Ahmed S. Elshall, Ph.D.

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Education

Ph.D. 2013	Water Resources Engineering, Department of Civil and Environmental Engineering, Louisiana State University, USA
M.Sc. 2009	Applied Environmental Geoscience, Department of Geoscience, University of Tübingen, Germany
Diploma 2007	Environmental Engineering, School of Engineering, The American University in Cairo, Egypt
B.Sc. 2003	Construction Engineering, Department of Construction Engineering, The American University in Cairo, Egypt

Ph.D. Dissertation
Title: Characterization and uncertainty analysis of siliciclastic aquifer-fault system
Advisor: Dr. Frank T.-C. Tsai
Funding Sources: U.S. National Science Foundation and U.S. Geological Survey

M.Sc. Thesis
Title: Practical design optimization of pump-and-treat systems at complex real-world sites using evolution strategies
Advisors: Dr. Michael Finkel, Dr. Olaf Cirpka and Dr. Peter Bayer
Funding Source: Evolution and Ecology Forum, Tübingen

Research Interests
1. Physical, chemical, and biological aspects of groundwater hydrology
2. Hydrogeophysics, geostatistics, and hydrofacies analysis
3. Modeling of groundwater flow, solute transport, and geochemical reactions
4. Interaction of groundwater with surface water, costal systems, climate, and human activities
5. Management and remediation of groundwater resources using simulation optimization methods
6. Inverse modeling, Bayesian statistics, uncertainty analysis, and high performance computing

Publications in Peer-Reviewed Journals
1. **Elshall, A.S.,** A.D. Arik, L.L. Bremer, C. A. Wada, K.M. Burnett, S.A. Pierce, and A. El-Kadi, Groundwater sustainable yield: A review of the interactions between science and policy, Environmental Research Letters (In-Preparation).
2. **Elshall, A.S.,** and M. Ye (2019), Making Steppingstones out of stumbling blocks: A Bayesian model evidence estimator with application to groundwater transport model selection, Water, 11(8), 1579.
3. **Elshall, A.S.,** M. Ye, G.-Y. Niu and G. A. Barron-Gafford (2019), Bayesian inference and predictive performance of soil respiration models in the presence of model discrepancy, Geoscientific Model Development, 12, 2009-2032.
4. **Elshall, A.S.,** M. Ye, Y. Pei, F. Zhang, G.-Y. Niu, and G. A. Barron-Gafford (2018), Relative model score: A scoring rule for evaluating ensemble simulations with application to microbial soil respiration Modeling, Stochastic Environmental Research and Risk Assessment, 32(10), 2809–2819.

5. Samani, S., M. Ye, F. Zhang, Y. Pei, G. Tang**, A. S. Elshall,** and A. A. Moghaddam (2018), Impacts of prior parameter distributions on Bayesian evaluation of groundwater model complexity, Water Science and Engineering, 11(2), 89-100.
6. Liu. P., **A.S. Elshall,** M. Ye, P. Beerli, X. Zeng, D. Lu, M. C. Hill, and Y. Tao (2016), Evaluating model probabilities using Markov chain Monte Carlo with thermodynamics integration, Water Resources Research, 52 (2), 734–758.
7. **Elshall, A.S.,** H. Pham, L. Yan, F.T.-C. Tsai, and M. Ye (2015), Parallel inverse modeling and uncertainty quantification of computationally demanding groundwater flow models using covariance matrix adaptation, ASCE Journal of Hydrologic Engineering, 20(8), 04014087.
8. Zhang, X, G.-Y. Niu, **A.S. Elshall,** M. Ye, G.A. Barron-Gafford and M. Pavao-Zuckerman (2014), Assessing five evolving microbial enzyme models against field measurements from a semiarid savannah: What are the mechanisms of soil respiration pulses? Geophysical Research Letters, 41(18), 6428–6434.
9. **Elshall, A.S.,** and F.T.-C. Tsai (2014) Constructive epistemic modeling of groundwater flow with geological structure and boundary condition uncertainty under Bayesian paradigm, Journal of Hydrology, 517, 105-119.
10. **Elshall, A.S.,** F.T.-C. Tsai, and J.S. Hanor (2013), Indicator geostatistics for reconstructing Baton Rouge aquifer-fault hydrostratigraphy, Louisiana, USA, Hydrogeology Journal, 21(8), 1731-1747.
11. Tsai, F. T.-C., and **A.S. Elshall** (2013), Hierarchical Bayesian model averaging for hydrostratigraphic modeling: Uncertainty segregation and comparative evaluation, Water Resources Research, 49(9), 5520–5536.

<u>Conference Proceedings</u>

1. **Elshall, A.S.,** A. D. Arik, G. Chun, L. Bremer, K. Burnett, A. El-Kadi and C. Wada (2018), Aligning Research and Management with Policy for the Protection of Hawai'i's Water Future, American Geophysical Union Fall Meeting 2018, H33E-05: Groundwater Sustainability Studies: Integrating Monitoring, Modeling, and Policy II, 10-15 December 2018, Washington D.C. (presentation).
2. **Elshall, A.S.** and M. Ye (2017), Numerical Daemons of Monte Carlo based Bayesian Model Evidence Estimators, SIAM Southeastern Atlantic Section Conference (SIAM-SEAS), Session: Theoretical and Computational Issues in Geosciences and Engineering, 18-19 March 2017, Tallahassee, Florida (presentation).
3. **Elshall, A.S.,** M. Ye, G.-Y. Niu and G. A. Barron-Gafford (2016), Numerical daemons in Monte Carlo estimation of Bayesian model evidence with application to soil respiration models, American Geophysical Union Fall Meeting 2016, Session H41B-1303: Towards intelligent decision making in Earth System modeling, 12-16 December 2016, San Francisco, California (poster).
4. Ye. M., **A.S. Elshall,** M. Ye, G. Tang and S., Samani (2016), Making steppingstones out of stumbling blocks: A new Bayesian model evidence estimator with application to groundwater transport model selection, American Geophysical Union Fall Meeting 2016, H08: Advances in Sensitivity and Uncertainty Analysis of Earth and Environmental Systems Models, 12-16 December 2016, San Francisco, California (presentation).
5. **Elshall, A.S.,** M. Ye, G.-Y. Niu and G. A. Barron-Gafford (2015), Bayesian multimodel inference of soil microbial respiration models: Theory, application and future prospective, American Geophysical Union Fall Meeting 2015, Session B22A-06: Constraining Ecosystem Carbon Uptake and Long-Term Storage with Integrated Modeling, Experiment, and Observation IV, 14-18 December 2015, San Francisco, California (presentation).
6. Samani, S., M. Ye, **A.S. Elshall,** G. Tang, X. Niu and A. A. Moghaddam (2015), Exploring model complexity for column experiments using model selection criteria, American Geophysical Union Fall Meeting 2015, Session H13A-1493: Advances and Breakthroughs in Hydrogeology III Posters, 14-18 December 2015, San Francisco, California (poster).

7. **Elshall, A.S.,** M. Ye, G.-Y. Niu, A.S. and G.A. Barron-Gafford (2014), Quantification of model uncertainty in modeling mechanisms of soil microbial respiration pulses to simulate Birch effect, American Geophysical Union Fall Meeting 2014, IN43B-3695: Frontiers in Uncertainty Quantification for Geophysical Modeling Posters, 18 December, 2014, San Francisco, California (poster)
8. **Elshall, A.S.**, F.T.-C. Tsai and J.S. Hanor (2013), Indicator geostatistical approach to reconstruct geological architecture of the Baton Rouge aquifer-fault system, Louisiana, 63rd Annual Convention of the Gulf Coast Association of Geological Societies and the Gulf Coast Section of SEPM, 6-8 October, 2013, New Orleans, Louisiana (presentation).
9. Pham, H., **A.S. Elshall**, F. T.-C. Tsai and L. Yan (2013), Parallel inverse groundwater modeling using CMA-ES, World Environmental & Water Resources Congress, 19-23 May, 2013, Cincinnati, Ohio (presentation).
10. Tsai, F.T.-C., A. Mani, H. Pham, E. Beigi, **A.S. Elshall** and N. Chitsazan (2013), Characterization of siliciclastic aquifer-fault system for Florida parishes, Southeastern Louisiana, World Environmental & Water Resources Congress, 19-23 May, 2013, Cincinnati, Ohio (presentation).
11. Pham, Hai, **A.S. Elshall**, F.T.-C. Tsai1 and L. Yan (2012), Local derivative-free parallel computing method for solving the inverse problem in ground water modeling, American Geophysical Union, Fall Meeting 2012, Session H21A-1164: Advanced Computational Modeling Paradigms for Hydrologic Systems Posters, 3-7 December 2012, San Francisco, California (poster).
12. Tsai, F.T.-C., **A.S. Elshall** and J.S. Hanor (2012), A hierarchical multi-model approach for uncertainty segregation, prioritization and comparative evaluation of competing modeling propositions, American Geophysical Union, Fall Meeting 2012, Session H43B-1326: Complexity, Falsifiability, Transparency, and Uncertainty in Environmental Modeling II Posters , 3-7 December, 2012, San Francisco, California (poster).
13. **Elshall, A. S.**, F.T.-C. Tsai and J.S. Hanor (2012), Hydrogeophysical data fusion and geostatistical approach to characterize the geological structure of the Baton Rouge aquifer system in Louisiana, American Geophysical Union, Fall Meeting 2012, Session H13B-1336: Characterization of Groundwater Systems III Posters, 3-7 December 2012, San Francisco, California (poster).
14. Tsai, F.T.-C. and **A.S. Elshall** (2012), A Bayesian model averaging method to characterize the Baton Rouge aquifer system, World Environmental and Water Resources Congress, 20-24 May 2012, Albuquerque, New Mexico (presentation).
15. **Elshall, A. S.**, F.T.-C. Tsai and J.S. Hanor (2011), Uncertainty and characterization of the Baton Rouge fault system in a Bayesian framework, American Geophysical Union, Fall Meeting 2011, Session H13A-1173: Characterization of Fault Zone Hydrology III Posters, 3-7 December, 2011, San Francisco, California (poster).
16. Tsai, F.T.-C. and **A.S. Elshall** (2011), A hierarchical Bayesian model averaging approach to cope with sources of uncertainty in conceptual ground water models, World Environmental and Water Resources Congress: pp. 1089-1098, doi. 10.1061/41173(414)112 (conference paper).

Invited Presentations

1. **Elshall, A.S.** (2017), Bayesian Model Selection of Microbial Soil Respiration Models, Water Resources Research Center, University of Hawaii Manoa, June 9, 2017, Honolulu, Hawaii (invited seminar)
2. **Elshall, A.S.** (2017), Model-Based Management of Groundwater Resources Under Uncertainty, Department of Civil and Environmental Engineering, University of Hawaii Manoa, May 11, 2017 University of Hawaii Manoa (invited presentation).
3. **Elshall, A.S.** (2017), Theory and application of Bayesian multimodel inference with application to microbial soil respiration models, Geophysical Fluid Dynamics Institute, Florida State University, April 11, 2017, Tallahassee, Florida (invited seminar).

4. **Elshall, A.S.** (2017), Numerical Daemons of Monte Carlo Estimators of Bayesian Model Evidence, Department of Scientific Computing, Florida State University, March 9, 2017, Tallahassee, Florida (invited seminar).
5. **Elshall, A.S.** (2016), Multimodel analysis of water resources systems, Department of Civil Engineering and Construction, Bradley University, March 25, 2016, Pieria, Illinois (invited presentation).
6. **Elshall, A.S.** (2015), Bayesian multimodel analysis in geoscience, Department of Engineering Geology, Institute of Applied Geosciences, Karlsruhe Institute of Technology, February 13, 2015, Karlsruhe, Germany (invited seminar).
7. **Elshall, A.S.** (2015), Bayesian multimodel analysis in geoscience, Water and Earth System Science cluster, Center of Applied Geoscience, University of Tübingen, February 9-12, 2015, Tübingen, Germany (invited seminar).
8. **Elshall, A.S.** (2014), Bayesian data analysis: Evaluating candidate hypotheses for generating soil respiration pulses, Department of Scientific Computing, Florida State University, November 12, 2014, Tallahassee, Florida (invited seminar).
9. Ye, M. and **A.S. Elshall** (2014), A Bayesian framework for environmental uncertainty quantification with application to soil carbon modeling, Climate Change Science Institute, Oak Ridge National Laboratory, August 4-8, 2014, Oak Ridge, Tennessee (invited presentation).
10. **Elshall, A.S.**, H. Pham, F. T.-C. Tsai and L. Yan (2013), High performance computing for stochastic modeling of groundwater systems using CMA-ES, 2nd Annual High Performance Computing User Symposium, Louisiana State University Center for Computation and Technology, and Louisiana Optical Network Initiative (LONI), June 12-13, 2013, Baton Rouge, Louisiana (invited presentation).

Selected Presentations and Posters:

1. **Elshall, A.S.**, F. T.-C. Tsai and J. S. Hanor (2013), Reconstructing Baton Rouge aquifer-fault hydrostratigraphy using indicator geostatistics, Seventh Annual Louisiana Groundwater and Water Resources Symposia, Baton Rouge Geological Society and Louisiana Geological Survey May 8, 2013, Baton Rouge, Louisiana (presentation).
2. **Elshall, A.S.** and F.T.-C. Tsai (2011), Geophysical and geostatistical approaches to subsurface characterization of the Baton Rouge area, Fifth Annual Louisiana Groundwater, Coastal Geology and Subsidence-Land Loss Symposia, Baton Rouge Geological Society & Louisiana Geological Survey, January 11-12, 2011, Baton Rouge, Louisiana (presentation).
3. **Elshall, A.S.** and M. Finkel (2009), Design optimization of a groundwater remediation system using Evolution Strategies, Evolution and Ecology Forum Annual Meeting, December 3-4, 2009, Tübingen, Germany (poster).

Teaching Experience

Instructor, CEE 271 Engineering Mechanics II Dynamics (3), Summer 2018, Summer 2019
Guest Lecturer, ISC 5236 Applied Groundwater Modeling (3), Spring 2017

Professional Experience

2018-Now	Part-time Lecturer, Department of Civil and Environmental Engineering, University of Hawaii at Manoa, Honolulu, Hawaii
2017-Now	Affiliate Faculty, Water Resources Research Center, University of Hawaii at Manoa, Honolulu, Hawaii
2017-Now	Postdoctoral Research Associate, Department of Earth Sciences, University of Hawaii at Manoa, Honolulu, Hawaii
2014-2017	Postdoctoral Research Associate, Department of Scientific Computing, Florida State University, Tallahassee, Florida

2010- 2013	Research Assistant, Department of Civil and Environmental Engineering, Louisiana State University, Louisiana
2007-2010	Research Assistant, Center of Applied Geoscience, University of Tübingen, Tübingen, Germany
2006-2007	Senior Environmental Management Specialist, EcoConServ, Cairo, Egypt
2005-2006	Contract Administrator, PGESCo, Egypt
2003-2005	Contract Administrator, Contrack International Inc., Egypt

Journal Referee Service

- Computational Geosciences, Springer
- Environmental Research Letters, IOP Publishing
- Hydrogeology Journal, International Association of Hydrogeologists
- International Journal of Environmental Research and Public Health, MDPI
- Journal of Hydrologic Engineering, American Society of Civil Engineers
- Journal of Hydrology, Elsevier
- Reliability Engineering & System Safety, Elsevier
- Remote Sensing, MDPI
- Soil Science Society of America Journal, ACSESS Digital Library
- Sustainability, MDPI
- Water, MDPI
- Water Resources Research, American Geophysical Union

Professional Memberships

- 2014- Now: Member, The National Postdoctoral Association, USA
- 2010- Now: Member, American Geophysical Union, USA

Awards

2018	Outstanding Reviewer Award, Environmental Research Letters, IOP Publishing
2010	Graduate School Supplementary Award, Louisiana State University (2010-2013)
2009	Walsh Fellowship, Teagasc: The Agriculture and Food Development Authority, Ireland
2009	EvE Advancement Award, Evolution and Ecology Forum, University of Tübingen
2000	Exchange student for one academic year, Department of Civil and Environmental Engineering, University of Colorado at Boulder

Contact Details of Potential Referees

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Relation to the applicant: Postdoc Mentor

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Professor, Department of Civil Environmental Engineering, Louisiana State University
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Phone: (225) 578-4246 / Fax: (225) 578-4945
ftsai@lsu.edu
Relation to the applicant: Ph.D. Advisor

Dr. Gwen A. Jacobs
Director of Cyberinfrastructure, University of Hawai'i System
Mailing Address: 2520 Correa Rd, Honolulu, HI 96822
Phone (808) 956-5767 / Fax: (808) 956-2412
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Relation to the applicant: Project PI and Supervisor

Dr. Clifford I. Voss
Research Hydrologist, USGS Water Resources Mission Area
Mailing Address: 345 Middlefield Road, Menlo Park, CA 94025, USA
Phone: (650) 329-5885 / Fax: (650) 329-4545
cvoss@usgs.gov
Relation to the applicant: An advisor board member of the project that I am currently working on at the University of Hawaii Manoa

Dr. Michael Finkel
Senior Researcher, Center for Applied Geoscience, University of Tübingen
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Phone: +49-(0)7071-29-73177 / Fax: +49-(0)7071-29-5059
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Relation to the applicant: M.Sc. Advisor