



Facies, architecture and diagenesis of middle to upper Jurassic carbonates in the Ghissar Range (Uzbekistan)

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Recent field work has been carried out in the Ghissar range to study the development and architecture of middle-upper Jurassic carbonate platforms of the northern Amu Darya basin. The carbonates series thickness ranges from 250 m in the northern Ghissar to 500 m in the central and southern Ghissar. The main proximal-distal polarity of the platform is from East to West, although small scale E-W trough probably linked with syn-sedimentary faults may have developed and locally modified this polarity.

Neither significant sedimentary slopes, nor large scale barrier reefs were observed, challenging previous stratigraphic interpretations. Facies rather deposited on tens to hundreds of km large gently dipping ramps. Two major sequences have been recognized, one being Callovian in age and the other potentially Oxfordian to Lower Kimmeridgian.

The first one is made of seven well defined deepening-shallowing upward 4th order sequences, showing an evolution from outer to inner ramp facies. These medium-scale sequences can be traced through the Ghissar from Turkmen to Tajik borders. In this sequence, large scale (several 10s of km wide) ooidic belt deposit on the inner ramp, while patch and pinnacle reefs (meters to tens of meters wide and high) develop distally, in the storm wave action zone. Small siliciclastic deltas develop in the northern Ghissar, probably related to the erosion of exposed Hercynian reliefs.

The second large-scale sequence is composed of inner ramp peritidal deposits showing rapid vertical and lateral facies shifts depicting a more complex architecture. Small scale ooidic grainstone bodies alternate with pellet packstone and mudstone with gypsum pseudomorphs. Middle Oxfordian black shales are intercalated in this second sequence near Turkmenistan and indicate a significant transgression. In proximal position, this transgression could be recorded by intensely bioturbated facies showing selective dolomitization of either burrows or matrix. The upper carbonate beds alternate with massive nodular gypsum, indicating hypersaline environments. Gypsum increases in thickness upward and carbonate production probably ceased during the Kimmeridgian-Tithonian interval.

Overall, this facies evolution depicts an increasing restriction of the Amu Dary Basin and probably a drier regional climate during the upper Jurassic.