ION

IME – Interbed Multiple Elimination

At ION, we can use either a convolution/correlation approach where primary reflections arriving on different source-receiver pairs are combined to emulate the ray path taken by an associated interbed multiple bounce, (as shown in the figure below) or an interbed multiple prediction based on wavefield extrapolation.

Problematic interbed multiples are frequently associated with a generating event with a strong reflectivity coefficient. Most significant interbed multiples have their two bottom bounces on a common anomalously bright event, and that event ends up acting as a mirror for the events above. Common examples of bright events are top of salt, carbonates, volcanic, and coal layers.

The interbed travel time can be emulated by convolving primary travel paths AC, with DB and correlating out primary path DC. This is very similar to SRME, however requires a good understanding of the interbed generating mechanism to work effectively. This requires an initial analysis to identify the multiple generators of interest, and an accurate pick in time of these horizons. Interbed multiples tend to be short in period, meaning apertures are much smaller than in SRME.

IME is not limited by water depth though all water layer multiples should be attenuated prior to IME. A single pass of IME will only predict those interbed multiples for which the upper reflector lies above a specified horizon and the lower reflectors lie beneath. For different generations of very strong interbeds, multiple passes of IME can be applied working from shallow to deep events.
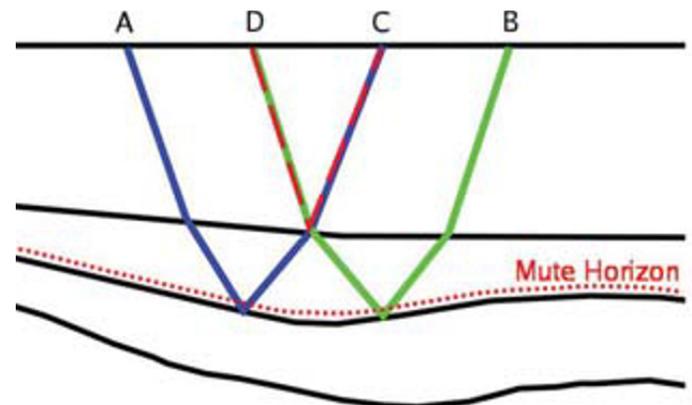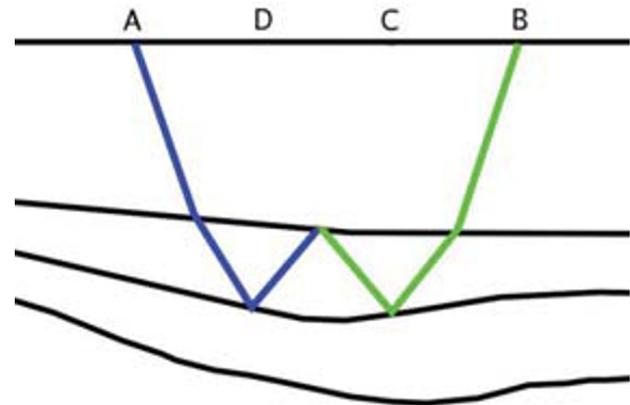
The example shown below is from data in the Western Desert of Egypt: it is clear from the results that it can be extremely difficult to be certain that a given event is indeed an interbed multiple, unless we have an external QC such as a well log. Comparison with well synthetics gives us confidence that the removed energy was indeed undesired multiple.
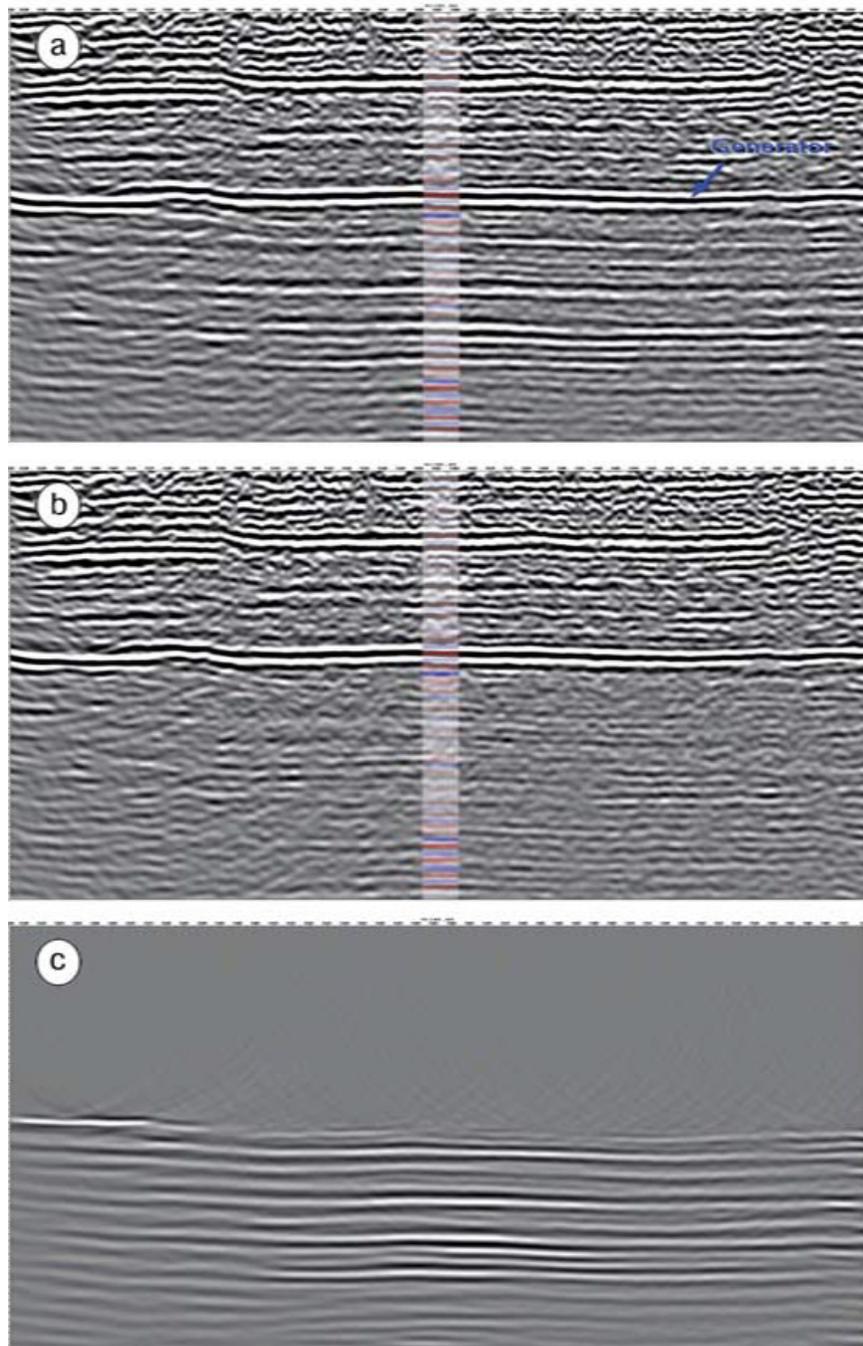
(a) Egyptian Western Desert data with well synthetic overlay, (b) with interbed multiples attenuated, and (c) removed interbed multiples