

## **Facies Modeling Described by Probabilistic Patterns Using Multi-Point Statistics: An Application to the K-Field, Libya**

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### **Abstract**

The main objective of this study is to illustrate the stochastic modeling of facies bodies using a multi-point statistical methodology (MPS) based on probability patterns derived from the integration of facies interpretation at well locations, seismic data, and the conceptual geological model. The proposed methodology was applied to real data in the K-Field of Libya. The reservoir unit, the Mamuniyat Formation of Ordovician age, is interpreted as a glacially-influenced setting ranging from shoreface to base of slope fan-channel environments.

The input data was classified in two main groups: 1) hard data corresponding to facies description, derived from core, conventional logs and especially image logs (FMI), from wellbores; and 2) soft data used as conditioning, derived from a scaled conceptual model constructed on the basis of seismic horizon slice interpretation and analogues. The final results illustrate the benefits of using multi-point statistics for facies distribution in complex settings. The resulting model reproduces the facies heterogeneity and, to a significant degree, the conceptual model, leading to the conclusion that multi-point statistics offer a significantly improved representation of the geological heterogeneity.