

Modern Workflows for the International Explorationist, with Examples from Southeast Asia and Benin, West Africa

Early international oil and gas discoveries resulted from “bread and butter” field work by pioneering geologists. Later discoveries, more often than not, began in Third World data rooms filled with yellowed well reports, gravity maps, and seismic sections. The international exploration workflow has always been a moving target, and the skill profile of the successful explorationist has evolved in the ceaseless attempt to stay competitive.

The newest workflow innovations involve the application of newly emerging software technologies to vintage and recent digital data. The purpose of this presentation is to review and demonstrate examples of modern geology and geophysics (G&G) workflows that can be used by international explorationists to “mine” existing digital data for overlooked potential.

The lecture is in three parts. Part one discusses recent watershed workflow changes of particular relevance to the modern explorationist. Part two presents Southeast Asian exploration (and development) practices using these new approaches, with several illustrative examples. Part three reviews workflow design and results from the Benin offshore, a frontier area just beyond the latest string of West African discoveries to the east and south.

Workflow Changes

New workflows leverage powerful new integrated software. They are changing the way that explorationists work in both frontier basins as well as in areas densely covered with exploration 3D. Fast workstations can now be harnessed to automate much of the tedious work that often consumes a project. This new “recoupling” technology frees stratigraphers, structural geologists, petrophysicists, depth imaging specialists, and others to work more creatively in a “decoupled” mode, channeling energies into the search for overlooked potential. Consequent recoupling of individual workflows onto a dynamic visualized geologic model enhances team integration and allows technical work to quickly result in informed business decisions.

Southeast Asia

The exploration and development of Southeast Asian Tertiary basins has always been difficult. One reason is the highly faulted and often nonmarine nature of these basins, with attendant sparse flooding surfaces and difficult correlations. Workflows based on classically integrated G&G often spiral out of control as structural and stratigraphic uncertainties become entangled with each other. A more natural workstation-based sequence stratigraphic and structural (S&S) approach helps to remove these bottlenecks and uncover overlooked potential. These new workflows rely heavily on the use of automated geological modeling, coherence/variance 3D cubes, visualization techniques, and inversion/AVO technologies.

West Africa

An ongoing Benin frontier project is reviewed to illustrate new workflows in frontier areas. Lying on Nigeria’s northern border, Benin possesses favorable petroleum geology though it has a disappointing exploration history. The regional geology and local petroleum systems are examined, along with a short chronology of the exploration history. The special problems for exploration in Benin are then discussed, and the design of a tailored reconnaissance workflow is presented, one specifically geared to the search for subtle combination structural/stratigraphic traps. Results are presented that demonstrate new insights into both the geology and prospectivity of offshore Benin. These results include the delineation of a new “combination” trap fairway on the shelf (see Figures 1 and 2) as well as Upper Cretaceous and Tertiary outer continental shelf plays.

The presentation concludes with speculation on the role that modern workflows will play in the organization of international exploration and development asset teams and departments.

Biographical Sketch

Steven Tobias graduated from Penn State in 1977 with an M.S. in geophysics. Since then he has held a variety of positions with

Mobil, Tenneco, and BHP Petroleum. Within the last decade he has worked in exploration and/or development in the U.S., Australia, Southeast Asia, West Africa, South America and Central Europe. Prior to forming The Energy Outpost Company in 1996, he served as international exploration manager for Pogo Producing Company. His company offers consulting

services that include high-end workflow design and implementation, as well as integrated interpretation/evaluation services for the exploration and development community. More information and links to published articles are available at www.oilgas.com. □



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Figures 1. and 2. Depth imaging of highly distorted “time” seismic sections offshore Benin reveals significant and overlooked petroleum potential beneath the steeply sloping West African shelf. This developing play is the product of a modern “frontier” geology and geophysics workflow designed to reduce major risk components through the staged application of depth imaging and other technologies. The depth-imaged version (Figure 2., processed under the guidance of Dr. David Kessler of CGG Houston) unveils highly masked counter-regional dip and an apparent late Albian to Cenomanian carbonate buildup. Finely imaged stratigraphic detail, interval velocities, and well control combine to delineate a new Upper Cretaceous exploration fairway along trend with two commercial discoveries. Thanks to Abacan Resource Corporation for permission to release these data to the Houston exploration community.

Figure 1 AB Time

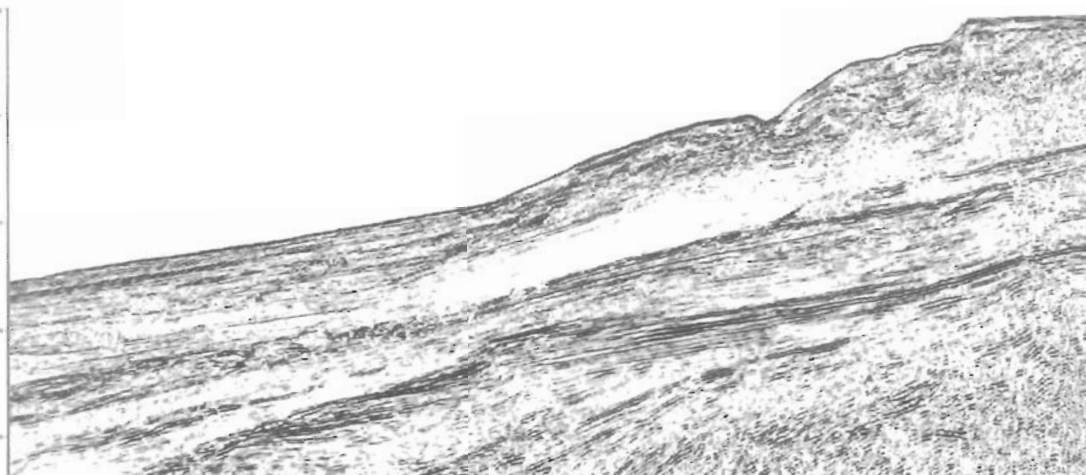


Figure 2 AB Depth

