MWD for Shallow Water Demultiple: A Hibernia Case Study

Hongzheng Jin[1], Min Yang[1], Ping Wang[1], Yan Huang[1], Mervyn J. Parry[2], and Yvonne Paisant-Allen[2]
[1]*CGGVeritas, Houston, Texas, USA*
[2]*ExxonMobil, Houston, Texas, USA*

Abstract

Model-based Water-layer Demultiple (MWD) is a recently-developed method aimed at tackling the challenge of multiple attenuation in shallow water. MWD works by modeling the Green's function of the water-bottom primary reflections based on a user-supplied water-layer model, then convolving it with the recorded data to predict water-layer-related multiples. In this paper, MWD is applied to Hibernia field data which has a water depth of around 70-90 meters. The results show that while SRME by itself has limited success, MWD is effective in attacking water-layer-related multiples. The effectiveness is attributed to the fact that MWD predicts the multiple models with correct relative amplitude and a spectrum similar to the input data's. SRME, on the other hand, suffers in shallow-water situations, primarily due to cross-talk between multiples. Once the water-layer-related multiples are removed by MWD, SRME can then be applied to predict and eliminate other types of surface-related multiples which tend to have longer periodicity and less cross-talk. The combination of MWD and SRME is demonstrated as an effective demultiple package for shallow-water data and results in fewer residual multiples and better-preserved primaries over tau-p gapped deconvolution. This, in turn, contributes to a more realistic velocity model and, finally, higher quality images.