HGS/GSH JOINT DINNER MEETING

SEISMIC GUIDED LOG PROPERTY MAPPING: A CONTROLLED STUDY

Phil Schultz

HGS DINNER MEETING – March 7, 1994
Social Period, 5:30 p.m., Dinner and Meeting, 6:30 p.m.
H.E.S.S. Building, 3121 Buffalo Speedway

A good understanding of the spatial distribution of hydrocarbon reservoir properties, such as porosity, water saturation, permeability and formation volume fractions makes the task of planning developmental drilling and estimating reserves more tractable. When we have 3D seismic data over the reservoir, we use it routinely and effectively to estimate the structure of the reservoir body (or at least the geological structure controlling the reservoir). On the other hand, when it comes time to create maps of reservoir or rock properties, log data and regional geological information are used to the exclusion of the seismic. Today the technology is at hand to analyze 3D seismic attributes with borehole data to identify statistically significant relationships, and then to generate seismic guided property maps which show both increased resolution (detail) and increased accuracy (ability to predict).

To demonstrate the increased accuracy of maps created in this fashion, we made a controlled study on a producing field in a marine environment. The reservoir was covered by good quality 3D seismic data, while fifteen logged wells provided spatial control for maps of properties. Estimates of the distributions of two properties, porosity and water saturation, were made for a producing layer from well data, both with and without seismic attribute guidance. Five differing development scenarios were simulated, where wells were withheld from the analysis, and used for validation. The maps generated with seismic guidance gave increased detail in all cases, and increased predictive accuracy in four of the cases. In the best result, which came from a step-out scenario, maps generated using seismic guidance were two times more accurate for porosity, and two and one half times more accurate for water saturation. The results of controlled studies, such as this one, suggest a simple but profound conclusion: we get better estimates of the distribution of rock and reservoir properties away from well control when using 3D seismic attribute guidance.

PHIL SCHULTZ -
Biographical Sketch

Phil Schultz holds a Ph.D. degree in geophysics from Stanford University, and is currently a staff Technical Consultant for GeoQuest Systems in Houston. He recently transferred from Paris, where for over three years he managed an engineering department developing the Reservoir Modeling workstation for Schlumberger. Prior to his activities in France, he directed seismic data processing development for Geco-Prakla in the U.K., was the seismic department head for Schlumberger K.K. in Tokyo, and was a project manager for Digicon Geophysical in Houston. He is a member of the SEG, GSH, and SPE.