

FACIES AND RESERVOIR PROPERTIES ESTIMATION BY TRANSDIMENSIONAL SEISMIC INVERSION

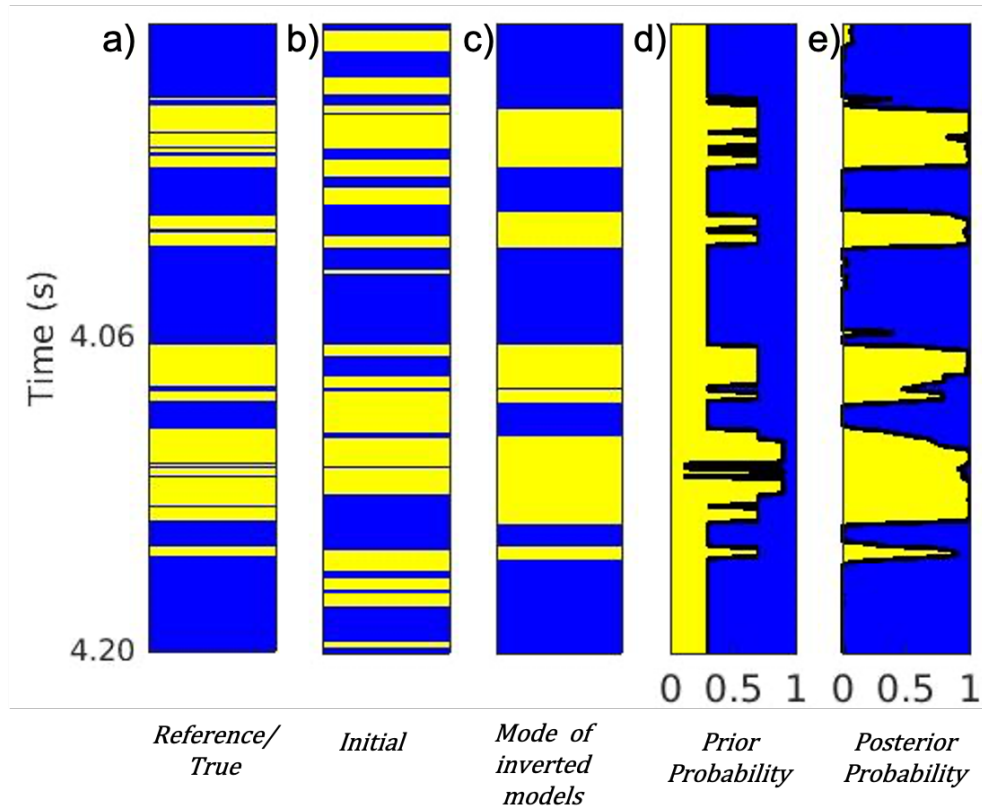
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ABSTRACT

We present a new methodology for seismic inversion that generates high resolution reservoir models of facies and elastic properties from pre-stack data. Our inversion algorithm uses a transdimensional approach in which, in addition to the layer properties, the number of layers is also treated as an unknown. RJMCMC (reversible jump markov chain monte carlo) is an effective tool to solve such transdimensional problems; it generates high resolution models of reservoir properties. Here, we extend the RJMCMC algorithm to simultaneously invert for facies and elastic reservoir properties. At each location, the target elastic reservoir properties generally have multimodal and non-parametric distributions. We extend the RJMCMC method to iteratively sampling the facies, by moving from one mode to another, and reservoir properties, by sampling within the same mode. The integration of facies classification within the reservoir characterization processes reduces the non-uniqueness of the inverse problem and produces geologically consistent reservoir properties.



Facies inversion with the proposed sampling method in case of synthetic seismic data a) the true/reference facies model b) one of the starting models c) the most likely facies model obtained by our proposed method using five different chains d) prior probability of facies distribution e) posterior probability of facies distribution