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# Retrieving the Reflection events from passive signals

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To create virtual shot gather from passive signals it is essential to cross-correlate all the signals with the reference trace. Since surface sources dominate the origin of seismic noise, the correlated sections are highly dominated by surface waves. If the target is surface wave inversion general cross-correlation will suit the target. But if the extraction of body waves from those signals is the main objective, coherent ground roll events mask the body waves making it difficult to extract them. To tackle this issue a frequency-spatial nonCoherent filter (FX-NCF) plus a post-correlation processing module are introduced. FX-NCF is a prediction filter and the filter operator is a function of frequency, station interval and the slope of the interested event. In the frequency domain, the filter is looking for the prediction of n-th trace coherence spectrum from the (n-1)-th signal's coherence spectrum by minimizing the objective function. Hybrid norms used to minimize the error. The coherence spectrum of each trace is the coherency between the reference signal and the desired trace. Applying the FX-NCF on 2D real recorded passive signals shows its superiority over general cross-correlation, deconvolution interferometry, cross-coherence and multi-taper-method-coherence-estimation methods in highlighting surface and body waves also improving the signal-to-noise (S/N) ratio. To show the necessity of post correlation processing (before applying on real recorded signals) to highlight reflection events, hyperbolic Radon transform (HRT) as a suitable post-correlation module applied on correlated section due to applied FX-NCF on simulated passive signals from a simple 2D synthetic model. The result encouraged us to apply the same hybrid modules (FX-NCF plus HRT) on real recorded passive signals to reconstruct wanted reflection events.