4D SEISMIC INVERSION WITH AND WITHOUT LOW FREQUENCY UPDATE
AT THE NORNE FIELD

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ABSTRACT
This work examines how a low frequency update of the initial model affects the result of 4D seismic inversion at the Norne field. The importance of this work is to investigate the possibility to incorporate information from time shifts into the inversion workflow in order to obtain the most reliable estimate of relative acoustic impedance. The inversion of the monitor survey was completed with the same initial model as the base survey, and with the same model updates based on information obtained from estimated time shifts. The purpose of the low frequency update is to incorporate the additional information that time shifts can provide into the inversion process. Time shift maps between two seismic vintages are generated by maximizing the cross correlation of the corresponding traces for a time window above and below the reservoir. These maps are used to align the surveys correctly and to create the low frequency update. The results indicate large variations in estimated relative acoustic impedance based on whether the low frequency updates are used or not.
The figure shows a part of crossline 1458, which runs through the water injector C-2H. In the upper panel the difference data 2001-2006 is shown. In the middle panel the estimates of relative acoustic impedance change from inversion without a low frequency update is shown. Here a strong increase in acoustic impedance is observed around the well in dark colors. In the lower panel the estimates of relative acoustic impedance change from inversion with a low frequency update is shown. Compared with the middle panel the results are quite different. There has been a negative shift in the estimated values of acoustic impedance change. This indicates the strong impact of the low frequency updates.