Reverse Time Migration of Structures Below Gas Clouds

*Sajjad Amani[1], Hitoshi Mikada[1], Junichi Takekawa[1]

1. Kyoto University

It is important to estimate structural information below gas clouds or chimneys in exploration geophysics for better earth resources prospecting. Since compressional waves are sensitive to the low bulk modulus of gas, they are strongly attenuated and, in turn, any signals reflected back from structures below gas bearing zones suffer lack of resolution. The presence of a gas could be related to a potential hydrocarbon reservoir below the gas bearing zones. The enhancement of resolution to structures below is considered as a key to the hydrocarbon potential. These zones are associated with high attenuation but the extent of the zones may not be well determined due to the spatial variation of saturation in both gas and formation fluids in the gas bearing zones. The conventional methods are based on the seismic wave equations that do not consider the attenuation (Q) in themselves which come up with the wrong locations. Here, we apply a novel technique to locate these zones using the seismic data calculated by the time-domain viscoacoustic wave equation following a constant Q model. The technique we use here is reverse time migration (RTM) which uses all the wave information to provide more accurate subsurface images. Then, using the different numerical simulations, we show the effectiveness of the proposed Q-RTM approach compared to the conventional methods for locating of gas clouds and monitoring of the structures under these zones.

Keywords: Gas cloud, Attenuation, Viscoacoustic Wave Equation, Reverse Time Migration

