

Monday, March 19, 2007

Register Now! Registration deadline is Fri 16-Mar-07 5:30 PM

Westchase Hilton • 9999 Westheimer

Social Hour 5:30-6:30 p.m.

Dinner 6:30 p.m.

Cost: \$28 Preregistered members; \$35 non-members & walk-ups

The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail reservations@hgs.org, or call the office at 713-463-9476 (include your name, e-mail address, meeting you are attending, phone number and membership ID#).

HGS International Explorationists Dinner Meeting

by W. Keith Campbell

HGS International Dinner Meeting

Impact of Seismic Loop-Scale Depositional Models on Reservoir Architecture in a Heavy Oil Accumulation, Santos Basin, Brazil

University and College Students Please Note: the first 14 students can attend for free, compliments of Swift and ConocoPhillips. Additional students will be charged the emeritus rate, half the regular member rate. Students are encouraged to call the HGS office in advance of the meeting they wish to attend and to make a reservation; but walk-ins are also accepted at events. Students will need to identify themselves and provide school name and ID.

Several deepwater turbidite discoveries of Eocene age have been made in the northern Santos mobile salt basin, offshore Brazil. The Shell-operated BS-4 NE discovery (2001) shows significantly better reservoir development than in equivalent sections penetrated nearby. Both the discovery and appraisal wells encountered in excess of 100 m of predominantly clean sand.

A 3D seismically-based study covering some 4000 km² was undertaken to better understand the sub-regional context, paleo-slope position and depositional architecture of the proximal, high net-to-gross reservoirs penetrated in the BS-4 NE. The main focus was on detailed loop-scale seismic interpretation of internal heterogeneities and understanding aquifer potential, both of which have direct impact on field development planning.

Study results demonstrate that considerable uncertainty remains with respect to the distribution of discrete heterogeneities within these highly amalgamated reservoirs, specifically the nature and configuration of predominantly silty material that drapes over incision surfaces. Reservoir facies were deposited within a dominantly channelized environment as part of a fan apron developed across an inherited stepped slope profile, with a depositional trend from NW to SE. An Eocene intra-slope break is evident about 15 km up-dip of the present-day closure, at the

downward limit of several confined feeder canyons, outboard of which low- to moderate-aggradation channel complexes were deposited across a lower gradient slope. The BS-4 NE reservoir complex is situated in the outer part of this low gradient "step flat" with a higher gradient "exit ramp" immediately down-dip. Seismic mapping of complex erosional surfaces with evidence for multi-phase knick point migration and significant bypass, also supported by core and image log data, provide a framework within which to better understand the distribution of key heterogeneities. A key observation is that the canyon systems and channel complexes become progressively younger to the NE.

Seismic mapping of complex erosional surfaces...supported by core and image log data, provide a framework within which to better understand the distribution of key heterogeneities.

There is a strong interplay between this migrating sedimentary system and tectonics that can be related to the amount of incision and bypass. The conceptual models derived from this front-end work provide key constraints to static reservoir model building in order to derive realistic infill architecture for testing the dynamic impact of reservoir heterogeneities. Results from the 2006 appraisal drilling on BS4-NE are consistent with the conceptual geological model. ■

Biographical Sketch

W. KEITH CAMPBELL is production geologist for Shell Brazil's BS4 Appraisal/Development Team based in Houston. Keith's 16-year career with Shell International E&P has covered a variety of technical roles. Based initially **International Dinner** *continued on page 21*

in the Netherlands, he worked on exploration projects in the Southern North Sea, both as seismic interpreter and as regional/structural geologist. In 1997, Keith transferred to Syria, where he was involved in country-wide and near-field evaluations, in both carbonate and clastic environments. In 2000, Keith was seconded to Al Furat Petroleum Company, a joint venture with the Syrian government. He spent the next 5 years working as production geoscientist on mature



waterflood projects in the clastic-dominated Euphrates Graben. He took on sub-surface coordination roles in both operations and study teams before transferring to Texas in early 2005. His talk today is based on a presentation made at the AAPG Annual Convention in April 2006.

Keith received BSc Honours in geology from University College London and was awarded an MSc in basin evolution and dynamics from Royal Holloway College. In between his University of London studies, he worked for 2 years in Indonesia as exploration geologist for Petromer Trend Corp., where his work included conducting a 6-month field geological survey in southeast Borneo.

In The News continued from page 17

the percentage of incoming sunlight the earth reflects back to space, did not change significantly over the Arctic during the four year period 2000–2004 over which he was able to measure it. A decrease in albedo is expected to provide a positive feedback mechanism for increasing the rate of global warming (the ice-albedo mechanism), because more energy would be absorbed as less heat was reflected. Kato found that whatever decrease in albedo had resulted from the melting of ice and snow in the Arctic was compensated by an increase in cloud cover that acted to reflect back a percentage of the incoming solar radiation. In short, the decrease in surface reflectivity was matched by an increase in reflectivity from more cloud cover. It is not known whether the increased cloud cover was simply fortuitous or a result of increased moisture and clouds that we can expect to match the decrease in albedo over the long term. Over the measured period at least the ice-albedo mechanism for amplifying warming did not kick in.

Kato S., Loeb, N.G., Minnis, P., Francis, J.A., Charlock, T.P., Rutan, D.A., Clothiaux, E.E. and Sun-Mack, S. (2006). Seasonal and interannual variations of top-of-atmosphere irradiance and cloud cover over polar regions derived from the CERES data set. *Geophysical Research Letters*, 33, L19804. doi:10.1029/2006GL026685.

Lindsey, Rebecca, 2007: Arctic Reflection, Clouds Replace Snow and Ice as Solar Reflector, *Earth Observatory, NASA, Features*, January 31, 2007, can be viewed at: <http://earthobservatory.nasa.gov>

The Fourth IPCC Report on Climate Change Released

The Intergovernmental Panel on Climate Change (IPCC) released its fourth report on February 2 and its findings are not encouraging. Among the conclusions reached by the 600 authors from 40 countries are the statements that the fact of global warming is

unequivocal and that most of the warming is the result of human activity. It took the IPCC 6 years to finish the report.

According to Kerr (2007) the Summary for Policy Makers is a distillation of the IPCC report that resulted from a meeting of 300 IPCC delegates from 113 governments in Paris from January 29 through February 1, 2007. The report upgraded its 2001 conclusion that the warming is most likely due to rising greenhouse gasses to the statement that global warming is very likely human caused.

Some of the main conclusions are as follows:

“Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years. The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land-use change, while those of methane and nitrous oxide are primarily due to agriculture.

- Carbon dioxide is the most important anthropogenic greenhouse gas. The global atmospheric concentration of carbon dioxide has increased from a pre-industrial value of about 280 ppm to 379 ppm in 2005. The atmospheric concentration of carbon dioxide in 2005 exceeds by far the natural range over the last 650,000 years (180 to 300 ppm) as determined from ice cores. The annual carbon dioxide concentration growth-rate was larger during the last 10 years (1995–2005 average: 1.9 ppm per year), than it has been since the beginning of continuous direct atmospheric measurements (1960–2005 average: 1.4 ppm per year) although there is year-to-year variability in growth rates.

- The primary source of the increased atmospheric concentration of carbon dioxide since the pre-industrial period results from fossil fuel use, with land use

In the News continued on page 23