

An approach to estimate gas hydrate saturation from 3-D heterogeneous resistivity model: A study from Krishna-Godavari basin, Eastern Indian offshore

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1. A gas hydrate reservoir is characterized three dimensionally using downhole resistivity data in Indian offshore basin.
2. A spectral based method is proposed to simulate 3-D heterogeneous resistivity and density model using downhole data.
3. Volumetric gas hydrate saturation is estimated from simulated heterogeneous resistivity and density model in the Krishna Godavari basin.

Pure gas hydrates are highly resistive compared to the host sediments, and their presence in the pore space of sediments increase the resistivity of the formation. The anomalous increase of resistivity is used as a proxy for the delineation of gas hydrates using the resistivity log. A 3-D heterogeneous resistivity model has been constructed from one dimensional resistivity log in Krishna Godavari (KG) basin, eastern Indian offshore. The simulated model contains all small scale variation in resistivity of the reservoir and maintains all properties associated with covariance, like root mean square fluctuation, characteristic scales and fractal dimension of the observed log. We have estimated volumetric hydrate saturation (fig 1) using the three dimensional simulated model. The porosity used for estimating hydrate saturation is calculated from the simulated density field generated using the observed density log. Estimated average gas hydrate saturation is about 9.84% of the pore volume over a 1000 x 1000 x 131 cubic meters area surrounding the well log 10.

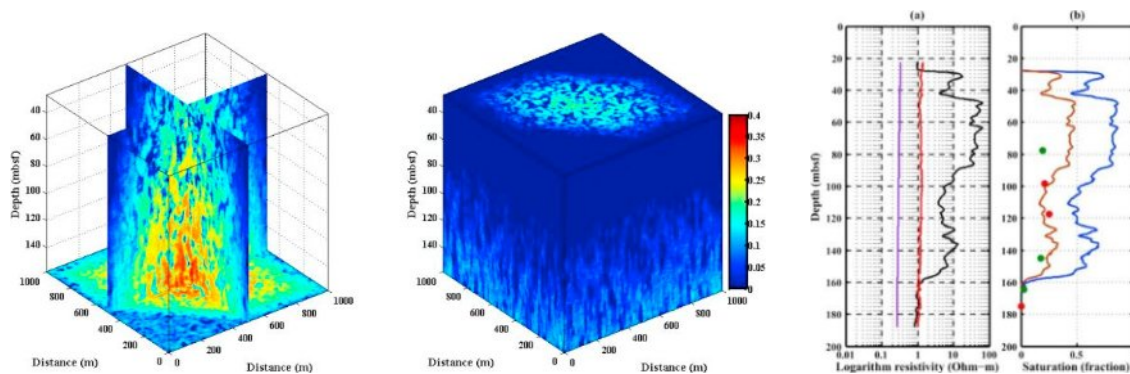


Fig 1. 3-D cross-sectional view of gas hydrate saturation (left), 3-D volumetric view (1000 m × 1000 m × 131 m) of gas hydrate saturation (middle), and at the right: observed resistivity (black line), formation water resistivity (purple line), water saturated sediment resistivity (red line) (a), gas hydrate saturation derived from observed resistivity, direct hydrate saturation estimated from the pressure cores at well 10B (red dots) and 10D (green dots).

For Further details:

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