

Evolution of Pre-stack Multiple Suppression based on velocity discrimination

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Separation and removal of multiple energy from seismic data can be a very challenging task. Currently, the seismic industry accomplishes multiple suppression in two principle venues, velocity dependent and velocity independent methods. Multiple identification and removal is essential in both marine and land data due to the extensive masking of primary reflection data at potential reservoir levels. Marine data are characterized with multiple arrivals which can be modeled quite easily. Land data multiples can be very difficult to model due to near-surface. Here, we present an overview of velocity dependent Radon and FK filtering techniques that identify and remove unwanted multiple energies.

We have carried out a comparative study of several pre-stack multiple suppression techniques utilizing different commercial and in-house developed software. We demonstrate the shortcomings of using FK and Radon (hyperbolic/parabolic) filters which impact the original texture of the seismic signals in terms of amplitude and frequency. We also demonstrate the success of a new in-house developed multiple suppression technique. This new velocity dependent technique is based on the path-summation approach and utilizes FK and step-variant median filters. In a real land data case, this technique appears to preserve relative amplitudes while successfully attacking the multiples.

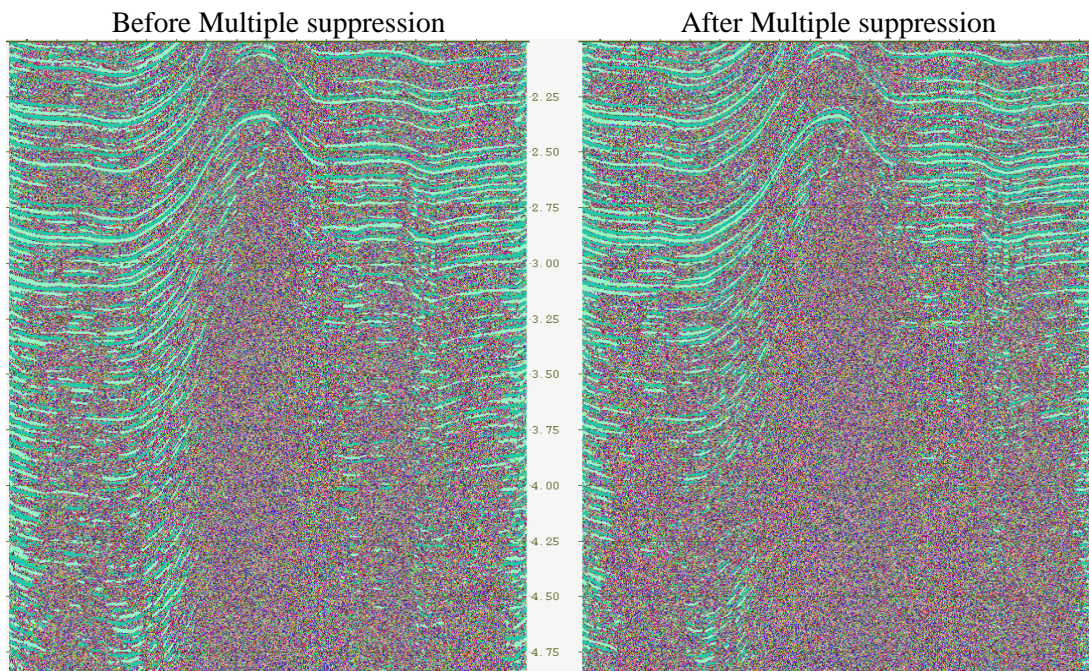


Figure 1. A comparison of stack sections without (left) and with (right) the new multiple suppression technique.