On The Suitability of Static Models for SAGD-Based Processes

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Summary

SAGD-based recovery in the Athabasca Oilsands is challenged with risks associated with geological heterogeneities. The key objectives of the static geological model are to quantitatively simulate and distribute in 3D the reservoir lithological and petrophysical properties within the structural and stratigraphic framework while honouring the conceptual geological model. The digital model provides images of the reservoir that have similar heterogeneity or variability as the geological occurrence. The geostatistical approach to reservoir characterization provides the best tools for the integration of diverse data, deterministic and stochastic, for the prediction of spatial reservoir properties and for calculation of post-processed statistics. The static model is used as a rendering of the image into a digital format suitable for input to reservoir engineering simulation software.

Can we ensure the static model is fit for the physical process? Muddy reservoir heterogeneities can act as barriers or baffles. The configurations of thief zones, water and gas, are significant uncertainties. Prior to steaming, fluid zones can appear compartmentalized or as stacked transition zones. Permeability is the critical parameter for performance; it has bias in measurement, is scale dependent and can be dynamically altered during high pressure steam flooding. The performance of actual SAGD-based processes has complex challenges, many of which can be studied via representative static models. The modeling choices can strongly affect the simulated performance.
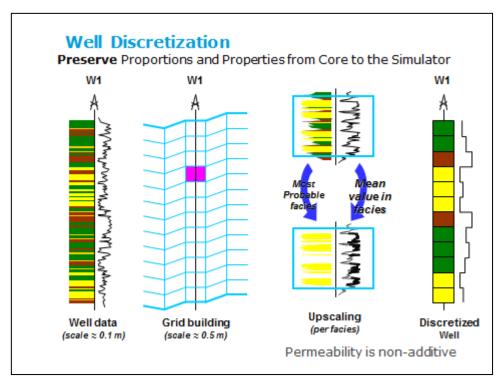
Figure 1: Well data, facies and petrophysics, are resampled when logs are blocked. Modeling Choices have consequences.

Acknowledgements

References

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