Sawaf, T., Brew, G., Litak, R., and Barazangi, M., *Geologic evolution of the intraplate Palmyride basin and Euphrates fault system, Syria.* In PeriTethys Memoir #6, Eds. Ziegler, P., Cavazza, W., Robertson, A., and Crasquin-Soleau, S., 441-467, 2001.

Abstract:

The Palmyride Basin and the Euphrates fault system are two Late Paleozoic / Mesozoic rifts that formed on the southern margin of the NeoTethys Ocean. Data collected during hydrocarbon exploration are analyzed to determine the geologic history and regional tectonic implications of these structures. The Palmyride Basin formed during Late Paleozoic aulacogen-type rifting and subsequent Mesozoic thermal subsidence and fault reactivation. Basin inversion in the Cenozoic resulted in the formation of the Palmyride fold and thrust belt. In contrast, the Euphrates fault system is an aborted intracontinental rift, formed during the Late Cretaceous, that experienced minor transpression in the Cenozoic. Both these structures are hypothesized to have formed along zones of Proterozoic crustal weakness inherited from the accretion of the Arabian plate. Both regions also contain significant hydrocarbon reserves; predominantly gas in the Palmyride Basin and oil in the Euphrates fault system. The tectonic histories of these features are inseparably linked to the intraplate stresses generated in the northern Arabian plate by the polyphase opening and closing of the adjacent NeoTethys Ocean.

Figure 19. Summary of geologic evolution and tectonic events of the northern Arabian platform. On the left are schematic cross-sections through the Palmyrides at each stage, and on the right are sections through the Euphrates graben. These cross-sections are not to scale and patterns do not represent lithology. Approximate location of cross-sections shown by dotted lines on top central map. On the central maps, thick black lines show approximate positions of supposed plate boundaries. DSFS = Dead Sea fault system; Ng = Neogene; Jr = Jurassic; LK= Lower Cretaceous; Pg = Paleogene; Pz = Paleozoic; Tr = Triassic; UK = Upper Cretaceous.
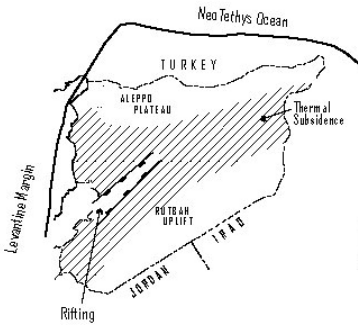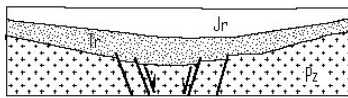
Carboniferous and Permian

NW   SE

Pz

TURKEY
ALEPPO PLATEAU
Deposition
RUTBAH UPLIFT
JORDAN
IRAQ
Rifting
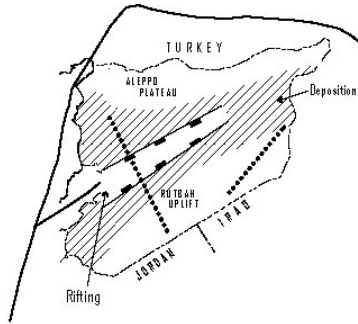
¥ Rifting in Palmyrides due to stress reorganization and NeoTethys opening

¥ Erosion at Permo-Triassic boundary
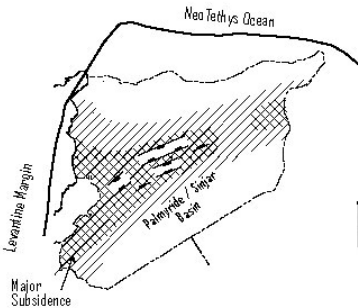
SW   NE

Pz

Triassic and Jurassic

Jr
Tr
Pz

NeoTethys Ocean
TURKEY
ALEPPO PLATEAU
Thermal Subsidence
RUTBAH UPLIFT
JORDAN
IRAQ
Levantine Margin
Rifting
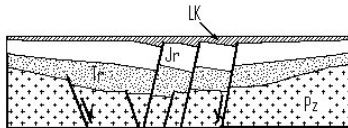
¥ Thermal subsidence in the Palmyride / Sinjar basin

¥ Precursory extension in Euphrates?

Pz
Tr
?

Early Cretaceous

LK
Jr
Tr
Pz

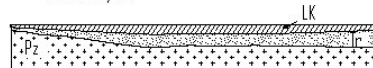NeoTethys Ocean
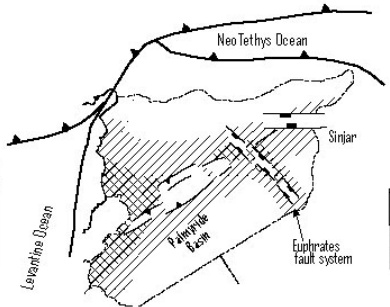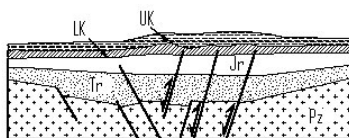Levantine Margin
Palmyride / Sinjar Basin
Major Subsidence
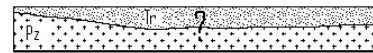
¥ Reactivation of some faults in Jurassic

¥ Extensive volcanism, uplift and erosion in Late Jurassic / Early Cretaceous

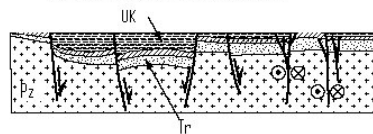¥ Continued subsidence and rifting in Central Syria

LK
Pz
Tr

Late Cretaceous

LK
UK
Jr
Tr
Pz

NeoTethys Ocean
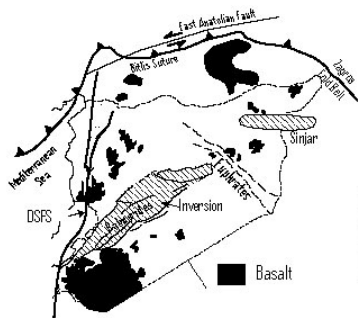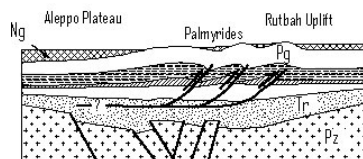Levantine Ocean
Palmyride Basin
Sinjar
Euphrates fault system

¥ Subduction along northeastern margin causes accelerated rifting especially in the Euphrates graben

¥ Abrupt cessation of rifting and ophiolite obduction due to end Cretaceous northern margin collision
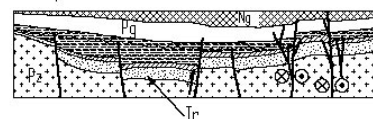
UK
Pz
Tr

Cenozoic

Ng
Aleppo Plateau
Palmyrides
Rutbah Uplift
Pg
Tr
Pz

East Anatolian Fault
Bitlis Suture
Zagros Fold Belt
Sinjar
Mediterranean Sea
DSFS
Euphrates
Inversion
Basalt

¥ Terminal suturing between Arabia and Eurasia causes inversion of Palmyrides & Sinjar, minor inversion of Euphrates

¥ Opening of the Red Sea

¥ Movement on the Dead Sea Fault system

Pg
Ng
Pz
Tr

PALMYRIDES   EUPHRATES