

Seismic Imaging of Gas Hydrate Distribution - A Case Study

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Abstract

Natural gas hydrates, a type of inclusion compound or clathrate, are composed of gas molecules trapped within a cage of water molecules. The pressure and temperature conditions for gas hydrate the stability zone are found in permafrost areas and deepwater basins around the world (Kvenvolden, 1993). The presence of gas hydrates in permafrost regions has been confirmed by core samples recovered from mallik gas hydrate research wells located within Mackenzie Delta in Northwest Territories of Canada (Dallimore et al., 1999 and Dallimore et al., 2005). Strong vertical variations of sonic logs and seismic expressions of gas hydrates indicate that lithological heterogeneities control the lateral distribution of gas hydrates. Seismic scattering studies predict that typical horizontal scales and strong velocity contrasts due to gas hydrate concentration will generate strong forward scattering, leaving only weak energy to be captured by surface receivers. Vertical Seismic Profile (VSP) techniques can be used to calibrate seismic imaging of gas hydrate distribution through surface seismograms.