

Well Log Analysis of Gas Hydrates Bearing Region: Green Canyon, Gulf of Mexico and Mt. Elbert, North Slope Alaska.

Speaker: Srishti Ashish

Advisor: Dr.How-Wei Chen

National Central University, Jhongli City, Taoyuan County, Taiwan

Abstract

Occurrence of gas hydrate has been found worldwide in the continental shelf, marginal seas and polar region. As interest in gas hydrate as a potential energy resource continues to grow, the need for accurate assessments of the amount gas stored in gas hydrate at the accumulation or basin scale becomes more important. Potential gas hydrates production are strongly dependent on a number of reservoir parameters, including the areal extent of the gas hydrate occurrence, reservoir thickness, reservoir porosity and the degree of gas hydrate and free gas saturation. The distribution and saturation of gas hydrate can be determined by seismic imaging and interpretations. Three most difficult reservoir parameters to be determined are the porosity, degree of gas hydrate and free gas saturation. The detailed hydrate bearing sediment properties are available through well logging or from experimental/lab analyses of hydrate samples. Well log processing for oil and gas reserves is customary but processing for gas hydrates becomes relatively advanced. In recent years, a growing number of deep sea drilling expeditions have been dedicated to locating marine gas hydrates and understanding the geologic controls on their occurrence. This has led to execution of gas hydrate research drilling and down hole logging programs.

The purpose of this project is to review the responses of well logs to the presence of gas hydrates, at Mt. Elbert (ME), North Slope Alaska and Green Canyon (GC), Gulf of Mexico and carry out well log processing and analyses and interpretation. This is done by using the software package TechLog - Quanti. Evaluation is done by optimizing simultaneous equations between tools, response parameters and formation component volumes described by one or more interpretation models. The information consists of a set of tools, or equations; a set of formation components, or volumes, and a set of constraints. Implicitly response parameters and other global and model-specific parameters are derived from the log curves, background geological information, and confirmed using cross plots.

At the Mt.Elbert gas hydrates production is identified at two stratigraphic sections bearing reservoir-quality sandstone between 2016-2060ft and 2136-2180ft .Both zones displayed gas-hydrate saturations with values between 60% and 75%. At Green Canyon Gulf Of Mexico three sites were drilled GC955-I, GC955-H, GC955-Q and thick gas-hydrate-filled sand reservoir section has been discovered within the depth interval of 1300~15fbsf. At GC955-Q Gulf Of Mexico gas hydrates bearing zones are identified as shaly sand zones between 1360-1400 fbsf and 1417-1427 fbsf with GH saturations with values varying between 20% to 70 % with occurrence of free gas . At GC955-H Gulf Of Mexico gas hydrates bearing zones are identified as mud rich zones with sand reservoirs between 1360-1440 fbsf , 1460-1469 fbsf and 1470-2186 and 1470-2186 with GH saturations varying between 70~80% with presence of Gas hydrates rich reservoirs.. The description of the existing well log evaluation techniques used to characterize porosities and water saturation in gas hydrate bearing reservoirs is also included in this project.

Keywords: Gas Hydrates, Well Log Processing, Green Canyon, Mt. Elbert