Comparison between Gas Hydrate Saturation Estimation Techniques of Krishna Godavari -Basin, India and Mount Elbert, Alaska.

Abstract

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Gas hydrates, or clathrates, are ice-like crystalline solids composed of water molecules surrounding gas molecules. In-situ physical characteristics of gas hydrate-bearing sediments have been investigated extensively because of their widespread occurrence in most of the world oceans and in permafrost regions and their recognition as a negative feedback control on global temperature fluctuations, as a potential energy resource, and as a factor in seafloor stability and safety issues.

Gas hydrate can take on many forms, including small nodules, lenses, veins, fracture-filling, and pore-filling. In the simplest model, rising methane combines with the sediment pore fluid to form gas hydrate, partially replacing the pore fluid (i.e. pore-filling), but little change to the sediment structure or volume.

The presence of gas hydrate in-pore space of marine sediments can therefore significantly affect the bulk physical properties of the sediments. Gas hydrates exhibit relatively high compressional wave Velocity compared to pore-filling fluids such as water therefore, the velocity of gas hydrate bearing sediments are usually elevated. Natural gas hydrate formation reduces the effective porosity and electric conduction, so that gas hydrate bearing sediment has high electrical resistivity.. The measurement of such properties can therefore be used to estimate gas hydrate saturations.

Well logs have been used extensively to characterize in-situ gas hydrate-bearing sediments (GHBS) including saturations acquired at the Mount Elbert, North Slope Alaska which is in the permafrost region and Krishna Godavari Basin which is a petroliferous basin of continental margin located in the east coast of India, provided a unique opportunity to accurately characterize the properties of naturally occurring GHBS and to assist in assessing gas hydrate as a potential energy resource on the Alaska North Slope.

The purpose of this study is to analyze and compare and accurately estimate in-situ gas hydrate saturations using various well logs such as nuclear magnetic resonance (NMR), P- and S-wave velocity, and electrical resistivity logs along with gamma and density logs, measured salinity and temperature data