The Late Barremian–Albian Eastern Levant Platform exhibits an ideal playground for studying platform development in a setting of mid-Cretaceous sea-level changes, local tectonics and climate variations. The platform was located at the passive continental margin of the North African/Arabian Plate at the southern border of the Tethyan Ocean. The Upper Aptian–Albian succession of the Levant Platform was studied in several projects in two regions: Sinai and Northern Israel (Galilee/Golan Heights). Both regions were characterized by shallow-marine inner platform settings. Facies analyses, stratigraphy and stable isotopes of several sections were studied, to reconstruct transects across the shallow shelf and finally lead to depositional models. The combination of biostratigraphy, on the base of benthic foraminifers (mainly orbitolinids), and ammonites with the stratigraphic interpretation of the stable isotope composition result in an integrated stratigraphic chart. Benthic foraminifer biozones were correlated with the ammonite zones and the global subdivision of the Late Barremian-Albian stage according Gradstein et al. (2004). Thus a detailed timing of the shallow-water strata was possible. The depositional architecture of the Levant Platform was controlled by local tectonics, climate and 2nd-order sea-level changes affecting the sedimentation patterns. Four 2nd-order sequences boundaries were identified, bounding the Early Cretaceous Levant depositional sequences MCL 1 – MCL 4. They partly correlate with those ones observed on the Arabian Plate, suggesting a regional influence on their development. Until the late Early Aptian, northern Sinai was influenced by normal fault development, while the Galilee/Golan Heights area exhibits continuous sedimentation without major tectonic influence. Climate changes may have influenced the continental weathering system and thus the input of detrital sediments and ferruginous ooids.

Both regional transects reveal five platform stages (PS I – V) that differ with respect to platform architecture, siliciclastic input and response on sea-level changes. PS I, Late Barremian-earliest Aptian: The Upper Barremian marine sedimentation started above terrestrial sedimentation. While in northern Israel a homogenous ramp existed, northern Sinai was subdivided in small scaled SW-NE striking sub-basins marginal bounded by active normal faults. Open marine high-energy sedimentation and continuous transgression characterised the Galilee/Golan Heights area during the second-order TST of MCL 1, while near coast siliciclastic and protected lagoonal carbonates alternate with deeper marine sediments in northern Sinai. PS II, Early Aptian-earliest Late Aptian: During the HST of MCL 1, continuous filling of the accommodation with shallow marine protected facies resulted a change from ramp to platform geometry at northern Israel. Due to higher subsidence around normal faults, sub-basin development kept on and protected to deeper subtidal sedimentation characterised the northern Sinai. Significant reduction of detrital input in both areas may result from changing weathering regimes. PS III, early Late Aptian: During the LST of MCL 2 the tectonic activity terminated resulting in reorganisation of the northern Sinai platform. The former fault-controlled sub-basins became inactive and were covered by a shallow ramp architecture that controlled the depositional processes. Emergence was evidenced from northern Sinai to northern Israel indicating an extended platform system. PS IV, Late Aptian–middle Albian: A stable platform architecture, marked by a homoclinal ramp in northern Sinai and a flat topped platform in Galilee/Golan Heights, was sandwiched between transgressive surface MCL 2 and the end of TST of MCL 3. In northern Sinai, a broad delta system with high siliciclastic input interfingers in the N with carbonate ramp deposits. High accumulation rates on parts of the ramp resulted in slight changes of the dipping direction. Less siliciclastic input and inner platform sediments characterise the coeval Galilee/Golan Heights region. PS V, Late Albian and younger: During HST (MCL 3) and TST
(MCL 4) in northern Sinai pure limestones and dolomites were accommodated. Together with continuous transgression a flat topped platform was established similar to northern Israel. Our data indicate that extensional faults were active in northern Sinai until the late Early Aptian, which is significantly younger than observed before.

Figure: Schematic transect trough the northern Sinai shallow shelf displaying the Late Barremian–Albian evolution and involving the factors extension along normal faults and sea level change (a-e). Palaeoenvironmental maps indicate the lateral extension of facies zones (f-h). a) PS I and PS II are characterised by increasing sea level. b) The southern coastline was located at a normal fault, with a possible short-termed southward transgression at the end of PS II. c) A significant drop in sea level cause emergence of wide areas and erosion of the former relief. d) During PS IV, a homoclinal ramp characterises the depositional architecture. A delta system developed in the proximal areas, interfingering with lagoonal and shallow ramp sediments. e) The strike of the facies belts changes from SW-NE to WSW-ENE. f) During Late Albian drown by rising sea-level, a shallow platform without major changes developed.