High-resolution characterization of the North Sea fluvio-deltaic system by seismic Bayesian inversion

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The main goal of seismic interpretation is the recovery of an accurate model of the subsurface. The details of potential reservoirs that we wish to characterize are only indirectly present in the reflected acoustic wave fields that we measure at the surface. Therefore, reservoir characterization from seismic data can only be accomplished after solving an inverse problem. The primary focus of this paper is the development of a method that estimates the acoustic parameters of the seismic data at the sub-seismic scale in clinoform sequences. The method was tested on an example of the Upper Cenozoic fluvio-deltaic system in a 3D seismic dataset of block F3 in the North Sea. The Bayesian seismic inversion method presented here uses a priori information obtained from a well and shows encouraging results when applied to a clinoform field example from the North Sea. Acoustic parameters of the sub-seismic layers with thicknesses as thin as 1/15th of the seismic wavelength were estimated with a high accuracy (errors less than 10%). The resulting geological model of the subsurface demonstrates a good match with the measured seismic and the a priori information.