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Pore Pressure Prediction in Gas Hydrate Bearing Sediments of Krishna-Godavari Basin, India

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Pre-drill estimation of pore pressure (PP) from seismic data is a standard practice followed by many major oil companies. PP information guides the development of the mud schedule, casing program, rig selection and wellhead ratings. Pore Pressure analysis is required to understand geological influences on maturation and migration of hydrocarbons, and their ultimate trapping in reservoirs that are reachable with the drill bit. In recent years prediction of pore pressure based on 2D/3D seismic allow scanning to provide alternative well locations and to see the distribution of pressure with respect to the structure and geology. An attempt has been taken to describe the procedure of PP prediction from 2D marine seismic data acquired over NGHP-01-10 site in the Krishna-Godavari (K-G) offshore, India. PP has been predicted in the gas hydrate bearing sediments in Krishna-Godavari (K-G) basin at site National Gas Hydrate Programme (NGHP) 01-10 using multilayer feed forward neural network (MLFN). A series of elastic parameters namely P-wave velocity (Vp), S-wave velocity (Vs), density (Dn), Vp/Vs, P impedance (Zp) and S impedance (Zs) have been derived from seismic data using pre-stack inversion [1]. PP has been predicted using MLFN network for the study area with above mentioned seismic sections including four wells [2]. PP estimated from the sonic transit time log has been calibrated with pressure core measurement for the depth interval 1060-1280 m and its magnitude is ranging from 10.5 to 12.9 MPa where the vertical stress varies from 10.7 to 13.4 MPa at the same depth interval. The estimated PP has been treated as target log and Zp, Zs, Vp/Vs and Dn have been used as input parameters during the training of MLFN. The trained network is then used to generate subsurface PP along two 2D multi channel seismic section (line-X and line-Y) at site NGHP01-10 within the time interval of 1420 – 1620 ms corresponding to the depth interval of 1060-1280m. The result shows the pressure is hydrostatic within gas hydrate bearing sediments and above-hydrostatic below the gas hydrate bearing zone.

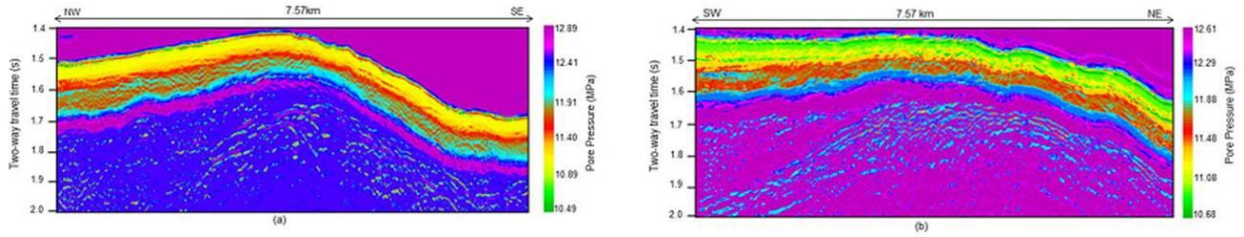

Figure 1: MLFN predicted pore pressure distribution in gas hydrate bearing sediments (a) for line X and (b) for line Y in K-G basin.

References

[1] Hampson D et al (2001) Geophysics 66(1): 220-236

[2] Singha D K et al (2014) Marine Geology 357:1-11