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Enhancement of the automatic onset time picking via wavelet thresholding

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Since arrival time-picking is a critical step in the analysis of geophysical data, many time picking algorithms have been developed. Nowadays, the ‘’short-time-average through long-time-average trigger” (STA/LTA) in different forms are the most commonly used.

This study aims at improving this algorithm in the presence of high amplitude noise. The suggested method consists of denoising the seismic trace using the discrete wavelet transform. Therefore, the STA/LTA curve obtained from the denoised trace displays a faster build up at the position of the wave arrival, and the picking error is reduced.

The application of this technique is first demonstrated on synthetic seismic traces with varying noise levels, then extended to uphole seismic traces recorded in the Algerian Sahara. The results show that the picked first arrivals are more accurate than those yielded by the standard STA/LTA algorithm and this method can tolerate high noise levels.

Keywords: picking, first arrival, seismic wave, wavelet thresholding.