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Empirical mode decomposition method applied to high frequency seismic data : An aid to the seismic interpretation and fault detection

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Very High-Resolution (VHR) reflection seismics such as sparkers and minisparkers constitutes a powerful tool to study the sedimentary and tectonics processes in shallow waters, with a metric (or less) vertical resolution and penetration up to 200 meters in soft sediments. These systems are relatively easy to handle and are frequently carried out on continental shelves, but are unfortunatly sensitive to noise (currents, weather conditions). Moreover, the first multiple reflection due to the shallow water depth often masks the underlying true seismic reflectors and complicates the interpretation of geological structures. The basic data processing includes frequency filtering and attenuation correction using a true signal processing software in order to improve the ratio signal/noise but can not remove the first multiple reflection. Empirical mode decomposition is a method developed in order to filter a signal and to decompose it into a sum of modes. With the help of Hilbert-Huang spectral analysis, it can be used to locally extract an amplitude and a frequency. We use this method for each vertical transect, and identify structural changes automatically in each vertical slice. We explore the possibility of such automatic signal processing technique to aid conventional seismic interpretation. New seismic profiles have been processed in order to better delineate the sedimentary sequences and to precise the fault detection.