ABSTRACT

Multiple noise is one of the major challenges in marine seismic reflection data processing, as it can obscure primary reflections and degrade the quality of subsurface imaging. This study aims to identify the characteristics of multiple noise and optimize Radon Demultiple parameters to attenuate multiples in 2D marine seismic data from Field "H". The data processing workflow consisted of preprocessing, multiple identification, multiple attenuation using the Radon Demultiple method, and post-attenuation processing. Multiple identification was carried out through the analysis of CMP gathers, velocity spectra, and stacked sections. The optimization of Radon Demultiple parameters was performed iteratively by evaluating velocity analysis results, multiple models, and the quality of stacked sections to achieve optimal separation between primary reflection energy and multiple energy while preserving primary reflections. The results indicate that the dominant multiples present in the dataset are water-bottom multiples, characterized by repetitive reflection patterns, relatively strong amplitudes, and the presence of energy trends with lower apparent velocities than those of the primary reflections. Optimization of the mute moveout parameter in the Radon Demultiple process from 150 ms to 50 ms successfully attenuated multiple energy, as evidenced by a reduction in semblance peaks along the multiple velocity trend, decreased multiple amplitudes on CMP gathers, and improved reflector continuity on the stacked section. These results demonstrate that the optimized Radon Demultiple parameters effectively enhance water-bottom multiple attenuation without significantly affecting primary reflections, resulting in clearer subsurface images and supporting more reliable geological interpretation.

Keywords: seismic data processing, 2D marine seismic data, multiple attenuation, Radon Demultiple, water-bottom multiple.