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Sequence Boundary Mapping and Palaeogeographic Reconstruction: The Keys to Understanding Deepwater Fan Deposition across the NW Borneo Active Margin

One of the cornerstones of risk analysis for reservoir development at play level is to carry out regional sequence boundary mapping and from there establish palaeogeographic reconstructions through time that enable depositional domains to be identified and mapped. This paper will show examples of how sequence mapping and palaeogeographic reconstruction have been carried out across NW Borneo using an extensive 2D and 3D seismic dataset and well data. Now that a comprehensive regional framework has been established it

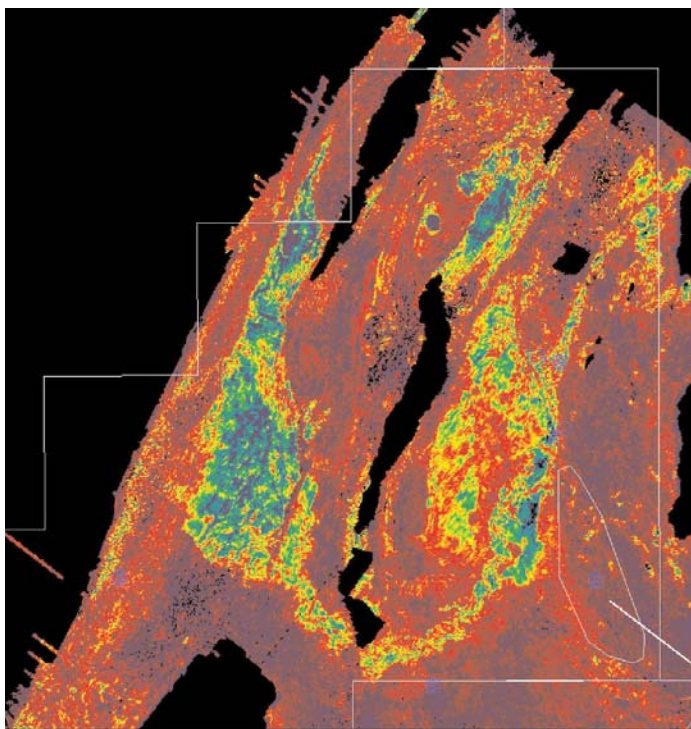
becomes clear why this Neogene regressive active margin has become the hottest new deepwater oil play in SE Asia.

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One of the unique features of the NW Borneo intra-plate margin is that active tectonics inboard has resulted in a relatively short distance between the coast line of Borneo and the toe-of-slope within the NW Borneo trough. During the Late Miocene in particular, uplift and erosion across the inboard shelf and mountainous hinterland regions of Sabah shed large volumes of sediment into the

shallow marine domain of the NW Borneo basin. Because of limited accommodation space along a narrow shelf, sands and shales entering the margin, from river systems such as the Padas in Sabah or from shelf-edge collapse, cascaded down the slope and across the basin floor, forming a series of fan lobes that amalgamated laterally and vertically into major fan complexes. Because of a relatively steep slope profile, much of the sand component was dumped close to the toe-of-slope break, where turbidity flows decelerate because of a rapid change in slope gradient on the order of 4–10° across the NW Borneo margin. Today these deep marine fans have been folded and thrust within the NW Borneo active margin fold belt. Deformation within this fold belt commenced about 9.5 Ma.

This case study highlights the role sequence mapping and palaeogeographic reconstruction can play in helping to predict reservoir development in untested deepwater plays. Through the integration of regional geological studies with palaeogeographic indicators determined from spec 2D seismic and wildcat well data, it is possible to reconstruct the slope profile across a margin through time. I proposed that the key to success in many deepwater ventures is to use knowledge of the slope profile to predict where the sweet spots for sand deposition are, before committing millions of dollars on signature bonuses and wells. ■ **HGS International Dinner** continued on page 33



Maximum amplitude extraction in a gated 50-ms window, 80-ms below top Pink Fan Marker, extracted from an absolute AvO difference volume. The picture shows the +ve AvO anomaly associated with the Middle Pink Fan channel belt and terminal lobe, North Block SBG, NW Sabah.

Biographical Sketch: Colin J. Grant

“Born: Glasgow, Scotland at 12.10 am, July 5th, 1964 (One half of identical twins—the other is a geologist with ConocoPhillips.) Lived the life of a normal spotty Central Scotland schoolboy, who liked (in no particular order) chips, football, rugby, athletics, girls and haggis.



“Attended Glasgow University from 1981 to 85, graduating with BSc Hons 1st Class in Geology, and a passion for middle distance running.

“Conducted PhD research at the University of Liverpool from 1985 to 1988 on high-grade shear zones within the Northern Highlands of Scotland. Apart from structural mapping and microfabric analysis I began drinking whisky, the water of life. I also found my life partner, Helen. In January 1989 I joined Shell

International and commenced my career as an oil field geologist. My first posting was to Benghazi, Libya where I worked on the NC153 EPSA between 1989 and early 1992. To save me from N. African-induced insanity I married Helen in March 1990. In May 1992 I joined Shell Expro in Aberdeen working as a production geologist and seismologist in the Central North Sea, where I was involved in the development of the Gannet and Guillemot oil fields. In 1996, I departed the sweet cool shores of Scotland and headed east to the balmy tropical paradise of Miri, located on the western seaboard of the island of Borneo. I worked in Miri for Shell Malaysia E&P primarily on exploration of the NW Sabah shelf and later deepwater plays. I also became Chieftain of the Scottish Community of Miri, Grand Master of the Miri Hash, and an aging triathlete. In March 2004 I transferred to Houston to work for SIEP in the cloak and veil world of new venture exploration. I now eat raw steak, wear cowboy boots and spend my weekends watching my sons playing soccer for the Albion Hurricanes.”

HGS International Group Awards Best Talk and Top Student Posters for 2004–2005.

Volunteer judges evaluate each talk during the year for the HGS International Group. Awards are presented at the last meeting of the season, which is May 16 this year.

Best talk for 2004-2005

(May 2004–March 2005) goes to Lesli Wood, for her talk on “Quantitative Seismic Geomorphology of Clastic Reservoirs and Systems.”

Dr. Lesli J. Wood is a Research Scientist and Lecturer at the Bureau of Economic Geology in the University of Texas Jackson School of Geosciences.



Student Poster Awards

Student poster awards are selected at the annual R.E. Sheriff Lecture, held this past November 15 at University of Houston. This year 14 volunteer judges reviewed 39 posters prepared by graduate students in the Department of Geosciences at University of Houston in three tiers:

Tier I: New graduate students (5 posters)

Tier II: Experienced masters students, new PhD students (18 posters)

Tier III: Experienced PhD students (16 posters)

Tier I: Yardenia Martinez, “Evaluating Topographic Correction Techniques for Satellite Data in Steep Slope Areas: Case Study - Iron Lake Fault, Salmon River Mountains, Central Idaho,” Advisor Shuhab Khan

Tier II: Katarina Jovanovic, “Vector VSP’s P and S waves separation by Antialias Discrete Radon Transform,” Advisor Kurt Marfurt

Tier III: Connie VanSchuyver, “3-D Refraction Migration,” Advisor Kurt Marfurt

Each student will receive a plaque, and the advisor receives a certificate commemorating the accomplishment.

Awards will be presented at the May 16 dinner meeting of the HGS International Group.

The R.E. Sheriff Lecture is an annual event jointly organized by the Department of Geosciences at the University of Houston, the University of Houston Geoscience Alumni Association, and the International Group of HGS.

Many thanks for the volunteer judges at the Sheriff Lecture and at International dinner meetings. Special recognition is due to Bonnie Milne-Andrews, who diligently organized the judging activities. ■