23rd Annual Technology Conference Schedule

National Association of Black Geologists and Geophysicists

September 15 – 18, 2004

Theme: Partnering Our Different Worlds

Wednesday, September 15, 2004

Icebreaker/Kickoff Reception and Registration

6:00 P.M. - 9:00 P. M.

Thursday, September 16, 2004 – Morning 8:50am-11:45am

8:00 a.m. - 9:00 a.m.	**Registration, Continental Breakfast,**
8:00 a.m. – 5:00 p.m.	**Company/University Booths**
8:50- 11:45 am	**INTRODUCTORY SESSION**
8:50 - 9:10am	**Opening & Welcome Remarks**
	Conrad Allen, NABGG President
	Dr. William L. Fisher, Director of Jackson School of Geosciences
9:10 -9:30 am	**Morning Keynote Speaker**
	Dr. Sandra K. Johnson - IBM Systems and Technology Group
9:30 – 9:40 am	**Guest students exit to attend student outreach programming (page 13)**
	TECHNICAL SESSION I - Coordinated by Conrad Allen
9:45 - 10:15 am	**Speaker: Robert Johnson – Paradigm GeoTechnology**
	Seismic Driven Pore Pressure Prediction - A Case Study from Macuspana Basin, Mexico
10:30 - 11:00 am	**Speaker: Cesar Abeigne - Independent Consultant**
	Climate Changes and Bantu Migrations in West Africa
11:00 - 11:30 am	**Speaker: Scott W. Tinker, Ph.D. – Bureau of Economic Geology, Jackson School of Geosciences, U. of Texas at Austin**
	Global Energy Trends
12:00 noon - 1:15pm	**NABGG CONFERENCE LUNCHEON**

Luncheon Keynote Speaker Dr. Jerry Harris, Head of Geophysics Department, Stanford University

Thursday, September 16, 2004 – Afternoon 1:30pm-4:30pm

	TECHNICAL SESSION II - Coordinated by Conrad Allen
1:30 - 2:00 pm	**Speaker: A. Wesley Ward, Ph. D. – USGS – Tucson, AZ**
	THE TWO-BILLION YEAR BLOW: Eolian Features and Processes on Mars
2:00 - 2:30 pm	**Speaker: Ike Crumbly, Ph. D. - Fort Valley State University, GA**
	Selected Topics in Geosciences
2:45 - 3:15 pm	**Speaker: Robert Johnson – Paradigm GeoTechnology**
	Seismic Volume Interpretation (VI) and Visualization Techniques Applied To Petroleum Prospect Conceptualization
3:15 - 3:45 pm	**Speaker: Jennifer Jolivet – International Connections**
	Conquer the Desert and Cultivate the Spirit
3:45 - 4:15 pm	**Speaker: Cheryl Gullett-Young - Georgia State University**
	Silicate Diagenesis in Microbially Active Sediments of the Atlantic Coastal Plain, SC

Friday, September 17, 2004 – Morning 8:50am-11:45am

8:30 - 9:00 am	**Registration/Continental Breakfast**
9:00 - Noon	**Company/University Booths**
9:00 - 11:30 am	**STUDENT PRESENTATION SESSION**
9:00 - 9:05 am	**Welcome by Aisha Ragas - Student Liaison Chairperson**
9:05 - 9:25 am	**Speaker: Mohamed Sati – Louisiana State University, Baton Rouge LA**
	Methods of Facies Inference
9:30 - 9:50 am	**Speaker: Olufemi "Femi" Akanbi - University of Houston, Houston, TX**
	3d Regional Velocity Mapping Of Western Arkoma Basin Oklahoma
9:55 - 10:15 am	**Speaker: Jerome Murphy – University of Oklahoma, Norman, Ok**
	Reservoir Compartmentalization At Cement Field, Cement, Oklahoma, Based On Geochemistry
10:20 - 10:40 am	**Speaker: Mark Little - Rice University, Houston, TX**
	Carbon, Global Warming, and Weathering: Understanding Future Climate
10: 50 - 11:20 am	**Speaker: Patricia Hall – Geoscience Recruiting Manager BP, Houston, TX**
	Resume Writing/Job Interviewing Tips: How to Jumpstart a Career
	TECHNICAL SESSION CLOSING COMMENTS

Friday, September 17, 2004 – Afternoon 1:00-3:00pm
1:00 - 3:00 pm GENERAL BUSINESS MEETING
Friday, September 17, 2004 – Evening 7:00-9:30pm
Scholarship & Awards Banquet
Keynote Speaker Dr. Edwin Dorn, Dean, Lyndon B. Johnson School of Public Affairs
Saturday, September 18, 2004 – Morning 7:45 am-11:30am
Field Trip: Inner Space Caverns

NABGG 23rd ANNUAL CONFERENCE STUDENT OUTREACH PROGRAM FOR INVITED LOCAL HIGH SCHOOL AND COLLEGE STUDENTS
Thursday Morning, Sept. 16th, 9:00am-1:00pm

Lyndon B. Johnson High School, Kealing Junior High School, Huston-Tillotson College

SCHEDULE:

8:45 - 9:30am	**Welcome/NABGG Morning Speaker - Dr. Sandra Johnson Bass Lecture Hall**
9:45 - 9:50	**Arrive at Barrow Conference Room**
9:50 - 10:00	**Welcome - Tosan Omatsola, NABGG**
10:00-10:10	**Welcome - Dr. Leon Long, Jackson School of Geosciences, UT at Austin**
10:10-10:40	**Careers in Geosciences - Nysha Chaderton, Jackson School of Geosciences**
10:40-11:10	**Hands-On Mineral/Rock Samples and Q&A session**
11:15-11:45	**3D Visualization Session**
11:45- 1:00	**Rejoin NABGG for lunch - Thompson Conference Center Building**

NABGG 23rd ANNUAL TECHNICAL CONFERENCE – ABSTRACTS & BIO'S

Climate Changes and Bantu Migrations in West Africa
Cesar Abeigne, Ph.D., Independent Consultant
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Abstract

The 2D seismic interpretation located in Northern part of offshore Lower Congo Basin (Southern Gabon, West Africa) shows the initialization and development of moats from Oligocene to Present. These structures were interpreted as the result of a deep marine current activity on the sediments (sediments-drift), which would flow upward the slope. A global climate change is the proposed interpretation of this deep marine current (i.e. the switch from warm global period to cold global one at Eocene-Oligocene transition) with the development of ice sheets on Antarctica (South Pole). It would have generated cyclic changes of the surface marine temperature (SMT) and El Nino (cyclic climate perturbation) in South Atlantic. These changes of SMT would control the seasonality of the climate in adjacent continent during this global cold period.

Additionally, the analysis and the interpretation of Holocene sedimentation mud cores taken in onshore lakes in Cameroon and Gabon show that there is an alternation of warm and wet periods followed by cold and dry ones during Holocene. (i) Warm and wet periods correspond to hot SMT with tree forest areas extension, and thus with the reduction of continental erosion. (ii) Cold and dry periods correspond to cold SMT with tree forest areas reduction (refuge forest) but with the grass field development, and thus favorable to continental erosion.

It is thought that during these cold and dry periods of grass field development, Bantu would have crossed the equatorial forest instead of circumventing it to migrate from the first settlement areas North of the forest towards the South of Africa 30,000 years BC.

This argument is in agreement with results of archaeological and linguistics researches, which support the same hypothesis.

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3D REGIONAL VELOCITY MAPPING OF WESTERN ARKOMA BASIN OKLAHOMA
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Abstract

Integration of 3D seismic and well log data has provided a more robust regional velocity mapping of the Western Arkoma Basin, where very little velocity information is available. It also helps in the conversion of 3D seismic time horizon to depth.

The Arkoma basin is a highly prolific gas province, with structurally complex fields, involving Ouachita orogenic folding and faulting. The prominent Choctaw thrust system extending for several hundreds of miles in an E-W strike orientation and having a surface expression characterizes the western part of the basin.

Three major horizons were mapped at different depths to build a regional velocity field, from which a regional velocity cube of the Western Arkoma basin was generated.

This paper focuses on building a regional velocity model from correlation of 3D seismic data with well log data using EarthVision software. The result of this process is then used to convert 3D time horizons to depth to aid exploration and production activities in the basin. The effort also reveals the presumed horizontal variation of velocity, which is believed to be due to the thrusted and dipping overburden.

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Silicate Diagenesis in Microbially Active Sediments of the Atlantic Coastal Plain, SC

Gullett-Young, Cheryl
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Abstract

Microbial acetogenesis has been shown to be the most significant organic-acid producing mechanism during low temperature diagenesis of Atlantic Coastal Plain sediments. Microbial processes have an important role in mineral dissolution and providing material for mineral precipitation. Field and laboratory evidence show that sediments at Lake City, SC contain viable microorganisms actively producing organic-acids (formate and acetate). A description of the K_2O-SiO_2-AlO_2 diagenetic phases formed in Atlantic Coastal Plain sediments at Lake City, SC is provided.

To evaluate low temperature diagenetic products in microbially contaminated sediments at Lake City, SC, 40 m of core material was examined by light microscopy, scanning and transmission electron microscopy (SEM, TEM), X-ray diffraction analysis (XRD) and electron microprobe (EM). Geochemical modeling of the present-day groundwater composition provided mineral saturation indices for select silicate phases. Air permeability and Hg-porosimetry measurements were obtained to quantify the heterogeneity in fluid transport mechanisms between sands and clays.

Lake City, SC sediments are deltaic sands, silts and clays, with minor carbonate and silica cemented zones. Quartz, k-feldspar, mica, and illite/smectite are the dominant detrital minerals. Scanning electron microscopy supports XRD findings of opal-CT, clinoptilolite, and authigenic k-feldspar. Authigenesis is most dominant in fine-grain silts where opal-CT and clinoptilolite occur as pore-filling cements and syntaxial to detrital species. In the silts, multiple episodes of authigenic k-feldspar and opal-CT are observed in SEM. A complex precipitation history is to be expected where microbial processes are active in both mineral dissolution and providing material for mineral precipitation.

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Seismic Driven Pore Pressure Prediction - A Case Study from Macuspana Basin, Mexico

Robert J. Johnson, Senior Geoscientist/Team Lead Interpretations Solutions
Joann Wang, Senior Geoscientist/R&D
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Abstract

Overpressured formations have been encountered in all of the continents of the world where exploration wells are drilled for hydrocarbons. It has been documented that overpressure are present in around 180 basins worldwide. In the US Gulf Coast region, there are at least seven stratigraphic units, ranging in age from Jurassic to Recent, that are overpressured.

Pore pressure prediction becomes an important concern in petroleum exploration and production and creates tremendous amount of interest among geophysicists, geologists, petrophysicists and engineers. Pre-drill pore pressure prediction is very important for optimization of the drilling process.

The main principle that lies in the basis of most pore pressure prediction techniques states that the total overburden load of sediments is borne partly by solid rock matrix and partly by the pore fluid. The part of the load supported by the solid rock matrix is called the effective stress and this stress is mainly responsible for rock compaction.

Fast burial of low permeable rocks, when the pore fluid does not escape sufficiently fast, leads to an increase of fluid pressure and consequently to the reduction of the effective stress and undercompaction of rocks.

There is direct link between amount of compaction and the velocity of acoustic waves in the rock. Predicting effective stress from acoustic velocities allows us to estimate pore pressure. Different equations for pore pressure prediction use different relations between effective stress and acoustic velocity.

In this case study, we will show how commercially available software allows one to convert 3D seismic velocity data into pore pressure volumes and analyze this data along with seismic and log data.

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Seismic Volume Interpretation (VI) and Visualization Techniques Applied To Petroleum Prospect Conceptualization

Robert J. Johnson, Sr. Geoscientist/Team Lead
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Abstract

Volume Interpretation (VI) workflows are designed with the objective of discovering subtle details in 3D seismic data that may reveal key geologic information needed for evaluating geologic features and fault patterns which can then be used as preparation for prospect generation and ultimately, reservoir characterization.

Visualization in a real-time volumetric environment provides the most efficient manner to quickly grasp the structural and stratigraphic configuration of subsurface geology. In addition, mapping methods based on reference surfaces, and automated interpretation methods provide rapid assessment of large seismic surveys.

The optimized interpretation tools and visualization techniques used in these workflows can significantly enhance the prospects that may be extracted from a data volume and notably shorten the time required for geologic evaluation and interpretation.

This presentation will illustrate volume visualization workflows using non-conventional volume visualization techniques to analyze and evaluate 3D seismic data. The computing environment utilized to optimize these workflows includes VoxelGeo and Reservoir Navigator software packages. (Seismic Data courtesy of Veritas)

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Conquer the Desert and Cultivate the Spirit

Jennifer Jolivet
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Bio

Jennifer Jolivet has completed a recent NASA Fellowship at ARC Moffett Field, CA, this summer. A native Houstonian, she has lived and worked in Europe for 8 years, has traveled all over the USA, Canada, Mexico, and Caribbean, and speaks five foreign languages. She has degrees in applied mathematics and has been a Geophysicist and Professor of Mathematics. Her business background includes being an International Consultant for developing businesses and generating international initiatives in Technology. She has successfully managed two major projects in the Eastern Cape region of South Africa. Currently, she is a full-time Consultant for Corporations and Tertiary institutions involved in the advancement of technology. She has spoken worldwide on the importance of Technology Transfer and Internationalization of Institutions to build and maintain international partnerships.

As a philanthropist, she has founded AUMAD (Aunts and Uncles Making a Difference) which is dedicated to preparing students for a successful college education. She has also worked for the advancement of disadvantaged children around the world in their pursuit for Higher Education.

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Carbon, Global Warming, and Weathering: Understanding Future Climate.

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Abstract

Weathering of silicate rocks permanently sequesters a significant amount CO2 on our planet (Berner et al., 1983; Dessert et al., 2003; Gaillardet et al., 1999). Therefore, the investigation of soils and their conjugate protoliths have implications for a wide range of disciplines from soil to atmospheric sciences. This study investigates soil formed in Northern Tanzania on the southern slope of the dormant volcano Mt. Kilimanjaro. Our sample site is in the Machame region at an elevation of ~1640 m where the phonotephrite to basaltic bedrock has been dated at 0.4 to 0.5 million years (Evernden and Curtis, 1965). We determined bulk elemental concentrations of soil and bedrock samples from this region using an ICP-MS and XRF. From initial investigations into the bulk soil and bedrock chemistry using a novel mass balance method, we were able to investigate the relative mobility of a suite of elements. Relative abundances of Ta, Nb, Hf, and Zr are constant and therefore these elements are immobile. In contrast, Ti, an element commonly thought to be immobile, is clearly not immobile in our samples. The entire soil column appears to be highly depleted in Si and Ca but enriched in Al. These features indicate extensive weathering and indeed some samples approach bauxite compositions. Surprisingly, however, weathering versus depth is reversed. Si and Ca have been removed by 60 and 70 % respectively from the upper 2 meters, but below 2 m, they have been removed by 95 and 99 %. This means that the soil is more weathered at depth than in the shallowest 2 meters. We believe that ground water weathering is responsible for this inverted soil profile and may increase CO2 consumption estimates by 10-30% for similarly affected basalts.

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Reservoir Compartmentalization At Cement Field, Cement, Oklahoma, Based On Geochemistry

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Abstract

Petroleum geochemistry is an important tool in the petroleum industry through its applications in both the exploration and production phases of oil and gas field development. The focus of this project was to use geochemical, geological, geophysical

and petrophysical methods to assess the potential of the Cement fault system as barriers to hydrocarbon migration, as this knowledge could potentially aid companies operating in the field should they choose to reevaluate their production strategies.

In this study resistivity well logs were used to produce geologic structure maps on several horizons, in order to determine the location of faults in the study area. These well logs correlations revealed two major faults, one of which was normal and the other reverse, the Cement fault and Cement thrust, respectively. Both faults trend northwest – southeast, nearly parallel to the anticlinal axes of the East and West Cement domes, and merge with depth creating three fault blocks in this study area.

Several geochemical techniques, including gas chromatography, gas chromatography – mass spectrometry and isotope ratio mass spectrometry were employed in the characterization and correlation of 14 oils and 2 rock extracts. Based on these data, all oils in this study appear to have been derived from the same source rock, the Devonian – Mississippian Woodford Shale.

Geochemical star diagrams were constructed to determine whether or not the oils found in these reservoirs are communicating via the faults or are compartmentalized. The diagrams displayed a good correlation overall indicating that the faults may be acting as conduits, as there were few heterogeneities among the oils. However, the observed heterogeneities suggest some degree of reservoir compartmentalization. These data were combined with the characterization of the oil samples to reach the conclusion that the Cement fault and thrust are both likely conduits for hydrocarbon migration in this area.

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Methods of Facies Inference

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Abstract

Sedimentary facies are an important factor in reservoir characterization. The spatial variability and the point properties of rock depend on the facies distribution. Although knowledge of facies is valuable, core data is commonly not available for many wells and wireline logs must be interpreted to infer facies. Facies inference methods include spider charts, log curve shape identification, and model-based techniques such as artificial neural networks, Clustering analysis, fuzzy logic, and Bayes rule.

The accuracy of the engineering calculations conducted by a multidisciplinary team in oilfield companies is subject to the petrophysical correlation, which is used to estimate formation properties. Any improvements in this correlation certainly would improve not only the engineering calculations, but also the lateral reservoir development plans. Classifying a reservoir into certain fundamental elements or facies has been proven to be one of the benefits of improving these correlations.

One of the practices usually done by geoscientist or reservoir engineers is to visually classify facies using cores or patterns of wireline logs. This task, however, can turn out to be almost impossible with lack of cores and bad log quality. The aim of this study is to examine two approaches to classify facies. The first approach uses Bayes rule and the second one uses Clustering analysis technique. The techniques are illustrated using published log and facies data from a West African sandstone reservoir. These two approaches help to precisely determine the facies occurrences and also can be used as predictive tools for facies occurrence in the non-cored sections of wells.

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Global Energy Trends

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Bio

Scott W. Tinker is Director of the Bureau of Economic Geology, the University of Texas at Austin, a major international energy and environmental research organization. He is the State Geologist of Texas, holds the Edwin Allday Chair in the Department of Geological Sciences, and is a member of the Executive Committee of the Jackson School of Geosciences. Tinker serves as the Director for the Texas Region of the Petroleum Technology Transfer Council (PTTC). Before coming to the University of Texas in January, 2000, Tinker spent 18 years working in the oil and gas industry, most recently at Marathon Oil's Petroleum Technology Center in Littleton, Colorado. Tinker lectures on global energy resources, carbonate sequence stratigraphy, and reservoir characterization. He is recipient of best paper awards in two major journals and a former Association of American Petroleum Geologists (AAPG) Distinguished Lecturer and Society of Petroleum Engineers (SPE) Distinguished Lecturer. He is a member of many professional and honor societies, boards and foundations, including the NRC Board on Energy and Environmental Systems. Tinker holds a Ph.D. from the University of Colorado, M.S. from the University of Michigan, and B.S. from Trinity University, and is a Certified Professional Geologist, Certified Petroleum Geologist, and Licensed Geologist in the State of Texas.

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THE TWO-BILLION YEAR BLOW: Eolian Features and Processes on Mars

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Abstract

Recent missions have given tremendous new insight into Martian eolian features and processes. Dunes have been recognized on Mars since 1971. Their pristine nature and shedding of bright dust suggest that some are currently active. A variety of dune shapes indicates simple primary and secondary winds in many regions of Mars, but dune migration or slipface changes have yet to be fully documented between missions. The northern circumpolar
sand sea, a dark crescent around the polar ice cap, is the largest concentration of dunes on Mars. Sand streaks and wind circulation models suggest that the sand sea is trapped by seasonally reversing winds. In southern latitudes, dunes occur as dark inter- and intra-crater deposits as thick as 100 m. Their thermal inertias have been interpreted in terms of solid silicate grains, and orbital surveys indicate that the dunes are basaltic. Often between the dunes, a number of bright, low-amplitude features, perhaps similar to terrestrial granule ripples, occur. Elsewhere, larger bright dunes seem eroded, perhaps because they are cemented or incorporated as sedimentary bedrock. Finally, dust devil "trails" and even dust devils have been spotted it several locations on Mars; the role they play in the evolution of the Martian surface has yet to be determined.

The "activity state" of dunes remains to be identified, as do the sources and processes that created the sediments. Eolian erosional features are widespread on Mars. Yardangs (wind-eroded ridges) have been recognized from orbit. They are restricted to young rock units near the great volcanoes, leading to speculation of those units as volcanic ash-flows, although the yardang cluster known as "White Rock" is a layered, uniform unit composed of fine, bright-pink sediment. At least 50% of the rocks at the Pathfinder site show evidence of eolian abrasion. Winds indicated by depositional and erosional eolian features are very different; for example, at the Pathfinder site, bright streaks viewed from orbit, sediment "tails" behind rocks, and dunes indicate winds from the north-northeast; however, ventifacts indicate that winds came from the southeast. Models using obliquity changes (and possible past climatic regimes on Mars) indicate that obliquity (tilt) changes alone cannot produce the large directional wind shifts indicated by the erosional features on Mars. Spirit has imaged dark sediment tails behind a number of rocks and also small, dark transverse duneforms. Opportunity ventured close to the dunes at the floor of Endurance Crater, but became mired in dust, and will again try to maneuver in from other directions to examine the size and composition of Martian eolian sediments.