

Acoustic impedance inversion and porosity inversion

After inversion analysis at well location, the inverted impedance obtained along seismic line. High impedance was observed above base of gas hydrate stability zone impedance was observed below BSR, probable free gas zone. A small patch of high acoustic impedance was observed just above the base of landslide debris may be due to coarse grain sand deposition (fig. 5).

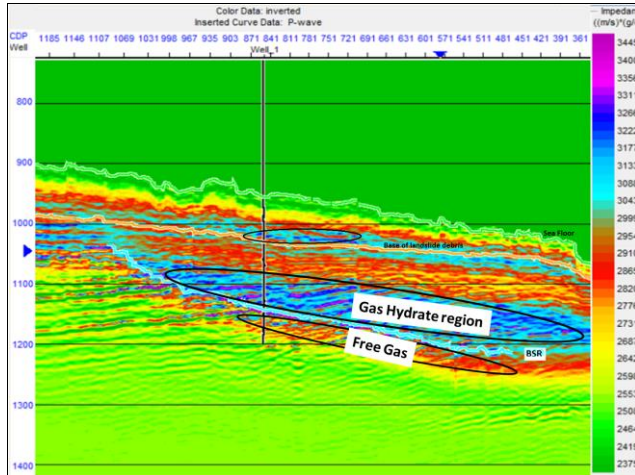


Figure 5: Inverted acoustic impedance along the seismic line showing high impedance and low impedance values respectively at gas hydrates and free gas zone and small patch of high impedance just above base of landslide debris.

The inverted porosity along seismic line obtained from porosity inversion shown in figure 6. Low porosity above BSR in gas hydrate zone and high porosity in the free gas zone below BSR was observed on seismic section. Low to medium acoustic impedance and medium to high porosity below seafloor was observed due to presence of unconsolidated clay/silt sediments.

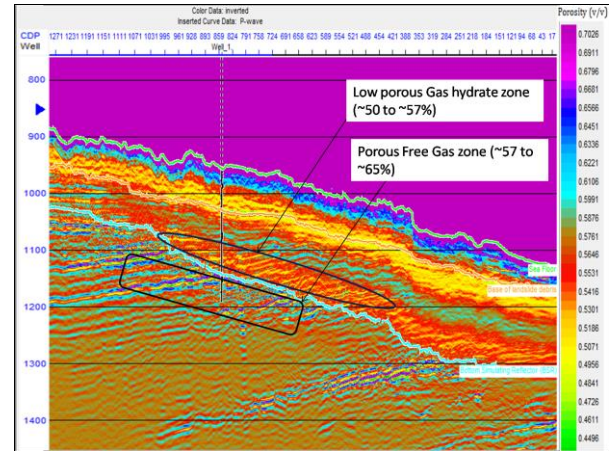


Figure 6: Inverted porosity along the seismic line showing low porosity in gas hydrate zone above BSR and high porosity below BSR in free gas zone.

Conclusions

Estimation of Acoustic impedance and porosity implemented on seismic section using model based acoustic impedance inversion and porosity inversion. The acoustic impedance and porosity wavelet inversely correlated due to negative trend between acoustic impedance and porosity. The porosity wavelet is convolved with porosity reflectivity and a better correlation is achieved between resulting synthetic and seismic traces. This work demonstrated porosity prediction methodology from post-stack seismic data. Predicted porosity section is following a good correlation with the geological trends of Hikurangi margin. The inverted acoustic impedance and porosity varies from 3050 to 3450 m/s*g/cc and 50% to 60% respectively in gas hydrate bearing zone whereas low value of acoustic impedance about 2600 to 3000 m/s*g/c and high porosity value in the range of 60-70% corresponds to occurrence of free gas.

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