Geophysical Research Abstracts
Vol. 13, EGU2011-1554, 2011
EGU General Assembly 2011

Tectonic- and eustatic- control on multi-scale sedimentary cycles in the Ladinian-Carnian carbonate-evaporite succession, southern Levant margin

Or Bialik (1,2), Antonina Kantorovitch (1), Aaron Meilijson (1), Dorit Korngreen (2), and Chaim Benjamini ()

(1) Ben-Gurion University of the Negev, Department of Geological and Environmental Sciences, Be'er-Sheva, Israel (orbia@bgu.ac.il), (2) Geological Survey of Israel, 30 Malkhe Israel St., Jerusalem, 95501, Israel

The Ladinian-Carnian succession of the Levant region in the northwestern Arabian plate is a product of a complex sequence of sedimentary events, constrained by local and regional changes in sea level, tectonic processes and climate. These events were widespread and characterize to a great extent the southwestern edge of this part of the Tethyan realm.

The Triassic of the Levant region is known mostly from the subsurface, where a number of localized, relatively small evaporite basins can be identified. Of these basins, the one outcropping in Makhtesh Ramon is unique in that cyclic and spatial trends can be observed in detail in the field.

The Ladinian - Early Carnian Saharonim Fm at Ramon is divided into four members (S1 –S4), all consisting of limestone with varying proportions of marl, dolomite and evaporites. It was formed almost entirely under submarine conditions, with two identified event of exposure in S3, and possibly two more in the upper member. The overlying Middle - Late Carnian Mohilla Fm is composed of a shallow water carbonate member (M1), an evaporite-carbonate member (M2), with several exposure events and topped by a small unconformity, and a dolomite-limestone member (M3) with a deepening-upward trend.

A high resolution bed-by-bed investigation yielded a systematic framework of several orders of small cycles, composed of facies changes between evaporites, carbonates, stromatolites and other microbialites. The full Ladinian-Carnian section represents a single large scale upward- deepening and shallowing sequence; renewed deepening upwards is truncated by early Jurassic unconformity. The large-scale cycle is composed of a higher order of deepening/shallowing cyclic units.

Bottom configuration and the degree of contact with the open sea appear to govern evaporite genesis. As of the Late Ladinian, an active barrier began to influence the depositional dynamics in the Ramon basin, limiting the connectivity to the open sea and contributing to periodic development of an evaporitic system, the products of which can be observed in lithological change as well as presence of ecologically-stressed biotas in the carbonates. Evaporites were particularly dominant during two intervals, both within the Carnian.

We propose here a dynamic model to explain this development. Basins are considered to be situated on the down-faulted side of tilted blocks belonging to a stepped half-graben system. The depressed part of the blocks provide accommodation space, while the uplifted parts form collectively part of the barrier system interfering with water exchange with the open sea. The alternating carbonate and evaporite phases can therefore both be explained by tectonic movements on the blocks. Structural movements acting in tandem with sea level change can explain some of the rapid facies shifts in this section.

The structural background for this scenario can be Neo-Tethyan rifting, more localized tensile tectonics, or transpressive movements related to shear. These structural styles have all been invoked for the Middle to Late Triassic of the northwestern Arabian plate.