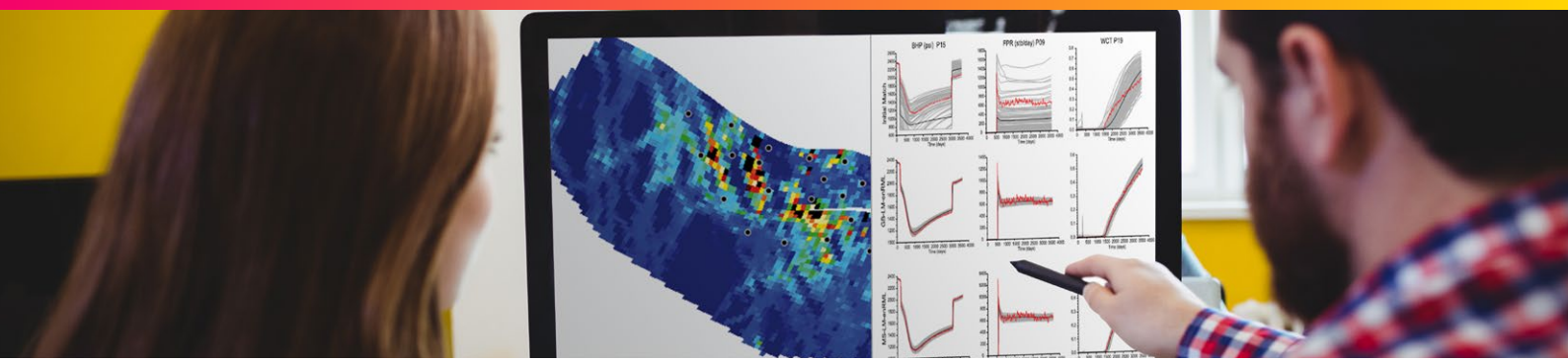
EBMatch

Ensemble-based multi-scale history matching



INDUSTRY CHALLENGES

Integrity

Preserve the geological and seismic detail in your static model during history matching by avoiding non-geological block upscaling and unrealistic, arbitrary model updates.

Uncertainty

Assess uncertainty by exploring the full range of possible geologically-constrained static and dynamic models with an optimized ensemble-based approach.

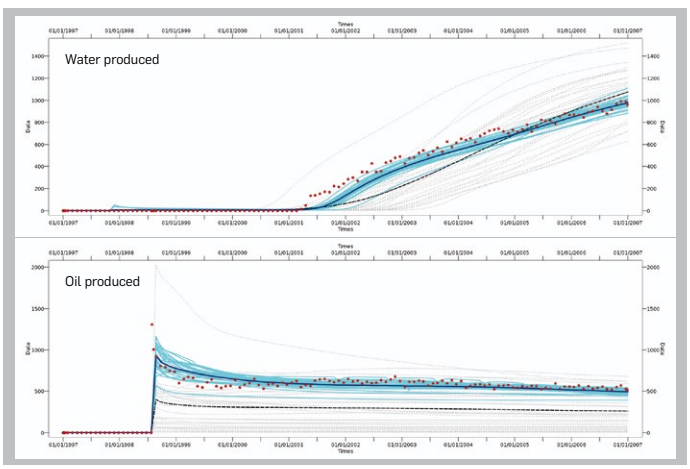
Efficiency

Reduce time spent on manual model building and history matching with the efficiency of a data-driven ensemble-based approach.

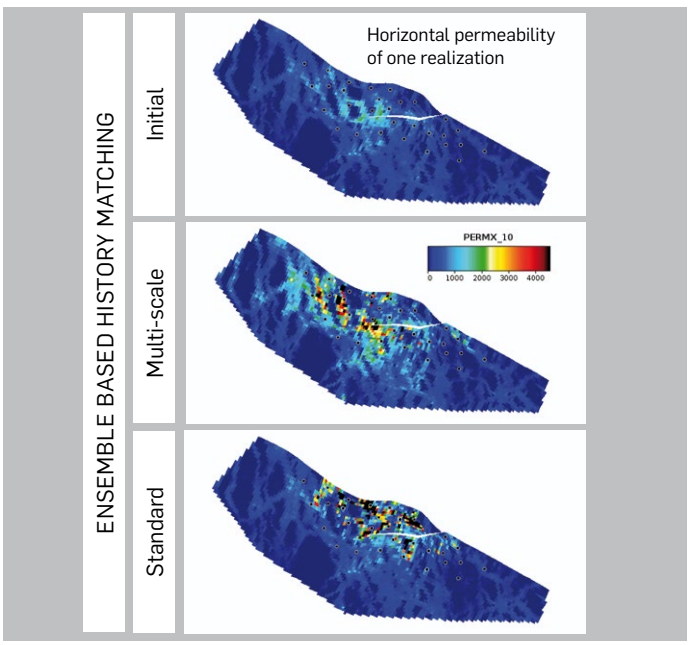
GEOSCIENCE SOLUTIONS

EBMatch advantages

- Better predictions of production with more realistic and accurate history-matched models, preserving the resolution of the petrophysical model and the seismic attribute data
- A full understanding of uncertainty in the static and dynamic reservoir models and reservoir simulations, better preserving the variability of the Ensemble and revealing forecast uncertainty
- Reduced turnaround time with a more efficient data-driven workflow which eliminates the need for multiple iterations of history matching and manual editing of the model



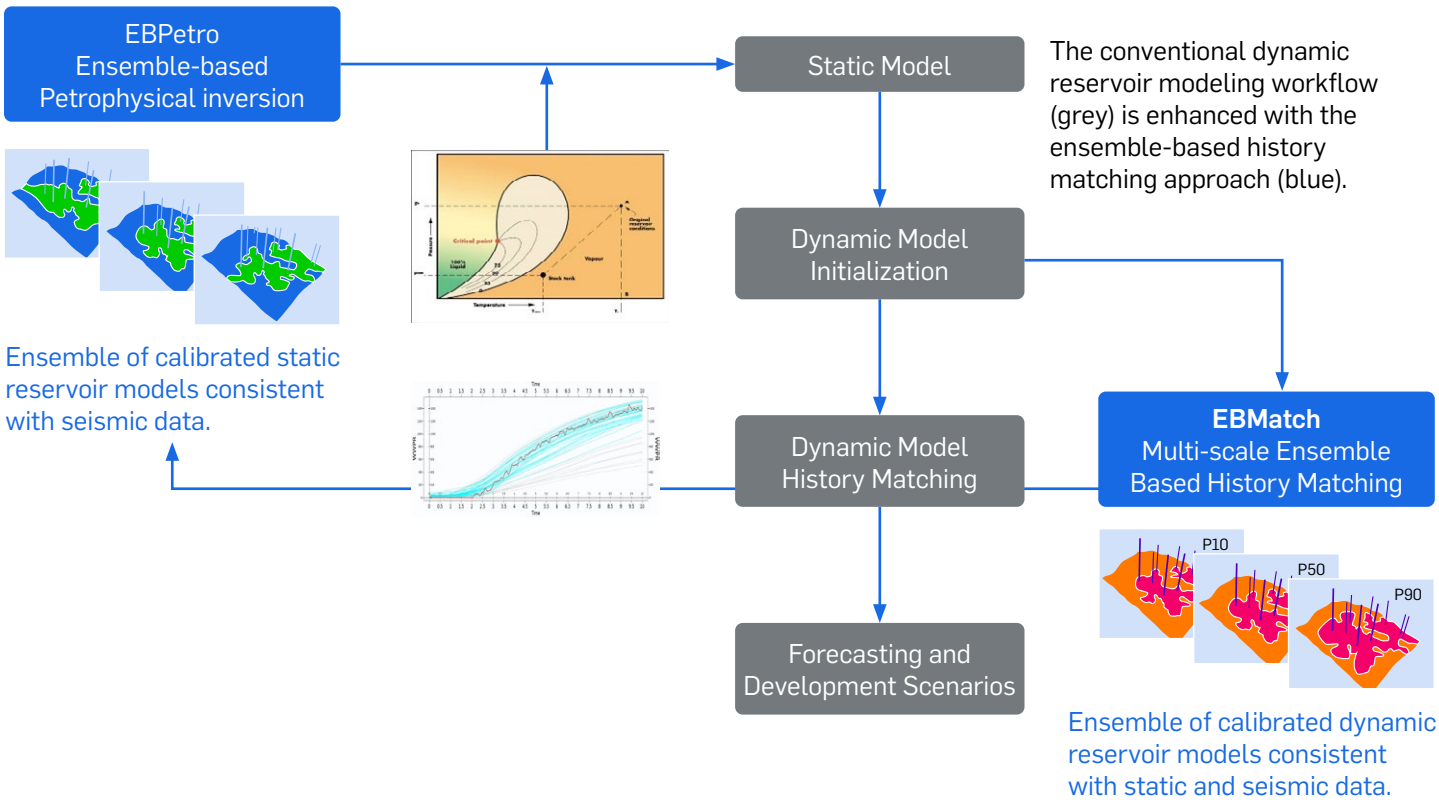
EBMatch updates multiple realizations of static reservoir grid properties (permeability, porosity, etc.) in order to improve the match to the observed production history data (red dots). The grey curves show flow simulation results of the realizations before, and the blue curves show the results after ensemble-based history matching of these multiple realizations of static properties.
From Gentilhomme et al. 2015



The porosity detail visible in the initial model (top) is preserved during the history match by EBMatch (middle) thanks to the multi-scale approach. A standard grid-blocked history match (bottom) results in loss of detail, which will impact flow simulation results

EBMatch

EBMatch workflow



Multi-scale ensemble-based history matching (Gentilhomme et al., 2015) aims to improve the match of observed production data with simulations from static models which better preserve the structure within the initial models that may carry important information such as seismic or geological interpretations:

- Flow simulations conducted for the entire ensemble of static model realizations - production responses are compared with production observations
- Inversion of the static models to better fit the production observations
- Multi-scale approach (starting with a coarse grid and progressing to finer grids) to ensure a better overall dynamic model history match which still preserves the structural details from the seismic data in the static model
- Multi-scale ensemble-based history matching can be applied on seismically-constrained static and dynamic models
- Seismic information is preserved throughout the process from static modelling to dynamic modelling; uncertainty is assessed and reduced during history matching

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