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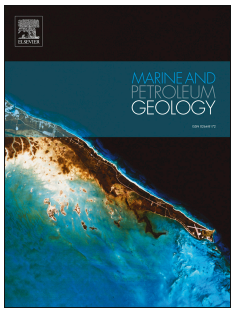

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Processes and typology in Gilbert-type delta bottomset deposits based on outcrop examples in the Corinth Rift

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Abstract

Middle Pleistocene Gilbert-type delta in the Gulf of Corinth, Greece, has been investigated combining field methods and photo acquisition by drone to generate a high-resolution 3D model. This study case can be used to document four different dynamics in Gilbert-type bottomset deposits, each one of which is characterized by a specific range of facies, facies associations and geometries: (1) the sandy-gravelly bottomset, (2) the erosional-bypass stage, (3) the fine-grained bottomset and (4) the massive-sandy bottomset. By comparing the typologies of the bottomset, we propose a conceptual model that predicts the occurrence of these four different bottomset stage dynamics depending on the stratigraphic context.

During highstand normal regression, the gravelly bottomset develops under subcritical flow. The supercritical flow undergoes a stationary hydraulic jump in the toeset due to the slope break. As a result, a low-relief channel-levees system is formed in the bottomset. The channels are filled/reworked by backstepping conglomeratic lenses interbedded with silty concave-up and concave-down levees. During normal regression, the foreset beds are steeper than during previous stage and scoured in the upper part. In the bottomset, significant erosion recording sediment bypass downstream toward the pro-delta can be observed. During lowstand normal regression, a starved fine silt to shale bottomset onlaps onto the major erosional surface. The bulk of the coarse-grained sediments is stored in the delta topset and foreset. During the transgressive to highstand stage, the former topset and foreset are eroded by high-density turbidity currents and massive-sandy turbidites are deposited in the bottomset, which onlap onto the foreset beds and form a slope apron geometry in the delta toe.

The stratigraphic model improves the prediction for the sand distribution within the various parts of the bottomset. This approach is particularly relevant for clastic depositional systems with high sediment discharge and a high accommodation rate.

Keywords: Facies association, Depositional architecture, Sequence stratigraphy, Hydraulic jump, Bypass

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