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Vertical Proportion Curves: Insights from Fluvial Process-based Stochastic Modeling

Vertical proportion curves (VPC) have proven to be very efficient tools to quantify sequential organization and variations of facies. Moreover, concerning reservoir characterization, VPC are the most important quantitative parameters controlling flow through the reservoir. Thus, it is interesting to understand which processes control the evolutions of VPC. As we developed a process-based stochastic model for fluvial meandering channelized reservoirs we can obtain several representations for the same fluvial deposits and consequently test the influence of the parameters of the model on VPC, and specify the key parameters for their interpretation.

First we considered global VPC, at the scale of the oil field. For example, among the parameters of interest, varying the frequency and intensity of the floods controls the sand proportion. Then changing the structure and geometry of overbank deposition the relative proportions of silt and clay can be assessed. Finally, other parameters have impact on the evolution of facies, some producing quick and abrupt variations whereas other provide smooth progressive transitions. Besides, at a smaller scale, local VPC are clearly influenced by the successive temporal locations of the channel belt.

The results of this work give a new way to look at VPC. Reciprocally, once the relations between our model parameters and VPC evolutions are clearly understood it will provide a better geological knowledge of the oil field an will help to obtain a methodology to condition simulations.