



Field-scale forward modelling of a shallow marine carbonate ramp: the Upper Jurassic Arab Formation (onshore Abu Dhabi - UAE)

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The stratigraphic record of a carbonate system is the result of the interplay of several local and global factors that control the physical and the biological responses within a basin. Conceptual models cannot be detailed enough to take into account all the processes that control the deposition of sediments. The evaluation of the key controlling parameters on the sedimentation can be investigated with the use of stratigraphic forward models, that permit dynamic and quantitative simulations of the sedimentary basin infill.

This work focuses on an onshore Abu Dhabi field (UAE) and it aims to provide a complete picture of the stratigraphic evolution of Upper Jurassic Arab Formation (Fm.). In this study, we started with the definition of the field-scale conceptual depositional model of the Formation, resulting from facies and well log analysis based on five wells. The Arab Fm. could be defined as a shallow marine carbonate ramp, that ranges from outer ramp deposits to supratidal/evaporitic facies association (from bottom to top). With the reconstruction of the sequence stratigraphic pattern and several paleofacies maps, it was possible to suggest multiple directions of progradations at local scale. Then, a 3D forward modelling tool has been used to i) identify and quantify the controlling parameters on geometries and facies distribution of the Arab Fm.; ii) predict the stratigraphic architecture of the Arab Fm.; and iii) integrate and validate the conceptual model. Numerous constraints were set during the different simulations and sensitivity analyses were performed testing the carbonate production, eustatic oscillations and transport parameters. To verify the geological consistency the 3D forward modelling has been calibrated with the available control points (five wells) in terms of thickness and facies distribution.