2013 BPSM Industrial Affiliates Meeting Schedule
November 13, 2013

9:00    Steve Graham, Introduction
9:20    Inessa Yurchenko, Organic geochemistry and basin modeling, Alaska North Slope
9:50    Minh Tran, Source rock analysis from logs, Alaska North Slope
10:15   Coffee break
10:35   Lauren Schultz, Alaska research and introduction to Los Angeles Basin
10:55   Tess Menotti, Modeling the interplay of basin evolution, silica diagenesis, and tectonic deformation in the Salinas Basin, California
11:40   Lunch
1:30    Blair Burgreen, The impact of structural deformation in a 2D basin and petroleum system model of the East Coast Basin, New Zealand
2:15    Yao Tong, Basin and petroleum system modeling and sensitivity analysis of Piceance Basin, Colorado
2:45    Coffee break
3:15    Wisam H. AlKawai, Integrating basin modeling with seismic technology and rock physics
3:45    Amrita Sen, Benchmark basin and petroleum system model
4:15    Danica Dralus, Kinetics of Monterey Formation
4:40    Allegra Hosford Scheirer, Field trip introduction

Evening Group discussion if desired: What would you like to see us working on? What are the problems of utmost priority?
Stanford Faculty Affiliated with the Basin and Petroleum Systems Curriculum

STEPHAN GRAHAM ~ Stanford University, Department of Earth and Environmental Sciences, School of Earth Sciences, Stanford 94305; 650-723-0507; sagraham@stanford.edu

Stephan Graham is W.J. and M.L. Crook Professor in Stanford University's School of Earth Sciences, where he also serves as GES Department Chair. Dr. Graham's research deals with the tectonics and fill patterns of sedimentary basins and their petroleum resources, especially basins associated with convergent continental margins and collisional orogens; as well as the characteristics and evolution of deep-water clastic depositional systems.

J. MICHAEL MOLDOWAN ~ Stanford University, Department of Earth and Environmental Sciences, School of Earth Sciences, Stanford 94305; 650-725-0913, moldowan@stanford.edu

J. Michael Moldowan is a Professor (Research)-Emeritus in Stanford University's School of Earth Sciences, Department of Geological and Environmental Sciences. Dr. Moldowan's research focuses on organic geochemical methods for characterization of fossil fuels and ancient sediments. Applications are at the foundations of petroleum systems analysis and basin modeling, environmental issues of petroleum production and usage, as well as biogeochemical, paleoenvironmental and evolutionary aspects of life.

TAPAN MUKERJI ~ Stanford University, Department of Energy Resources Engineering, School of Earth Sciences, Stanford 94305; 650-723-0507; mukerji@stanford.edu

Tapan Mukerji is Associate Professor in Stanford University's School of Earth Sciences, Department of Energy Resources Engineering. Dr. Mukerji was a Research Scientist in the Department of Geophysics prior to assuming his present faculty position in the ERE Department in 2007. He specializes in rock physics, geostatistics, and wave propagation.
Stanford Faculty Affiliated with the Basin and Petroleum Systems Curriculum

KENNETH E. PETERS ~ Business Development Manager, Schlumberger, kpeters2@houston.westerngeco.slb.com; kpeters@stanford.edu

Ken Peters is Consulting Professor in the Department of Geological and Environmental Sciences, Stanford University, as well as a scientist/manager with IES Schlumberger. He used geochemistry and numerical modeling to study petroleum systems at the USGS beginning in 2002. He spent 15 years with Chevron and 9 years with Mobil and ExxonMobil and taught courses in petroleum geochemistry and thermal modeling at Chevron, Mobil, ExxonMobil, Oil and Gas Consultants International, the University of California at Berkeley, and Stanford University. Ken is principal author of The Biomarker Guide (2005, Cambridge University Press).

LESLIE B. MAGOON ~ Department of Geological and Environmental Sciences, Stanford University, Stanford, CA 94305; lmagoon@stanford.edu

Les Magoon is Consulting Professor in the Department of Geological and Environmental Sciences, Stanford University, as well as Emeritus Research Geologist with the U.S. Geological Survey. He worked 8 years for Shell Oil Company in exploration and 32 years with the USGS. From 1981, he has investigated and popularized the petroleum system through talks, courses, and AAPG Memoir 60, The Petroleum System—From Source to Trap, which received the R.H. Dott. Sr. Award in 1996.

ALLEGRA HOSFORD SCHEIRER ~ Department of Geological and Environmental Sciences, Stanford University, allegras@stanford.edu

Allegra Hosford Scheirer is Consulting Professor in the Department of Geological and Environmental Sciences. For 5 years she specialized in oil and gas resource assessment at the U.S. Geological Survey. Her research expertise includes constructing three-dimensional geologic models of sedimentary basins, potential fields analyses, and seismic refraction studies. She has participated in numerous field studies, both at sea and on land.
Scientists Associated with BPSM Teaching/ Research at Stanford

CAROLYN LAMPE ~ ucon Geoconsulting, Cologne, Germany

Dr. Lampe worked at BEB (German branch of Royal Dutch Shell and Exxon Mobil), and subsequently spent seven years as chief geologist at Integrated Exploration Systems GmbH (IES) where she was involved in worldwide training of industry clients, agents and consultants for 2D and 3D petroleum systems modeling. She is currently Director of ucon Geoconsulting, providing support of oil and gas exploration and development projects with internationally operating E&P companies in the areas of petroleum systems analysis, migration modeling, charge risk and resource assessment.

BJORN WYGRALA ~ The Petromod Group, Schlumberger, Aachen, Germany

Dr. Bjorn Wygrala has had more than 20 years of experience in basin analysis and the application of simulation technologies for exploration risk and resource assessments of petroleum E&P companies in more than 40 countries. His interests lie in the areas of applied petroleum systems modeling, and quantification and sensitivity analysis of geologic parameters and processes in petroleum exploration. He is currently Managing Director, Technology Transfer at IES, which provides software and services for Petroleum Systems Modeling.
Proposal and Science Plan for Basin and Petroleum Systems Modeling at Stanford University

Objectives

A team of researchers has developed a science plan to facilitate training of students and non-proprietary research in quantitative numerical modeling of petroleum systems, through an industrial affiliates program at Stanford University.

Our goal is to become a recognized center of excellence for training and research in visualization and quantification of the geohistory of basins and petroleum systems.

Objectives:

1. Train the next generation of petroleum systems modelers
2. Devise quantitative tools that, in combination with assessment methodology, can be used to evaluate geologic risk in various exploration settings
3. Conduct basin and applied energy-focused research
Impetus to Form the BPSM Graduate Curriculum

• Rare among American university programs
• Exceptional student talent pool
• Comprehensive set of courses already available
• Good pre-existent university-industry relations
• Draw together multiple relevant/interested faculty and local experts
• Computational resources (CEES)
• Perceived industry need
Resources

The proposed research group uses the following assets, among others:

1. A parallel processing environment. Hardware time provided at no cost from the Center for Computational Earth and Environmental Sciences at Stanford (CEES).
2. All necessary Petromod® licenses (latest version) for research and teaching purposes to allow parallel processing of large models. Provided by Schlumberger IES, Aachen Germany.
3. All necessary PC-based Petromod® licenses (latest version) for research and teaching purposes to allow students to run simple 1-D or 2-D models and prepare input for larger 4-D models using their own PCs. Provided by Schlumberger IES, Aachen Germany.
The BPSM curriculum consists of a limited set of core courses, selected to provide a broad cross-sectional view of the elements of basin modeling. Students will complete the balance of required total units from the list of elective courses. Other courses may be substituted in consultation with faculty advisor.
GRADUATE COURSES

CORE BPSM COURSES

GES 240. Geostatistics for Spatial Phenomena—(Same as ENERGY 240.) Probabilistic modeling of spatial and/or time dependent phenomena. Kriging and co-kriging for gridding and spatial interpolation. Integration of heterogeneous sources of information. Multiple-point geostatistics and training image-based stochastic imaging of reservoir/field heterogeneities. Introduction to GSLIB and SGEOM software. Case studies from the oil and mining industry and environmental sciences. Prerequisites: introductory calculus and linear algebra, STATS 116, GES 161, or equivalent.

3-4 units, Win (Journal, A)

GES 249. Petroleum Geochemistry in Environmental and Earth Science—How molecular fossils in crude oils, oil spills, refinery products, and human artifacts identify their age, origin, and environment of formation. The origin and habitat of petroleum, technology for its analysis, and parameters for interpretation, including: origins of molecular fossils; function, biosynthesis, and precursors; tectonic history related to the evolution of life, mass extinctions, and molecular fossils; petroleum refinery processes and the kinds of molecular fossils that survive; environmental pollution from natural and anthropogenic sources including how to identify genetic relationships among crude oil or oil spill samples; applications of molecular fossils to archaeology; worldwide petroleum systems through geologic time.

3 units, Win (Moldowan, J)

GES 251. Sedimentary Basins—Analysis of the depositional framework and tectonic evolution of sedimentary basins. Topics: tectonic and environmental controls on facies relations, synthesis of basin development through time in terms of depositional systems and tectonic settings. Weekend field trip required. Prerequisites: 110, 151.

3 units, Aut (Graham, S)


3 units, Spr alternate years, (Graham, S)

GES 255. Basin and Petroleum System Modeling—For advanced undergraduates or graduate students. Students use stratigraphy, subsurface maps, and basic well log, lithologic, paleontologic, and geochemical data to construct 1-D, 2-D, and 3-D models of petroleum systems that predict the extent of source-rock thermal maturity, petroleum migration paths, and the volumes and compositions of accumulations through time (4-D). Recent software such as PetroMod designed to reconstruct basin geohistory. Recommended: 251 or 253.

3 units, Win (Peters, K)

GES 257. Clastic Sequence Stratigraphy—Sequence stratigraphy facilitates integration of all sources of geologic data, including seismic, log, core, and paleontological, into a time-stratigraphic model of sediment architecture. Tools applicable to regional and field scales. Emphasis is on practical applications and integration of seismic and well data to exploration and field reservoir problems. Examples from industry data; hands-on exercises.

3 units, Spr alternate years, (McHargue, T)

GEOPHYS 183. Reflection Seismology Interpretation—The structural and stratigraphic interpretation of seismic reflection data, emphasizing hydrocarbon traps in two and three dimensions on industry data, including workstation-based interpretation. Lectures only, 1 unit. Prerequisite: 182, or consent of instructor.

1-4 units, Spr (Klemperer, S; Graham, S)

GEOPHYS 200. Fluids and Flow in the Earth: Computational Methods—Interdisciplinary problems involving the state and movement of fluids in crustal systems, and computational methods to model these processes. Examples of processes include: nonlinear, time-dependent flow in porous rocks; coupling in porous rocks between fluid flow, stress, deformation, and heat and chemical transport; percolation of partial melt; diagenetic processes; pressure solution and the formation of stylolites; and transient pore pressure in fault zones. MAT/LAB, Lattice-Boltzmann, and COMSOL Multiphysics. Term project. No experience with COMSOL Multiphysics required.

3 units, Win (Mukerji, T)
Cross-disciplinary

Observation

Theory

Laboratory
Best Preparation Possible: Software

Work Environment

Petrel

PetroMod

Dynel

TechLog

Petra

EarthVision

MATLAB

ArcGIS

Basin and Petroleum System Modeling Group
Best Preparation Possible: Exposure

2013 Internships: Aera, Chevron, EOG, Saudi Aramco, Shell, Statoil

Experts: Bird, Cumella, Meisling, Schoellkopf, Weimer, & BPSM Principals

Collaborations: BioMarker Technologies, Great Bear core repository, Western Geco, IHS Energy

Presentations at sectional and national meetings, leading field trips, field school, software training
Cross-disciplinary

Projects in:
- Alaska
- California
- Colorado
- Gulf of Mexico
- Rock Physics
- Geostatistics
- Pore pressure prediction
- Diagenesis kinetics
- Seismic scaling
BPSM Students, Fall 2013

Post-Doctoral Scholar
Danica Dralus

Graduate Students
Wisam AlKawai
Blair Burgreen
Tess Menotti
Lauren Schultz
Amrita Sen
Yao Tong
Minh Tran
Inessa Yurchenko
**Overriding Principles Applicable to Stanford Industrial Affiliates Programs**

- Promotion of openness in research results
- Enrichment of educational experiences for students and postdocs
- Maintenance of the University’s role as a credible and impartial resource
- Protection of faculty members’ right to pursue research topics and methodology of their choice
- Conformance to the University’s primary mission of teaching and research

While member companies may offer suggestions for research activities, the involved faculty must be free to select research topics, adopt research methodology, select participants, and direct research funded by the programs.

Consistent with Stanford’s openness in research and dissemination of research policy, research activities generated under the program will be made to members and non-members.

Research must have broad application and may not be geared toward any member or company.
Industrial Affiliate Programs in the School of Earth Science

Basins and Petroleum Systems Modeling Group

Center for Aquifer Simulation

Geothermal Program Affiliates

Molecular Organic Geochemistry Industrial Affiliates

Smart Fields

Stanford Center for Reservoir Forecasting

Stanford Exploration Project

Stanford Project on Deep-water Depositional Systems

Stanford Project on Productivity & Injectivity of Horizontal Wells

Stanford Rock Fracture Project

Stanford Rockphysics & Borehole Geophysics Project

SUPRI-A (Stanford University Petroleum Research Institute): Thermal Oil Recovery Program

SUPRI-B (Stanford University Petroleum Research Institute): Reservoir Simulation Affiliates

SUPRI-C (Stanford University Petroleum Research Institute): Gas Injection Affiliates

SUPRI-D (Stanford University Petroleum Research Institute): Well Test Interpretation Affiliates
Impetus to Form the BPSM Industrial Affiliates Program

• Greater access to research problems & data
• Platform for expanded BPSM research at Stanford
• Closer relations between faculty, students & industry
• Financial support for students & research projects
Benefits of Industrial Affiliates Membership

Industrial Affiliates and related Stanford programs supported by corporate membership fees:

• facilitate the transfer of knowledge into society and dialogue between academia and industry

• provide an effective way for industry to contribute to and sustain the research and teaching of the departments and programs in which they have long-term interests.

Access to membership will be available equally to all companies prepared to meet the requirements of membership.

Facilitated access to research programs and relevant faculty and students is provided to members.
Specific Benefits of Membership in the BPSM Industrial Affiliates Program

- Invitations to annual meetings and workshops
- Faculty liaison
- Student recruitment opportunities
- Copies of reports and publications
- Opportunities to interact with students in research projects
- Campus visits
BPSM Industrial Affiliates

- CAERA
- bp
- Chevron
- ConocoPhillips
- Great Bear Petroleum LLC
- HESS
- MURPHY
- nexen
- OXY
- PTBETROBRAS
- Saudi Aramco
- Schlumberger
Meeting content will be uploaded next week.
Contact Allegra if you need BPSM login information.
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