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### Petroleum Geology Characterization and Oil Potential in the Southwestern Sector of the Cuban Exclusive Economic Zone (CEEZ) in the Gulf of Mexico

Based on the possible existence of plays and petroleum systems in the Southwestern sector of the CEEZ in the Gulf of Mexico, the evaluation and results of the oil potential are expressed.

Data from the Cuban onshore seismic interpretation, 1D and 2D geochemical simulations were used, and at the same time the comparison and integration with the plays and petroleum systems in Southeast Mexico.

The Following highlights are given:

- The sector is referred to the Yucatan Domain, occupying the proper platform and surrounding areas. The thrust belt to the south, the foreland basin at middle and the Yucatan platform (inner, margin and slope) to the north and west are included, with specific structural characteristics and filled with sediments from the Jurassic to the Recent up to 11 - 12 *km* thickness.

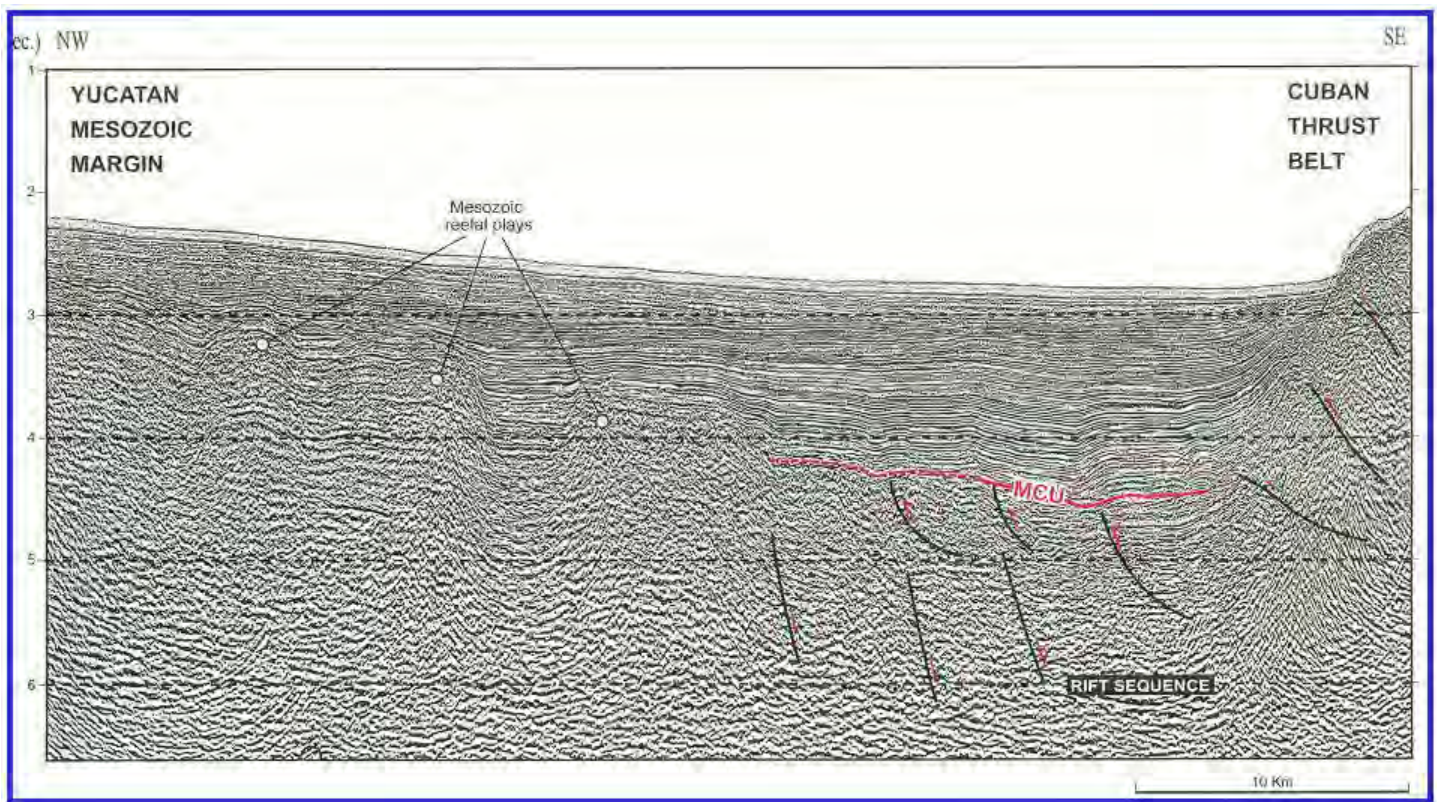


Figure 1

## OIL COLUMNS OF OILFIELDS FROM SOUTHEASTERN MEXICO BASIN AND NORTHWESTERN CUBA

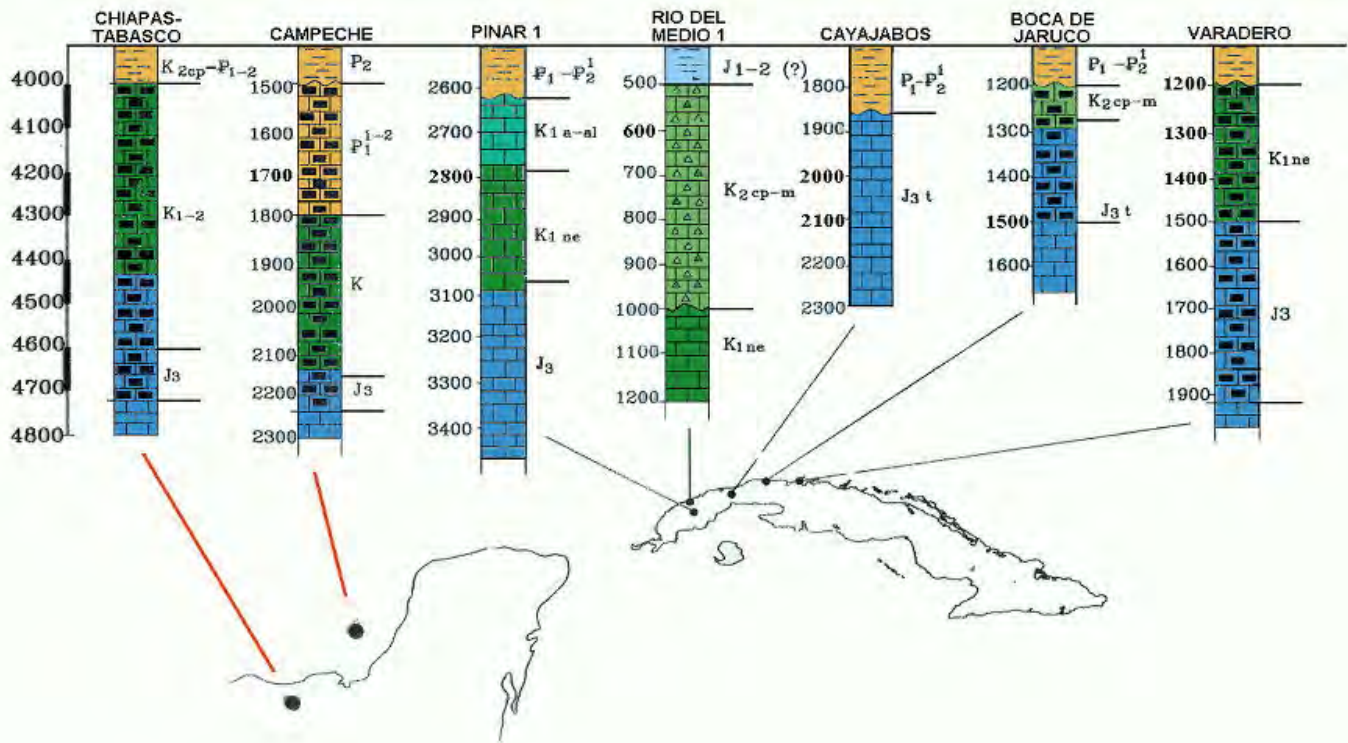


Figure 2

In the figure 1 which corresponds to a seismic section of the sector, the mentioned tectonic elements and the characteristics of the sedimentary infill are shown. The boundaries between the Flexural Basin (Upper Cretaceous - Campanian to Recent) and those of the North American Continental Margin (Upper Jurassic - Middle Cretaceous) through the Mid - Cretaceous Unconformity (MCU) are well expressed. The syn - rift sediments (Lower - Middle Jurassic) underlying to the continental margin below the top C with their characteristic geometry as wedge forms are highlighted. At the same time the presence of "paleochannels" separating structural highs possibly as marginal reefs and parts of the inner margin of Yucatan are also relevant.

- Geochemical simulation indicates favorable conditions for important oil and gas generation from three oil kitchens, which give rise to two petroleum systems associated to the thrust belt and the foreland basin. Both are able to charge the potential traps seen in the seismic.
- Five plays are developed from the seismic interpretations associated to the Upper Jurassic - Cretaceous continental margin sediments:
  - Duplexes and rollovers in the thrust belt.
  - Structural highs at the base of the fore deep.
  - Structural - Stratigraphic mixed traps at the slope.
  - Bild ups (reefs?) at the platform margin.
  - Structural Stratigraphic mounts associated to the Kimmeridgian platform.

In the figure 2 which corresponds to a seismic section of the studied area at least 3 potential plays mentioned before are well represented; the reefal play toward the northwest of the section, the play corresponding to the structural highs at the bottom of the foreland basin in the central part, and the play of the duplexes and antiforms of the thrust

belt toward the southeast of the sector.

On the base of the showed seismic sections, the existence of two main oil kitchens can be inferred: The former associated to the Cuban Thrust Belt to the south related to the existence of oil fields with more than 3,0 billions barrels of oil in place as Varadero, and the other one, to the north of the mentioned before, related to the flexural basin. This one could be responsible for charging different types of traps especially those of the reefal highs and structural highs in the Yucatan Platform (peripheral zone) as well as to the structural highs at the bottom of the flexural basin.

The former plays have their analogous in Southeastern Mexico.

It should be pointed out the location of the studied sector at the periphery of the Yucatan platform is the same as the prolific fields in Campeche Sound and Chiapas - Tabasco.

In the figure 3, the geological columns of the oil fields in the Northwest Cuba and the Mexican Southeastern Basin are showed. They exhibit similar characteristics: great thickness of saturated hydrocarbon rocks of Jurassic - Cretaceous and K- T boundary also, covered by seals of Early Tertiary age. This similarity, the above mentioned points and the seismic sections allow to consider similar behavior to the southwest sector of the Exclusive Economic Zone (EEZ) of Cuba in the Gulf of México with the Mexican counterpart.

According to this study, oil field are expected to be found in this sector with the requeriments needed for exploration - production in deep waters areas.