

# EA Pre-Salt Lacustrine Petroleum System, Onshore Mexico\*

Colin Stabler<sup>1</sup> and Raul Gonzalez<sup>2</sup>

Search and Discovery Article #30655 (2020)\*\*

Posted April 6, 2020

\*Adapted from extended abstract based on oral presentation given at 2020 AAPG Hedberg Conference, Geology and Hydrocarbon Potential of the Circum-Gulf of Mexico Pre-salt Section, Mexico City, Mexico, February 4-6, 2020

\*\*Datapages © 2020. Serial rights given by author. For all other rights contact author directly. DOI:10.1306/30655Stabler2020

<sup>1</sup>Consulting Petroleum Geologist, Mexico City, Mexico ([colinstabler@yahoo.com.mx](mailto:colinstabler@yahoo.com.mx))

<sup>2</sup>Deceased

## Abstract

A petroleum system in carbonates lying beneath evaporites in a Jurassic graben in the Tampico-Misantla Basin is an analog for applying to the interpretation of pre-salt seismic sequences in grabens elsewhere in the Circum-Gulf of Mexico. The graben, which is about 40 kms wide and known to be at least 60 kms long, lies to the west of the Tuxpan Platform, near the town of Poza Rica, Veracruz State, [Figure 1](#). It is largely filled with marine shales and limestones, in which ammonites as old as Upper Bathonian have been identified from cores, (Cantu 1979).

The petroleum system was discovered by PEMEX at the Huehuetepc oilfield in 1969, (Gonzalez 1970). The reservoir is known from a few wells in the area to be a partially dolomitized limestone up to 30 meters thick, [Figure 2](#). The sequence contains oolitic, bioclastic and pelletoid grainstones and argillaceous micrites and wackestones. Fossils include small gastropods, pelecypods, arenaceous foraminifera, ostracods, arthropod pellets and calcareous algae. The carbonate is interpreted to have been deposited in a saline lacustrine to restricted marine environment.

Porosity in the carbonate reservoir was measured as 13%. Permeability is indicated by initial production of up to 1,050 barrels of oil per day at Huehuetepc No. 3. The light paraffinic oil, (30 to 35.8 degrees API gravity), could have been generated from in situ microlaminated (probable algal mat) limestones or migrated upwards from Lower Jurassic shales deeper in the graben. The trap at the Huehuetepc discovery is a small anticline, interpreted to have formed by drape over an intra-basinal horst, sealed by salt with red shale beds. Although remaining reserves are estimated to be only 4.6 million barrels of oil equivalent and have not been further developed, this old discovery is significant as an analog for future pre-salt exploration.

Further research on this petroleum system could include:

- fitting this system into Middle Jurassic paleogeographic reconstructions of the Gulf of Mexico,
- analyzing the geochemistry of the microlaminated limestones and typing them to the oil using biomarkers,

- studying the detailed petrography, diagenesis and petrophysics of the samples and cores to better understand the facies distribution and their reservoir properties.

### **References Cited**

Cantu Chapa, A., 1979 “Bioestratigrafia de la Serie Huasteca (Jurásico Medio y Superior) en el Subsuelo de Poza Rica, Veracruz”. Revista del Instituto Mexicano del Petróleo, Vol XI, No.2, Abril, pp 14-24.

Gonzalez Garcia, R., 1970 “La Formación Huehuetepc nueva unidad litoestratigráfica del Jurásico de Poza Rica”. Ingeniería Petrolera, Vol X, Julio pp 5-22.

Rueda-Gaxiola, J, 2009 “The palynostratigraphy of red-bed and salt units of the Mexican petroleum sub-basins of the Gulf of Mexico”, in C. Bartolini and J.R. Roman Ramos, eds., Petroleum systems in the southern Gulf of Mexico: AAPG Memoir 90, p. 137-154.

Stabler C. L. and Illing, L.V, 1969 “The Search for Further Petroleum Reservoirs in the Upper Jurassic of the Soledad-Miquetla Area” Illing & Associates report to the Gerencia de Exploración, Petróleos Mexicanos, January, pp 1-44.

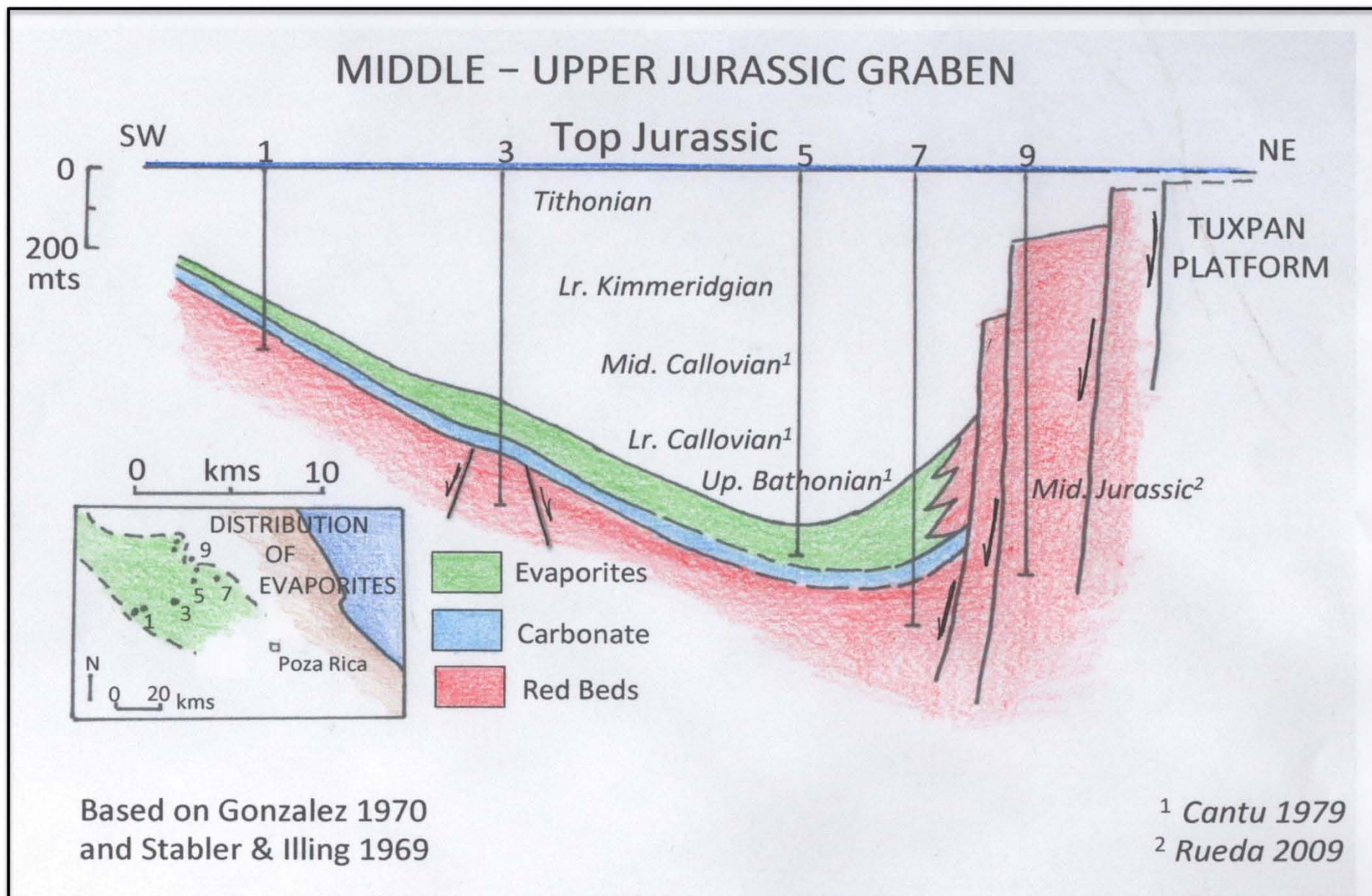
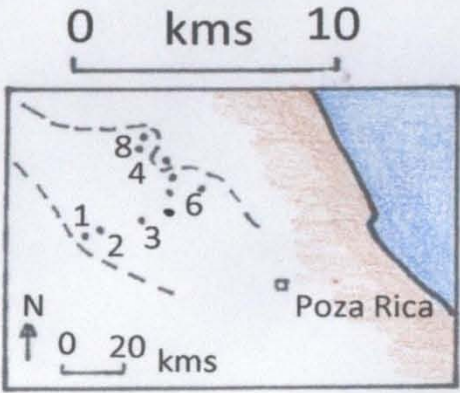
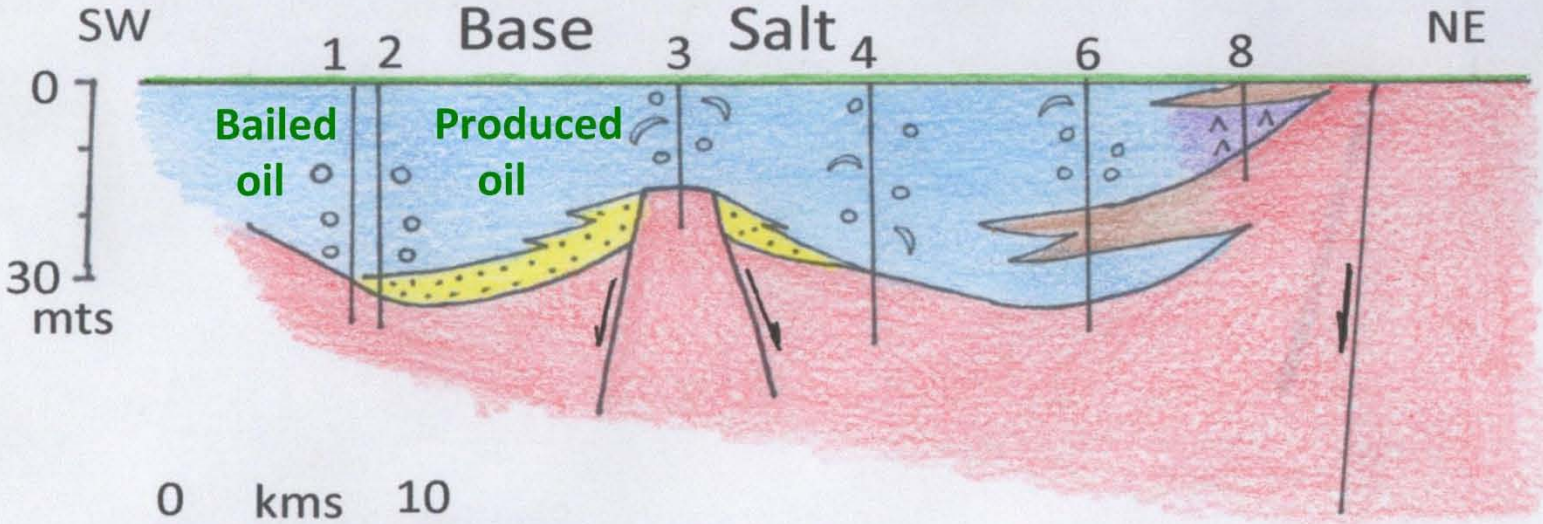


Figure 1. Middle-Upper Jurassic Graben.

# MIDDLE JURASSIC SALINE LAGOON – MARGINAL SEA



- Limestone
- Sandstone
- Anhydrite
- Red Beds

Based on Gonzalez 1970  
and Stabler & Illing 1969

Figure 2. Middle Jurassic Saline Lagoon - Marginal Sea.