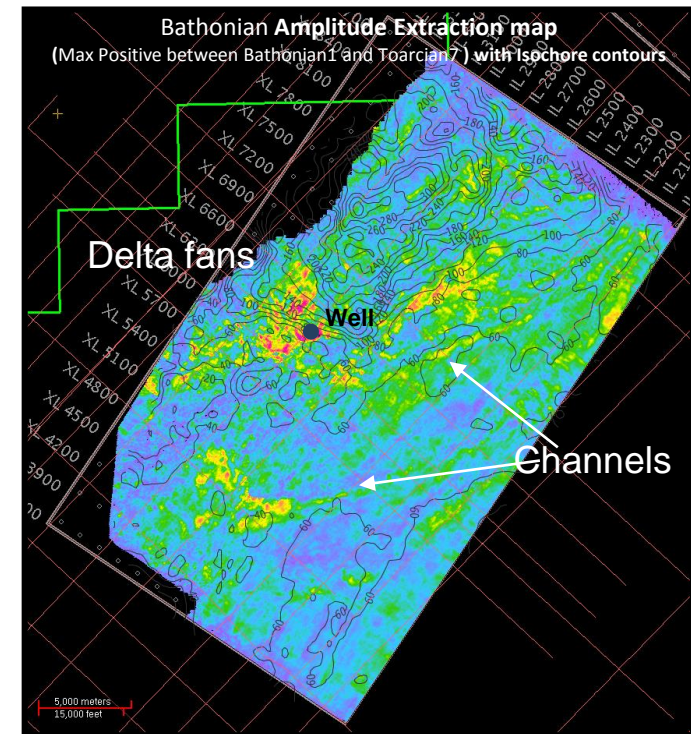
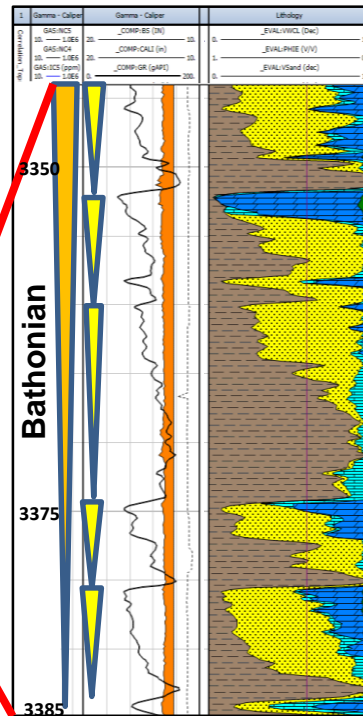
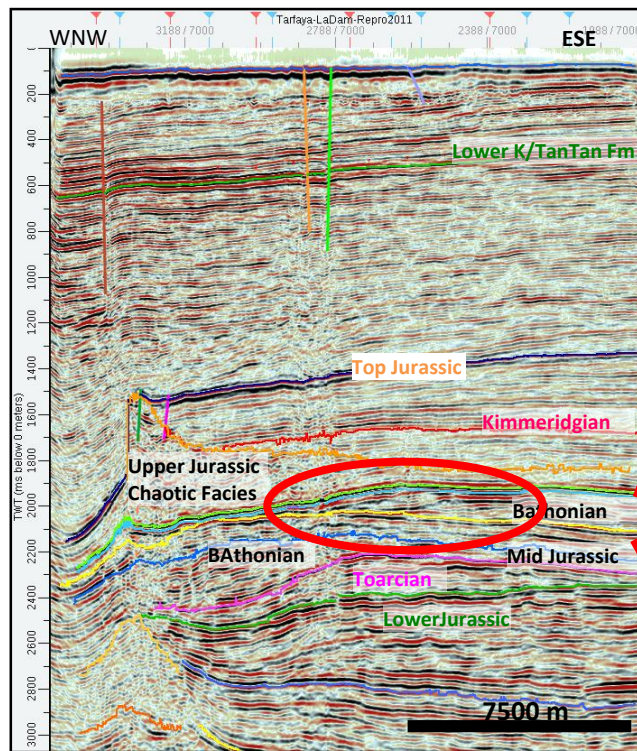


# HYDROCARBON EXPLORATION : OFFSHORE DRILLING ACTIVITIES

## Offshore Wells drilled in 2013/2015: Post mortem studies & learned lessons

### Platform related plays :

- Middle Jurassic prograding deltas, on the shelf, and their covalent silici-turbidites, in the slope and basin, would be good objectives to be targeted in addition to the upper and lower Jurassic platform carbonates in the Tarfaya area.







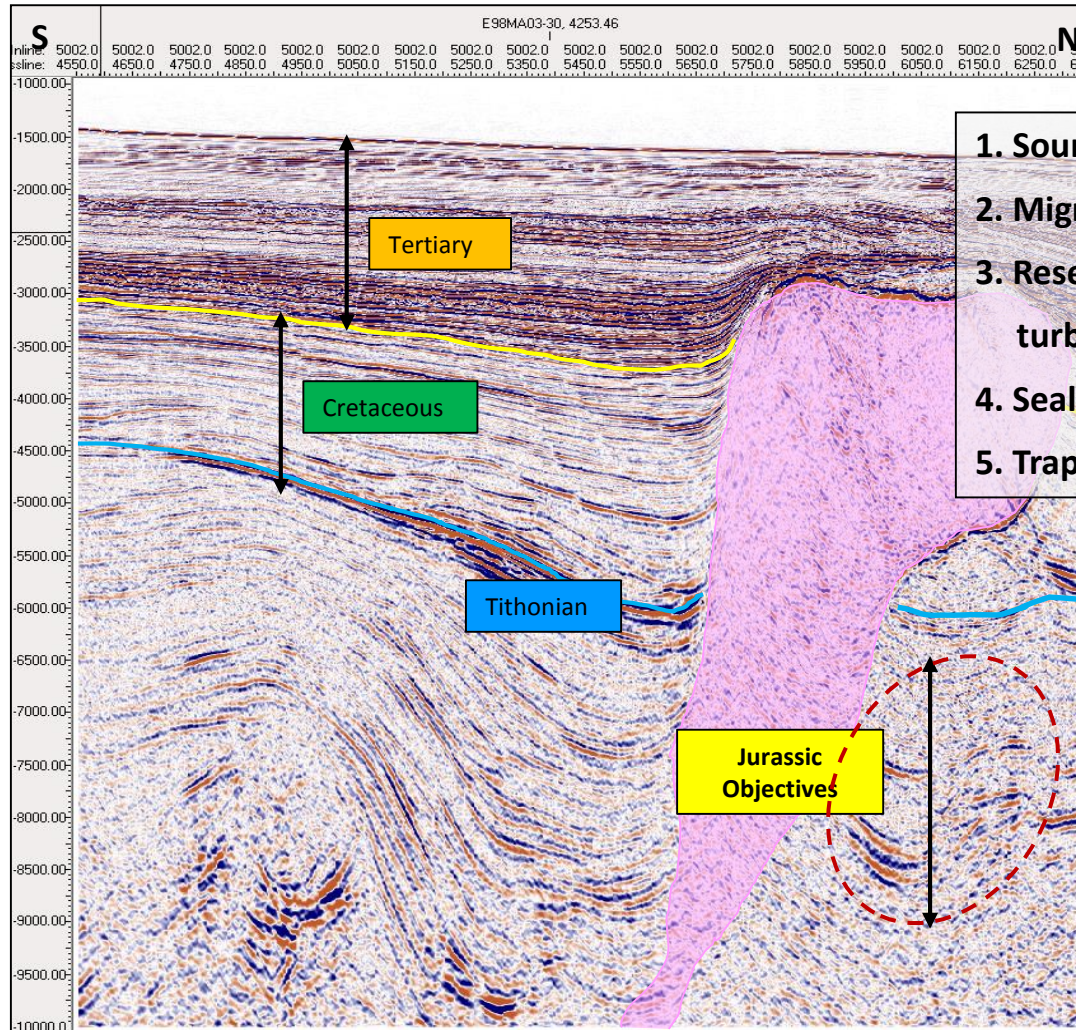
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# **HYDROCARBON EXPLORATION: EXAMPLES OF NEWLY DEVELOPED PLAY CONCEPTS**

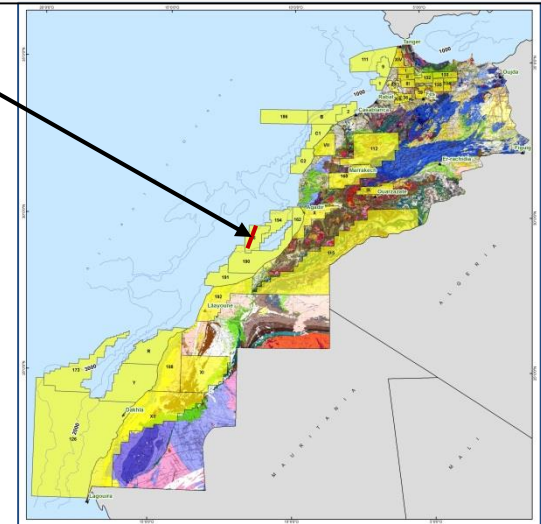


# HYDROCARBON EXPLORATION: EXAMPLE OF PLAY CONCEPTS

## Sub-salt play (Foum Draa Offshore)



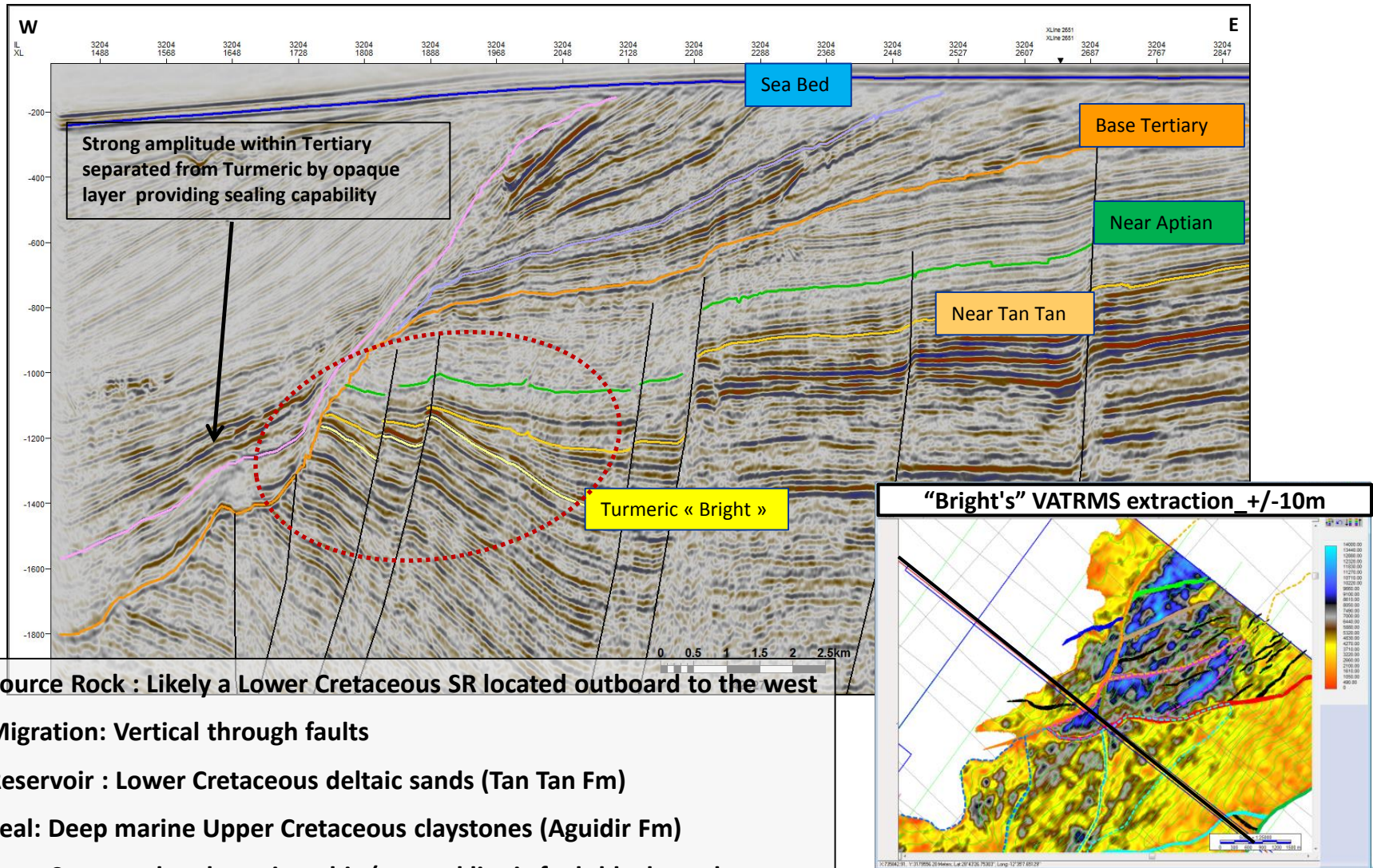
1. Source Rock: Lower Jurassic marls & carbonates
2. Migration: Vertical through salt welds
3. Reservoir : Lower Cretaceous and Upper Jurassic turbidite sandstones and carbonates
4. Seal: Overlying salt
5. Trap: Combined (sub-salt)





# HYDROCARBON EXPLORATION: EXAMPLE OF PLAY CONCEPTS

## Lower Cretaceous faulted & truncated blocks (Tarfaya Offshore)

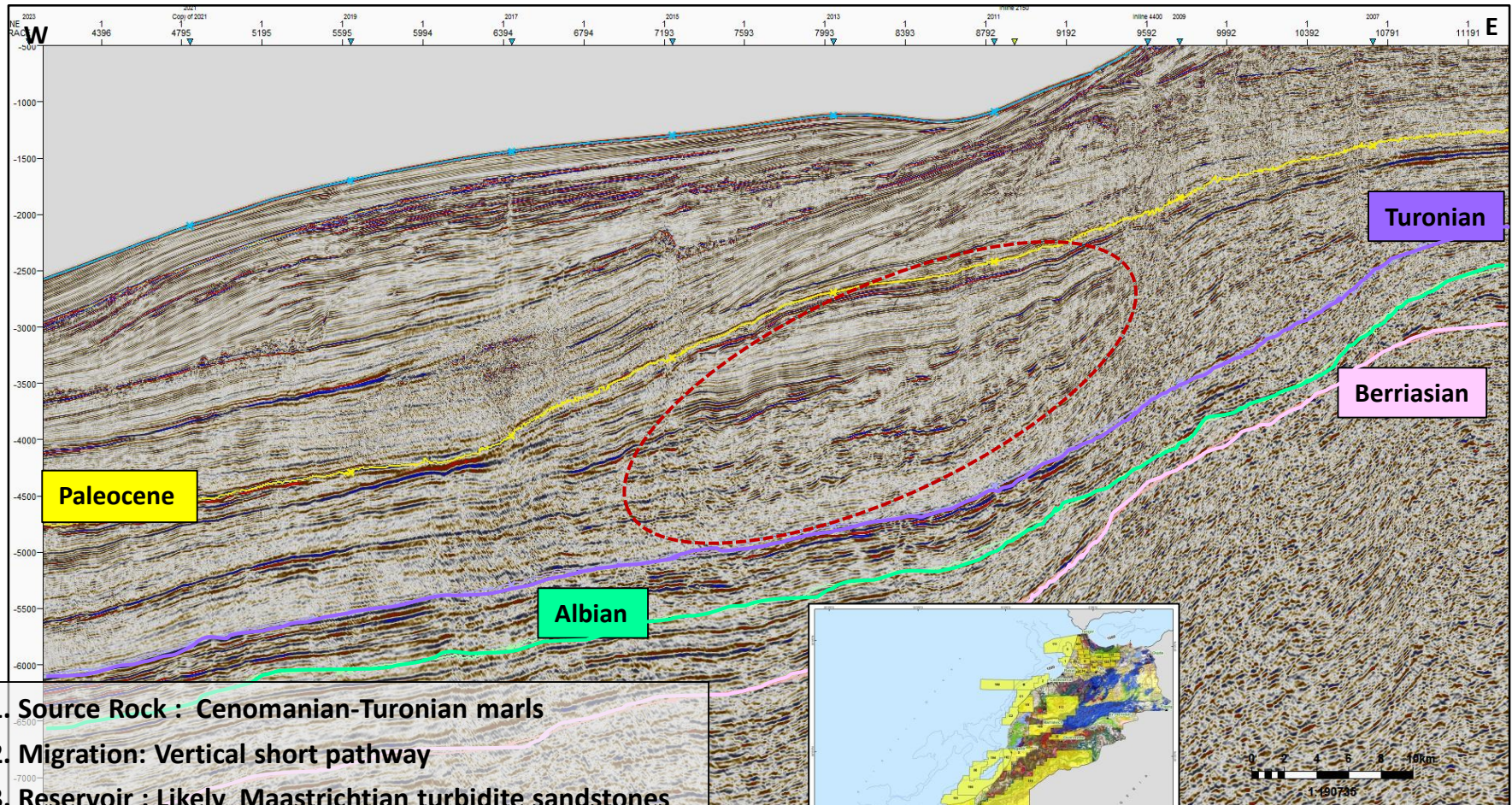


1. Source Rock : Likely a Lower Cretaceous SR located outboard to the west
2. Migration: Vertical through faults
3. Reservoir : Lower Cretaceous deltaic sands (Tan Tan Fm)
4. Seal: Deep marine Upper Cretaceous claystones (Aguidir Fm)
5. Trap: Structural and stratigraphic (rotated listric fault blocks and truncation edge with the BTU)



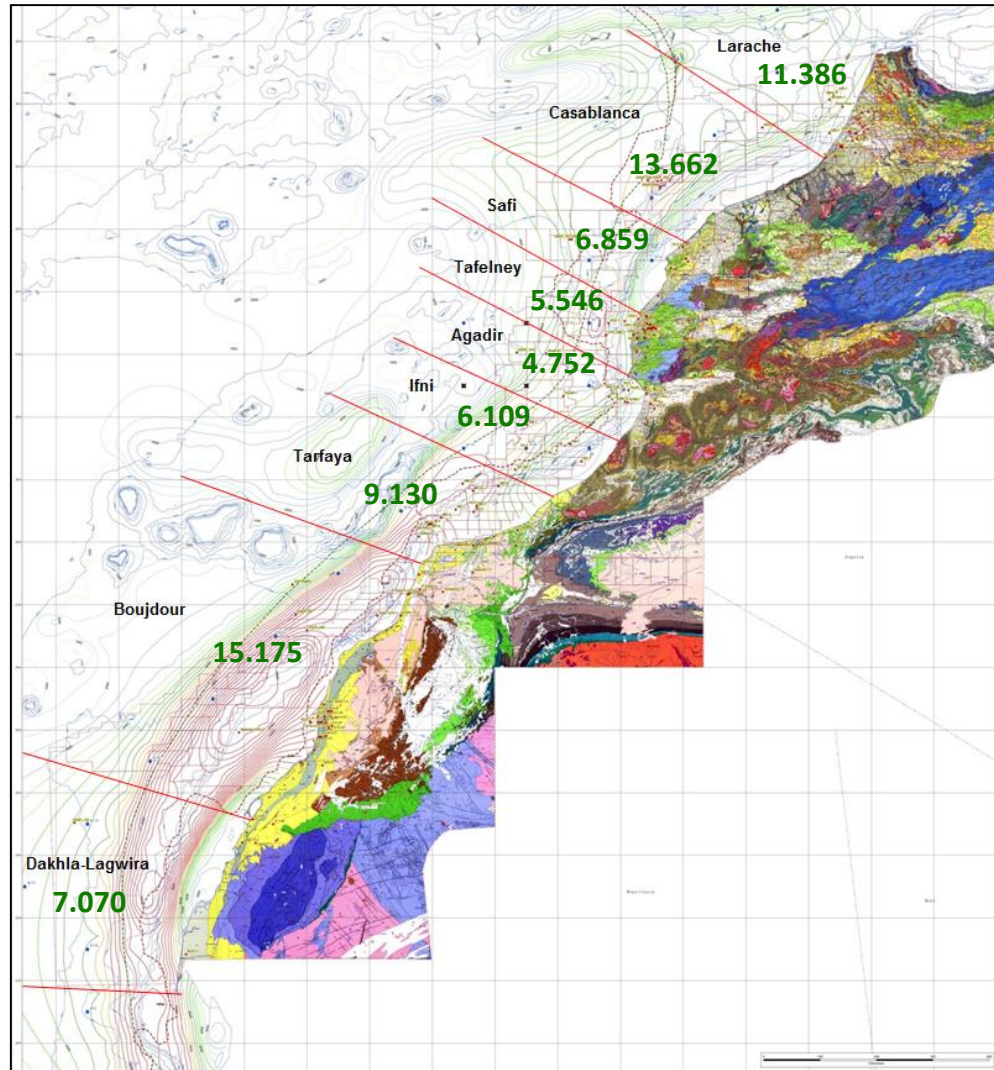
# HYDROCARBON EXPLORATION: EXAMPLE OF PLAY CONCEPTS

## Example of Upper Cretaceous Slope Fan Turbidites (Dakhla Offshore)





# HYDROCARBON EXPLORATION: RESSOURCES ASSESSMENT



## MOROCCAN ATLANTIC MARGIN

- Total unrisked generated volumes in the Moroccan Atlantic Margin about **79.7 BbblOE**. These are comprising:
  - **73.1 BbblOE** from Jurassic and Lower Cretaceous source rocks ;
  - **1.4 BbblOE** from Mesozoic and Cenozoic source rocks in the thrust and melange zone ;
  - **5.2 BbblOE** from conjectural Triassic lacustrine and pre-salt sources.



# CONCLUSIONS

## The main strategic reasons to explore for hydrocarbons in Morocco

- **Stable and attractive country** with market place that is rapidly deregulating and opening.
- **Promising Potential**
  - Most of the nation's territory is under explored
  - Wherever adequately explored, Moroccan sedimentary basins have produced Hydrocarbons.
- Opportunities that combine **low entry cost and suitable exit options.**
- **One of the most attractive fiscal regime worldwide.**
- **Fully shared vision with partners and...**
- **An exciting future to the investors.**



# THANK YOU

