Multiple Prediction and Subtraction from Apparent Slowness Relations In 2D synthetic and Field Ocean-bottom Cable Data and 3D Synthetic Data

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A target oriented algorithm is developed for the prediction of multiples recorded on ocean-bottom cables by utilizing apparent slowness relations in common-source and common-receiver gathers. It is based on combining offsets and times of primary reflections to predict multiples by matching apparent slownesses at all source and receiver locations; all higher order multiples can be predicted by matching apparent slowness alternately in common-source and common-receiver gathers. No knowledge of the subsurface velocity is required. Traveltimes of the direct waves and primary reflections need to be picked from common-source gathers. The subtraction of multiples involves flattening the predicted moveout of multiple events, subtracting a local spatial average trace from each trace, within a fixed time window containing the wavelet of the multiple, and then shifting the data back to its original time. Tests of 2D synthetic and field data and 3D synthetic data indicate that the proposed method predicts multiples very well and removes them from seismic data efficiently with negligible affect on the primary reflections, as long as the primary and multiple reflections do not overlap in time and slowness over substantial offset windows.