

FROM DEPOFACIES TO LITHOFACIES: A WAY TO INTEGRATE FACIES AND ROCK TYPES INTO 3D GEOCELLULAR MODELS

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3D geological facies modeling has been confused in the past with 3D petrophysical rock types (PRT) modeling. The efforts made by sedimentologists trying to understand the 3D geometry of facies and their distribution in the reservoir, sometimes are not well used by modelers who base their facies definition on petrophysical cutoffs which normally don't follow sedimentological concepts.

There are many important implications when determining facies using petrophysical cutoffs: 1. Even though petrophysical properties are initially delineated by sedimentation processes, they are normally altered by diagenetic processes (Morad, et al 2010). This causes mismatches between core described facies and facies based on petrophysical cutoffs. 2. It is not possible to capture the log signature of the facies which is linked directly with their 3D shapes (Serra, 1986). This causes, for example, that sandstones deposited in canalized systems which normally exhibits a bell or cylinder GR signature can be treated as those deposited in fan shapes which exhibit funnel log signatures. 3. There is a bias when selecting core plug for determining petrophysical properties (Terzaghi, 1965). Normally the sampling

is concentrated in medium to high quality reservoir rocks and shales are not sampled. This causes that during clustering in crossplots for defining facies, data is not representative of the bad rock quality facies.

This paper presents a methodology for facies modeling integrating core facies definition, conceptual geological models (deposfacies and petrophysical rock types). Two field cases, one in South America and the other in South East Asia are used to apply this methodology.

REFERENCES

- MORAD, S. KHALID AL-RAMADAN, J. M. KETZER, L. F. DE ROS. 2010. The impact of diagenesis on the heterogeneity of sandstone reservoirs: A review of the role of depositional facies and sequence stratigraphy. AAPG Bulletin, V. 94, No. 8, 1267-1309.
- SERRA, O., 1986. Fundamentals of Well-Log Interpretation. (2. The Interpretation of Logging Data). Developments in Petroleum Science, 15 B, 684 pp., Elsevier (Amsterdam).
- TERZAGHI, R.D., 1965, Sources of errors in joint surveys: Geotechnique, v. 15, p. 287-304.