Geophysical Research Abstracts
Vol. 16, EGU2014-257-1, 2014
EGU General Assembly 2014

Application of curvelet denoising to 2D and 3D post-stack seismic data - practical considerations.

Andrzej Górszczyk, Anna Adamczyk, and Michał Malinowski
Institute of Geophysics, Polish Academy of Sciences, Poland (agorszczyk@igf.edu.pl)

Contamination of seismic signal with noise of various origins is one of the main challenges encountered during processing and interpretation of seismic data. Several methods exist for eliminating different type of noises like coherent or incoherent one, multiples etc., but optimal random noise attenuation still remains difficult. Here we investigate relatively new technique based on Discret Curvelet Transform (DCT). Features like multi-resolution, multi-direction and locality of DCT introduce minimal overlapping between coefficients representing signal and noise in curvelet domain which is prime advantage of this method. We present practical application of DCT describing its main features and focusing on useful details, especially more complex thresholding based on analyzing 2D Fourier spectrum and vector of curvelet coefficients. We demonstrate that better understanding of relations between DCT properties and obtained results in pair with additional investigation of curvelet domain provide better localization and, in consequence, separation of noise and signal energy. Introduced scale and angle dependent weighting of curvelet coefficients leads to significant improvements of results with respect to noise attenuation and signal energy preservation. Effectiveness of our approach is demonstrated both on synthetic 2D sections with white and colored noise applied, as well as on real 2D and 3D post-stack seismic data. Curvelet denoising seems to be much more robust as compared to coherency or band-pass filtering, especially when noise and signal spectra overlaps.