STEPHAN GRAHAM ~ Welton Joseph & Maud L'Anphere Crook Professor in Department of Geological and Environmental Sciences, Associate Dean of the School of Earth Sciences

Dr. Graham's research focuses on 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.

TAPAN MUKERJI ~ Associate Professor of Research, Department of Energy Resources Engineering

Formerly a Research Associate in the Department of Geophysics, Dr. Mukerji assumed his current position in 2007. He specializes in rock physics, geostatistics, and wave propagation.

GARY MAVKO ~ Professor of Research, Department of Geophysics

Dr. Mavko works to discover and understand the relationship between geophysical measurements and the rock and fluid properties that they sample in the Earth.

J. MICHAEL MOLDOWAN ~ Professor of Research Emeritus, Department of Geological and Environmental Sciences

Dr. Moldowan’s research focuses on organic geochemical methods for characterization of fossil fuels and ancient sediments. He continues to advise the BPSM program as Professor Emeritus.
KEN PETERS ~ Scientific Advisor for Schlumberger Information Solutions (SIS). He uses geochemistry and numerical modeling to study petroleum systems and has more than 30 years of experience working for Chevron, Mobil, ExxonMobil, the USGS, and Schlumberger. He taught petroleum geochemistry and basin modeling at Chevron, Mobil, ExxonMobil, Oil & Gas Consultants International, UC Berkeley, and Stanford University. Ken is principal author of The Biomarker Guide (2005, Cambridge U. Press) and Consulting Professor at Stanford University, Chair of the AAPG Research Committee, and Associate Editor for AAPG Bulletin and Organic Geochemistry. Ken was an AAPG Distinguished Lecturer in 2009 and 2010, principal organizer of the 2009 AAPG Hedberg Research Conference on Basin and Petroleum System Modeling, and editor for the 2009 AAPG CD-ROM No. 16 “Getting Started in Basin Modeling”. In 2009, Ken received the Schlumberger Henri Doll Prize for Innovation and the Alfred E. Treibs Award presented on behalf of the Organic Geochemistry Division of the Geochemical Society to scientists who have had a major impact on the field of organic geochemistry through long-standing contributions. Ken holds BS and MS degrees in geology from UCSB and a PhD in geochemistry from UCLA.

LES MAGOON ~ He worked 8 years for Shell Oil Company in exploration and 32 years with the U.S. Geological Survey. 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. Les co-teaches all 3 courses in the basin & petroleum system modeling curriculum at Stanford.

ALLEGRA HOSFORD SCHEIRER ~ For 6 years Dr. Hosford Scheirer 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 field analyses, and seismic refraction studies. She has participated in numerous field studies, both at sea and on land. At Stanford, she conducts research in basin and petroleum system modeling, advises graduate students, gives guests lectures, and administers the BPSM Research Group. She holds degrees from Brown University (B.S.) and MIT (Ph.D.).
CAROLYN LAMPE ~ 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.

OLIVER SCHENK ~ Dr. Schenk is a Geologist and Petroleum Systems Analyst at Schlumberger Center of Excellence for Petroleum Systems Modeling (formerly IES) in Aachen, Germany. He is currently project manager for the Alaska North Slope multiclient study, which constitutes the first major 3D petroleum system modeling effort based on a regional-scale geologic model. Oliver received MS and PhD degrees in geology from the Technical University in Aachen, Germany, with the main emphasis in structural geology and microtectonics.

NOELLE SCHOELLKOPF ~ Noelle Schoellkopf joined Schlumberger Information Solutions in 2011 as Petroleum Systems Modeling Advisor after 24 years at Chevron. She has worked in over 40 countries and is author or co-author of numerous internal studies and external abstracts and papers. She has spent many years working South Atlantic Margins, Asia and Eurasia. She has provided guest lectures and student advising at Stanford University from 2010 to present, and is an instructor for Schlumberger NExT and AAPG. Noelle holds a M.S. in Geology from George Washington University and a B.A. in Geology from Bryn Mawr College.

BJORN WYGRALA ~ Dr. 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.
BPSM Students, 2014

Post-Doctoral Scholar
Danica Dralus*

Graduate Students
Wisam AlKawai
Mustafa Al Ibrahim
Blair Burgreen*
Tess Menotti*
Lauren Schultz
Amrita Sen
Will Thompson-Butler
Yao Tong
Inessa Yurchenko
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
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.
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.
Basin and Petroleum System Modeling (BPSM) Industrial Affiliates Program Graduate Coursework

The BPSM curriculum consists of 8 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 a list of elective courses.

BPSM core courses are:
GES 240. Geostatistics for Spatial Phenomena—(same as ENERGY 240)
GES 249. Petroleum Geochemistry in Environmental and Earth Science
GES 251. Sedimentary Basins
GES 253. Petroleum Geology and Exploration
GES 255. Basin and Petroleum System Modeling
GES256. Quantitative Methods in Basin and Petroleum System Modeling
GES 257. Clastic Sequence Stratigraphy
GEOPHYS 223. Reflection Seismology Interpretation—(formerly GEOPHYS 183)
GEOPHYS 200. Fluids and Flow in the Earth: Computational Methods

Additionally, GES248, “The Petroleum System: Investigative method to explore for conventional & unconventional hydrocarbons” is being offered in Fall Quarter, 2014 for the first time by Les Magoon and Allegra Hosford Scheirer.
Cross-disciplinary

Basin and Petroleum System Modeling Group

Observation

Theory

Laboratory

Figure 35: Burial history at region of maximum overburden in the Star area
Cross-disciplinary

Projects in:
• Alaska
• California
• Colorado
• Gulf of Mexico
• New Zealand
• Rock Physics
• Geostatistics
• Pore pressure prediction
• Diagenesis kinetics
• Seismic scaling
Best Preparation Possible: Software

Work Environment

Basin and Petroleum System Modeling

- PetroMod
- Dynel
- TechLog
- Petrel
- Petra
- EarthVision
- MATLAB
- ArcGIS

Basin and Petroleum System Modeling Group
Best Preparation Possible: Exposure

- 2013 and 2014 Internships: Aera, Chevron, EOG, Oxy, 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
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 Affiliates 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

Natural Gas Initiative

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 Rock physics & 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
Meeting content will be uploaded next week.
Contact Allegra if you need BPSM login information.
Today’s Schedule

All events in Oak West Lounge
• 8:30 a.m. light breakfast
• 9:00 a.m. Oral session begins
• Buffet lunch at noon
• Complete field trip forms and return to Allegra
• Group dinner at 6:30pm Gravity Wine Bar, Palo Alto
• Gather 7:30-7:45 a.m. tomorrow and depart at 8

Join today’s conversation at: [http://goo.gl/cFamfa](http://goo.gl/cFamfa)
9:00 a.m. | **Steve Graham**, Introduction

9:20 a.m. | **Inessa Yurchenko**, Unraveling hydrocarbon charge history of the Shublik Formation, central North Slope of Alaska

10:00 a.m. | **Mustafa Al Ibrahim**, Integrated Geologic Characterization of Carbonate Mudrocks: The Case of the Tuwaiq Mountain and Hanifa Formations, Saudi Arabia

10:35-10:50 a.m. | Coffee break

10:50 a.m. | **Wisam AlKawai**, Integrating basin modeling with seismic attributes through rock physics

11:15 a.m. | **Lauren Schultz**, Basin and petroleum system modeling in the Los Angeles Basin, California

11:40 a.m. | **Wisam AlKawai**, Investigating the impact of allochthonous salt and overpressure on petroleum system development in the Thunder Horse minibasin by integrating 3D basin and petroleum system modeling with quantitative seismic interpretation

12:10-1:30 p.m. | Lunch (please complete field trip forms if haven’t already done so)
<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1:30 p.m.</td>
<td><strong>Danica Dralus</strong></td>
<td>Kinetics of the opal-A to opal-CT phase transition in low- and high-TOC siliceous shale source rocks</td>
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<td>2:00 p.m.</td>
<td><strong>Amrita Sen</strong></td>
<td>BPSM benchmark basin model project</td>
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<td>2:25-2:45 p.m.</td>
<td>Coffee break</td>
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<tr>
<td>2:45 p.m.</td>
<td><strong>Will Thompson-Butler</strong></td>
<td>A geochemical assessment of the Utica Shale in the Mohawk Valley of New York</td>
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<td>3:15 p.m.</td>
<td><strong>Tapan Mukerji</strong></td>
<td>Introductory comments on uncertainty analysis in basin modeling</td>
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<tr>
<td>3:20 p.m.</td>
<td><strong>Yao Tong</strong></td>
<td>Basin and petroleum system modeling and sensitivity analysis of Piceance Basin, CO</td>
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<tr>
<td>3:50 p.m.</td>
<td><strong>Mike Moldowan</strong></td>
<td>Novel geochemical technologies set the stage for correct models of complex basins</td>
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<tr>
<td>4:20 p.m.</td>
<td><strong>Ken Peters</strong></td>
<td>Petroleum generation kinetics: single- versus multiple heating-rate open-system pyrolysis</td>
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