

Sheldon Gorell, Ph. D

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Profile:

Dr. Gorell is a senior technologist with over 30 years' experience in the oil and gas industry. He is a highly motivated, creative problem solver who excels at innovating real world products and solutions. His areas of expertise include reservoir simulation and characterization, geologic and reservoir modeling, uncertainty analysis and optimization. Dr. Gorell has a proven record of success in education, research and development, management, consulting, training, business development/pre and post-sales support.

Academic Qualifications:

- Ph.D., in Chemical Engineering, Stanford University, 1983
- M.S., in Chemical Engineering, Stanford University, 1979
- B.S., in Chemical Engineering, University of Rochester, 1978

Research Interests:

Research Interests are related to high performance reservoir simulation and modeling, focusing on challenging problems relevant to the current oil & gas environment:

- Calibration of effective reservoir properties using fine-scale heterogeneous models for conventional and unconventional reservoirs,
- Modeling of flow and pressure in fractures shale and tight reservoirs.
- Simulation and process automation applied to history matching and optimization,
- Sampling methodologies for multi-parameter optimization.

Experience & Accomplishments Include:

- Developed and taught both undergraduate and graduate level classes in Reservoir Simulation. Member of various academic administrative committees.
- Served as an expert witness as part of an international arbitration litigation associated with valuation of a South American oil field. This included analysis, critique, documentation and testimony related to reservoir modelling, reservoir engineering and reservoir simulation work performed by plaintiff and in support of defendant.
- Served as Director Landmark Software and Services Reservoir Management technical business line. This included managing all aspects of strategy, technology direction, product development, portfolio management

and commercialization for the Nexus reservoir simulation technology business line. Managed a budget, staffing, cost and revenue forecasting for a group of 46 people with a total annual budget of approximately \$9 million. Consistently met software delivery targets, on time and to specifications, to support commercial releases and milestone based funded development cost offsets.

- Managed RPS Knowledge Reservoir's modeling and reservoir simulation group of consultants. Supported and participated in projects, including project management, technical contributor, advisor and mentor.
- Developed methods for modeling oil and gas production for shale reservoirs using standard reservoir simulators. This includes developing of novel simulation gridding technology (patent in progress). This work supported multi-million dollar consulting opportunities.
- Performed research on reservoir model upscaling, reservoir simulation gridding and coarsening, and methods for model updates. Developed novel reservoir simulation coarsening methods to account for well locations and faulting (patent in progress)
- Developed methods for visualization of correlated data associated with 2-dimensional and 3-dimensional simulation results. (patent in progress)
- Designed and performed basin wide pressure and flow connectivity analysis and simulation for multi-field region offshore Brazil to support field unitization opportunities. This included creating and testing the feasibility of various conceptual descriptions of reservoir connectivity, using a rapid simulation methodology.
- Performed Reservoir modeling, pattern analysis and simulation for valuation of a West Texas CO2 flood to support merger and acquisition discussions
- Performed fundamental research into CO2 flooding Water-Alternate-Gas (WAG) processing and Reservoir Simulation modelling techniques. Modeled the effects of reservoir heterogeneity and Water Alternate Gas (WAG) injection applied to carbon dioxide enhanced recovery processes, performed analysis and simulations accounting for carbon dioxide-water co-injection and trapping of oil by water, modeled the effects of layering on carbon dioxide injectivity behavior.
- Successfully managed the development and commercialization of Landmark's Nexus and DMS software applications, supported multi-million dollar sales of these applications to major accounts, consistently met software delivery targets, on time and to specifications, to support commercial releases and milestone based funded development cost offsets. Managed a \$9 million budget with over 40 people.
- Performed quality assurance, technical review and mentoring, supporting reserves certification for a large offshore Thailand reservoir
- Conducted large grid block field simulations of various carbon dioxide injection schemes using both compositional equation-of-state and miscible simulators.
- History matching, updates and predictions for a large Gulf of Mexico reservoir.
- Created and conducted reservoir simulation and geostatistics training classes for both in house staff and external clients.

Patents in progress:

- Method and System of Plotting Correlated Data: (12/16/2010), 2010-IP-036810, PCT/US2010/060681, LANDMARK - Sheldon Burt Gorell

- Method and System of Updating a Geocellular Model: (01/13/2011), 2010-IP-038231, PCT/US2011/021058, LANDMARK - Sheldon Burt Gorell
- System and Method for Coarsening in Reservoir Simulation System: (09/20/2011), 2011-IP-041191, PCT/US2011/052373, LANDMARK - Sheldon Burt Gorell
- Method and System of Updating a Geocellular Model: (01/07/2012), 2010-IP-038231, 2012/20227, LANDMARK - Sheldon Burt Gorell
- Methods and Systems of Modeling Hydrocarbon Flow from Kerogens in a Hydrocarbon Bearing Formation: (10/26/2011), 2011-IP-050458, PCT/US2011/057898, LANDMARK -Ronald Glen Dusterhoft; Ken E. Williams; Sheldon Burt Gorell; Amit Kumar
- Systems and Methods for Subsurface Oil Recovery Optimization: (10/06/2011), 2011-IP-050884, 61/544,202, LANDMARK - Alvin Stanley Cullick; Gustavo A Carvajal; Sheldon Burt Gorell; Amit Kumar; Priyesh Ranjan; Karelis Alejandra; Urrutia Fuenmayor
- Methods and Systems of Modeling Hydrocarbon Flow from Layered Shale Formations: (04/18/2012), 2012-IP-054919, PCT/US2012/034063, LANDMARK - Ronald Glen Dusterhoft; Ken E. Williams; Sheldon Burt Gorell; Amit Kumar
- Managing Versions of Cases: (03/28/2012), 2012-IP-055129, PCT/US2012/030911, LANDMARK - Sheldon Burt Gorell; Amit Kumar
- Automatic Reservoir Simulation Gridding for Extremely Low Permeability Shale Gas Reservoirs: 2012-IP-055125, LANDMARK - Sheldon Burt Gorell; Amit Kumar
- Sequential Process for Reservoir Simulation Optimization of Spatially Dependent Attributes, 2012-IP-055027, LANDMARK -Sheldon Burt Gorell

Employment History:

- Associate Professor, Bob L. Herd Department of Petroleum Engineering, Texas Tech University, 2016 – present
- Vice President, Technology (RPS Knowledge Reservoir), 2012 -2016
- Chief Technologist/Subject Matter Expert, Digit Asset Group (Halliburton Energy Services), 2011 - 2012
- Landmark Graphics, Research Fellow (Halliburton Energy Services), 2010 - 2011
- Landmark Graphics, Director Reservoir Management (Halliburton Energy Services), 2005 - 2010
- Landmark Graphics, Senior Management Consultant (Halliburton Energy Services), 2004 - 2005
- Landmark Graphics, Business Development Manager- North America (Halliburton Energy Services), 2002 - 2003

- Landmark Graphics, Sr. Product Manager Flow Modeling, Manager Simulation Pre & Post Processing, Product Marketing Manager (Halliburton Energy Services), 1996 - 2002
- Senior Staff Engineering Geoscientist (Western Atlas Software), 1991 - 1996
- Senior Research Engineer (Shell Development Company), 1983 - 1991

Memberships & Activities:

- Active in Society of Petroleum Engineering
- Committee member, Society of Petroleum Engineering Review Committee for Reservoir Engineering, 1996-1997, 1999-2003, 2003 SPE Reservoir Symposium
- Steering Committee Member for EOR / IOR SPE Applied Technology Workshop, Feb. 2007
- Steering Committee Member for SPE Forum, Maximizing Oil Recovery, June 2009
- Performed keynote address and served as discussion leader for various sessions at various SPE and joint industry Forums and Applied Technology workshops

Publications & Presentations Include:

- “Principle Component Analysis Methods for Covariance Localization in the Ensemble Kalman Filter History Matching”; Jiang, Junzhe, Gorell, Sheldon, SPE-190015-MS, SPE Western Regional Meeting, April 2018
- “The Impact of the Fracturing Additives on the Near Fracture Face Matrix Permeability for Shale and Low Permeability Sand Formations”, Al-Ameri, Aymen; Gamadi, Talal; Heinze, Lloyd; Ispas, Ion; Gorell, Sheldon, URTEC-2850669-MS, Unconventional Resources Technology Conference, August 2018
- “Complex Toe-to-Heel Flooding: A Completion Strategy to Increase Oil Recovery from Sandstone Formations”, Algarhy, Ahmed; Soliman, M. Y.; Heinze, Lloyd; Gorell, Sheldon; Henderson, Steven; Nasr-El-Din, Hisham, SPE-187488-MS, Sep 2017
- “Reservoir Models: Data Improvement Needs”, Sheldon Gorell, presented at Advanced Energy Forum Microfabricated Sensors Workshop, September 8, 2010, Houston, Texas.
- “Decision Making With Uncertainty While Developing Multiple Gas / Condensate Reservoirs: Well Count and Pipeline Optimization”, C. S. Kabir, S. B. Gorell, M. E. Portilla, A. S. Cullick, SPE Reservoir Evaluation & Engineering, June 2007, Volume 10, Number 3, pg. 251.
- “Implication of Non-Uniqueness on History Matching”, Keynote presentation, SPE Applied Technology Workshop on History Matching, Houston, October 2006.
- “Next-generation modeling workflows improve reservoir management decisions”, Sheldon Gorell, Tom Smart, Keshav Narayanan, Pom Sabharwal & Sarah Bassett, first break magazine, volume 23, October 2005.

- "Optimal Field Development Planning of Well Locations With Reservoir Uncertainty", Stan Cullick, Keshav Narayanan & Sheldon Gorell, SPE-96986, presented at the 2005 SPE Annual Technical Conference and Exhibition, Dallas, Texas, October 9 – 12, 2005.
- "Decision Making With Uncertainty While Developing Multiple Gas / Condensate Reservoirs", Shah Kabir, Sheldon Gorell & Stan Cullick, SPE-95528-PP, presented at the 2005 SPE Annual Technical Conference and Exhibition, Dallas, Texas, October 9 – 12, 2005.
- "Trends in Reservoir Simulation: Big Models, Scalable Models? Will You Please Make Up Your Mind?", Sheldon Gorell & Robert Bassett, SPE 71596, Presented at the 2001 SPE Annual Technical Conference and Exhibition, New Orleans, Louisiana, 30 September–3 October 2001.
- "Use of Reservoir Description Approach to Identify Improved Recovery Opportunities: Process and Case History", M.Y. Soliman, L.E. East, Jr., Sheldon Gorell, 4th International Conference on Reservoir Conformance, Profile Control, Water and Gas Shut-Off, August 10-12, 1998.
- "Quantifying the Benefits of Seismic Data for Reservoir Characterization: A Case Study", S. B. Gorell, Presented at the Rio '95 Conference (4th International Congress of the Brazilian Geophysical Society / 1st Conference of the Latin American Geophysical Union), Rio De Janeiro, Brazil, August 24, 1995.
- "Using Geostatistics to Aid in Reservoir Characterization", S. B. Gorell, The Leading Edge, September 1995, Vol. 14, No. 9, page 967. Originally presented at the SOVG Congress (Society of Venezuelan Geophysicists), Caracas, Venezuela, September, 1994. Subsequently presented at the Canadian Society of Exploration Geophysicists Luncheon, Calgary, June 15, 1995.
- "An Integrated Approach to Predicting Lithology Using Statistical Analysis, Acoustic Inversion and Well Logs", A. A. Peloso. S. B. Gorell, L. E. Driskill, presented at the 1995 AAPG Convention, Houston, TX.
- "Creating 3-D Reservoir Models using a real Geostatistical Techniques Combined with Vertical Well Data", S. B. Gorell, SPE 29670, presented at the Society of Petroleum Engineers Western Regional Meeting, Bakersfield, CA, March 1995.
- "The Integration of Seismic and Petrophysical Data for Reservoir Modeling", S. B. Gorell and Laurence (Loz) Darmon, The American Oil & Gas Reported, November, 1993.
- Outlook for Calibration of Large Grid Block Models for Miscible Flooding Applications", S. B. Gorell, paper 24186, presented at the SPE / DOE Symposium on Enhanced Oil Recovery, Tulsa, OK, April, 1992.
- "Implications of Water-Alternate-Gas Injection for Profile Control and Injectivity", S. B. Gorell, paper 17335, SPE / DOE Symposium on Enhanced Oil Recovery, Tulsa, OK, April, 1990.
- "Comparison of Laboratory - and Field - Observed CO₂ Injectivity Behavior", P. G. Christman and S. B. Gorell, Journal of Petroleum Technology, February 1990. Originally appeared as paper SPE / DOE Symposium on Enhanced Oil Recovery, Tulsa, OK, April, 1988.

- “Discussion of A Proposed Technique to Simulate One-Dimensional Immiscible Fingering”, S. B. Gorell, Soc. Pet. Eng. Reservoir Engineering, August 1989.
- “Modeling the Effects of Trapping and Water Alternate Gas (WAG) Injection on Tertiary Miscible Displacements”, S. B. Gorell, paper 17340, SPE / DOE Symposium on Enhanced Oil Recovery, Tulsa, OK, April 1988.
- “A Theory for the Most Stable Variable Viscosity Profile in Graded Mobility Displacement Processes”, S. B. Gorell and G. M. Homsy, AIChE Journal, 1985, vol. 31, No. 9, p. 1498.
- “Two-Phase Displacement in Hele-Shaw Cells; Experiments on Viscously Driven Instabilities”, C.W. Park, S. B. Gorell, G. M. Homsy, J. Fluid Mech. 1984, vol. 141, p. 257.
- “Theory of the Optimal Policy of Oil Recovery by Secondary Displacement Processes”, S. B. Gorell and G. M. Homsy, Soc. Of Industrial and Applied Mathematics Journal, vol. 43, No. 1, p. 79, February 1983.