

Hydrate Quantification SW offshore Taiwan through the integration of EM and seismic data

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Abstract

Our goal is taking the advantages of seismic and electromagnetic experiments to carry out the quantification of methane hydrate saturation. Lack of the drilling data and sample experiences of gas hydrate research, the quantification of hydrates through integrating survey data is essential to efficiently and cost effectively plan a drilling campaign and for a resource assessment of methane hydrates as an energy source to Taiwan. The work carried out in a collaboration of Taiwanese and German scientists and funding organizations. Preliminary and qualitative processing of seismic and electromagnetic data acquired on the Four-Way-Closure accretionary ridge situated on the active margin south-west of Taiwan shows the presence of hydrates and indication that hydrate concentrations are relatively high. We furthermore show that the derivation of quantitative hydrate concentration models from the data is difficult to achieve using either seismic or electromagnetic data alone. Here I establish the porosity model and seawater parameters through compiling previous research; moreover, we combine the resistivity model inversion to finish the calculation subsequently.

For our 1-D CSEM inversion results, they are very consistent with the corresponding seismic reflection features. As a result, we observed a high resistivity layer in shallow sediment at the top of the Four-Way Closure Ridge (<100mbsf), which may cause 80% saturation hydrate. Besides, there are some obvious resistivity increasing at the basin boundary east of the ridge, the gradually change is from 150mbsf to BSR, which might indicate the high potential (saturation > 60%) of hydrate exist.

Keywords—methane hydrates, marine electromagnetics, marine seismic, CSEM, P-cable seismic, joint inversion.