Auroop R Ganguly

R&D Associate (Scientist)
Geographic Information Sciences & Technology Group
Computational Sciences and Engineering Division
Oak Ridge National Laboratory, Oak Ridge, TN

Adjunct Professor
Information and Industrial Engineering
University of Tennessee
Knoxville, TN

Education

2002, PhD, Civil & Environmental Engineering, **Massachusetts Institute of Technology**, Cambridge, MA
1997, MS, Civil Engineering, **University of Toledo**, Toledo, OH
1993, B Tech (Hons.), Civil Engineering, **Indian Institute of Technology**, Kharagpur, India

Research / Academic Experience

2004 – Present, Scientist, GIST, CSED, **Oak Ridge National Laboratory**, Oak Ridge, TN
2006 – Present, Adjunct Professor, IIE, **University of Tennessee**, Knoxville, TN
2004 – Present, Courtesy Assistant Professor, CEE, **University of South Florida**, Tampa, FL
2003 – 2004, Visiting Faculty, IT& QM, CEE, **University of South Florida**, Tampa, FL

Professional Experience

2003 – 2003, Senior Product Manager, Analytics & Strategy, **Demantra Inc.**, Waltham, MA
1998 – 2003, **Oracle Corporation**
1999 – 2003: Product Manager, Demand Planning, Oracle Corporation, Burlington, MA
1998 – 1999: Time Series Software Developer, Oracle Corporation, Nashua, NH
1997 – 2003, Voluntary Research, **MIT Sloan School of Management**, Cambridge, MA

Journal Publications *(Reverse chronological order)*

1. Kuhn, G., Khan, S., **Ganguly, A.R.**, M. Branstetter (2006): *Geospatial-temporal dependence among weekly precipitation extremes with applications to observations and climate model simulations in South America*, **Advances in Water Resources**. (In Review).
2. Huang, C., Hsing, T., Cressie, N., **Ganguly, A.R.**, Protopopescu, V.A., and N.S. Rao (2006): *Statistical Analysis of Plume Model Identification Based on Sensor Network Measurements*, **ACM Transactions on Sensor Networks**. (In Review).
3. Sabesan, A., Abercrombie, K., **Ganguly, A.R.**, Bhaduri, B.L., Bright, E.A., and P. Coleman (2006): *Metrics for the comparative analysis of geospatial datasets with applications to high-resolution grid-based population data*, **GeoJournal**. (Invited: In Review).
4. Khan, S., Kuhn, G., **Ganguly, A.R.**, Erickson, D.J., and G. Ostrouchov (2006): *Spatio-temporal variability of daily and weekly precipitation extremes in South America*, **Water Resources Research**. (In Revision).
5. Gupta, A., Seshasai, S., Mukherji, S., and **A.R. Ganguly** (2006): *Offshoring: The Transition from Economic Drivers toward Strategic Global Partnership and 24-Hour Knowledge Factory*, Invited Lead Editorial Paper, **Journal of Electronic Commerce in Organizations**. (In Press).
6. Khan, S., **A. R. Ganguly**, S. Bandyopadhyay, S. Saigal, D. J. Erickson, III, V. Protopopescu, and G. Ostrouchov (2006): *Nonlinear statistics reveals stronger ties between ENSO and the tropical hydrological cycle*, **Geophysical Research Letters**, 33, L24402, doi:10.1029/2006GL027941.
7. Samatova, N., Branstetter, M., **Ganguly, A.R.**, Hettich, R., Khan, S., Kora, G., Li, J., Ma, X., Pan, C., Shoshani, A., and S. Yoginath (2006): *High performance statistical computing with parallel R: Applications to biology and climate,* **Journal of Physics**: Conference Series 46 (2006), 505-509.
8. Khan, S., **Ganguly, A. R.**, and Saigal, S. (2005): *Detection and predictive modeling of chaos in finite hydrological time series*. **Nonlinear Processes in Geophysics**, 12: 41-53.
9. **Ganguly, A. R**., and Bras, R. L. (2003): *Distributed quantitative precipitation forecasting combining information from radar and numerical weather prediction model outputs,* **Journal of Hydrometeorology**, 4(6), 1168-1180.
10. **Ganguly, A. R**. (2002): *A hybrid approach to improving rainfall forecasts,* **Computing in Science and Engineering**, IEEE and AIP, 4(4), 14-21, July/August.
11. Reyes-Aldasoro, C. C., **Ganguly, A. R.**, Lemus, G., and A Gupta (1999): *A hybrid model based on dynamic programming, neural networks, and surrogate value for inventory optimisation applications.* **Journal of the Operational Research Society**, 50(1), 85-94.

Peer-Reviewed Conference Publications

12. Agovic, A., Banerjee, A., **Ganguly, A.R.**, and V.A. Protopopescu (2006): *Non-Linear Anomaly Analysis with Applications to Transportation Corridors*, **SIAM Conference on Data Mining**, Minneapolis, MN. (In Review).
13. Fang, Y., **Ganguly, A.R.**, Singh, N., Vijayaraj, V., Feierabend, R.N., and D.T. Potere (2006): *Online change detection: Monitoring land-cover from remotely sensed data*, The 2006 IEEE International Workshop on Mining Evolving and Streaming Data, **Proceedings of the 2006 IEEE International Conference on Data Mining: Workshops**, 626-631, Hong Kong, 18 December.
14. **Ganguly, A.R.**, Hsing, T., Katz, R., Erickson, D., Ostrouchov, G., Wilbanks, T., and N. Cressie (2005): *Multivariate dependence among extremes, abrupt change and anomalies in space and time for climate applications*, Proceedings of the Workshop on Data Mining for Anomaly Detection, **The Eleventh ACM SIGKDD International Conference on Knowledge Discovery and Data Mining**, Chicago, IL, August..
15. **Ganguly, A.R.**, Protopopescu, V.A., and A. Sorokine (2005): *A bottom-up strategy for uncertainty quantification in complex geo-computational models*, GeoComputation 2005, **8th International Conference on GeoComputation**, Ann Arbor, MI.
16. Mukherji, S., and **A.R. Ganguly** (2004): *Sustaining the offshore outsourcing boom for software development: transitioning from low-cost service providers to strategic partners for information systems*, **Proceedings of the 9th International Symposium on Logistics** (9th ISL), Bangalore, India.

ORNL Technical Reports

17. Sabesan, A., Abercrombie, K., **Ganguly, A.R.**, Bhaduri, B.L., Bright, E.A., and P. Coleman (2006): *Uncertainty in Population Estimates — A Comparison between GPW and LandScan Data Models*, ORNL/TM-2006/540, **Oak Ridge National Laboratory**.
18. Gerdes, D.A., Khan, S., and **A.R. Ganguly** (2006): *Nonlinear Dependence Measures with Application to Static Scale Data from the Watt Road Weigh Station*, ORNL/TM-2006/549, **Oak Ridge National Laboratory**.
19. Fang, Y., and **A.R. Ganguly** (2006): *Probabilistic Principal Component Analysis for Online Anomaly Detection with Application to Static Scale Data from the Watt Road Weigh Station*, ORNL/TM-2006/546, **Oak Ridge National Laboratory**.
20. Gabriel, K., and **A.R. Ganguly** (2006): *Geospatial-temporal dependence among the usual and the extreme values with applications to observed and simulated precipitation in South America*, ORNL/TM-2006/542, **Oak Ridge National Laboratory**. (In Review).

Invited Editorial Review Article

21. **Ganguly, A. R.** (2002): *Software Review – Data Mining Components*. **OR/MS Today**, Institute for Operations research and the Management Sciences (INFORMS), 29(5), 56-59, October.

Book Chapters

22. Khan, S., **Ganguly, A. R.**, and A. Gupta (2005): *Creating knowledge about the future through business forecasting and planning*, **Encyclopedia of Knowledge Management**, D. Schwartz (editor), Idea Group.
23. **Ganguly, A. R.**, and A. Gupta (2005): *Data mining and decision support for business and science*, **Encyclopedia of Data Warehousing and Mining**, J. Wang (editor), Idea Group.
24. **Ganguly, A. R.**, and A. Gupta (2005): *Framework for strategic IT decisions*, **The Handbook of Business Strategy**, P. Coate (editor), Emerald.
25. **Ganguly, A. R.** (2002): *Forecasting rainfall and floods – advances and way forward*, **Advances in Civil Engineering**, Volume I: Water Resources and Environmental Engineering (Bandopadhyay and Kumar, editors), Allied Publishers India, page 166-174.

Other Conference Presentations

26. **Ganguly, A.R.**, and B.L. Bhaduri (2006): *A framework for geospatial-temporal knowledge discovery*, **American Association of Geographers**, Annual Meeting, San Francisco, CA.
27. Kuhn, G., Khan, S., and **A. Ganguly** (2006): *New approaches for extreme value analysis in large-scale geospatial-temporal data with applications to observed and climate-model simulated*

precipitation in South America, Session on Role of Observed Precipitation in Atmospheric and Land Surface Models I, Fall Meeting of the **American Geophysical Union**, San Francisco, CA.

28. Fuller, C., Sabesan, A., Khan, S., Kuhn. G., **Ganguly, A.**, Erickson, D., and G. Ostrouchov (2006): *Quantification and visualization of the human impacts of anticipated precipitation extremes in South America*, Session on Catastrophic Risk from Natural Perils: Scientific, Engineering, and Financial Issues, Fall Meeting of the **American Geophysical Union**, San Francisco, CA.
29. Branstetter, M.L., Erickson, D.J., Ghan, S., **Ganguly, A.**, and Khan, S. (2006): *Hydrology in the IPCC Simulations*, **CCSM3 (Community Climate System Model, Version 3) Workshop**, Breckenridge, CO.
30. **Ganguly, A.R.** and Y. Fang (2006): *Online alarm generation in sensor-cyber networks, Session on Sensor-Cyber Networks for Homeland Defense*, **9th ONR/GTRI Workshop on Target Tracking in Sensor Fusion**, Analytical Predictions of Tracking Performance, Office of Naval Research and Georgia Tech Research Institute, Gatlinburg, TN.
31. Huang, C., Hsing, T., Cressie, N., **Ganguly, A.R.**, Protopopescu, V.A., and N.S. Rao (2006): *Plume Model Identification Based on Statistical Analysis of Sensor Network Data*, Session on Sensor-Cyber Networks for Homeland Defense, **9th ONR/GTRI Workshop on Target Tracking in Sensor Fusion**, Analytical Predictions of Tracking Performance, Office of Naval Research and Georgia Tech Research Institute, Gatlinburg, TN.
32. **Ganguly, A. R.** (2006): *Basic research needs in SensorNet®*, Invited Presentation, **First Conference on Statistical and Quantitative Methods for Defense and National Security**, RAND Corporation and the American Statistical Association, Santa Monica, CA.
33. Abercrombie, K., Sabesan, A., **A.R. Ganguly** (2006): *Metrics for the comparative analysis of geospatial datasets with applications to high-resolution grid-based population data*, **American Association of Geographers**, Annual Meeting, Chicago, IL.
34. **Ganguly, A.R.**, Khan, S., Erickson, D.J., Katz, R.W., Ostrouchov, G., Protopopescu, V.A., Bandyopadhyay, S., and S. Saigal (2005): *Multivariate dependence in complex systems*, **Fifth Symposium on Understanding Complex Systems**, University of Illinois at Urbana-Champaign, IL, May.
35. Khan, S., Bandyopadhyay, S., **Ganguly, A.R.** (2005): *Nonlinear dependence among multiple time series from limited observations and noise*, Session on Nonlinear Data Sciences for Finite Data with Noise and Periodicity, Fall Meeting of the **American Geophysical Union**, San Francisco, CA.
36. **Ganguly, A.R.**, Khan, S., Saigal, S. (2005): *Impact of noise and seasonality on the detection and nonlinear prediction of chaos from finite river-flow time series*, Session on Nonlinear Data Sciences for Finite Data with Noise and Periodicity, Fall Meeting of the **American Geophysical Union**, San Francisco, CA.
37. Samatova, N., Branstetter, M., **Ganguly, A.R.**, Hettich, R., Khan, S., Kora, G., Li, J., Ma, X., Pan, C., Shoshani, A., and S. Yoginath (2006): *High performance statistical computing with parallel R: Applications to biology and climate*, **US DOE SciDAC PI Meeting**.
38. Khan, S., **Ganguly, A.R.**, and S. Saigal (2004): *Complexity analysis and predictive models for hydrologic systems*, Invited Presentation at the Annual Meeting of the Institute for Operations Research and the Management Sciences (**INFORMS**), Denver, CO.
39. **Ganguly, A.R.**, Khan, S., and S. Saigal (2004): *Weather economics: The business of uncertainty*, Invited Presentation at the Annual Meeting of the Institute for Operations Research and the Management Sciences (**INFORMS**), Denver, CO.
40. **Ganguly, A. R.**, and Aronowich. M. (2003): *Advanced analytics for closed-loop enterprise planning and forecasting*. **INFORMS** Annual Meeting, Atlanta, Georgia.
41. **Ganguly, A. R. (2002)**: *Forecasting systems and frameworks in disparate complex domains*, **International Conference on Complex Systems**, Nashua, NH.
42. **Ganguly, A. R.** and Bras, R. L. (2002): *Quantitative precipitation forecasting using radar and numerical weather model outputs*, **American Geophysical Union** Spring Meeting, Washington, DC.
43. **Ganguly, A. R.** and R.L. Bras (2002): *Artificial neural networks and ensemble methods for forecasting mean rainfall intensities and confidence bounds in space and time*, **American Geophysical Union** Spring Meeting, Washington, DC.

44. **Ganguly, A.R.** and A. Gupta (1998): *Inventory optimization using statistical and artificial neural network based data mining*, **MIT Industry Liaison Research Directors' Conference**, May 6-7.
45. **Ganguly, A. R.**, Garrotte, L. and Bras, R. L. (1997). *Application of a physically based distributed hydrologic model to large basins,* Proceedings of the Joint Session of the 13th International Conference on Hydrology and the 13th International Conference on IIPS, **American Meteorological Society**, page J55-J58.

ORNL Invention Disclosures

46. **Ganguly, A. R.** and S. Khan.
47. **Ganguly, A. R.** and G. Kuhn.

Professional Business Papers

48. **Ganguly, A. R.** (2003). *Promotion Effectiveness – Analytical White Paper*, **Demantra Inc.**
49. **Ganguly, A.** (2003). *Shape Models for Product Profiles & Promotion Planning*, **Demantra Inc.**
50. **Ganguly, A.** (2002). *Oracle Demand Planning – Executive White Paper*, **Oracle Corporation.**

Professional Service

A. *Program Committee Member*, IEEE International Workshop on Mining Evolving and Streaming Data, **The 2006 IEEE International Conference on Data Mining** (ICDM), Hong Kong, December 2006.
B. *Session Chair and Organizer*, Nonlinear Data Sciences for Finite Data with Noise and Periodicity, Fall Meeting of the **American Geophysical Union** (AGU), San Francisco, CA, December 2005.
C. *Session Chair and Organizer*, Data Mining for the Earth Sciences, Annual Meeting of the **Institute for Operations Research and the Management Sciences** (INFORMS), Denver, CA, 2004.
D. *Peer Reviewer* for the following journals: IEEE Transactions on Engineering Management; Information Fusion; Journal of Hydrometeorology; Statistical Papers; Pattern Recognition Letters; Computers and Operations Research; IEEE Transactions on Systems, Man and Cybernetics
E. *Peer Reviewer* for book chapters: Encyclopedia of Data Warehousing and Mining; Encyclopedia of Knowledge Management
F. *Member, Proposal Evaluation Committee,* Dartmouth College (ISTS)

Graduate Courses Taught

Fall 2004: Applied time series and spatial statistics (3 credits), University of South Florida, Tampa
Spring 2004: Hydrologic models (3 credits), University of South Florida, Tampa

Selected invited presentations

2006: US JFCOM, United States Department of Defense
2006: US ARMY, United States Department of Defense
2005: US ARMY, United States Department of Defense
2005: United States Department of Homeland Security
2005: Department of Statistics, University of Tennessee, Knoxville
2004: Procter and Gamble, Global Analytics Group (via teleconference)
2002: Quantitative Methods, Indian Institute of Management, Ahmedabad, India

Publicity

2006: Press Conference, Media Events of the American Geophysical Union
2003: Quoted in Canadian Transportation & Logistics Magazine
2002: Letter to the Editor in the Bulletin of the American Meteorological Society
2002: Contributor to the Glossary of Meteorology
2002: Mentioned by the Institute for Forecasting Education

Undergraduate Student Mentoring

Outstanding Mentor Award, Office of Science Undergraduate Research Program, **US Department of Energy**, ORNL, February 2006
Certificate of Appreciation, **Research Alliance in Mathematics and Science**, ORNL, Summer 2006

Graduate Students

Major Ph.D. Supervisor, Shiraj Khan, CEE (Systems), **University of South Florida**, Tampa, FL
Ph.D. proposal successfully defended by Shiraj Khan; Expected graduation July/August 2007
Ph.D. Committee, Duminda Randeniya, CEE (Transportation), **University of South Florida**, Tampa, FL

Post-Doctoral and Post-Master Students *(Direct Mentor)*

Post-doc, Dr. Olufemi Omitaomu, **Oak Ridge National Laboratory**
Post-doc, Dr. Gabriel Kuhn, **Oak Ridge National Laboratory**
Post-master, Shiraj Khan, **Oak Ridge National Laboratory**
Post-master, Yi Fang, **Oak Ridge National Laboratory**
Post-master, David Andrew (Disco) Gerdes, **Oak Ridge National Laboratory**

Undergraduate Students *(Direct Mentor)*

Summer Intern, Christopher Fuller, **Oak Ridge National Laboratory**
Summer Intern, Kathleen Abercrombie, **Oak Ridge National Laboratory**

Student Collaborators

Post-master, Aarthy Sabesan, **Oak Ridge National Laboratory**
Post-master, Veeraraghavan Vijayaraj, **Oak Ridge National Laboratory**
Post-master, Nagendra Singh, **Oak Ridge National Laboratory**
Post-master, Neal Feierabend, **Oak Ridge National Laboratory**
Post-master, David Potere, **Oak Ridge National Laboratory**

Past or Present Affiliations

IEEE; ACM; AMS; AGU; INFORMS; ASCE

Projects and Roles

Principal Investigator

ORNL Laboratory Directors R&D Funds: Awarded $790K over 2 years
Knowledge discovery from weigh station sensors for transportation and logistics security
Team: ORNL staff from two divisions, students, post-doc, university collaborators

ORNL LDRD SEED Money funds: Awarded $125K for 1 year
Multivariate dependence in climate extremes
Team: ORNL staff from two divisions, students, post-doc, university/FFRDC collaborators

Investigator

ORNL SensorNet® Program
Spatio-temporal statistics for analysis of data from sensor networks
Led collaboration with Ohio State (Tailen Hsing and Noel Cressie) for one year
Transportation security via knowledge discovery on data from weigh station sensors

ORNL LandScan™ Population Modeling, GIST Group
Comparison of grid-based population models and uncertainty in population data

ORNL (Multiple Sources), Computer Science and Mathematics Division
Statistical Inference from Experimental Data for the Spallation Neutron Source (SNS)

Contributions to Funded Proposals

National Geospatial-intelligence Agency (NGA), Uncertainty in Geospatial Data: Investigator
US DOE Scientific Discovery through Advanced Computing (SciDAC): Investigator
Software infrastructures for biology & climate
Multiple DOD and DHS Agencies
Process-driven Intelligent Decision Environment (PRIDE): Principal Investigator
Multiple proposals / presentations under consideration

Summary of Industry Experience

1. Demantra Inc. was a best-of-breed demand forecasting software vendor, with R&D offices in Israel and headquarters near Boston, MA. The company has been subsequently acquired by Oracle Corporation. Role as the Senior Product Manager for analytics and strategy comprised developing, and managing the development of, analytical methodologies across Demantra's product suite, specifically for Demand Planning and Promotion Analytics.
2. Oracle Corporation is one of the world's largest software development companies. Developed software for the core time series kernel as a time series software developer. Subsequent role as Product Manager for Demand Planning included managing the development of the product roadmap and the core statistical and functional features, as well as interactions with external customers or prospects and internal organizations like R&D, sales, marketing, and consulting.