



## **Forward sedimentary modelling of the Lower-Middle Ordovician carbonate platform in north Tarim Basin, China**

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Numerical sedimentary modeling can quantitatively investigate the development of carbonate platform and test the role and interplay of controlling factors. A forward model of the Lower-Middle Ordovician carbonate platform (North Tarim Basin, China) was produced using CARB3D+, a 3-D process-based forward modelling software able to model carbonate platforms in terms of geometries, sedimentary facies, lithological and physical properties and early diagenesis. Parameters for the simulation with CARB3D+ were defined after detailed analyses of subsurface data, laboratory results and previous researches, integrated with constraints from ancient and modern analogues. Accommodation space related parameters include subsidence and eustacy. Facies distribution and composition permitted the definition of the productivity parameters for the reef facies (dominated by algae), the platform margin (where production was highest), the inner platform and basin. The type and amount of carbonate production of each facies were deduced by observation on the composition and structures of subsurface cores and surface samples. The sediments transport parameters were inferred from similar modern environment. We acquired the best-estimated forward model by adjusting parameters which is proved consistent with geological models. The changes of geometries of platform growth and sedimentary facies distribution reflect the evolution of the studied platform. Furthermore, forward modelling highlighted the interaction between the required parameters, providing hints about key control factors on the platform development. The integration of geological datasets with forward modelling promotes a better characterization of carbonate platforms and their interacting controlling factors, improving the understanding of the factors controlling their sedimentary architecture and facies associations.