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Authors (alphabetic order):

- Hélène Binet, Geovariances (Avon, FRANCE)
- Jean-Marc Chautru, Geovariances (Avon, FRANCE)
- Pedro Correia, Geovariances (Avon, FRANCE)
- Nicolas Nosjean, Neptune Energy (La Défense, FRANCE)
- Didier Renard, Mines ParisTech (Fontainebleau, FRANCE)

Title: A case study of a new Time-Depth conversion workflow designed for optimizing recovery

Topic: 2.7: Reservoir Modeling / Geostatistics

Abstract:
To optimize hydrocarbons recovery and quantify future production risks, it is necessary to accurately characterize traps geometry. This geometry is estimated from both seismic and well data, using Time-Depth conversion methods. This characterization is a critical issue in reservoirs with thin beds, as the uncertainty on horizons depth can lead to large variations of beds thickness.

The paper presents an application on real data of a new Time-Depth conversion integrated workflow which is based on advanced geostatistical estimation and simulation multivariate algorithms and on automatic Spill Point recognition. It enhances horizons depth estimation and minimizes the uncertainty on the consecutive horizons. This workflow is extremely efficient in faulted layer-cake deposits, especially when reservoirs are thin.

First, the theoretical background of the geostatistical multivariate algorithm is briefly summarized, including its version in the Bayesian framework. Then, the application example is used to highlight the differences between the simultaneous conversion of consecutive horizons and the standard conversion where horizons are considered as independent to each other. Focus is put on the vertical evolution of uncertainty and on the Geophysicist input allowed by the Bayesian framework.

The workflow is versatile enough to convert directly Time in Depth or to compute intermediate enhanced velocity models when required. Practical examples are presented to illustrate the characteristics of each method.

The impact of the different conversion options on Spill Points location and on the reservoirs Gross Rock Volumes are highlighted.

One of the most original and useful features of the workflow is its ability to include faults location uncertainty in the global in the global Gross Rock Volumes uncertainty quantification. The implementation of this capability is explained and illustrated from its application to real data.

In the end, the impact on ultimate recovery uncertainty is analyzed and illustrated from a practical case study.