



Smart Solutions for Today's Geoscientist



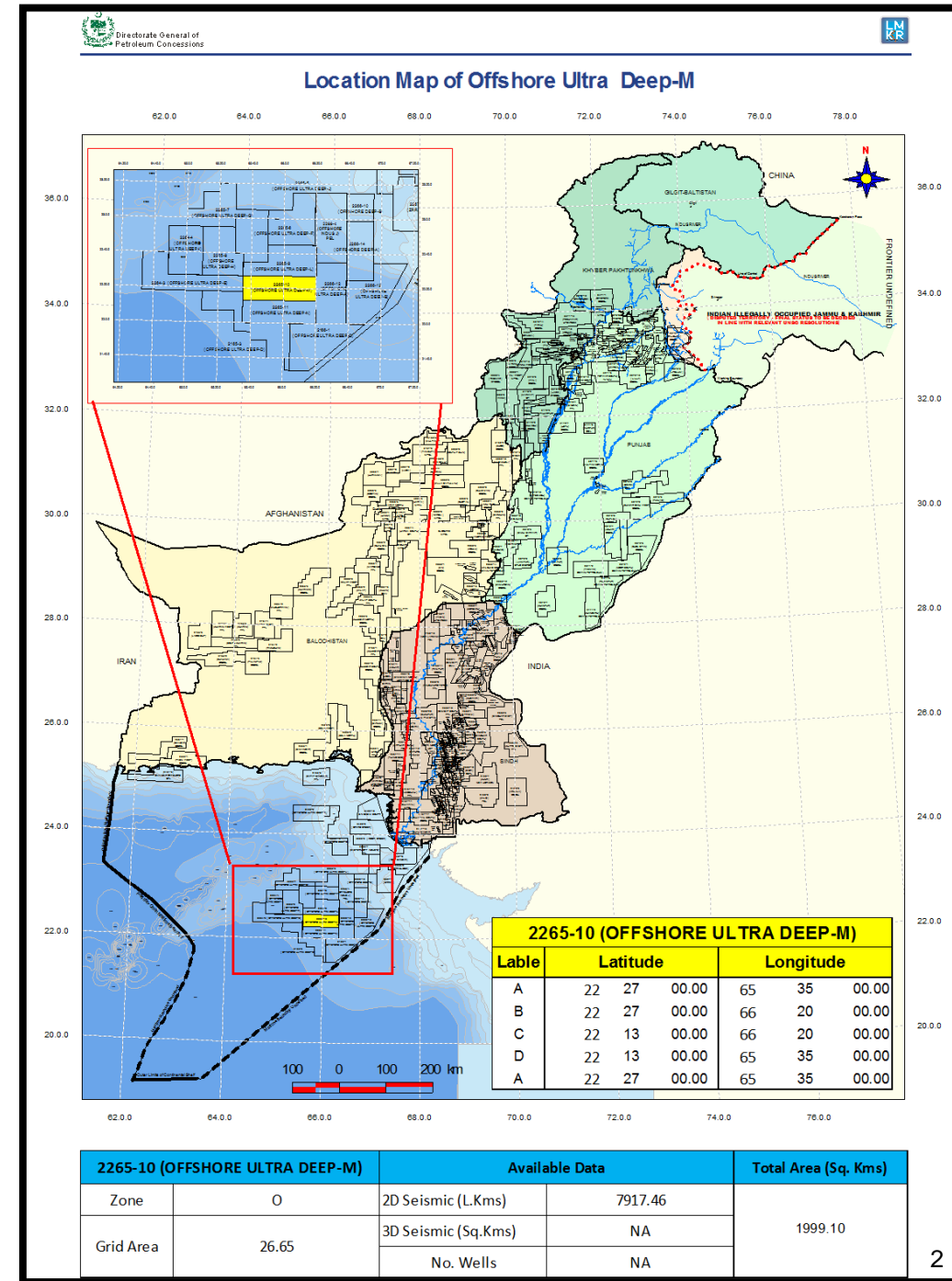
# BLOCK: OFFSHORE ULTRA DEEP M

OFFSHORE BIDDING BLOCK BIDDING ROUND 2022

MINISTRY OF ENERGY PETROLEUM DIVISION (DGPC)

# INTRODUCTION

- Offshore Ultra Deep M Block covers an area of 1999.10 Sq. Kms.
- Geological Basin: Offshore Indus, Basin Pakistan.
- The block falls in Prospectivity Zone O.
- BP, ELF, Total and WGC acquired 2D seismic data approximately 7917.46 L. Kms in the block within the years 2007, 1977, 2000 and 1999 respectively.
- The Block is surrounded by Offshore Ultra Deep L (North), Offshore Ultra Deep N (South), Offshore Ultra Deep A (East) and Offshore Ultra Deep E (West) blocks.
- The wells drilled in the near vicinity is Kekra-01 and Pak G2-01.



# GEOLOGICAL HISTORY

## Late Cretaceous – Early Paleocene:

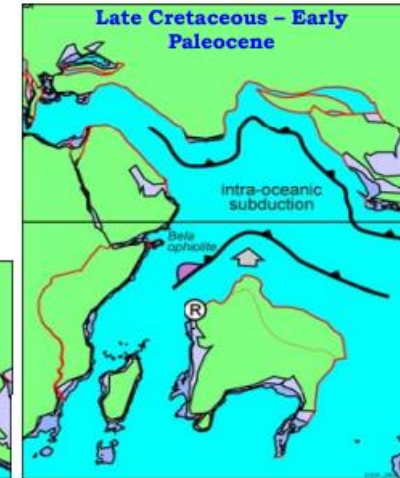
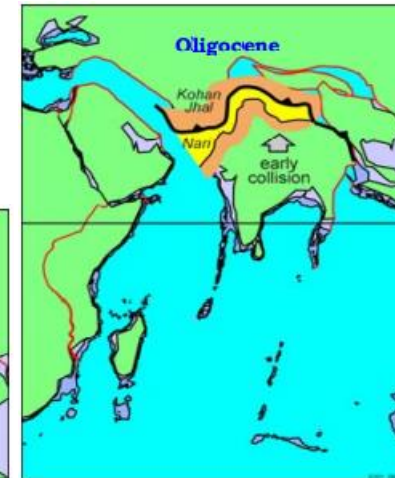
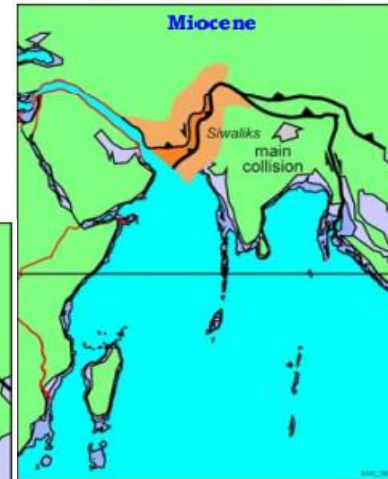
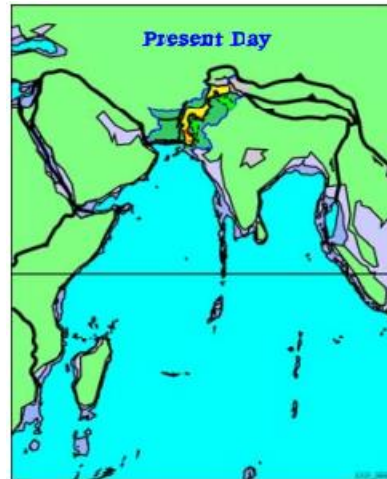
- Rapid northward movement of Indian Plate after separation from Madagascar
- Bela ophiolites obduction
- Extrusion of Deccan Volcanics

## Paleocene - Eocene:

- Deposition of limestone on seamounts and shales in lows / depressions

## Oligo-Miocene:

- Himalayan orogeny
- Indus Delta-Fan deposition



# PETROLEUM SYSTEM

## Source Rock:

- Paleocene condensate section can be the source rock.
- Oligocene and Miocene section can also act as source rock in Offshore Indus Basin.

## Reservoir Rock:

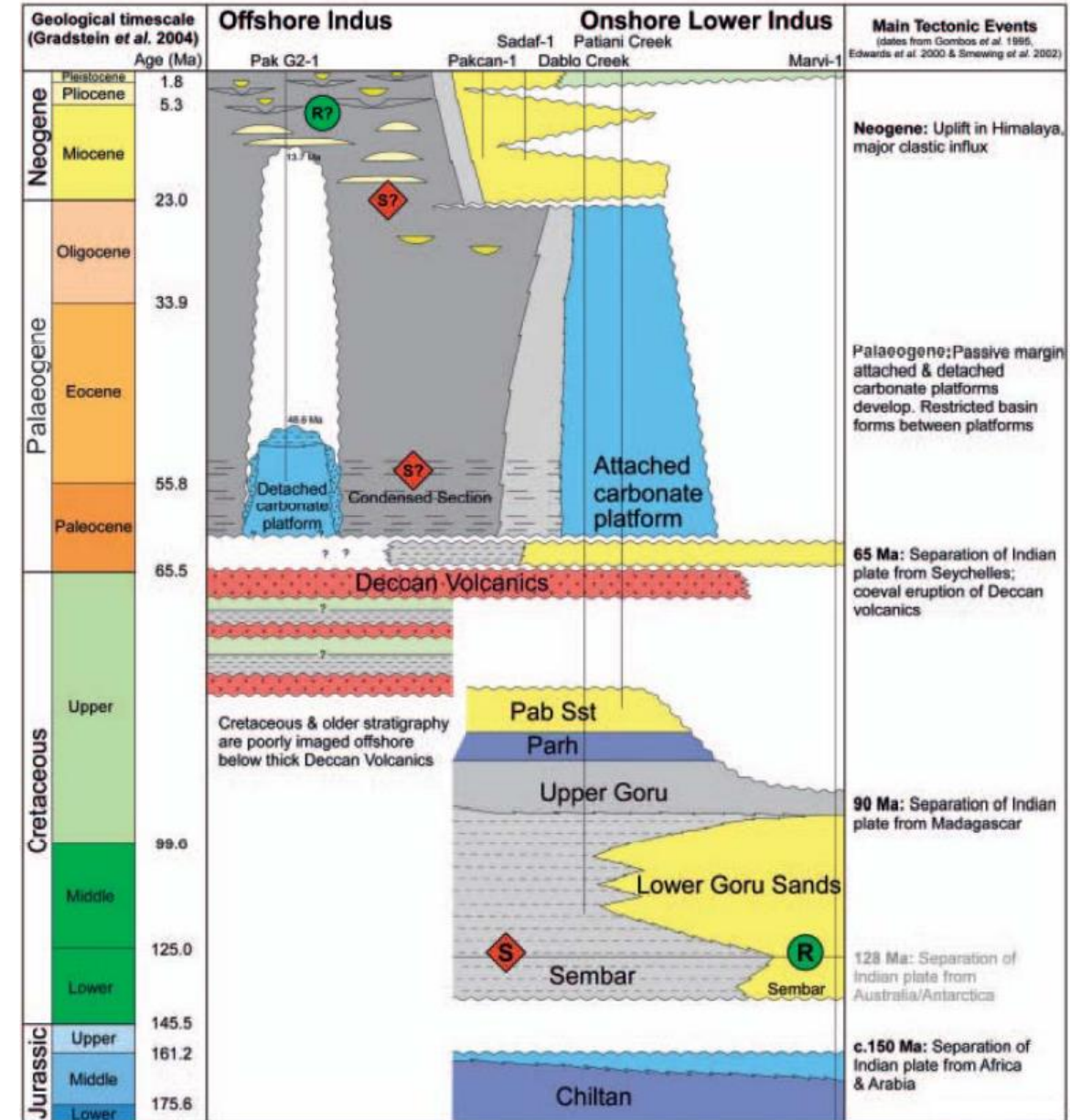
- Miocene sandstones are proven reservoir, Individual sandstone units vary in thickness from 2-50m with porosity ranging between 15-20%.
- In deep offshore, reefal or shoal limestone of Eocene-Oligocene age with more than 20% porosity.

## Seal:

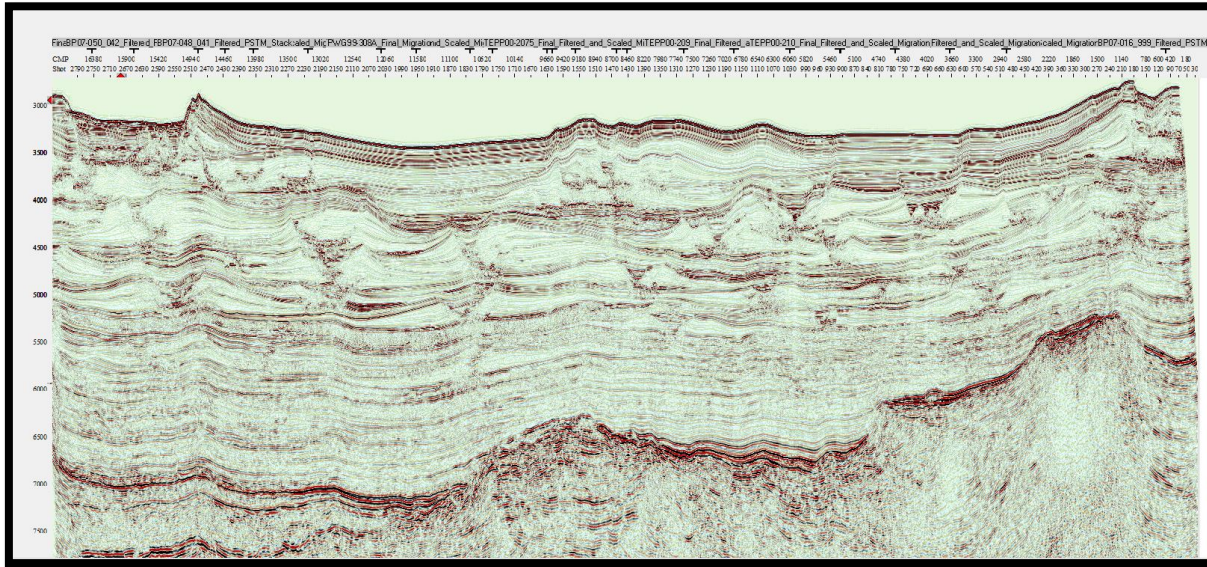
- Mud dominated sediments packages will provide seals for potential reservoirs.
  - Transgressive mudstone and marls provide seals for Eocene-Oligocene reservoir.
  - Intra-formational shales of Miocene would provide seal for the Miocene sands.

## Trap:

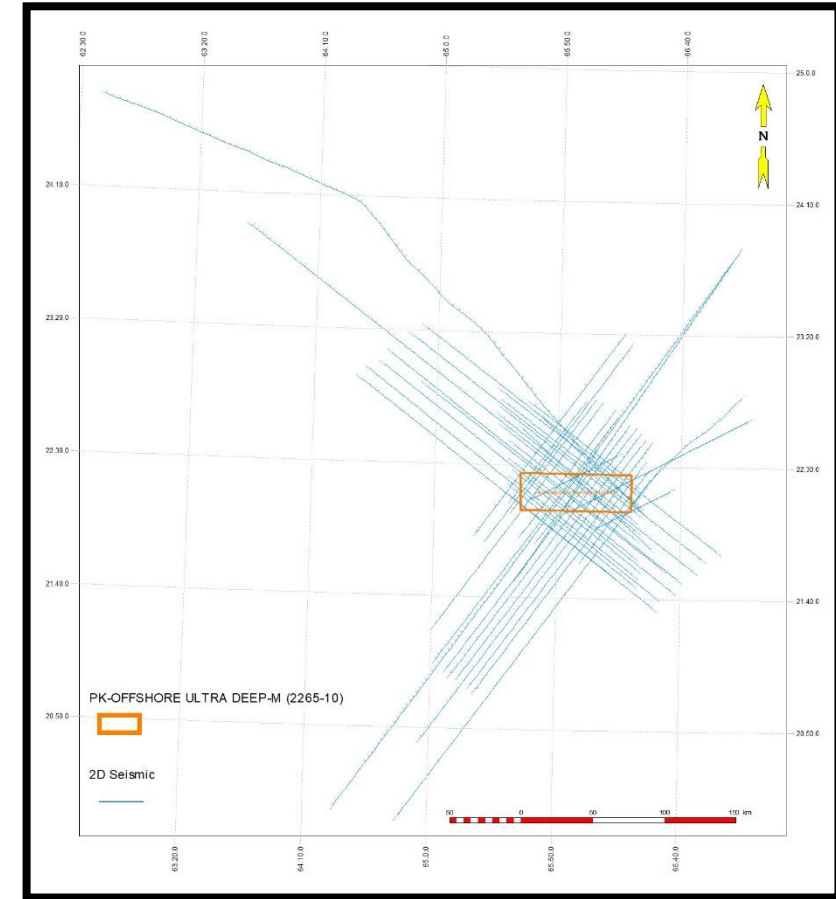
- Both structural and stratigraphic traps
- Eocene carbonates build ups over seamounts, growth faults, roll-over anticlines and stratigraphic traps within deltaic fan system (e.g., bars, barrier islands and pinch-out / facies change etc.) are likely trapping mechanisms



# PROSPECTIVITY



- High resolution seismic data can allow to delineate true potential of the block
- Both structural and stratigraphic traps



# EXPLORATION RISKS

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- Source & Charge: Medium to High risk
- Reservoir: Low to Medium risk
- Seal: Low to Medium risk
- Trap: Low to Medium risk
- Key challenges for future exploration in Tertiary Petroleum System are to establish:
  - Distribution and timing of effective source intervals' development within the drainage area of prospect.
  - Timing of over-pressuring (up to 7000 psi at 2800m in Indus Marine-1A well) within Miocene section (for Miocene and younger targets) with respect to source rock maturation and expulsion.

# OPPORTUNITY

Comparison suggests that discoveries in offshore deltas have been made in:

- Extension of proven onshore petroleum system to offshore at drillable depth (e.g. Niger, Nile, Irrawady & Mahakam deltas)
- Reservoir –Seal pairs associated with good quality but less mature source rock drilled onshore (at shallow depths) progressively mature in offshore (e.g. Krishna-Godavri and Nile deltas)
- Biogenic gas found in shallow younger Tertiary section (e.g. Krishna-Godavri and Nile deltas)

International offshore exploration efforts in delta areas have generally been successful due to:

- Extension of established onshore petroleum system to offshore at drillable depths
- Good quality less mature source rock drilled onshore progressively mature in offshore
- Gas discoveries of biogenic origin

# THANK YOU

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