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Identification of Some Physical Key Parameters for a Fluvial Process-based Stochastic Model

We have developed a process-based and stochastic approach for the modeling of meandering stream floodplain formation at the scale of oil reservoirs. Many different realistic realizations for the same deposits can then be generated. Thus, running the model we can compute statistics for comparison with experimental observations of channel morphology and processes, this in order to decide which parameters of the model to focus on and to infer from possible available data.

Although much information is available concerning relationships between channel parameters, it is rarely in a suitable form to work at the scale of oil reservoirs. Moreover paleohydrological data often lack accuracy and even exactitude. Then, rather than using punctual statistics we propose to interpret the full geological series using vertical proportion curve (VPC) in relation with the channel parameters. Indeed the results of our work show that physical parameters can be inferred from VPC. Although the relationship between the parameters of the model and the proportion of facies is certainly not a one to one relationship, the channel geometrical parameters, the frequency, intensity and structure of overbank floods affect both the proportion of facies and their spatio-temporal evolution.

Finally, once the relationship between the parameters are clearly understood, the next step will be to infer them and their spatio-temporal variations from well data, general knowledge of the basin and possibly seismic.