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**SW Tethyan Triassic Evaporite Facies; Palaeogeographical Correlation of Deep-wells from the Off-shore Croatia and On-shore Central Syria**

Evaporitic-carbonate deposits have been penetrated in the exploration wells from Croatian off-shore (e. g. Kornati more-1, Vlasta-1) and Syrian on-shore (e. g. Jihar-1, Al Mahr-1 and Mrah-2) (fig.1). Palynostratigraphically, the evaporitic-carbonate successions of both regions, which contain characteristic "Onslow" palynoflora, are approximately isochronous and they were deposited during the Late Ladinian, Carnian and Norian times.

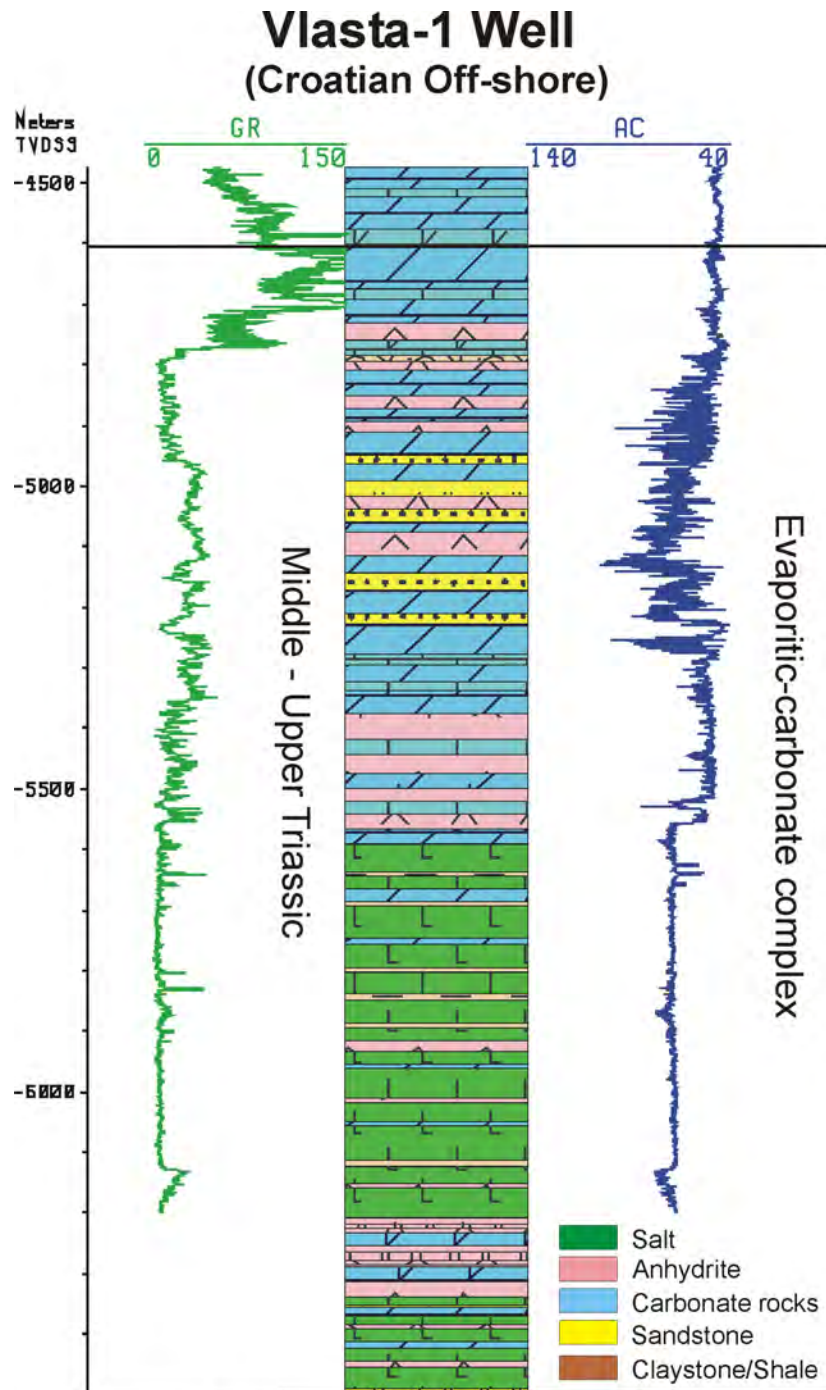
By means of petrographical, palynological, organic geochemical and wire logging analyses, these successions have been studied in order to recognize their lithofacies, palynofacies and organic facies features and to correlate the similarities and differences of their depositional environments.

The oldest sediments of the evaporitic-carbonate succession in Vlasta-1 well (fig.2) are assigned to Late Ladinian and they consist of dolomitic limestone, early diagenetic dolomite, anhydrite and salt which alternate with marl, siltite and fine-grained sandstone. In Syrian wells, Al Mahr-1, (fig.3) corresponding deposits are represented by interbedded dolomite, limestone, anhydrite, shale and claystone which are regularly multiple repeated. The deposits of this section were deposited within restricted tidal flat to supratidal settings.

The "Main salt body", the most noticeable lithofacies of the evaporitic-carbonate succession, has been identified in



**Fig.1 Location Map**



**Fig.2. Lithological Column**

both regions as a Carnian event. It consists of glassy salts with frequent intercalation of dark, dolomitic claystone/shales and acicular anhydrites with relicts of argillaceous dolomites and its total thickness is up to 650 m. The "main salt body" is the result of cyclically controlled deposition within the intertidal to supratidal saline environment. Other Carnian evaporites are composed of anhydrite with early diagenetic dolomite and salt with intercalations of dolomitic claystone/shale being deposited in a broad area from restricted shallow marine to supratidal environment.

## Al Mahr-1 Well (Syrian On-shore)

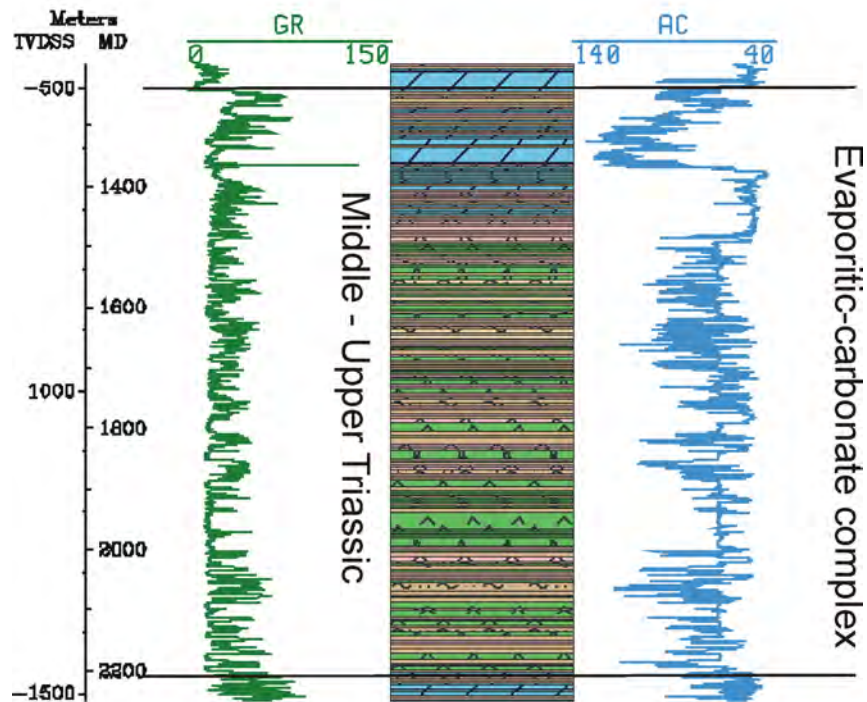


Fig.3. Lithological Column

The succeeding evaporitic-carbonate deposits contain Norian palynoflora. The upper sections of the Norian in both regions are characterized by the termination of the "Onslow" palynoflora, completely replaced by the Circumpolles dominated palynoflora. In Syrian wells, the Norian deposits consist of dolomitized mudstone, mudstone/wackestone and packstone together with medium crystalline, partly anhydritized dolomite. In places, very fine crystalline argillaceous dolomite and mainly acicular anhydrite with relicts of argillaceous dolomite laminated with dark, dolomitic claystone, predominate. In Croatian wells anhydrite and early diagenetic dolomite predominate. Lower section of Norian in Croatia may be regarded as supratidal, whereas the upper section indicates lagoonal, intertidal settings. Syrian section throughout the Norian revealed periodical open sea influence within restricted tidal flat settings with low terrestrial influence. The Norian successions were deposited in a broad area from restricted shallow marine (tidal flat) to supratidal settings. The deposition of the evaporitic-carbonate successions terminates at the end of the Norian.

The investigated organic facies is mostly amorphous with sporadically traces of liptodetrinite. Appearance in transmitted, reflected and blue fluorescent light displays thermal alteration, i. e. catagenetic stage in thermal evolution. Gas chromatograms of saturate fractions of soluble organic matter show domination of phytane over pristine and smooth n-alkane profile that reaches a maximum of about n-C16 to n-C20. This type of distribution is characteristic for sediments containing organic matter of microbial and/or algal origin deposited under reducing conditions. However, some chromatograms display in lower degree bimodal distribution of n-alkanes presenting the input of terrestrial organic matter. The palynological composition of organic matter is consistent with the organic facies features.

**Conclusion:** The evaporitic-carbonate successions of both regions contain "Onslow" palynoflora which characterizes successions of continental margins that surrounded the western and southern Tethys. Accordingly, it can be concluded that the Late Ladinian-Norian evaporitic-carbonate successions from Croatia and Syria belonged to the same palaeogeographic province. The most striking uncommon feature of the studied successions in both regions is the cyclic sedimentation. These cycles were driven by cyclical variation in rainfall, aridity, influx of clay-silt fines into the shallow basin, repeated isolation of the basin and repeated phases of evaporate precipitation. Therefore, the environmental model in which these successions were deposited correspond to the tidal flat environment which many times went lacustrine through repeated interludes of evaporate precipitation, and isolation from sea water. High subsidence rate balanced with eustatic changes and evaporation rate, enabled accumulation up to 1800m thick evaporitic-carbonate deposits during the Late Ladinian-Norian period. Some differences of lithofacies, palynofacies and organic facies features reflect locally controlled environmental conditions (palaeorelief, source of both anorganic and organic terrestrial material, run-off episodes, nutrient availability, primary bioproduction etc.).