



ResX 4D Seismic

Qualitative & quantitative
use of 4D seismic data

Better decisions with ensembles that are consistent with static, production and 4D seismic data

The shooting of 4D seismic at regular intervals is a significant cost for an operator, but it provides critical information on the evolving location of fluid or fluid/gas contacts, bypassed hydrocarbons, reservoir connectivity and other challenges. While there are uncertainties related to imaging and the quantification of the nature of the fluids, 4D seismic monitors the distribution of fluids in relation to production and injection wells. Resoptima uniquely enables the integration of 4D seismic data into the tight iterative loop conditioning the subsurface model and production history concurrently, consistently managing the added uncertainties and their impact on predictions.

Facilitating the integration of 4D seismic

- An add-on module to ResX
- Available on Petrel* or DELFI* platforms
- Integrate single or multiple 4D acquisitions
- Match in the seismic, elastic properties or simulation domains

Industry-driven

- Developed within a JIP 2018-2019
- 4 operators and 2 service companies
- Tested and validated on existing fields

* Mark of Schlumberger



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Quantitative 4D Seismic Assisted History Matching Using Ensemble-Based Methods on the Vilje Field

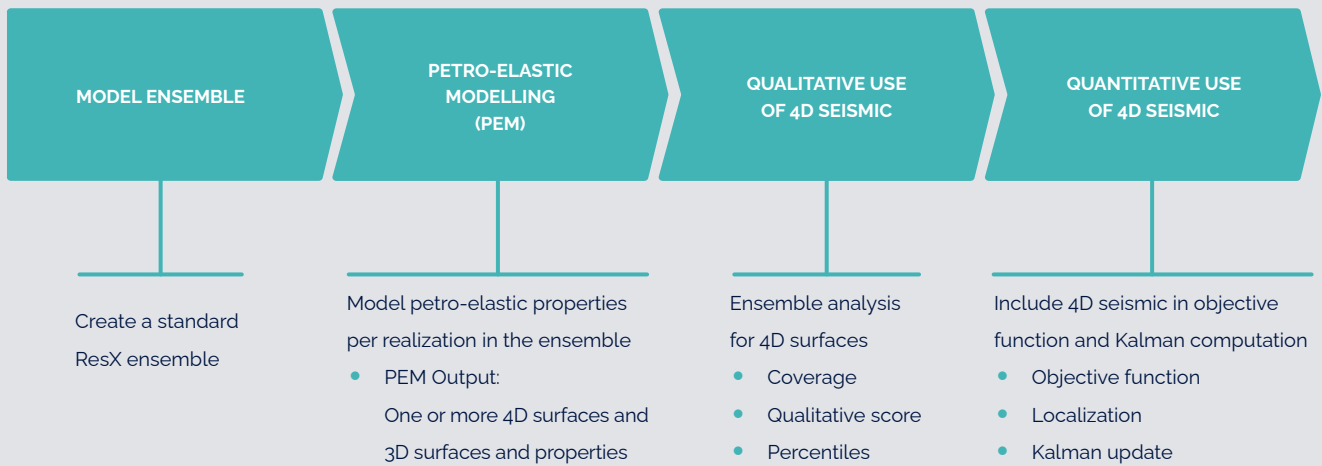
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Ultimately, the inclusion of 4D seismic is supporting better informed decision making

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The user can chose the domain in which to perform the matching.
 The workflow schema shown here uses the petro-elastic modelling domain (vp, vs, rho, DVP/VP, ...).
 Alternately the seismic domain (AVO/AVA) or the simulation domain could have been used.

Systematic use of 4D seismic in modelling

The ResX 4D seismic workflow provides a systematic framework for the use of 4D seismic data for reservoir characterization and history-matching. The output of the 4D workflow is an ensemble of reservoir models that are consistent with static, production and 4D seismic data, while capturing uncertainty and exposing shortcomings and biases present in the model. This results in a better understanding of reservoir connectivity, flow barriers and bypassed hydrocarbons. in turn leading to better decision-making for assets including locating infill drilling and optimizing production and injection flow rates.



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