A fast non-local transform-domain method for seismic random noise attenuation

*Sajjad Amani[1], Hitoshi Mikada[1], Junichi Takekawa[1]

1.Kyoto Univ.

All of the seismic data include different amounts of seismic random noises, even after doing a comprehensive seismic data processing. This results in lower signal to noise ratio (SNR), or in other word, lower quality of seismic data. Because of the time consuming processes of methods for doing seismic random noise attenuation, data processing companies don't perform additional processing for attenuating of random noises after doing conventional methods like stacking and applying some filters. BUT, what about a very fast method which increases SNR both in pre-stacked and post-stacked data, significantly? Here, in this study we introduce an algorithm which is called 'Fast 3D Block Matching (F3DBM)' which combines the advantages of non-local and transform-domain denoising methods. This method has superior capability for preserving discontinuities presented in seismic data both qualitatively and quantitatively. We compare the ability of F3DBM with that of the state-of-the-art curvelet-based seismic denoising method for random noise attenuation both in pre-stacked and post-stacked data.

Keywords: Random noise, Block matching, Curvelet-based denoising method, Pre-stacked and
          post-stacked seismic data denoising