Improving of signal-to-noise ratio by nonlinear stacking of six-component seismograms

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In general, seismograms suffer from undesirable noise, which can complicate identification and analysis of weak seismic phases. Six-component seismograms registered by the same instrument (e.g. Rotaphone or small-aperture array - seismic antenna) can help to solve this problem by improving signal to noise ratio of the six-component records. Both Rotaphones and seismic antennas provide multiple earthquake records either at a single point or within a small area. A recently developed technique based on non-linear stacking these multiple seismic signals. The method is applicable also in epicentral regions of microearthquakes. Rotation-to-translation relations generalized to proximal sources with directional radiation are employed in this approach. Examples of signal-to-noise ratio improvement in six-component Rotaphone records measured in the vicinity of Katla volcano, South Iceland, are shown.