

Broadband Seismic Acquisition, Processing and Imaging using Dispersed Source Arrays

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ABSTRACT

During the last few years the importance of recording, processing and interpreting a wider range of frequencies has been highlighted with numerous field acquisition examples and case studies. A great effort has been dedicated to the recording of low as well as high frequencies for obtaining high resolution images. The ability to reduce the seismic wavelet's side lobes by recording lower frequencies, and at the same time the increase of bandwidth has been proven to be the main advantage of recording broadband data. The land seismic data used in this paper was acquired in Saudi Arabia by using an acquisition configuration based on a variation of the dispersed source arrays concept (Berkhout, 2012). During this seismic experiment we were sweeping three different frequency bands, namely, 1.5 to 8 Hz, 6.5 to 54 Hz and 50 to 87 Hz and with various sweep lengths (Kim and Tsingas, 2014). To increase productivity the data were continuously recorded in a blended mode. In this study, we outline a novel seismic acquisition survey, which aimed for the optimum and efficient recording of broadband seismic data and we demonstrate the methodology employed for optimum broadband processing in terms of deblending full waveform inversion (FWI) and reverse time migration (RTM) technologies.