Speakers: Biographies and Abstracts

Juergen Adam, Dalhousie University

ABSTRACT

How Sedimentation controls Structural Evolution and Reservoir Distribution in Salt Basins

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The Scotian Basin passive margin sequence has been involved in thin-skinned deformation due to gravity spreading on salt. Salt provinces beneath the Scotian shelf and slope are characterised by diverse salt-related deformation styles that reflect the pre-salt basement topography and sedimentation rates and patterns during the Jurassic and Early Cretaceous.
The Salt Dynamics Group at Dalhousie University and the Geological Survey of Canada-Atlantic are conducting an integrated geoscience study that combines 4D physical modelling with innovative optical deformation monitoring and 2D/3D seismic interpretation of public domain seismic data to study the interaction between gravity-driven extension, syntectonic sedimentation and salt-mobilisation that control the passive margin basin architecture (e.g. spatial-temporal distribution of reservoir rocks, structural trap formation). Public domain seismic data provide the experiment parameters including tectonic setting, geometry of salt basins, and sedimentation pattern and rates.
This new modelling approach allows us to quantitatively assess: 1) the timing and mechanisms of faulting, sedimentation and salt mobilization, 2) the role of variable sedimentation patterns and rates, and 3) the coupling between extension in the shelf and slope and compression in the deepwater basin. The experiment results show that gravity-spreading and salt mobilization generates complex 3D structures similar to those observed along the Scotian Margin. The tectonic evolution is strongly controlled by sedimentation pattern and rates. Integration of 4D physical simulations with 2D/3D structural modelling and seismic interpretation will lead to a new generation of improved interpretation templates for salt-related structures and depositional systems offshore Atlantic Canada.

BIOGRAPHY

Dr. Juergen Adam is a senior researcher at Dalhousie University since 2003. He is the manager of the new Analogue Model Deformation Laboratory and leader of the Salt Dynamics Group. Prior to his Dalhousie position he was research associate at the GeoForschungsZentrum Potsdam and assistant professor at the University of Hamburg and Technical University of Berlin, Germany. In addition to the scientific research J. Adam has done contract work for federal and state geosciences agencies in Germany and BP in Norway.

J. Adam is a structural geologist and physical modeller with more than 15 years of professional experience as researcher and lecturer in geodynamics, structural geology, and neotectonics. Research areas include modern and ancient active and passive continental margins, fold-and-thrust belts, and related sedimentary basins.
His actual research focuses on the mechanics of brittle continental deformation and coupled tectonic, climate and sedimentation/erosion processes.

At Dalhousie University he has established together with D. Grujic the new Analogue Model Deformation Laboratory as part of the *Pan-Atlantic Petroleum System Consortium* collaborative research initiative. Actual PPSC research focuses on the simulation of tectonics and sedimentary basin evolution at passive continental margin with emphasis on salt tectonics to support hydrocarbon exploration in Atlantic Canada.

Paul Amyotte, Dalhousie University

ABSTRACT

CO_2 Storage Potential in Nova Scotia

The presentation will review both the need and the potential for carbon dioxide storage in Nova Scotia. Emphasis will be placed on the dual process of carbon storage and enhanced coal bed methane (ECBM) recovery. The role of carbon storage and ECBM recovery in addressing the climate change adaptation issues identified by the Canadian Council of Professional Engineers will be addressed. Recent initiatives between Dalhousie University and industrial partners will also be described.

BIOGRAPHY

Paul is a professor of chemical engineering at Dalhousie University where he has been on faculty for the past twenty years (the first eleven as a faculty member of the Technical University of Nova Scotia). He is a graduate of the Royal Military College of Canada (Bachelor's), Queen's University (Master's) and TUNS (Doctorate). His research and practice interests are in industrial safety and loss management, with specific expertise in the prevention and mitigation of dust explosions. He has recently been engaged in various projects relating to process safety management and quantitative risk assessment.

Paul is the current Past-Chair of the Canadian Engineering Qualifications Board, and is a Past-President of the Canadian Society for Chemical Engineering. He currently serves as Secretary of the Board of Directors of the Combustion Institute/Canadian Section. For the past five years he has edited the Journal of Loss Prevention in the Process Industries as North American Regional Editor.

Jim Bardsley & Dave Stewart, High Performance Energy Systems

ABSTRACT

Earth Energy Systems

BIOGRAPHY: Jim Bardsley

James Bardsley is currently an Engineer in Training. He went to Florida State for Electrical Engineering (1989). He is a licensed Refrigeration Technician, Electrician, Plumber (Instructor) and Electronics Technologist. He is working towards a Ph.D. program in advanced thermal storage. He has been involved with earth energy for the last twenty years in collaboration with Environment Canada and is one of the leading experts in Canada in the field of Underground Thermal Energy Storage. He designed and built Canada's first thermal response testing equipment under contract from Environment Canada.

With High Performance Energy Systems he is currently involved in leading edge technologies such as Phase Change, Ground based Electrical Energy Storage and Building based Distributed Generation systems with David Stewart his partner/associate. He directed the design of the largest UTES system in Canada in the last 10 years. His latest Research & Development has focused on the storage of cold energy in the ground using advanced borehole drilling techniques. One of his projects locally was the 2001 Environment Home the first Zero CO_2 house in Canada. Recent contracts include PV film for high performance window system and a 430 uniit phase change conditioned resort in Mexico and three research laboratories in Calgary.

BIOGRAPHY: David Stewart

David Stewart is a professional engineer with his mechanical engineering degree from the University of Waterloo (1974) and his Masters of Science in Ocean Engineering from the University of Rhode Island (1978). He has been involved in the development and marketing of energy management and renewable energy for the last 27 years. While at Nova Scotia Power, as Senior Customer Service Engineer he was responsible for the development of demand side management programs for large commercial and industrial customers. Since 1997, he has been involved with leading edge green building projects such as the Horton High School, which was Canada's nominee in the school category for Green Building Challenge '98.

He was one of the first consulting engineers in Canada to offer energy simulation services to reduce the demand for electrical and fossil fuels under the Commercial Building Incentive Program. He has been recognized by Natural Resources Canada as a Experienced Consultant through the successful application of twenty one projects which have qualified for the CBIP. He is an accredited LEED consultant, with one successful project and three on-going projects. Since 2003 he has been a partner with James Bardsley with High Performance Energy Systems.

David Brown, CNSOPB

ABSTRACT

Conjugate Margins

Decades of academic research and petroleum exploration have resulted in a reasonable understanding of Central Atlantic conjugate margins basins' geology. However, limited petroleum exploration successes over the past decade have pointedly underlined the true limits of our knowledge, particularly regarding these basins' petroleum systems and especially in those with older hydrocarbon discoveries.

In August 2007, a conference devoted to increasing our understanding of the Central Atlantic region's basins and petroleum systems will be held at Dalhousie University in Halifax. The "Central Atlantic Conjugate Margins Conference" will be a timely opportunity to incorporate the results of past hydrocarbon exploration throughout this region with the latest ideas and interpretations on divergent margin basin evolution and petroleum systems. The conference is envisioned as a pan-Atlantic gathering for researchers and industry to focus on topics directly impacting hydrocarbon exploration on these Atlantic basins with the expectation on improving understanding of these conjugate basins formation, evolution and petroleum systems that together will lead to elevated hydrocarbon prospectivity, reduced exploration risks and more exploration successes. There will be particular emphasis in providing a venue for colleagues from both sides of the Atlantic to interact, share ideas and exchange knowledge on subjects of mutual interest.

This conference is planned for August 2007 at Dalhousie University with three days of consecutive technical presentations and poster displays. Pre- and post-meeting field trips are planned to view pertinent geological successions and features in Nova Scotia and Morocco respectively. A published volume of selected papers is also envisioned.

BIOGRAPHY

David Brown is a native Nova Scotian born and raised in Halifax. He graduated from Dalhousie University with a Bachelor of Sciences (Honours) degree in Geology in 1979. He joined the petroleum industry working first with Amoco in Calgary, a local consulting firm in Halifax, and then nine years as an explorationist with Mobil Oil Canada in Calgary and Toronto focusing on East Coast offshore and arctic frontier basins. Since 1990, David has been employed as senior geologist with the Canada-Nova Scotia Offshore Petroleum Board in Halifax. His responsibilities include hydrocarbon resource assessment, monitoring and advising on the geological aspects of all offshore exploration and development activities, scientific liaison with other government, academic and regulatory agencies, and conducting research on specific geological subjects. David has authored and contributed to a number of technical papers and publications on the geology of frontier basins and has a keen interest in Atlantic margin pre-rift and early syn-rift basin development and petroleum systems. He is a member of several geological societies including the CSPG, GAC, AGS, and is Vice-President of the Petroleum Society of CIM (Halifax Section).

Bruce Cameron, NS Department of Energy

ABSTRACT

Seismic Statement of Practice

BIOGRAPHY

BRUCE CAMERON is Director responsible for policy, planning, intergovernmental and offshore regulatory affairs at the Nova Scotia Department of Energy. Mr. Cameron did his undergraduate work in the social sciences at Carleton University in Ottawa and received an MBA from Dalhousie University.

In general, much of his recent work has focused on initiatives to improve the regulatory and investment climate for offshore energy activities. He has had leadership roles within the Atlantic Energy Roundtable, the Frontier and Offshore Regulatory Renewal Initiative, the drafting committee of the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment, both the first and second NS R&D Forums and is Secretary-Treasurer of the Offshore Energy Technical Research Association and the Offshore Energy and Environment Research Association.

Chris Campbell, Ocean Renewable Energy Group

ABSTRACT

Wave Energy

With eight provinces and three territories bordering three oceans, Canada has wave and tidal current energy opportunities that are too large to ignore. How big are the resources? That is the question driving the development of a Canadian Renewable Ocean Energy Resource Atlas.
With development in ocean energy technology focused in Europe, do we know what renewable electricity in Canada might cost? That is the big question driving efforts to accelerate development of renewable energy production systems in Canada. It is one of the questions motivating the development of a research network from Victoria to St John's, bringing together disciplines from ocean engineering to integrated energy systems.

Some of the major research challenges that can come from renewable ocean energy are:
• Power take off optimization (energy conversion and conditioning);
• Modeling and forecasting power recovery and output;
• Umbilicals and connectors;
• Structural engineering, materials, foundations and mooring in harsh environments;
• Risk and cost minimization.

BIOGRAPHY

Chris has degrees in marine science from the University of Wales and Memorial University of Newfoundland and Labrador. He was an accomplished researcher in France and in Canada. He spent six years as Vice President of the Newfoundland and Labrador Institute of Fisheries and Marine Technology. He has almost 20 years of experience working as a consultant to industry and government in fisheries, aquaculture, ocean technology, marine industry and offshore energy - on Pacific and Atlantic coasts. Since 2004, he has been instrumental in the launch of the Ocean Renewable Energy Group, a sectoral development association bringing together developers, researchers, federal and provincial governments and utilities to pursue the Canadian opportunity for wave and tidal stream energy.

Graham Campbell, Natural Resources Canada

ABSTRACT

Clean Coal Technologies

BIOGRAPHY

In his present position as Director General, Office of Energy Research and Development, Mr. Campbell is responsible for Natural Resources Canada's Program on Energy Research and Development (PERD) which provides funding for research and development in technologies related to energy sources, energy end-use and related environmental issues.

He has contributed to the National Climate Change Process as co-Chair of the Technology Issues Table made up of representatives from the federal and provincial governments, energy suppliers, industry, academia and ENGOs from across Canada. The Technology Table developed options to accelerate the development, demonstration and commercialization of technologies to reduce GHG emissions, and recommended means to enhance Canadian capabilities and opportunities in supplying technologies in domestic and international markets.

At present, he leads the technology development, innovation and international technology initiatives under Climate Change Action Plan 2000 and is the co-chair of the federal-provincial-territorial Technology Working Group convened under the auspices of the Council of Energy Ministers.

Mr. Campbell has worked earlier in oil and gas exploration and development in Canada's offshore and northern areas in the private sector and with government. His work has included the assessment of potential supplies of oil and gas from frontier areas, and regulation of exploration and drilling activities in the North and East Coast offshore.

In his previous position with the National Energy Board, Mr. Campbell's Branch provided oil and gas supply advice in support of the Board's regulatory functions and its analysis and reporting on Canadian energy supply and demand.

Mr. Campbell is a graduate of the University of Waterloo (Physics) and the University of British Columbia (Metal Physics) and is a member of the Association of Petroleum Engineers, Geologists and Geophysicists of Alberta (APEGGA). He is Chair of the International Energy Agency's Committee on Energy Research and Technology (CERT), and is a member of several R&D advisory boards.

Scott Carr, JASCO Research Ltd.

ABSTRACT

Sound Levels

Observations of Coral Communities on the End Moraines of the Upper Scotian Slope and other localities around the world
D.B.Scott, J.H.M. Willison, Dalhousie University, M.J. Risk, McMaster University, Hamilton, Ontario L8S 4M1 CANADA; C. Hillaire-Marcel, B. Ghaleb**,** Université de Quebec à Montréal

Abstract: This presentation presents photo-documentary evidence of the glacial end moraine on the southern Scotian Shelf and the different types of benthic habitats that are present. Also studies done by European workers in the North Sea. Studies of this kind have been carried out with various platforms but the most effective appears to be an ROV. In the present studies ROV's provided the opportunity to acquire high quality video, samples of sediment and organisms needed for detailed study. The video obtained together with samples provided a unique picture of the diversity that is associated with deep-sea corals, similar to that of shallow water reefs or rain forests on land. The videos also show the wholesale destruction of these reefs by bottom dragging. Hovland has suggested, off Norway, that corals may be associated with methane seeps.

BIOGRAPHY

Scott Carr has been with JASCO since 1997. In August 2003, he relocated from Victoria, BC to Halifax, NS to establish and oversee the company's East Coast Operations. Prior to joining JASCO, Scott served 12 years as a Naval Combat Systems Engineering Officer with the Canadian Navy.

Scott has been involved with numerous engineering and environmental assessment projects dealing with acoustic system performance and sound propagation modelling. While stationed at the Canadian Forces Maritime & Experimental Test Ranges, Scott gained extensive experience in the operation, performance analysis, and environmental impact assessment of Naval Acoustic Systems from various countries including the United States, Canada and the United Kingdom. More recently, he has worked closely with representatives from the Department of Fisheries and Oceans' Bedford Institute of Oceanography, planning, coordinating and conducting Acoustic Impact Modelling and Environmental Effects Monitoring (EEM) projects off Canada's East Coast and in the Arctic. Scott holds a Bachelor of Engineering from the Royal Military College of Canada and is currently finishing a Master of Engineering (Acoustics) at Penn State University

Norval Collins, CEF Consultants

ABSTRACT

Methodology for Hunt's Seismic EEMP

An environmental effects monitoring program was designed to test the impact of a typical seismic survey on cod, an important commercial species in the survey area. The design of the program was based on placing cod at increasing distances from the path of the survey vessel. The closest the ship could safely pass was considered to be 100 m from the array. Distances of 100, 500 and 1000 m from the path of the vessel were selected for exposure based on anticipated sound pressure levels.
Hatchery reared cod were placed in seven cages lined with ½-inch mesh netting. Hatchery fish were selected to avoid problems differentiating between health or genetic variations in individual wild fish, with an expectation of reduced variance in the results. Two cages were placed at a control site well removed from any influence of the seismic airgun discharges. Five other cages were placed at a test site for exposure to airgun discharges. Approximately 15 fish were placed in each cage. The primary basis for evaluating the magnitude of impact will be based on electron microscopic analysis of delicate ear tissues, although gross necrology will also be examined.

The EEMP proceeded on schedule November 1, 2005. The seismic survey vessel, Gulf Pacific, passed within 138 m of the closest test vessel with the airguns firing at full pressure.

BIOGRAPHY

Norval Collins has worked as a fisheries biologist and environmental planner in the Maritimes for over 30 years. He has specialized in environmental impact assessment and the synthesis of information covering both environmental and land-use issues, with particular emphasis on freshwater and marine fish habitat. Studies have included preparation of marine overviews; design and conduct of environmental monitoring programs; environmental impact assessment of oil and gas projects; spatial analyses of fishing activity; seasonal sensitivity analyses; seabird, marine mammals and fish habitat mapping; evaluating effects of flow changes and habitat alteration; and estimating fish and wildlife production and value.

Mr. Collins holds a Bachelor of Science in Ecology and Statistics, and a Masters in Urban and Rural Planning. His background in science and planning brings a unique perspective to environmental impact assessment and integrated resource planning in Atlantic Canada. He is a member of the Canadian Institute of Planners, the American Fisheries Society, the Atlantic Society of Wildlife and Fisheries Biologists, and the Canadian Society of Environmental Biologists. He is an accomplished bio-statistician, who has taught Quantitative Methods at the Department of Urban and Rural Planning, Dalhousie University.

Don Cummings, Queen's University

ABSTRACT

Shelf Margin Deltas

Shelf-margin deltas have not been explicitly recognized as a play type in the passive margin basin offshore Nova Scotia, perhaps because Mesozoic shelf-margin positions are rarely well resolved in seismic data. It is argued, however, that several of the largest gas accumulations offshore Nova Scotia (Venture, Alma, Glenelg) occur in growth-faulted shelf-margin delta complexes that formed at or near the paleoshelf edge during periods of low relative sea-level. Shelf-margin deltas are excellent exploration targets for several reasons: they commonly have laterally-extensive shale seals and expanded sandstone reservoirs, are associated with early movement on growth fault structures, and are commonly overpressured. Also, because they commonly link downdip to sand accumulations on the slope and basin floor, identification of shelf margin depocenters can help identify the location of "deep-water" exploration targets. Criteria that have proved useful in identifying shelf-margin deltas offshore Nova Scotia include: (1) proximity to large-scale (*i.e*., at least several hundred metres relief) basinward-dipping slope reflections; (2) association with large-scale listric growth faults; (3) evidence of delta-front/prodelta gravity-flow deposition in core; (4) relatively large scale upward-coarsening deltaic/shoreface successions (several tens-of-metres to over two hundred metres thick); and (5) paleoecological evidence for rapid shallowing.

Recognition of the growth-faulted shelf-margin play type will not only improve exploitation strategies in offshore Nova Scotia, but provide an important framework to guide the identification of new exploration opportunities in genetically-related parts of the stratigraphic section.

BIOGRAPHY

Don Cummings is a postdoctoral fellow and adjunct professor at Queen's University. He received his PhD in 2004 from the University of Ottawa for his work on gas-rich shelf-margin deltas offshore Nova Scotia. Although his interests are broad, his main, long-term goal is to understand what controls the size, shape and internal heterogeneity of *fan-shaped sediment bodies* (e.g., deltas, subaqueous-outwash fans), as well as their regional 3-D distribution in sedimentary basins, and, in turn, to apply this knowledge to the development of groundwater aquifers and petroleum reservoirs. Current research projects focus on the sedimentology and seismic stratigraphy of a modern tide-dominated delta in Korea; bedforms generated under storm-like conditions in a wave tunnel; mud transport in the shallow ocean and the stratigraphic organization of mudstone units (e.g., Naskapi mudstone, offshore Nova Scotia); and the sedimentology and seismic architecture of esker-fan aquifers in central Canada.

Charles Demond, Atlantic Wind Power Corporation

ABSTRACT

Wind Energy Policy

BIOGRAPHY

Charles Demond is a lawyer and chartered accountant and is active in the wind industry. He is the president of Pubnico Point Wind Farm Inc., the owner and operator of a 30.6 megawatt wind farm at Pubnico Point, Nova Scotia. Charles is a director and the treasurer of the Canadian Wind Energy Association; and a director and the vice-chair of the Renewable Energy Industry of Nova Scotia. Charles is involved in a number of wind farm development initiatives with the Nova Scotia based Altantic Wind Power Corporation (2005) Ltd.

Edwin DeMont, Saint Francis Xavier University

ABSTRACT

Potential Impacts of the Energy Industry on Invertebrates

The current literature regarding the potential effects of seismic and marine noise will be reviewed. Summaries of two projects in which the author was involved will be presented. (1) A summary of a preliminary study designed to evaluate the potential impact of low-level seismic energy on the reproductive biology of snow crab will be given. The study was conducted in late 2003 off the west coast of Cape Breton. The experiment examined short (12 day) and medium term (5 month) differences in the morphology and physiology at the test and control sites. (2) The effects of submerged natural gas pipelines on lobster mobility will be described. This was a large collaborative project which involved field studies to measure (i) potential underwater noise, and electromagnetic fields generated by a pipeline, (ii) catchability of lobsters near the pipeline, and (iii) a lab-based study to determine the scaling/climbing ability of lobsters over simulated pipelines.

BIOGRAPHY

Edwin DeMont is a Professor in the Biology Department at St. Francis Xavier University. He is also an Adjunct Professor in the School of Biomedical Engineering at Dalhousie University and in the Department of Biomedical Sciences at the Atlantic Veterinary College, U.P.E.I. His research focuses on the mechanics of locomotion in invertebrates and the mechanics of soft tissues.
Dr. DeMont is the President of the new OEER Association, a non-profit organization that will increase scientific knowledge to assist regulators in making decisions and recommendations regarding the interaction between offshore energy activities (including renewable energy) and the marine environment. As OEER president, Dr. DeMont will work with colleagues at Cape Breton University, Nova Scotia Department of Energy and other Nova Scotia universities.
Dr. DeMont has been a member of two national NSERC committees: Integrative Animal Biology Committee (2000-2003) and Chair in 2003, and the E.W.R. Steacie Memorial Fellowship Selection Committee (2005).

Dr. DeMont received the St. Francis Xavier University President's Research Award in 1997 and the Outstanding Teaching Award in 1998.

Meinhard Doelle, Dalhousie University

ABSTRACT

Tidal Energy, Law, and Policy Options

The vast potential for tidal power development in the Bay of Fundy region of the Atlantic coast has been recognized for decades. At the same time, finding an effective way to harness this power in a cost effective, sustainable and environmentally responsible manner has been an ongoing challenge. In the 1980s, barrage based tidal power technology was piloted in Annapolis Royal, Nova Scotia. It was found to be unsuitable from both environmental and cost perspectives. More recently, new technology has been developed using open turbines in place of barrages, significantly reducing both the cost and the environmental impact. While this technology is still in the early stages of commercialization, there are pilot projects underway around the world. As a result, the question of how to make decisions on whether, where and under what conditions to permit tidal power development in regions such as the Bay of Fundy have arisen again.

The presentation will explore this question from a law and policy perspective. Constitutional issues are explored, and thoughts offered on how to move forward in light of jurisdictional issues. The opportunity to implement principles of sustainability, integration and public participation in the planning and regulatory processes designed for tidal power are also explored. Tidal power, in its new form, shows considerable promise.

The patience of previous generations, to say no to tidal power until technology has advanced to make this a truly sustainable renewable energy source, appears to be paying off. A strong and open Strategic Environmental Assessment process, together with integrated planning and a fair and efficient regulatory process should put this emerging industry in Nova Scotia on a solid footing.

BIOGRAPHY

Meinhard Doelle, BSc (Chemistry), LLB (Dal), LLM (Osgoode Hall), JSD (Dal), is a full time faculty member at Dalhousie Law School, specializing in environmental law. He teaches Environmental Law I: Introduction to Environmental Law and Policy, and Environmental Law II: Environmental Law as Regulatory, Political and Social Process, and currently serves as the Associate Director of the Marine and Environmental Law Institute. From 1996 to 2001, he was the Executive Director of Clean Nova Scotia. He serves as Environmental Counsel to the Atlantic Canada law firm of Stewart McKelvey, and has been involved in prosecutions, issues of common law liability, environmental assessments, environmental audits, site assessments, and other areas relating to environmental law. H was the principle legislative drafter of the draft Nova Scotia Environment Act (1995).

Professor Doelle was a policy advisor with the Federal Environmental Assessment Review Office (FEARO) during the development and passage of the Canadian Environmental Assessment Act and regulations. Since 2000, he has served as an environmental non-governmental representative on the Canadian Delegation for negotiations under the United Nations Framework Convention on Climate Change. He has been a member of the Editorial Advisory Board for Canadian Environmental Regulation and Compliance News since 1997. Professor Doelle has written on a variety of environmental law topics, including climate change, invasive species, environmental assessments, and public participation in environmental decision making. His most recent book is entitled From Hot Air to Action: Climate Change, Compliance and the Future of International Environmental Law.

Dr. Jeferson Luiz Dias, Petroleo Brasilerio

ABSTRACT

Brazil Experience
Authors: Jeferson Luiz Dias

Petrobras was installed in 1954 to take care, on behalf of the Federal Government, of the Brazilian Petroleum Sector. The activities, investments and strategic movements conducted by Petrobras in the Brazilian Exploration led to many cycles of discoveries.

Exploration in the Brazilian offshore basins had its main milestone with the first discovery in the shallow marine carbonate reservoirs of the Campos Basin, the Garoupa oilfield in 1974. Soon after the first albian discovery, upper cretaceous and tertiary turbidite sandstones started to be prospected and very soon became the main target in the basin, but the volumes discovered remained still modest for the country's needs.

At the beginning of the 80´s the Company started exploring the deep water region of the basin and huge mass-transport related unconfined tertiary turbidite reservoirs were responsible for the discovery until 1996 of seven giant oilfields.

In 1997, a New Oil Law was promulgated in Brazil and the National Oil Agency (ANP) was created to manage the Brazilian Oil Sector. Petrobras, as well as the other Oil Companies operating in Brazil, became a concessionaire of the ANP.

From 1997 to 2001, Petrobras Exploration was decentralized, and decisions, studies and human resources were spread in seven regional Business Units. A very conservative exploration took place and investments in the period were compressed, resulting in few and small discoveries, mostly in the onshore mature coastal cretaceous basins.

The path of discoveries was only retaken in 2002 with the re-centralization of the exploration in the head-quarters of the company. The "focus" of the exploration shifted from the mature core of the Campos basin to the northern and southern regions of the basin and to the adjacent basins of Espírito Santo and Santos.

As a result, a total volume of 6.6 billion barrels of equivalent oil and started to be appraised in more than 30 Evaluation Plans. Until now, seventeen (17) new oil and gas fields were defined commercially, mostly in deep and ultra-deep waters and in deeper and older reservoirs than the usual ones. Other discoveries are still in appraisal activities.

BIOGRAPHY

Dr. Jeferson Luiz Dias graduated in Geology at Universidade Federal do Rio Grande do Sul, Brazil, in 1977, earned M.S. degree in geology from the Universidade Federal do Rio de Janeiro, in 1991 and obtained his Ph.D. in geology from the Universidade Federal do Rio Grande do Sul in 1998. He was employed by PETROBRAS in 1978 and has been worked as an exploration geologist in many Brazilian basins. Since 2000 is the exploration manager in Santos Basin, offshore Brazil.

Leslie Eliuk, GeoTours Consulting Inc

ABSTRACT

Well Cuttings Data

A low-tech hard look at the Abenaki carbonate edge: What the rocks themselves tell us about the setting of shelf-margin reefs and the Panuke gas field

Leslie S. Eliuk, P.Geol. Geotours Consulting Inc. geotours@eastlink.ca

The operational history of petroleum exploration is one of increasingly sophisticated geophysics (primarily seismic including 3D) and petrophysics (wireline well logging including FMI) and of more expensive drilling (due in part to deviated or even horizontal paths) offset by faster penetration rates. Unfortunately for actually looking at the rocks themselves the trend has been for less and less usable rock samples. In the absence of expensive and rare whole core or drilled sidewall-cores (a helpful innovation), samples formerly comprised large chunks from cable tool drilling then representative chips from rotary bits but have become the chalkified-cooked-sheared-small cuttings of PDC bits, Polycrystalline Diamond Compact, from high speed turbo drilling. At the same time, geologists seem less willing to look at such rock given their many other tasks and increasingly hectic pace. But certainly the older well cuttings and even some of the newest well cuttings with some searching and cleaning have a lot to tell that cannot be derived from geometries or wireline logs in carbonates. In fact some results seem outright contradictory but may help correct old assumptions or unravel subsequent geologic-structural history. For instance the simple understanding of reefal facies is sometimes modified to allow for various reef types yet is still dogmatically equated to massive clean reservoir. But both modern and ancient examples exist of argillaceous carbonates that are both reefal and have created positive-relief buildups but have been misinterpreted before drilling and were not porous. The assumption that oolitic grainstone equals reservoir also is often made but can be negated by the 'wrong' type of ooids and deep burial. A different insight based on cuttings and corroborated by a few core is the widespread style of Abenaki shelf-margin development where micritic mud-mound-rich slope facies establish, after a regional often-oolitic transgressive event, then shoal up into reefal then oolitic facies. Although modern seismic easily allows slope interpretation based on clinoforms, at least in one well the rock-based slope interpretation appears obscured from seismic by later movement. Cuttings indicate that at increasing distances from the Sable Island paleodelta the slope and margin are increasingly oxidizing and may even have red and pink microbial mud mounds. In contrast, the deep Panuke penetrations never show major slope mud mound development. This may indicate the long-lived existence of an underlying paleohigh that favoured continued reefing and oolite shoals until capped by deeper-water and/or argillaceous-nutrient-rich sponge reefs. While the adjacent Sable Island paleodelta is the obvious source of argillaceous content, the closer Marquis area culminates not in sponge reefs but in ooid shoals then sandstones even though it also initiated with microbial muddy slope deposits. In some Panuke-Cohasset wells, cuttings show a surprising absence of ooids amongst the reefal facies. Those reefs likely formed on a distally steepened ramp creating local positive relief that was both too small/deep for ooid formation and by-passed by ooids transported downslope.

BIOGRAPHY

Les is Alberta born, educated and employed – 1946-01-01 (? first baby boomer), U of A BSc. (Hon.Geology-Zoology 1968)-MSc. (Geology-palynology 1969) and 35+years petroleum geology. For the first 3 decades he mostly worried about carbonate reservoirs and sour gas for Shell Canada. Sounds like Western Canada Sedimentary Basin Foothills, but actually the first half-decade was spent exploring in Eastern Canada (Quebec Cambro-Ordovician to Gulf of St. Lawrence Carboniferous to offshore Jurassic-Cretaceous carbonate margin). Several publications and even a little gas resulted from this effort but more of both resulted during subsequent years in WCSB. Nova Scotia and Eliuk go way back to 1970 where he spent a seasick summer on a gas sniffer boat. Later he helped drill the first reefs on the buried

carbonate margin in 1974 and wrote 90 pages on the Abenaki in 1978. He enjoyed that so much that when pensioned off in 1999, he has been happy to help some smart younger PanCanadian geologists with their Deep Panuke discovery as GeoTours Consulting. He continues his Mesozoic reef interest and carbonate research with a move in mid-2005 to Lunenburg at the edge of the Atlantic.

Michael Enachescu, Memorial University

ABSTRACT

Searching for Offshore NS Elusive Reservoirs & Large Traps

Early success in the exploration for oil and gas and field development has heralded Nova Scotia offshore as a possible North American prolific petroleum province. Proven reservoirs and source rock were intersected in many exploration wells. As illustrated by recent large, high quality 2D and 3D seismic programs, the geology of the Scotian Slope abounds with large salt induced anticlines, turtle structures and mini-basins and with features that could be seismically interpreted as lowstand slope turbidites and basin floor fans. Striking similarities with petroleum rich deepwater areas such as offshore Angola, Gulf of Mexico and Brazil coupled with dwindling gas reserves in North America, triggered an end of millennium ardent race for offshore block licensing. Within these licensed blocks, the exploration took place on a number of distinct exploration trends: 1) on the Jurassic carbonate bank following the 1998 Deep Panuke discovery; 2) in the Sable sub-basin, exploration continued on the existing geopressured zone around the present Sable Island gas development and 3) targeting Cretaceous and Tertiary turbidite reservoirs on the present day slope, where high hopes for large finds were placed.
Several deepwater wells in the Scotian Salt Province, in water depths ranging from 700 to 1700 metres, were drilled for sandstone~~s~~ reservoirs associated with movement of Argo halite. Unfortunately no commercial discoveries were made either on the shelf or the slope. Annapolis G-24 was the only well that encountered significant gas in a slope fan play, but the delineation well was reservoir poor and not seen as successful. While gas was present in all wells drilled in the deepwater, the reservoirs were thin or poor, very fine grained or silt-size sandstone, and the longed hoped large discovery needed to propel the exploration forward remains elusive.

Offshore Nova Scotia's great gas reserve potential exists on both the shelf and slope - pending identification of quality reservoir fairways and significant size traps. An honest post-mortem on what plays ware drilled and what can be done to improve the chance of economic discoveries is needed to be carried out by the industry and government geoscientists. Here and in any Frontier area, exploration success will depend on improved seismic imaging technology, regional facies evaluation, quality of prospects drilled, long range commitment to the area, less expensive operations and a sustained tempo of drilling.

As exploration results during the NEP of the early eighties and the following major oil and gas discoveries has demonstrated, increased annual exploratory drilling rates are the only way to record new field discoveries and maintain a sustainable East Coast petroleum industry. Significant changes to the present fiscal regime of exploration in Nova Scotia and exploration and research community support for several deepwater stratigraphic drill holes may be needed. While recent drilling was disappointing, offshore Nova Scotia is a very large, under-explored area, which contains significant potential if the key to successful exploration can be found by ***concerted industry-government-academia efforts and synergetic scientific research studies.***

Acknowledgements: John Hogg, ConocoPhillips and Dave Brown, CNSOPB

BIOGRAPHY

Michael Enachescu is Husky Energy Senior Fellow in Exploration Geophysics at Memorial University of Newfoundland, an Associate Professor at the Department of Earth Sciences, Pan-Atlantic Petroleum Systems Consortium (PPSC) and Oil and Gas Development Partnership (OGDP) and an advisor to Palo Alto Investors group (PAI) and to several oil companies, seismic contractors and scientific panels. He worked in resource exploration and geophysical research in Europe and after 1981 as a petroleum explorationist in Calgary. He has been involved with major exploration drilling programs in the Grand Banks, Scotian Shelf and Slope, Labrador Sea, Arctic, Beaufort Sea first with Suncor Resources,

Trillium/Mosbacher and from 1984 to 2003 with Husky Energy. Michael was a member of the regional mapping, discovery and delineation teams and a contributor to the Development Plan Applications for Terra Nova and White Rose fields, offshore Newfoundland. Michael was a member of the Scientific Committee of LITHOPROBE, a member of the Site Survey Panel of ODP and IODP (1994-2003) and a volunteer with many other professional societies and charity organizations. Since the fall of 2003 at Memorial, Michael is teaching Atlantic Geology, Rift Tectonics, Marine Seismic Methods and Seismic Interpretation courses. Michael has extensively published on the structural setting and petroleum geology of Atlantic Canada. He received the 1999 CSEG *Meritorious Award* and is the first *CSEG Distinguished Lecturer (2005-2006)*. Michael is a member of CSEG, SEG, CGU, AAPG, CSPG, RGS, and a P. Geoph. with APEGGA.

David Finn, PRAC

ABSTRACT

Community of Interests: A Model for Research Collaboration

Petroleum Research Atlantic Canada (PRAC) has a mandate to help maximize the value of our regional petroleum resources for the benefit of both the private sector and society at large, without compromising safety or the environment. Operating costs and the safety of existing operations, recovery rates, the viability of marginal or isolated resources, and the export of solutions and expertise can all be improved through research and development. The effectiveness of the R&D required to achieve these goals will be significantly affected by the level of communication between the groups with R&D "needs" and those with the capacity to deliver technology and solutions. The "Community of Interest" model has at its heart this communication between these groups. Dave Finn will discuss the evolution of the Community of Interest model emerging within PRAC, its advantages and challenges, and what is required to make the model work.

BIOGRAPHY

Dave joined PRAC as President on March 1, 2006. He is an engineer with over 15 years experience in applied research, industry liaison, project management, consulting and business development. His experience spans the public and private sectors, small and large business. He has long been active in the Newfoundland Ocean Industries Association (NOIA), and is also a member of the Society of Petroleum Engineers.

Dave graduated from Memorial University with a Bachelor of Engineering (Naval Architecture) in 1988, and his Masters (Ocean Engineering) in 1991. Dave then moved to Ottawa and worked for several years as an Industry Liaison Officer with the National Research Council of Canada. He returned to Newfoundland in the mid-nineties to manage the Summit of the Sea, a series of international conferences examining the sustainable development of ocean resources. He also helped establish a remote-sensing start-up, and was Manager of Consulting Services for another local IT firm. Most recently Dave was responsible for regional business development in the oil and gas sector for Aliant, for whom he also served on assignment in Houston with Aliant Energy Services.

Dave is originally from Central Newfoundland. He now in lives in St. John's with his wife Kim Todd, and their three children Kate, Owen and Lucy.

John Gale, IEA Greenhouse Gas R&D Program

ABSTRACT

Carbon Storage Policy

Injection of CO_2 at a scale of 1 Mt/y has been underway at the Sleipner gas field in the North Sea since 1996. The gas from the Sleipner Vest field contains 8% CO_2 which is stripped and reinjected into a deep saline formation above the gas field. The formation known, as the Utsira formation, is a highly permeable sand body that's lies at a deep of over 800m. The fate of the injected CO_2 has been monitored using repeat 3-D seismic surveying and more recently using gravity monitoring. The seismic surveys have clearly identified the presence of the CO_2 within the Utsira formation. The gas which has been injected into the bottom of the formation has migrated upwards due to buoyancy effects and is moving outwards under the shale cap rock in a thin layer. Repeat surveys show that there is no evidence that the CO_2 has migrated pout of the Utsira formation after nearly 10 tears of injection. The presentation will provide an overview of the Sleipner projects and the results obtained to date from the monitoring programme.
ABSTRACT

Sleipner Project

Injection of CO_2 at a scale of 1 Mt/y has been underway at the Sleipner gas field in the North Sea since 1996. The gas from the Sleipner Vest field contains 8% CO_2 which is stripped and reinjected into a deep saline formation above the gas field. The formation known, as the Utsira formation, is a highly permeable sand body that's lies at a deep of over 800m. The fate of the injected CO_2 has been monitored using repeat 3-D seismic surveying and more recently using gravity monitoring. The seismic surveys have clearly identified the presence of the CO_2 within the Utsira formation. The gas which has been injected into the bottom of the formation has migrated upwards due to buoyancy effects and is moving outwards under the shale cap rock in a thin layer. Repeat surveys show that there is no evidence that the CO_2 has migrated pout of the Utsira formation after nearly 10 tears of injection. The presentation will provide an overview of the Sleipner projects and the results obtained to date from the monitoring programme.

BIOGRAPHY

John Gale has some 25 years experience of the utilisation and environmental impact of fossil fuel use. He has worked for the British Coal Corporation on both conventional and advanced coal fired power plant designs. After British Coal was privatised he has worked for a private consulting firm providing technical assistance to agencies such as the Asian Development Bank, World Bank, European Commission the UK DTI and UNIDO in countries such as Russia, China, India and Romania on improving the use of fossil fuels to reduce pollution. John joined the IEA Greenhouse Gas Programme in May 1999 and has acted as the project manager for the Programme on both technical studies and practical R&D projects on geological storage of CO_2. He has worked closely with projects such as Sleipner/SACS and Weyburn that are monitoring the fate of injected CO_2. He also co-ordinates three international research networks for IEA GHG on key topics related to CO_2 storage namely: well bore integrity, monitoring and risk assessment. In addition he acted as one of the Co-ordinating Lead Authors for the recently published IPCC Special Report on CO_2 capture and storage.

George Hagerman, Virginia Tech

ABSTRACT

Tidal Stream Energy in the Bay of Fundy

This paper will present the results of a feasibility study of tidal stream energy conversion in the Bay of Fundy, recently completed by the U.S. Electric Power Research Institute with co-funding support from the New Brunswick Department of Energy, the Nova Scotia Department of Energy and Nova Scotia Power, Inc. A total of fifteen potential project sites around the Bay of Fundy were characterized in terms of tidal stream energy resource, seafloor bathymetry and geology, utility grid interconnection requirements, maritime support infrastructure, and site-specific environmental issues. Based on this site survey, stakeholder advisory groups in each province then selected a representative site for feasibility-level design, performance analysis and cost estimating. Findings from the site survey and economic results from the selected sites will be reported at the forum, together with recommendations for further research.

BIOGRAPHY

George Hagerman has over 25 years experience evaluating and optimizing the design, performance, and economics of renewable ocean energy conversion systems, including offshore wind energy, wave power, tidal power, and ocean thermal energy conversion. He is currently a research faculty member at the Virginia Tech Advanced Research Institute in the Washington, DC area.

Ocean energy projects completed at Virginia Tech include evaluation of coastal wind data off Virginia, a preliminary assessment of the wave energy resource potential off southern New England, and site characterizations for the U.S. Electric Power Research Institute's (EPRI's) offshore wave energy conversion initiative in Hawaii, Oregon, Washington, and Maine.

In 2006, EPRI launched a similar initiative for the demonstration of tidal in-stream energy conversion, with participation by and co-funding from Nova Scotia, New Brunswick, Maine, Massachusetts, Alaska, San Francisco, and utilities in the Puget Sound area of Washington. As with EPRI's offshore wave energy program, Mr. Hagerman is responsible for assessment of the tidal stream energy resource and characterization of potential project sites. His findings for sites around the Bay of Fundy will be reported at the Forum, together with EPRI's feasibility-level assessment of tidal stream energy project economics at selected representative sites.

Eva Halland, Norwegian Petroleum Directorate

ABSTRACT

Socio-Economic Impact of Oil and Gas

The petroleum sector is extremely important to Norway. The industry is responsible for one fourth of all value creation in the country, and more than one fourth of the state's revenues. Nearly 80,000 people are employed in petroleum-related activities, and the spill-over effects to other industries are substantial. Norway is the world's third largest exporter of oil and gas.

Norway has acquired knowledge and expertise in efficient recovery of petroleum resources over the course of nearly 40 years of oil and gas activities. Less than one third of our estimated petroleum resources have been produced, which indicates that the Norwegian continental shelf still has much to offer.

The level of activity on the Norwegian continental shelf was very high in 2005. More than 250 million standard cubic metres of oil equivalents were produced, equal to the annual energy consumption of more than 100 million Norwegian households.

Petroleum-related investments in the Norwegian petroleum sector were record high in the past year. More than NOK 80 billion was invested in 2005, and there are good indications that this level will be maintained in 2006.

The government's primary objective is to maintain high levels of value creation, employment and expertise in the industry.

It is important that petroleum activities do not conflict with consideration for the environment.
Good stewardship of the external environment is a precondition for petroleum activities.

BIOGRAPHY

Eva K.Halland is educated cand.real in geology from University of Bergen, Norway. She has been with the Norwegian Petroleum Directorate (NPD) for the last 21 years, the last 5 years as member of the top management team. She has hold different positions within NPD, started as a geologist, head of section and head of supervisory activities (HSE). Her responsibilities has been within all parts of the petroleum activity, regulation, strategies for the Norwegian petroleum development, oil and gas policy, environmental issues, emergency preparedness, metering, new developments and value creation from mature areas.
She is a board member of the Research Council of Norway, "Program for petroleum oriented research (Petromaks)".

Paul Harvey, NS Department of Energy

ABSTRACT

Cohasset & Panuke

Paul J. Harvey*+ and Prasanta K. Mukhopadhyay (Muki)**
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**Global Geoenergy Research Limited, Halifax, NS, B3J 2A1 (Muki@global-geoenergy.com)
+ Speaker

The Cohasset and Panuke oil-condensate fields are located within the LaHave Platform on the western margin of the Sable Subbasin of the Scotian shelf. The Cohasset-Panuke Project began production in 1992 and reached its economic limit and production terminated on December 17, 1999. The project produced a total of 44.5 million barrels over its seven-year life.
The light oil and condensate in both fields have accumulated in elongated anticlines trapped both stratigraphically and structurally as the result of sands draped over the underlying high formed by the thick carbonate section of the Abenaki Formation deposited near the Shelf edge.
The Cohasset field discovered in 1973 consists of up to fifteen stacked sandstone reservoirs located within the Lower Logan Canyon Formation through the Naskapi Formation and the Upper Missisauga Formation. The Panuke Field discovered in 1986 consists of a series of five stacked reservoirs sandstones located entirely within the upper part of the Missisauga Formation.
The whole sequence seems regressive with a proximal lagoonal-estuarine depositional system overlying the various pulses of proximal to distal mouth bar sheets. Each fluvial pulse was dominated and eventually overwhelmed by marine influences after the sand packages were deposited over both fields at which time the shorelines moved seaward.
Geochemical fingerprinting suggests that the Abenaki Formation limestone and Misaine shale within the La Have Platform and Abenaki Subbasin did not have enough hydrocarbon potential to generate low GOR Mississauga and Logan Canyon Formation light oil and condensates in the Cohasset and Panuke fields. Discrete aromatic biomarkers (thiophenes or dibenzothiophenes) and stable carbon isotopes of saturate and aromatic fractions of these oil and condensates, and one-dimensional petroleum system modeling indicate that these oils have low maturity, high saturate fractions and are mostly derived from the lacustrine Type I or I-II source rocks from the Early Jurassic source rocks (possibly from the Mohican Group) similar to the Newark Basin situated in the eastcoast USA. The hydrocarbons have been vertically and laterally migrated (110-90 Ma) just after the reservoir formation from that candidate lacustrine source rock. The major contribution of hydrocarbons has not migrated from the distal marine late Jurassic Verrill Canyon source rock. The reservoir geochemistry of both the Mississauga and Logan Canyon oils suggests distinct compartmentalization of various reservoirs that has possibly changed due to multi-phase migration and fractionation of heavier hydrocarbons.

BIOGRAPHY

Paul J. Harvey is senior petroleum geophysicist for the Resource Assessment and Royalties Division, Nova Scotia Department of Energy. He has been with the province of Nova Scotia for almost 24 years, monitoring and promoting onshore and offshore exploration activity, providing an attractive regulatory regime for encouraging geophysical activity, and making technical assessments via geophysical data acquired by the petroleum industry. Paul has authored and co-authored a number of technical papers promoting Nova Scotia=s petroleum industry and is currently Project Manager of a major petroleum systems study being completed by the Department of Energy on Nova Scotia=s deepwater slope.

Before joining the province, he worked for five years in Calgary, Alberta with PanCanadian Petroleum Ltd. and Amoco Canada in a number of geophysical capacities responsible for different areas in Alberta.

He obtained a B.Sc. from Acadia University (1975), a Bachelor of Education from Saint Mary=s University (1976) and a Bachelor of Mining Engineering degree from the now Dalhousie University (1978). Harvey is a member of SEG, the Petroleum Society of CIM, the Association of Professional Engineers of Nova Scotia. He is currently Chairman of the Petroleum Society of CIM - Halifax Section.

Geoff Hurley, Hurley Environment Ltd.

ABSTRACT

EEM Work for CEAA

A special subcommittee of the Canadian Environmental Assessment Agency's multi-sectoral Regulatory Advisory Committee (RAC) was tasked to review the inclusion of exploratory activities in the *Comprehensive Study List Regulations* to determine whether an exploratory drilling project in a previously unassessed area should continue to require a comprehensive study level of assessment, whether all exploratory drilling activity should be subject to a comprehensive study, or whether a screening level assessment is more appropriate for all exploratory drilling.
An important consideration in this review is the state of the science associated with the potential environmental impacts of exploration. To this end, Geoffrey Hurley, M.Sc. and Joanne Ellis, Ph.D. were designated by the RAC sub-committee to determine: what impacts of exploratory drilling are known; what impacts are uncertain; and what gaps currently exist in our scientific understanding either of the interaction between exploratory drilling and the receiving environment or the changes or impact in the receiving environment as a result of the activity, including cumulative impacts.

The study team adopted a two-prong approach to carrying out the project:
1) A review of the scientific literature to provide a synthesis of the broader scientific knowledge of the interactions between exploratory drilling and the receiving environment
2) A detailed review of pertinent Canadian environmental effects monitoring (EEM) data to evaluate the interactions between drilling and the receiving environment. A total of nine EEM programs (8 east coast; 1 Beaufort Sea) were reviewed. The Canadian EEM programs that were reviewed covered a wide range of drilling scenarios and environmental sampling methodologies and therefore could be considered representative of exploratory and development drilling in Canada and abroad.

The effects of drill waste (spent mud and cuttings) were considered the primary environmental concern associated with drilling operations following a review of the scientific literature and consideration of other potential pathways (i.e., discharges and emissions) to the receiving environment. There was considerable consistency in effects of drill waste based on data from the Gulf of Mexico, North Sea, and Canadian offshore areas despite differences associated with the volumes and type of drill waste discharged, the scale and location of drilling, and variations in EEM methodologies.
The results of this review supported a decision by the Honourable Stéphane Dion, Minister of the Environment and Minister responsible for the Canadian Environmental Assessment Agency to change the regulation under the *Canadian Environmental Assessment Act* whereby offshore oil and gas exploratory drilling projects would be subject to a screening type environmental assessment rather than a comprehensive study type of assessment. In his announcement of the decision on November 17, 2005, the Minister stated that: *"The science indicates that the environmental effects of offshore oil and gas exploratory drilling are, in general, minor, localized, short in duration and reversible. Under the legislated criteria, a screening type assessment would provide an appropriate level of assessment for such projects."*

Comment [HAC1]: I would probably not include this last statement and quote in the abstract. You have already made the point in the other sentences. You could save the quote for a slide but the quote is nice as it summarizes the results!

BIOGRAPHY

Geoffrey V. Hurley, M.Sc., has a unique combination of over 25 years of professional experience at the senior executive level with the oil and gas and fishing industries, as a scientist with the the federal government (DFO), and as an independent consultant to industry and government.
With respect to offshore oil and gas in Nova Scotia, Mr. Hurley has been actively involved as a Senior Environmental Advisor during the planning, construction and operation of the ExxonMobil Sable Offshore Energy Project and during the environmental approval process for the EnCana Deep Panuke. He has also assisted with environmental/regulatory issues and stakeholder consultation for the Anadarko Bear

Head LNG Project. Mr. Hurley provides technical advisory services under contract to the Environmental Studies Research Fund (ESRF) Management Board (administered by the National Energy Board) for East Coast projects on an ongoing basis.

His firm, Hurley Environment Ltd., offers clients the following services related to offshore oil and gas:

- Preparing environmental management system documentation such as environmental protection plans, waste management plans, etc.
- Designing and implementing offshore environmental effects monitoring programs
- Providing advice on environmental matters related to regulatory approvals
- Coordinating and carrying out environmental impact, risk assessments and reviews for oil and gas projects
- Carrying out environmental inspections/audits of oil and gas facilities
- Consulting with key stakeholders such as fisheries interests and First Nations
- Providing advice during the early planning and design of oil and gas projects

Jack Lawson, Fisheries and Oceans Canada

ABSTRACT

Sensitivity/Mapping/Whale Identification

BIOGRAPHY

Dr. Jack Lawson joined the Department of Fisheries and Oceans in 2002 as a research scientist working on cetaceans and leatherback sea turtles in the Newfoundland and Labrador region. He is a member of the Society of Marine Mammalogy. Dr. Lawson has been studying marine mammals since 1981. His research has examined (1) social behaviour and communication of seals, (2) seal and cetacean diet and foraging ecology, (3) physiological processes such as digestive efficiency and metabolism of captive seals, (4) abundance of seals, cetaceans, and leatherback sea turtles, and review of the potential impacts of manmade sounds (such as seismic exploration) on marine mammals and sea turtles. He has conducted these studies in the wild, and using captive animals, at sites in Canada, the UK, the United States, and Russia. Current research on some of these topics is ongoing within the context of the Canadian Species at Risk Act, with cooperative research in Newfoundland and Labrador, and other DFO regions. Jack Dr. Jack Lawson Marine Mammal Section Department of Fisheries and Oceans St. John's, NL.

Kenneth Lee, Fisheries and Oceans Canada

ABSTRACT

Produced Water

BIOGRAPHY

Kenneth Lee received his B.Sc. degree in marine biology (Dalhousie University, 1975) and M.Sc. and Ph.D. degrees in limnology and microbial ecology (University of Toronto, 1977, 1982). He was then awarded a Natural Sciences and Engineering Research Council of Canada (NSERC) Visiting Research Scientist Fellowship for studies on the fate and effects of oil spills and oil dispersants at the Institute of Ocean Sciences, Fisheries and Oceans Canada (DFO) in British Columbia.

Upon completion of this work, in 1984, he set up a consulting company in Nova Scotia that focused on applied research in chemical oceanography and microbial ecology. In 1989, Dr. Lee joined DFO as Head of the Microbiology and Hydrocarbons Section at the Maurice Lamontagne Institute in Mont-Joli, Quebec, and implemented programs on the microbial transformation of contaminants in estuarine and coastal environments, which encompassed research on the development and evaluation of oil spill countermeasure technologies and toxicity assays for environmental impact assessment.

These activities and experiences led and expanded Dr. Lee's research interests into the evaluation of potential contaminant impacts associated with offshore oil and gas activities and subsequently led to a transfer to his native Nova Scotia to join the Marine Environmental Sciences Division at the Bedford Institute of Oceanography in Dartmouth, culminating in an appointment as Executive Director of the Centre for Offshore Oil and Gas Environmental Research (COOGER). The centre is responsible for the coordination of a national strategic program in environmental and oceanographic research relating to oil and gas activities within the DFO mandates. Here, his current responsibilities include the identification of departmental research priorities and the promotion of national and international collaborative research programs.

Dr. Lee has published over 250 articles in scientific journals, technical reports and books. His record of technology transfer includes the development of national and internationally sanctioned operational guidelines for oil spill countermeasures, scientific advice for the revision of regulatory guidelines, and the development of standard toxicity procedures. Dr. Lee currently serves as Co-chair of the Federal Panel of Energy Research and Development's Program at Objective level for Offshore Environmental Effects.

Marlon Lewis, Satlantic Inc. and Dalhousie University

ABSTRACT

New Technologies for Observing the Ocean Environment.

The dynamics of the ocean environment span a wide range of time and space scales. New automated robotic platforms and advanced sensors have been recently advanced and deployed to provide observations of the ocean over the necessary scales to enable understanding and enhanced predictive skill. Here we define the ocean observation problem and present a range of solutions both in current use and envisioned for the near future.

BIOGRAPHY

Dr. Marlon Lewis is the Chairman, CEO and Chief Scientist of Satlantic Incorporated and a Professor in the Department of Oceanography at Dalhousie University. He received Bachelors and Masters degrees in Science and Ecology at the University of Maryland, and a Ph.D. in Biology from Dalhousie University in 1984. Dr. Lewis is a recipient of the Lindemann Award from the American Society for Limnology and Oceanography, a Special Outstanding Achievement Award from NASA, a Killam Prize from Dalhousie University, and a Poste Rouge from the French Centre Nationale de Researche Scientifique. His research interests span a broad range of oceanographic areas from upper ocean physics to biological processes to the ocean's role in global climate. He was named Entrepreneur of the Year in the Technology category in Atlantic Canada, and was named as one of the Top 50 CEO's in Atlantic Canada. He holds adjunct appointments at Columbia University's Lamont-Doherty Earth Observatory, the Bigelow Laboratory for Ocean Sciences, and the Ocean University of China. Dr. Lewis has published over 100 peer-reviewed scientific publications, and serves on numerous advisory councils to organizations and governments in Canada, the United States, Europe, Japan and Asia.

Dr. Andrew MacRae, Saint Mary's University

ABSTRACT

Data Sharing

Petroleum data accessibility: the challenges of paper, the promise of digits:

Data collection from offshore eastern Canada is expensive and logistically challenging, but of great reward to industry if it leads to economic success. As the "land owner", the public has a long-term interest in resource development on public lands. The preservation and eventual release of information is one means to that end: it reduces the exploration risk. Confidentiality periods protect the immediate commercial interests of industry, while allowing information to be accessible for further research someday. If past experience is any indication, offshore eastern Canada is more attractive because information from previous exploration cycles is available to fuel the next cycle of ideas and tests of them.

Although the principle of data release from public lands is a sound one that is well-established around the world, it is not without challenges. For example, the current (early 2006) policy of paper release allows for some types of research, but for whole classes of data, the result for researchers is imprecise and incomplete compared to digital data. It is possible to do new research with these caveats, but only within certain restrictions, and it can be dramatically inefficient. Worse, some types of research cannot be done at all.

In light of recent announcements, it is timely to review what it takes to do some types of research under the old, paper policy, and to consider the promise of digital release in the future. It is also appropriate to discuss the implications and new challenges of a digital era, both in terms of research and the protection of commercial interests.

BIOGRAPHY

Dr. Andrew MacRae has worked as a teacher and researcher at the Department of Geology, Saint Mary's University since 2002. Before his appointment there he worked for 5 years at the Geological Survey of Canada (Atlantic). Most of his research in the last few years has focussed on petroleum-related sedimentary systems and biostratigraphy in the Cretaceous-Cenozoic of the Scotian Margin and Grand Banks. He has studied the palynology and sedimentology of tidally-influenced deltaic reservoirs in the Lower Cretaceous, chalks of the Upper Cretaceous, the later phases of salt motion on the shelf, and how sediment depocentres have varied in location and style on the Shelf and Slope during the Upper Cretaceous-Cenozoic.

His earlier work includes 3 field seasons in the Canadian Arctic studying the palynology and stratigraphy of volcanic-sedimentary successions while at the University of Calgary (M.Sc. and Ph.D.) and at Dalhousie University (B.Sc.). In collaboration with colleagues at the GSC, Andrew has also been involved in the implementation of computer databases and programs related to research in the offshore.

Camille Mageau, Fisheries and Oceans Canada

ABSTRACT

Seismic Statement of Practice

BIOGRAPHY

Director, the Oceans Policy and Planning Branch, Oceans Directorate, Fisheries and Oceans, Ottawa, Canada (DFO). Ms. Mageau holds postgraduate degrees in Marine Geology and Geophysics and in Oceanography.

During her career with the federal Public Service of Canada, Ms. Mageau has combined field experience in all three oceans with science management responsibilities in four natural resource departments. Charged in 1995 with development of Canada's vision for ocean management, she oversaw drafting of Canada's *Oceans Act* and implementation of the of the operational elements of Canada's oceans management approach: the development of integrated management plans for marine waters, the establishment of Marine Protected Areas and the development of Marine Environmental Quality objectives, guidelines and regulations.
As a visiting scientist with the National Oceanographic and Atmospheric Administration in Washington, DC, and through her work with the Intergovernmental Oceanographic Commission in Paris, Ms. Mageau has worked with scientists and managers in a number of countries to develop science-based tools needed to advance ocean management globally.

In her capacity as Director of Oceans Policy and Planning Branch she now directs three teams responsible for the formulation of departmental ocean related policies and the development of frameworks and tools to facilitate incorporation of ecological, social and economic considerations in ocean-related decision making. The development of the draft Statement of Canadian Practice for the Mitigation of Seismic Sound in the Marine Environment is one example of the type of guidance being developed to help guide environmentally sound development of ocean resources.

Carl Makrides, CNSOPB

ABSTRACT

Data Repository

Exploration activities in the Nova Scotia offshore area have been occurring for over 40 years while production of oil and gas is a relatively recent activity. A large volume of valuable petroleum data was acquired during this time at significant cost. This data is needed by the regulator, industry, governments, research institutions and the public. Modern exploration and development activities are generating progressively larger volumes of digital data, resulting in an 'information boom'. The Canada Nova Scotia Offshore Petroleum Board (CNSOPB) is responsible for the efficient, fair and competent regulation of petroleum activities and resources in the Nova Scotia offshore area. In addition, the CNSOPB is responsible for the storage and curatorship of all geophysical and geological records, reports and samples acquired within its jurisdiction. The CNSOPB does not have an effective and efficient system for managing this growing volume of digital data due to the lack of appropriate personnel and facilities. A good data management system is crucial to effectively manage oil and gas resources, particularly in a high cost environment such as offshore Eastern Canada. It is recognized that a good data management system would significantly benefit all those involved in petroleum exploration and development offshore Nova Scotia. Since April, 2005 the CNSOPB has been working towards the establishment of digital Data Management Center (DMC) for Nova Scotia offshore petroleum data. If federal and provincial government funding is secured and data access issues are resolved the DMC could be fully operational in 1 – 2 years.

BIOGRAPHY

Carl Makrides has been employed with the Canada Nova Scotia Offshore Petroleum Board (CNSOPB) since 1992. His duties include reviewing the geological and petrophysical aspects of industry submitted activity authorizations, development plans and petroleum rights applications. Carl is also a member of the CNSOPB Resource Assessment Team which conducts independent geoscientific and resource assessments of the sedimentary basins offshore Nova Scotia. He has been involved in digital data management projects since 2000 when he participated on the East Coast Shared Data Repository committees along with other industry, governments and regulatory representatives. Since April, 2005, Carl and other CNSOPB staff have been working to develop and implement a digital Data Management Center for Nova Scotia offshore petroleum data. He graduated from Dalhousie University in 1987 with a Bachelor of Science degree in Geology.

John Marrone

ABSTRACT: Canada's Clean Coal Technology Roadmap

Energy policy makers worldwide view coal as an important and strategic energy resource, one that is essential to maintaining world energy security at an economically competitive price. Canada is endowed with varied and abundant energy resources, which includes huge proven reserves of coal that contribute enormously to our energy mix and to our nation's economic prosperity. Coal is an inexpensive, secure, and readily available fuel, which is free from price volatility and completely capable of being utilized in an environmentally acceptable manner.

With these concerns in mind, over one hundred Canadian stakeholder comprising industry, government, researchers and academia developed Canada's Clean Coal Technology (CCT) Roadmap with the following objectives:

- to identify the market opportunities and CCT needs to foster the continued use of coal in Canada;
- to review and identify clean technologies, energy processes, and integration system pathways that best suit Canada's CCT needs;
- to provide information on the CCT respective time frame for development, capital and operating cost, environmental performance, technology risk, development and infrastructure needs; and
- to recommend actions required by stakeholders to have the Roadmap findings implemented in a timely fashion.

This presentation will provide an overview of Canada's Clean Coal Technology Roadmap. It will identify the key market forces that support the need for clean coal technologies in Canada's energy mix, and the respective near zero emissions performance targets for the technologies. The presentation will touch on Canada's required timelines for clean coal technology development and commercial implementation. Lastly, it will identify a number of clean technology pathways of interest to Canada and provide an overview on how these technologies can be made available to best suit Canadian timelines and market needs.

BIOGRAPHY

John Marrone is the Director General of the CANMET Energy Technology Centre in Ottawa, the largest of the three CETC technology centres under the Department of Natural Resources Canada. The centre works with industrial partners to develop clean energy technologies for buildings and communities, transportation, electric power generation and industrial processes.

Specifically, CETC develops technologies for energy efficiency, alternative and renewable energy sources and low emission use of fossil fuels.

John has 25 years experience in technology development, half of which were spent in the private sector.

His current responsibilities include leading national consultations to develop technology roadmaps for key clean energy technologies, such as the recently completed roadmaps for Clean Coal and CO2 Capture and Storage

Phil Moir, Geological Survey of Canada

ABSTRACT

Geoscience Data Repository and services; a significant improvement in access to data

The Earth Sciences Sector (ESS) is one of five sectors within Natural Resources Canada. It is the Government of Canada's principal Earth sciences agency, providing Canadians with timely and reliable geomatics and geoscience knowledge. ESS supports the environmental, social, and economic priorities of the federal government by focusing its science and technology programs on innovative projects that improve the quality of life of Canadians. The generation and dissemination of information that contributes to the well-being of Canadian citizens is at the forefront of all ESS activities.

In 2004, the CCGK program introduced the Geoscience Data Repository (GDR), a distributed network of databases that makes it easier for users to access and use the extensive holdings of ESS resource geoscience data. On-line, low-cost access to these data is essential for geological mapping and for mineral and hydrocarbon resource exploration. The GDR employs a series of services and applications to more effectively manage geoscience data, information, and its subsequent dissemination. It now distributes a significant portion of the Geological Survey of Canada's extensive mineral and energy geoscience legacy data and information through the Internet. As well as providing this service externally, the GDR has become an important information asset to internal ESS programs and activities.

BIOGRAPHY

Phil Moir is currently the Manager, Data Management Operations for the Data Management and Data Dissemination Branch, Earth Science Sector, Natural Resources Canada. For the past year he was Program Manager for the Consolidating Canada’s Geoscience Knowledge Program (CCGK), and previous to that the Project leader for the Geoscience Information System for Energy and Mineral Resources Project.

In 1985 he joined the Geological Survey of Canada, based at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia, where he worked as a sedimentary basin geologist, project manager, and information management/information technology expert. The main thrust of his work has contributed to an improved understanding of the sedimentary basins offshore Eastern Canada and their hydrocarbon potential. This directly relates to the issue of the discovery and development of new energy resources for Canadians. In his current position he is responsible for managing a wide array of geoscience and geomatic data sets for the entire country, and enabling much improved and unrestricted access to this wealth of information.

Dr. Prasanta Mukhopodyay (Muki), Global Geoenergy Ltd.

ABSTRACT

Genetic Relationship between Salt Mobilization and Petroleum System Parameters: Possible Solution of finding Commercial Oil and Gas within Offshore Nova Scotia, Canada during the Next Phase of Deepwater Exploration

Prasanta K. Mukhopadhyay (Muki)*, Paul J. Harvey and Kris Kendell****

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The results of recent deepwater drilling to explore for oil and gas in the deepwater Scotian Basin, Offshore Nova Scotia, Eastern Canada has indicated the presence of more complex petroleum systems compared to deepwater Gulf of Mexico and West Africa (offshore Angola). Four factors have controlled the variations in the major petroleum system components: (1) salt movement; (2) hydrocarbon drainage patterns; (3) hydrocarbon sustainability; and (4) play types.

Although limited data is available in the deepwater Scotian Basin (500-2100m water depth), this paper presents a new analysis incorporating seismic stratigraphy, geochemical fingerprinting, and petroleum system modeling. The results of this work reveal that the formation, timing, and fluidity of several large allochthonous salt canopies is closely connected to source rock anoxicity, bypassing of turbidite sands (in Early Tertiary and middle-late Cretaceous time); and the survival of hydrocarbons within various play types. Early mobilization of Jurassic salt which formed large canopies, especially within Tertiary sediments of the slope part of the Sable Subbasin (east-central part of the Scotian Basin), possibly originated from enhanced heat flow and hydrocarbon migration during three-phase fluid flow (using 1D and 2D petroleum system modeling) in late Jurassic-Early Cretaceous period. Current studies within target areas of the Scotian Basin indicate that the turbidite reservoir sands in Eocene/Miocene or Mid-Cretaceous may possibly be charged with mainly gas-condensate or light oil-gas within the slope region of the Sable Subbasin (beyond 2500m water depth) and the area between eastern parts of Shubenacadie I-100 and south of Albatross B-13 wells of the Scotian Basin (beyond 1500m). Petroleum system modeling data also suggests that the Tithonian Jurassic sands may be an important future exploration targets in deep and ultra-deep water.

BIOGRAPHY

Dr. Muki has thirty (30) years of experience in upstream petroleum research including petroleum system risk assessment in conventional oil and gas, coalbed methane, and shale gas exploration. Since 1990, he has been the President of Global Geoenergy Research Limited, Halifax, Nova Scotia, Canada where he has coordinated research contracts for various oil Companies throughout the world including South China Sea, Alaska North Slope and offshore Brazil. Gulf of Mexico, Nigeria, Nova Scotia and Newfoundland. Since 1995, Dr. Muki has been appointed also as an Honorary Adjunct Professor at the Department of Earth Sciences of the Dalhousie University, Halifax, Nova Scotia.

Prior to 1990, he had worked as Research Scientist in Atlantic Coal Institute in Sydney, Nova Scotia, Canada, Bureau of Economic Geology at the University of Texas at Austin in USA, Institute of Petroleum and Organic Geochemistry in Germany, Oil and Natural Gas Commission, Dehra Dun and Geological Survey of India, Calcutta, India. His PhD Dissertation is on Coal

Facies and Maturation and a two-year Post Doctoral Research (as Humboldt Fellow) is on Petroleum Geochemistry.

Dr. Muki has edited four special books for the American Chemical Society, Washington, D.C. and Elsevier Science publications, Amsterdam and has published 60 articles or chapters related to Petroleum/Coal Geochemistry and Environmental Petrology/Geochemistry in various Earth Science journals and books. He has conducted many training schools for various oil companies in Brazil, Canada, China, Japan, USA, and Venezuela. He is connected with scientific organizations like The Society for Organic Petrologists (as the President 2000-2001 and Vice-President1993-1994), American Association of Petroleum Geologists and American Geological Institute in various Scientific Committees.

Mark Noble, GX Technology

Mark Noble, graduated in Geology in 1988 from the University of London. Worked for Scott Pickford in UK as geologist/geophysicist/technical salesman until 1998. Joined GX Technology as technical salesman. Moved to Canada in 2002 to head up regional office in Calgary. Project manager for 2003 regional Nova Scotia Project. Since then have worked on a number of other regional basin studies from around the world.

Dr. Alexandre Pavlovski, P.Eng.þ, Green Power Labs

ABSTRACT

Solar Energy

Rising world energy prices and the necessity to control CO_2 emissions bring more and more attention to using renewable energy. Achieving energy security by turning to indigenous renewable energy resources is an urgent item on the energy agenda of every region in North America. Assessing the regional potential of renewable energy resources available – wind, solar, ocean, geothermal – is a necessary step towards their efficient use.
The presentation will address the problem of decision support for solar energy deployment in Atlantic Canada. The natural, technical and socioeconomic levels of solar potential will be discussed. Solar Energy Suitability Assessment and Application Planning toolset will be presented. The toolset includes a solar potential assessment methodology, regional/provincial solar resource maps, municipal solar suitability database, and solar site assessment tools. Municipal solar suitability assessment will be introduced as a necessary step in solar technologies deployment. Basic solar power potential of individual households will be presented for each of Atlantic Canada provinces. Barriers, policies and strategies for solar power deployment in the region will be discussed.

BIOGRAPHY

Dr. Alexandre Pavlovski is a professional engineer with over 25 years of expertise in renewable energy field. He holds a Master of Science, Electrophysics and a Ph.D., Power Conversion degrees from St.Petersburg Polytechnic University, diplomas and certificates in Environmental Policy and Innovations Management from St.Petersburg Polytechnic University – Institute for Innovations, Suffolk University – Sawyer School of Management (Boston) and Central European University - Department of Environmental Sciences and Policy (Budapest).
Dr. Pavlovski began his professional activities in 1981 as an environmental researcher with High Voltage Direct Current Power Transmission Research Institute. His 25-year career has taken him through several increasingly challenging research, academic and management positions. His engineering expertise has been focused on alternative/renewable energy applications: magnetohydrodynamic energy conversion, solar and wind power generation. Today, Dr. Pavlovski serves as President and CEO of Green Power Labs Inc. (Dartmouth, Nova Scotia), a renewable energy organization specializing in solar resource assessment and solar energy applications. Dr. Pavlovski also chairs the Renewable Energy Committee of the Halifax Chamber of Commerce.

Jerry Payne, Fisheries and Oceans Canada

ABSTRACT

Drill Wastes

BIOGRAPHY

Dr. Payne is a research scientist with DFO and has extensive experience in the science and "politics" of environmental issues related to offshore oil development.

Roger Percy, Environment Canada

ABSTRACT

Spills/ Dispersants

BIOGRAPHY

Roger Percy is currently the Regional Environmental Emergencies Coordinator for Environment Canada, Atlantic Region. In that capacity he chairs the Regional Environmental Emergencies Team (REET), a multi-agency team of experts charged with providing consolidated and comprehensive environmental advice during marine and land-based emergencies.

Roger graduated with an MSc from Carleton and Guelph Universities in Ontario. In a past life he worked on impact assessments of the Mackenzie Valley Pipeline and the Beaufort Sea Offshore exploration projects. He has also been responsible for managing oil and gas R&D studies funded by PERD. He led the Canadian team of advisors sent to assist Persian Gulf states during response to the massive oil spill in that region in 1991.

William Perrie, Fisheries & Oceans Canada

ABSTRACT: Impact of satellite-derived winds on forecast estimates of marine winds, waves and currents

The objective of this project is to foster the integration of remotely sensed wind sources into operational forecasts for high quality, basin-scale vector wind maps by combining remotely sensed RADARSAT-1 SAR-derived wind measurements with gridded outputs from numerical weather prediction (NWP) models. The gridded NWP wind used here are fine-mesh, routine forecast wind fields, for example from the operational MSC (Meteorological Service of Canada) GEM atmospheric model, for the NW Atlantic, or similar products from a mesoscale weather forecast model. The resolution for the GEM fields is presently about 15km. While extensive data assimilation is executed in the operational GEM simulations and forecasts, involving satellite products, no satellite wind data are presently included.

We use Hurricanes Gustav and Isabel to create 6-hourly maps for gridded wind fields, using wind estimates from GEM model, scatterometer wind data and SAR remotely sensed winds. These new winds are shown to compare well with *in situ* data, and to result in improved forecast estimates for waves and upper ocean currents.

BIOGRAPHY

Dr. Will Perrie (DFO) is an Adjunct Professor at Dalhousie University and a Research Scientist at Bedford Institute of Oceanography. His PhD is from MIT (1979), and he was a PDF at UBC (1980-1981) and NCAR (1981-1983). In the last 6 years, he has effectively mentored 18 visitors and students, resulting in 20 reviewed scientific papers. He is on the editorial board of the journal Ocean Modelling and was the invited editor for a 2-volume series on Atmosphere-Ocean Interactions. His research includes surface waves and marine winds, wave-drag, sea spray, remote sensing, air-sea interactions, regional atmosphere-ocean climate variations, and air-sea CO2 gas transfer.

Douglas Pincock, AMIRIX Systems Inc.

ABSTRACT

Fish Tagging Technology

Scientists have been using electronic tags as a tool to assist in determining the behaviour of fish and terrestrial animals in the wild for well over thirty years. In the ocean, two general approaches are prevalent:

1. Ultrasonic transmitters, possibly with associated sensors, which are detected by stationary or mobile receivers

2. "Archival Tags" which maintain a log data from physiological and environmental sensors which can be downloaded if the tag is recovered

VEMCO Division of AMIRIX Systems Inc., a Nova Scotia company, has been the world's leading provider of Ultrasonic Telemetry equipment for more than 20 years and this talk draws from that experience.

Following a discussion of the capabilities and limitations of acoustic telemetry today and in the future, the talk will describe system level solutions for determining large scale movements and/or detailed behaviour. These solutions will be illustrated by references to significant high profile projects now underway in various parts of the world.

The talk will conclude with an overview of new capabilities we expect to emerge from the research of VEMCO and its collaborators which will include, amongst other things, solutions bringing the transmitter and archival approaches together drawing on the strengths of each.

BIOGRAPHY

In 1981, Doug founded AMIRIX Systems Inc. and served as President & CEO until 2000 when he stepped aside to focus on the technology direction of the company. Prior to AMIRIX, he spent 12 years as a professor of Electrical Engineering at TUNS, UNB, the University of Paris and St. FX. While at UNB, Doug and his research team developed innovative technology in underwater acoustic telemetry. VEMCO Limited, a leading supplier of acoustic telemetry equipment whose products are sold worldwide, is a direct spin-off of this research. In a 2003 acquisition, VEMCO became a product division of AMIRIX.

Doug has served on a number of Boards including CMC, SamSys and Vemco. He has advised the Canadian Intellectual Property Organization Advisory Board and the Nova Scotia Council on Applied Science and Technology. Doug is currently Chairman of the Board at AMIRIX and is also Chairman for the Sable Island Preservation Trust. In 1998, he received the CATA Alliance's National Award of Distinction in private sector leadership, and was named one of Atlantic Canada's Top CEO's in 2000. In 2001, Doug formed the AMIRX MS Bike Tour Team which, to date, has raised more than $20,000 for MS research.

Ian Potter, Alberta Research Council Inc.

ABSTRACT

Clean Combustion/ Coal Gasifications

Technology has already played a major role in energy sustainability, for example, reducing greenhouse gas emissions and controlling costs, but as our scientific and technical understanding grows, it is readily apparent that new technologies hold the promise of increasing our supply of energy more efficiently and more cleanly.

Innovation in technology is the primary means of creating long-term options that are so necessary to any future cleaner energy economy. Successful innovation is the product of a complex network of interactions, stretching from basic university research to diffusion of commercial innovations in the market. Essential to the network is the importance of seeing innovation in system-wide terms and not just as a matter of individual, standalone technologies. The innovation theme needs to pervade all areas of future energy research and development activity and specifically in the ability to develop, adopt, adapt and apply technology that provides for enhanced hydrocarbon energy natural resource development whilst providing sustainable development.

This presentation investigates the process of innovation applied to Canadian energy research, development, demonstration and commercialization and reviews the historical impact and future opportunity for technology innovation on the Canadian energy sector.

Renewable Energy

Canada has one of the world's largest resources of hydrocarbons. At present, much of this resource is exported to the United States in either raw form or value added products. In the future, based on present projections by industry and governments, Canada's energy shipments to the United States could double or even triple by 2025, relying heavily on the oil sands industry. There are concerns that this future could be limited due to perceived low levels of remaining conventional resources, particularly natural gas, the immature development of unconventional gas resources and high natural gas prices. The gasification of hydrocarbon resources, whether coal, coke or bitumen, represents a potential economically viable technology that could not only provide a substitute for natural gas, but also promote Canada's energy industry to provide higher value added products, such as gas to liquids, petrochemicals, carbon dioxide for enhanced oil/gas recovery and other energy streams.

The challenge and opportunity for Canada lies not in the development of gasification technology, but the adaptation and the integration of the system from its currently wide application in the petrochemicals industry to Canadian specific polygeneration demands focused on the business drivers and the environmental utilization of Western Canada's unique blend of hydrocarbon resources.

This presentation will highlight the significant potential of gasification technology for Canada and identify the specific technical, economic, and environmental issues related to gasification.

BIOGRAPHY

Dr. Potter is Vice President, Energy at the Alberta Research Council. Previous positions at the Alberta Research Council have included Manager, Climate Change Technologies, Director, Carbon and Energy Management, Director, Cleaner Hydrocarbon Technology Futures and Director, Sustainable Energy Futures.

Previous to the Alberta Research Council, Dr. Potter served as an Officer in the British Royal Navy, as Assistant Professor of Mechanical engineering at the University of Calgary, as a Senior Research Engineer with C-FER Technologies and as a Marine Engineering Officer with Shell Tankers (UK). Dr. Potter received his bachelor of engineering in marine engineering from the Royal Navy Engineering College, and Masters and doctorate degrees in mechanical engineering from the University of Calgary. Dr Potter is an Adjunct Professor of Chemical and Petroleum Engineering at the University of Calgary and an Assistant Adjunct Professor in Mechanical Engineering at the University of Alberta.

Ted Potter, Fisheries and Oceans Canada

ABSTRACT

Fisheries Mapping

BIOGRAPHY

Attila J. Potter (Ted) is a native of Newfoundland. He received his Bachelor of Science Honours Degree (Marine Biology) from Memorial University of Newfoundland in 1989 and graduated with a Masters of Marine Management from Dalhousie University in 1996.

In 1986 he joined the Canadian Federal Public Service as a Naturalist with Parks Canada and held several positions in a number of National Parks throughout Atlantic Canada. He worked closely within inshore fishermen and community groups on a proposed National Marine Conservation Area along the northeast coast of Newfoundland.

In November 1998 he accepted a position with the Department of Fisheries and Oceans, Maritimes Region as Senior Advisor Oceans Policy and Programs and then as the Regional Oceans and Environmental Liaison Officer. In that capacity, he developed policy to address issues related to oil and gas exploration and development. He served as Co-Chair of DFO's Science Advisory Committee on Offshore Petroleum Activities (SACOPA) and participated on a number of Regional and National Working Groups dealing with Oil and Gas Issues.

Ted is now a senior manager in the Habitat Management Program. He initially managed the planning, auditing and stewardship functions for that Program but with the department-wide implementation of the new Environment Process Modernization Project, Ted accepted the position of Division Manager for the new Environmental Assessment and Major Projects Division.

Ted experience with DFO has given him the unique opportunity to be involved in both the development of policy and the application of government regulations as they are applied to coastal and marine management. This combination of experience gives Ted a balanced perspective for making decisions that consider both the environment concerns as well as the economic interest of industries and coastal communities.

Paul Pynn, Atlantic Orient Canada Inc.

ABSTRACT: Small Wind Energy Turbines

BIOGRAPHY

Paul Pynn P.Eng. has been involved in several large-scale construction projects in Canada and internationally in the past 9 years as a project manager/engineer.

Joining Atlantic Orient Canada Inc. in 2001, he was able to pursue his long time interest in renewable energy technologies. Mr. Pynn is responsible for project management and technical development of the company's wind turbine. He has acted as project manager for installations in Ireland, Scotland, India and Canada and has done installation, service and technical consulting work on projects in Ontario, Nunavut, Iowa, and England. He also played an integral part in developing the companies manufacturing capacity and has worked with local manufacturers to develop high quality component fabrication. Mr. Pynn played a key role in the establishment of a joint venture, which was formed to respond to a request for wind turbines in Nunavut and other areas of Northern Canada.

As a member of various renewable energy committees and a regular participant in international wind energy conferences, Mr. Pynn actively promotes sustainable energy development.

Mr. Pynn holds a Bachelor of Civil Engineering degree from Memorial University (1994).

Dr. Michael Raymont, EnergyINet

ABSTRACT

Canada: The Next Energy Superpower

In less than 25 years, world demand for oil is expected to be 70 percent more than it is today. Conventional oil and gas resources are declining, and environmental priorities are challenging how we look for and develop new energy sources. Access to stable, reliable and easily accessible sources of energy is imperative to sustain our economy and high quality of life.

The world of energy is undergoing tremendous changes and transformation, and EnergyINet is focused on the role that new research and leading-edge technologies can play in helping Canada become an energy superpower.

Dr. Raymont will outline EnergyINet's vision for a Canada that could find itself in a unique position: becoming a world leader in the development of new, leading-edge technologies that help us become a world energy superpower.

Designed to bridge the gap between research, industry and governments, EnergyINet brings these players together to look for real world solutions to overcome tomorrow's energy production and related environmental challenges.

Energy Sustainability Policy

Canadians can tap into practically every energy source. We can readily access hydro, natural gas, oil, coal, the oil sands and uranium and other nuclear fuels. We also develop unconventional energy sources like coal bed methane, gas hydrates and shale gas. We are also blessed with the ability to tap into the wind, the sun and our oceans to produce energy and reduce our environmental footprint.

The research and utilization of all of these sources of energy is very short-sighted however. As a country, we need to change our approach of how we think of energy. We need to find new ways to look for, recover and produce energy, not in isolation, but in a much more integrated and focused way.

Dr. Raymont will outline the need to change how we approach innovation, better coordinate research efforts and take a truly integrated focus to help build long-term, sustainable supplies of energy for Canadians.

EnergyINet is a not-for-profit corporation that brings together more than 200 energy, environmental and technical experts and strategists who are focused on Canada's energy future.

BIOGRAPHY

Dr. Michael Raymont became EnergyINet's first permanent Chief Executive Officer (CEO) in October 2005. Michael has extensive government and business experience, and will be responsible for leading EnergyINet's stakeholder engagement, network development, program integration and business sustainability activities.

Michael comes to EnergyINet with strong management, entrepreneurial and leadership experience in the research, technology, telecommunications and software service industries. Before joining EnergyINet, Michael was Acting President and Vice-President, Technology and Industry Support, with the National Research Council of Canada (NRC), where he provided leadership to NRC's major national industrial research programs, including the Industrial Research Assistance Program (NRC-IRAP).

Before joining government, Michael led several technology companies, raised public and private equity, developed business and marketing strategies, recruited management teams and established strategic relationships with several multinational Fortune 1000 companies. He served as Chairman and CEO of EquipNet Inc., Boston-based capital asset management software and service provider, and was President and CEO of three Canadian technology companies in the engineered materials and medical products sectors. In addition, Michael was CEO of the non-regulated subsidiaries of Telus Corp., where he ran their international operations and venture investments.

Michael holds Bachelor of Science (Hons.) and Ph.D. degrees in chemistry from Bristol University and the University of Calgary respectively, and was a Killam Scholar. He holds two patents, has authored numerous publications and presentations principally on technology commercialization and economic development. He has held board positions on a number of public and private technology companies, and is a member of several professional associations including the Canadian Society for Chemical Engineering, Licensing Executives Society and the American Chemical Society.

David Scott, Dalhousie University

ABSTRACT

Observations of Coral Communities on the End Moraines of the Upper Scotian Slope and other localities around the world

D.B.Scott, **J.H.M. Willison**, Dalhousie University, **M.J. Risk**, McMaster University, Hamilton, Ontario L8S 4M1 CANADA; **C. Hillaire-Marcel**, **B. Ghaleb,** Université de Quebec à Montréal

This presentation presents photo-documentary evidence of the glacial end moraine on the southern Scotian Shelf and the different types of benthic habitats that are present. Also studies done by European workers in the North Sea. Studies of this kind have been carried out with various platforms but the most effective appears to be an ROV. In the present studies ROV's provided the opportunity to acquire high quality video, samples of sediment and organisms needed for detailed study. The video obtained together with samples provided a unique picture of the diversity that is associated with deep-sea corals, similar to that of shallow water reefs or rain forests on land. The videos also show the wholesale destruction of these reefs by bottom dragging. Hovland has suggested, off Norway, that corals may be associated with methane seeps.

BIOGRAPHY

Received a Ph.D. in Geology, Sept. 1977 from Dalhousie University.

Fields of Interest

Micropaleontology - Particularly Recent and Pleistocene Foraminifera and Ostracoda, and their use as environmental indicators and coastal zone management tools, Thecamoebians, their present distribution and usefulness in paleo-ecology.

Quaternary Geology -Sea-level changes and environmental changes related to glacial periods, Quaternary paleoceanography, stable isotopes in the Quaternary, **global climate change, most recently using deep sea corals** as a climate archive and Arctic paleoceanography (paleo-ice cover)

Member of Geological Society of America, Paleontological Society of America,
Cushman Foundation for Foraminiferal Research (Patron and on board of directors) and
American Geophysical Union, Member

Approximately 140 papers published in refereed journals and conference/book chapters; also1 book, book reviews and over 120 conference presentations. Of most interest to this group might the book by Scott, D.B., Medioli, F.S. and Schafer, C.T., 2001, *Monitoring of Coastal environments using Foraminifera and Thecamoebian indicators*: Cambridge University Press (Feb. 2001), 176p which among other things discusses use of foraminifera in detecting oil spills.

Scrosati, Ricardo, Saint Francis Xavier University

Marine environmental impact assessment: Establishing baseline knowledge on rocky shore biological communities in northern Nova Scotia

Ricardo Scrosati [1], Christine Heaven [1], Lindsay Eckersley [1], Hugo Beltrami [2]

[1] Marine Ecology Laboratory, [2] Environmental Sciences Research Centre.
Saint Francis Xavier University, Antigonish, NS B2G 2W5, Canada.

With the predicted increase in marine oil and gas exploration and exploitation in Nova Scotia, the probability of environmental problems occurring on our coasts will rise. Healthy rocky shore ecosystems provide important services to humans. Examples are phycocolloids (alginates, carrageenan) from seaweeds, food from invertebrates (mollusks, crustaceans), habitat for fish reproduction and growth (stands of marine plants), and maintenance of upper levels in the food chain (predatory fish, sea birds) via trophic links with lower levels (seaweeds, filter feeders, grazers, carnivore invertebrates). A meaningful assessment of environmental impact (such as oil spill effects) requires baseline information on the affected system before it was disturbed. The long-term goals of our research group at StFX are: (1) to determine the 'normal' composition and abundance of benthic invertebrates and seaweeds from the western (Gulf of St. Lawrence) and eastern (Atlantic) rocky shores of northern Nova Scotia, and (2) to experimentally identify the environmental variables that affect the structure and dynamics of such biological communities. State-of-the-art general circulation models that predict future climate trends for our region will aid in predicting possible changes in these communities with time and, hence, their possible response to future environmental impacts. Our group is thus generating the necessary baseline information on which to base environmental impact assessments on these shores.

Arnfinn Skadsheim, International Research Institute of Stavenger

ABSTRACT

Norway Produced Water: Discharge regulation and assessing potential environmental impact from offshore

The off-shore Norwegian oil and gas industry has progressed from the North Sea into the Norwegian Sea and the Barents Sea. The Gulf Stream also runs northwards through all fields. This long area harbours globally significant fisheries and is a main migration route for marine many marine vertebrates. The northward gradient is paralleled by less natural science knowledge and increased conservation and precaution. Some areas are still closed for exploration and discharge regulations are strictest up north in the pristine Arctic. The largest produced water discharges are from the oldest southern fields and in key fishery areas.
The Norwegian legislation constitutes a key driver and has lead to a trend from chemistry to more biomarker type of effect based monitoring (mainly in fish) of produced water discharges. The monitoring is not field specific but covers defined regions. The concept will be revised past 2007. Potential impact is estimated by the Environmental Impact Factor (EIF). EIF builds toxicity values from assays, quantities discharged and estimates of the plume fate. Hazard and risk estimates, baseline and monitoring data support the selection of chemicals, operational procedures and technologies. The new C-Tour process for cleaning of produced water removes substances liable to bioaccumulate and is being installed on several platforms. Bioguard is a new sensor grid system being launched and provides real time monitoring around platforms and a potential for increased operational flexibility.
Aspects of some produced water components will be highlighted together with future knowledge demands to promote the development of an environmentally friendly and economically viable hydrocarbon industry.

BIOGRAPHY

Arnfinn Skadsheim, PhD, Senior Scientist, IRIS, Norway
PhD: Univ. of Oslo (UiO) Norway, Marine zoology and ecology.
Grants: UiO, Univ. of Århus, Denmark & British Antarctic Survey, Cambridge, UK.
Has worked in Denmark, Germany, England, Scotland and Spain.

Main research areas:

Ecology of amphipods; industrial R&D on fish farming, coastal ecology and nature conservation in relation to sea urchin and kelp forests interactions and hydrocarbon exploration and production (E&P).

Since 1994 an employee at IRIS, mainly conducting environmental impact assessment (EIA) research on accidental and regular discharges from the offshore Norwegian oil and gas industry with funding from the oil companies and the Research Council of Norway. Key parameters are fate, hydrocarbon partitioning, bioaccumulation and biomarker type of effect expression in marine organisms. Have lead international and national projects between industry and universities and other research units. Has together with colleagues written three reports on EIA on regular discharges for the Norwegian oil and gas industry and one for the British UKOAA. Present work is EIA on accidental and regular discharges from hydrocarbon E&P, cleaning of discharges, and challenges related to a future hydrocarbon industry in the Arctic and the deep-sea.

Brent Smith, CNSOPB

ABSTRACT

Abenaki Reef Trend

The Upper Jurassic carbonate bank extends for over 650 kilometres offshore Nova Scotia from Sable Island southwest to the U.S. border. With only 11 exploration wells drilled into the bank edge since 1970, one major field has already been discovered. Expected Value (EV) for the Deep Panuke field quoted by PanCanadian in 2002 was 1.2 Tcf original gas in place (OGIP). With 630 kilometres of mostly under explored bank edge remaining, more discoveries should be expected. This talk summarizes a recent study published by the Canada Nova Scotia Offshore Petroleum Board, providing a seismic and geologic perspective of this carbonate bank showing discovery wells, unsuccessful wells, and undrilled structures.

BIOGRAPHY

Brenton Smith P.Eng. is a Senior Geophysicist for the Canada Nova Scotia Offshore Petroleum Board in Halifax. He graduated from Acadia University with Certificate of Applied Science and a Bachelor of Science in math. He went on to the Technical University of Nova Scotia, graduating with a Bachelor of Engineering in mining. He then moved to Calgary to work as an Exploration Geophysicist with Amoco Canada Petroleum. His 10 years experience with Amoco included exploration in the Beaufort Sea, North Sea and Devonian reef plays in Alberta. He moved back to Halifax in 1990 as Senior Geophysicist for the newly formed Canada Nova Scotia Offshore Petroleum Board. In addition to dealing with regulatory requirements of the offshore industry, he is involved in ongoing petroleum resource assessment studies of Nova Scotia's offshore area. He has co-authored papers including "Hydrocarbon Potential, Deep-Water Scotian Slope" and "The Late Jurassic Abenaki Formation Offshore Nova Scotia: A Seismic and Geologic Perspective". He is an active member of the Association of Professional Engineers of Nova Scotia (APENS), Society of Exploration Geophysicists (SEG), and Canadian Society of Exploration Geophysicists (CSEG).

Jennifer Smith, WWF-Canada

Title: Striking a balance: planning for conservation and development

Abstract:

Consensus is growing that a new approach is needed to address the complex, multi-sectoral realities of achieving conservation, recovery and sustainable use of Canada's oceans. Canada's new direction for oceans management, led by the Eastern Scotian Shelf Integrated Management (ESSIM) initiative, presents an opportunity to move toward such forward planning of oceans uses. Area-based management tools such as networks of Marine Protected Areas (MPAs) provide a sound foundation for this approach. The benefits of MPA networks are now well known, and maritime nations around the world are taking steps toward establishing national and regional networks.

Canada has committed to completing MPA networks through international agreements and national policy. The present challenge is to chart a course for meeting these commitments. WWF-Canada has been working to inform this course by proposing a Framework for planning, designing and implementing networks of MPAs based on guidance, experience and best practice from around the world. This talk will provide an overview of WWF-Canada's contributions, highlighting the important role of industry stakeholders and the ways in which a clear framework for planning networks of MPAs will benefit industry as well as biodiversity.

BIOGRAPHY

Jennifer Smith is based in WWF-Canada's Atlantic office, where she is involved in marine conservation planning and the application of Geographic Information Systems (GIS). She sits on the ESSIM Stakeholder Advisory Committee as a representative of interested environmental non-governmental organisations.

Sara Jane Snook, Springboard

ABSTRACT

Commercializing Discoveries

The presentation will introduce Springboard, a network that supports the commercialization of university research in Atlantic Canada. Springboard provides resources to Atlantic Canadian universities to encourage the transfer of knowledge and technology to the region's private sector. The presentation will highlight energy-related R&D happening throughout the region at the universities and the commercial opportunities resulting.

BIOGRAPHY

Sara Jane Snook is the executive director of Springboard, a newly created network of fourteen Atlantic Canadian universities whose purpose is to enhance the effectiveness of technology transfer at universities in Atlantic Canada and to promote and accelerate the commercialization of technologies by Atlantic Canadian companies.

Sara Jane Snook is a professional engineer with over 20 years of experience in corporate finance and oil and gas development. She holds a bachelors and masters degree in engineering from the Technical University of Nova Scotia (now part of Dalhousie University).

Sara Jane began her career in Calgary working for a large, multinational oil company. She returned to Atlantic Canada to join the Nova Scotia government. After a decade which saw the first oil production and the first gas project in the Nova Scotia offshore accomplished, she returned to the private sector and spent five years in corporate banking with a large Canadian bank. Sara Jane is active in the local community with minor sports and encouraging young people toward careers in science and technology. Sara Jane is a member of the Association of Professional Engineers of Nova Scotia, the Association of Professional Engineers, Geologists and Geophysicists of Alberta, the Society of Petroleum Engineers and the Association of University Technology Managers.

Bob Stobbs, Canadian Clean Power Coalition

ABSTRACT

Clean Coal Power Coalition

The Canadian Clean Power Coalition (CCPC) is nearing completion of a detailed analysis of technology options to control air emissions, including CO_2, which result from coal use. The goal of the project is to demonstrate that coal-fired electric power can be generated with equivalent to natural gas combined cycle emission levels, and to show that CO_2 can be captured for commercial use or ultimate sequestration at a cost which does not render coal uneconomic.

The work commenced in 2001 and initial engineering studies were completed in 2003 to evaluate technology options for both retrofit and new plants. These feasibility studies addressed three technologies for CO_2 removal; i.e. amine scrubbing, CO_2/O_2 combustion and gasification. Three typical Canadian coal types were used in the study - bituminous, sub-bituminous and lignite. Capital cost, cost of electricity and cost of CO_2 avoided estimates were outlined.

A critical conclusion was drawn that there was a lack of gasification technologies that were suitable for low rank coals.

Additional work began in 2004 and the gasification study on low rank coal is currently in progress. The focus is on process developments to increase gasifier pressure, simplify gas cooling prior to cleanup and improve coal feed systems. The study will also look at blends of coal and petroleum coke with co-production of power and hydrogen, etc. (polygeneration).

This work also includes advanced supercritical steam optimization studies investigating advanced amine scrubbing systems and CO2/O2 combustion. This work will address five cases for three different coals used in Canada – bituminous, sub-bituminous and lignite.

The work will also lead to the development of a business case for one or more demonstration projects. It is planned to complete a full scale demonstration project by the 2010-2012 timeframe.

BIOGRAPHY

Bob Stobbs has several years of experience in the electrical utility industry related to the design of power plants, assessing new technologies and project management. His wide experience was augmented by a two year posting at Environment Canada in Ottawa as a Senior Advisor - Greenhouse Gas Program, as part of the Public Service of Canada's Executive Interchange Program.

Most recently, Bob held the position of Project Leader at SaskPower responsible for the clean coal initiatives of the Power Production Business Unit. He has been the chair of the Canadian Clean Power Coalition (CCPC) technical committee since 2001. Since January 2004, Bob has been seconded to the CCPC as the Executive Director. With the merging of the CCPC with EnergyInet's Clean Coal/Carbon Program, Bob is also a Program Director for EnergyINet.

The CCPC is a national association of coal and coal-fired electricity producers representing most of Canada's coal-fired electricity generation. Our objective is to demonstrate that coal-fired electricity generation can effectively address all environmental issues projected in the future, including CO_2. The CCPC is committed to demonstrate a clean coal technology at a commercial scale by 2012.

Bob graduated from the University of Saskatchewan with a chemical engineering degree.

Russell David Tait, ExxonMobil Upstream Research Company

ABSTRACT

Keynote Address: Joint Industry Partnership on Marine Sound

Research into anthropogenic sound and its effects on marine animals has greatly increased over the past decade because of information needs in many segments of society, including regulators, marine environment users, researchers and many others. Most of the research has been focused on marine mammals, however research on fish (adults, larvae and eggs) and invertebrates has recently increased.

The **International Association of Oil & Gas Producers (OGP) Sound and Marine Life Joint Industry Programme (JIP)** formally begins on May 18, 2006 with initial direct funding in excess of US$5M per year. The programme is envisaged to extend over the next three years. Broadly, this programme will characterize the sound field emanating from different oil and gas industry sources, measure and model the propagation of these sounds in differing marine environments, describe and measure any effects this sound may have on marine animals, and assess, develop and improve mitigation measures.

To date, 34 research topics have been proposed for funding under this programme. The programme's Executive Committee is preparing to establish priorities among these topics for initiation in 2006. The JIP is also pursuing joint funding opportunities, so as to cover as many topics as possible. This presentation describes the programme and priority areas of research.

BIOGRAPHY

Russell has worked for ExxonMobil for over 25 years, as an environmental and SHE specialist and Manager. He holds an M.Sc.(Hons) degree in ecotoxicology and a B.Sc.(Hons) in limnology.

Russell has worked in Australia, U.S.A., U.K., Europe and the former Soviet Union countries on a range of environmental and SHE assignments. Between 1989 and 1992 he lead the Exxon environmental damage assessment field studies for the *Exxon Valdez* oil spill in Prince William Sound and the Gulf of Alaska.

Currently, Russell has a lead scientific role for ExxonMobil's participation in the OGP Joint Industry Programme to address data gaps on the effects of E&P Industry sound on marine life. He is also a senior environmental management system auditor, having also been involved in development of ISO 14000 EMS standards for Australia in the early 1990s.

Russell is a Life Member of the American Fisheries Society and the Australian Society for Limnology, and a member of the Society for Marine Mammalogy and the Society for Environmental Toxicology and Chemistry. He has published over 60 papers in the scientific literature.

Gabor Tari, Vanco Energy Company

ABSTRACT

Deep-water exploration in Morocco: what did not work so far and what may work in the near future

Gabor Tari, Katrina Coterill, Marek Kaminski, Jim Molnar and Dave Valasek

The Moroccan salt basin is still one of the under-explored West African salt basins. The dimensions of this salt basin are about 100 km average width and almost 1000 km in length along the Atlantic margin of Morocco. As opposed to the Aptian salt basins of the South Atlantic, in NW Africa the salt was deposited during the last stage of rifting prior to the continental break-up in the Upper Triassic/Lower Jurassic.

Whereas there are small producing fields in the onshore Essaouira Basin, there were only subcommercial discoveries made on the shelf so far. During the last few years, three exploration wells were drilled in the deep-water which all turned out to be dry holes. To date, the most critical problem appears to be the scarcity of clastic reservoirs within the Tertiary and Upper Cretaceous deep-water sequence.

There are several play types offshore which were defined by extensive 2D and 3D reflection seismic surveys. In the Safi segment of the margin there are at least eight different play types, mostly salt-related. Combination structural inversion-stratigraphic traps include Middle Jurassic and Lower Cretaceous basin floor fans with potential hydrocarbon charge from deeply buried gas-prone Lower Jurassic marine shales. Another type of combination trap include toe-thrust anticline structures associated with the leading edge of the allochthonous salt. Other salt-supported plays are represented by sub-salt structural traps and ponded turbidites in the updip salt-withdrawal mini-basins. Beneath the present-day upper slope, several turtle and raft structures can be found as the result of pronounced down-dip translation on a salt detachment surface. In the shelf area of the Safi segment of the margin, the Jurassic carbonate shelf edge provides a play identical to the Panuke play on the conjugate margin in Nova Scotia. Also on the shelf, the Permo-Triassic clastics in several syn-rift grabens represent the Doukkala play known from the adjacent onshore area.

In the Ras Tafelney segment of the Moroccan margin, the style of salt tectonics is more advanced and therefore almost all the play types are salt-related. Tertiary structural-stratigraphic traps include submarine channel systems influenced by several salt diapirs/tongues close to the edge of the salt basin. The salt-cored toe-thrust anticlines provide spectacular structures, but may have an uneven reservoir distribution within the Upper Cretaceous sequence, partially due to the syn-depositional growth of these structures. There are several traps associated with salt tongues and diapirs defining the classical salt-flank play. Numerous allochthonous salt sheets and canopies provide for the Gulf of Mexico-style subsalt play. The subsalt traps include anticlinal structures and truncation traps within the Lower Cretaceous and Jurassic strata. Outboard of the salt basin, the Neocomian (and Middle Jurassic?) inverted basin floor fan play represents yet another untested play type. These large, low-amplitude anticlines were formed during the mid-Tertiary as the result of the deep-water manifestation of the Atlasic inversion episode onshore.

BIOGRAPHY

Dr. Gabor C. Tari holds Masters degrees in Geophysics and in Geology from Eötvös University of Budapest, Hungary. He graduated from Rice University with a Ph.D. in Geology and Geophysics in 1994. After working for Amoco on several exploration projects focusing on the Romanian Carpathians and the Moesian Platform he transferred to the Amoco Angola Team in 1996. First he did regional evaluations for several Angolan bid-rounds, but later joined the Block 18 project, where several discoveries were made since then. Following the merger between BP and Amoco, he continued to work for the new organization. Gabor joined Vanco Energy Company in 1999 and currently he is Vice President of Geosciences working on several projects offshore Morocco, Ivory Coast, Ghana, Gabon, and Madagascar. Gabor is also an Adjunct

Professor at the Department of Geology and Geophysics, Rice University, Houston, teaching seismic reflection interpretation to undergraduate and graduate students.

Jim Theriault, Defence Research and Development Canada

ABSTRACT

Alternatives to Air Guns: A coherent story about loud sources

Marine hydrocarbon exploration requires imaging of the geological structures below the seabed. Undoubtedly, the most common means of imaging the structures is by using a ship-towed air-gun source array with a multi-line receiver array. Air-gun arrays produce an impulsive waveform with all of the energy transmitted in a short duration. By measuring return strength and travel-time of echoes from geological horizons, an image is constructed of the seabed structure. However, concerns regarding the impact of such operations on the marine environment have resulted in a search for other imaging technologies. Alternative concepts using either electro-magnetic imaging or acoustic imaging using non-impulsive sources exist. However, there are practical and technical constraints on any solution. This presentation will include an overview of the differences between non-coherent (impulsive) and coherent (non-impulsive) acoustic sources; the environmental concerns; and the complexities of developing and using a coherent source with the same imaging fidelity as obtained through using air guns.

BIOGRAPHY

Mr. Theriault is a senior scientist with Defence R&D Canada – Atlantic. He has been involved in acoustic sensing and modelling since he joined DRDC Atlantic (then Defence Research Establishment Atlantic) in 1985. Throughout his tenure, he has had extensive experience with high-power coherent and incoherent sound sources. Since 1992, he has had a growing involvement in mitigating the potential negative impacts of DRDC Atlantic's and the Canadian Navy's active sonar activities on marine mammals. He is currently the Canadian Navy's science and technology advisor on the topic.

Grant Wach, Dalhousie University

ABSTRACT

Shelf & Slope Reservoir Characterization

Reservoir Distribution along Shelf Margin and Slope Depositional Systems

Linked depositional systems on active and passive margins provide a variety of opportunities for accumulation of reservoir quality sands, but preservation and continuity of these deposits can be problematic. Continuity of reservoir is subject to depositional and stratigraphic control, in addition to the inherent structural complexity of the margin, coupled with syntectonic activity. One can not always make a clear distinction between active and passive margin settings and associated depositional systems.

Studies of petroleum systems formed in depositional environments ranging from deltaic to deepwater fans, including examples from offshore West Africa, the Gulf of Mexico, South Africa, Trinidad, South America and offshore Atlantic Canada, will illustrate reservoir complexities both on a basin scale, and at the field scale. At the basin scale, seismic and well log data sets are used to discern the presence of reservoir quality rocks and to develop a stratigraphic framework to use for predicting reservoir where little data exists. At the field scale the complex heterogeneities, i.e. baffles and barriers that may limit oil and gas production (reservoir performance) will be illustrated.

Our preferred approach is to integrate analogous outcrop and subsurface data with iterative studies that incorporate regional basin scale parameters (e.g. plate movements and provenance) down to the microprobe (e.g. complex mineralogy and effective porosity). Shallow seismic analogs are used for understanding and characterizing deeper reservoirs that are poorly imaged in the seismic data. Seismic data from the shallow time interval has better resolution to provide the critical stratigraphic and architectural detail. Integration with analog outcrop studies increases our “resolution” of these deeper targets. Data and interpretations from outcrop studies provide a sense of scale for reservoir systems where only sparse data are available.

(Elements of this talk were presented at the CSPG Luncheon in April, 2006)

BIOGRAPHY

Dr. Grant D. Wach is Professor of Petroleum Geoscience, Department of Earth Sciences and Director of Energy, at Dalhousie University. Prior to his 2002 appointment at Dalhousie, he was Geoscience Research Associate at Texaco Upstream Technology (now Chevron) in Houston, Texas. At Texaco he was a specialist in deepwater depositional systems, reservoir characterization, sequence stratigraphy, clastic sedimentology and core description for business units, operating affiliates and partners worldwide. He has considerable exploration and commercialization experience in West Africa, the Far East, Americas and Western Europe.

Dr. Wach began his petroleum industry career in 1979 with Syncrude Canada in the oilsands of northeastern Alberta. This provided a unique opportunity to spend several years working, literally, inside a complex oil reservoir. He has also worked for Exxon Production Research Company (now ExxonMobil). His undergraduate degree is from the University of Western Ontario, M.Sc. from the University of South Carolina and D.Phil. from the University of Oxford. He has over forty published articles and abstracts and numerous technical reports in several areas of reservoir characterization, sedimentology and stratigraphy. He has lectured and led field seminars for universities and industry worldwide.

Malcolm Wilson, EnergyINet

ABSTRACT

Carbon Capture & Storage: The Big Picture

The need to reduce the amount of CO2 and other greenhouse gases entering the atmosphere is becoming clearer with current concentrations in the atmosphere now in excess of 380 ppm and forecast global average temperature changes set at 2.9^{o}C for a concentration of 560 ppm. Additionally, this concentration will lead to acidification of the surface waters of the oceans with significant negative effects on the fauna. Since the use of fossil fuels will continue for many decades and other techniques (biomass, conservation, energy efficiency, renewables, etc.) will have limited impact on emissions growth, there is an imperative to evaluate other techniques that can be effective over the next five decades or so. Such an option is the capture of CO2 from large point sources and its injection into the subsurface for long-term storage. There are a number of techniques available for capturing CO2, in a concentrated form, from the use of fossil fuels; these techniques will be described in brief with an evaluation of the cost and energy penalty involved with these techniques. Once captured, the CO2 can be compressed and transported, usually by pipleline, to a location for its injection into the subsurface. Some uses, albeit limited, provide an economic return – these would include enhanced oil recovery, enhanced coal bed methane recovery and, potentially, enhanced gas recovery. These techniques and their applications will be briefly discussed as well as the use of existing information on these techniques that can be extrapolated to storage in saline aquifers. The risks of storage will also be discussed briefly.

BIOGRAPHY

Malcolm received his degrees in Geology from the Universities of Nottingham (UK) and Saskatchewan (Canada). Following his he worked for 20 years with the Government of Saskatchewan in the areas of Geology, research funding and policy development. Much of his focus has been on enhanced oil recovery and environmental issues facing the energy sector. As a result, Malcolm has been actively engaged in the climate change debate in Canada and internationally. Malcolm moved to the University of Regina in 2001 and has recently taken a secondment to work with EnergyINet, a national group intended to create and foster collaboration in research related to the energy sector in Canada.

Malcolm was part of the creation of the Weyburn Monitoring and Storage project and the International Test Centre for CO_2 Capture in Saskatchewan. He is one of the Canadian representatives to the IEA Greenhouse Gas R&D Programme, and the local organizer for the GHGT 7 conference in Vancouver in 2004. M Malcolm is also on the Science Advisory Boards for CO_2 SINK and CO_2GEONET in Europe. He has recently been working with an international group on the creation of a Special Report on Capture and Storage for the IPCC and on a paper for the CSLF on monitoring and verification.