

# IDENTIFYING SUITABLE METRICS FOR COMPARING DATA IN SEISMIC HISTORY MATCHING

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## ABSTRACT

An approach is proposed for improving the use of seismic data in populating geological models. Since seismic data provide information on the inter-well variability of geologic properties, seismic history matching has become invaluable and requires that comparison is made of observed and predicted seismic data. Often this comparison is done with the wrong assumption that the observed data is properly calibrated and represents the same physical properties that are modelled. This study will examine alternative approaches so that the relative nature of time-lapse seismic can be properly examined and calibrated to ensure proper data assimilation in seismic history matching. The approach proposed here involves a robust 2-stage computer-aided workflow for updating reservoir properties in the numerical earth models. In the first stage, measured seismic data will be calibrated with petro-physical and rock-physics data, inverted, normalised, and cross-scaled, and incorporated in seismic history matching workflow for quantitative comparison to the predictions of reservoir simulations, while generating an ensemble of earth models in an optimisation loop. In the second stage the models will be fed into a simple, fast and robust novel appraisal workflow for thorough quantitative assessment of the value of information provided by the seismic data, and for the evaluation of measures of data resolution and trade-off in the earth model properties within Bayesian framework. The approach will be validated with some synthetic data and Norne field data, and will provide a powerful tool to the oil and gas industry for increased confidence in building and populating geological models.

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