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EDUCATION

- PhD (1995) **Utah State University**, Logan, UT: Civil and Environmental Engineering (specialization: Stochastic Hydrology, Hydro climate/Water Resources)
Dissertation “Nonparametric Stochastic Generation of Daily Precipitation and Other Weather Variables”
- M. Tech.¹ (1991) **Indian Statistical Institute**, Calcutta, India: Quality Reliability and Operations Research
Thesis “Hypothetical study of Water Resources Management using Systems Analysis”
Project “Application of Statistical Design of Experiment Techniques to a Quality problem in a Chemical Industry”
- B. Tech.¹ (1989) **National Institute of Technology**, Kurukshetra, India: Civil Engineering
Sr. Projects “Structural Design of a Five Storied Building”
“Layout and Design of a highway connecting two points in Kurukshetra”

EMPLOYMENT HISTORY

- 2007- **Associate Professor**, *Department of Civil, Environmental and Architectural Engineering, University of Colorado at Boulder*
- 2000 - 2007 **Assistant Professor**, *Department of Civil, Environmental and Architectural Engineering, University of Colorado at Boulder*
- 2001- **Fellow**, *Co-operative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder* (Re-appointed for a 5-year term in 2003)
- 1997-2003 **Research Assistant Professor**, *Utah Water Research Laboratory (UWRL), Utah State University, Logan, UT*
- 2000- **Adjunct Associate Research Scientist**, *International Research Institute for Climate Prediction (IRI), Lamont-Doherty Earth Observatory (LDEO) of Columbia University, New York*
- 1999-2000 **Associate Research Scientist**, *IRI / LDEO, Columbia University, New York*
- 1997-1999 **Associate Research Scientist**, *LDEO, Columbia University, New York*
- 1995-1997 **Post Doctoral Research Scientist**, *LDEO, Columbia University, New York*
- 1991-1995 **Graduate Research Assistant**, *UWRL, Utah State University, Logan, UT*
- 1991 **Summer Intern**, *Alembic Chemicals, Ltd., Baroda, India* Performed statistical design of experiments to improve the efficacy of their leading cold/cough drug
- 1990 **Summer Intern**, *Hindustan Cables Ltd., Hyderabad, India*. Performed *Statistical Quality Control* analysis on their cable manufacturing process
- 1988 **Summer Intern**, *Engineers India Ltd., Cochin, India*. Worked on structural design and construction supervision at their petroleum refinery site

¹ With Honors

HONORS AND AWARDS

World Meteorological Organization Norbert Gerbier - MUMM International Award for 2009, for the paper entitled “Unraveling the Mystery of Indian Monsoon Failure During El Nino”, published in SCIENCE, Vol. 314, 6 October 2006.

Department Research Development Award, Civil, Environmental and Architectural Engineering, University of Colorado, 2006

Department Young Researcher Award, Civil, Environmental and Architectural Engineering, University of Colorado, 2003

Invited Participant, 15th Annual Beckman Frontiers of Science Symposium, *National Academy of Sciences*, Irvine, CA, Nov 6 - 8, 2003.

Nominated for the Lorenz G. Straub award for the most meritorious thesis in hydraulics and hydrology and (finished in the top three), 1996

Honorable mention, Award for the Outstanding Water Resources Dissertation in the field of Engineering and Physical Sciences, The Universities Council on Water Resources, 1996

Distinguished Utah State University Dissertation in Engineering, for the period, 1993-1995

Utah State University's nomination for the Council of Graduate School's Distinguished Dissertation Award, 1995

Best Student Paper award, at the student paper contests conducted by American Water Resources Association, Utah chapter during 1992 and 1993

Govt. of India Scholarship, Indian Statistical Institute, Calcutta, India, 1989-1991

National Merit Scholarship, National Institute of Technology, Kurukshetra, India, 1985-1989

RESEARCH**PEER-REVIEWED JOURNAL MANUSCRIPTS (IN REVIEW / UNDER REVISION)**

- ***1. Towler, E., B. Rajagopalan and S. Summers, Using Parametric and Nonparametric methods to model TOC, Alkalinity, and pH after Conventional Surface Water Treatment, (under revision) *Environmental Engineering and Science*, 2009
- ***2. Apipattanavis, S., B. Rajagopalan and U. Lall, Local Polynomial Technique for Analyzing Flood Frequency of Mixed Population, (in review), *Journal of Hydrologic Engineering*, 2009.
- ***3. Apipattanavis, S., K. Sabol, K. Molenaar, B. Rajagopalan, Y. Xi, B. Blackard and S. Patil, An Integrated Framework for Quantifying and Predicting Weather Related Highway Construction Delays, (in review), *ASCE Journal of Construction Engineering and Management*, 2008
- ***4. Rajagopalan, B., K. Nowak, J. Prairie, M. Hoerling, B. Harding, J. Barsugli, A. Ray and B. Udall, Water Supply Risk on the Colorado River: Can Management Mitigate?, (in review), *Water Resources Research*, 2009
- ***5. Barsugli, J., K. Nowak, B. Rajagopalan, J. Prairie and B. Harding, Comment on “When Will Lake Mead Go Dry?”, (in review), *Water Resources Research*, 2009
- ***7. Towler, E., B. Rajagopalan, S. Summers and D. Yates, A framework for probabilistic forecasting of seasonal water quality threshold exceedance, (in review), *Water Resources Research*, 2009
8. Krishna Kumar, K., K. Kamala, B. Rajagopalan, M. Hoerling, J. Eischeid, S. K. Patwardhan, G. Srinivasan, B. N. Goswami and R. Nemani, The Once and Future Pulse of Indian Monsoonal Climate, (in review), *Climate Change*, 2009
- ***9. Brecken, C., B. Rajagopalan, and J. Prairie, A multi-site seasonal ensemble streamflow forecasting technique, (in review), *Water Resources Research*, 2009

PEER-REVIEWED JOURNAL PUBLICATIONS (PUBLISHED/ACCEPTED/IN PRESS)

(***Papers that received press coverage; ***Papers with students and Research Assocs. at CU Boulder; student names are underlined)

68. Podesta, G., F. Bert, B. Rajagopalan, S. Apipattanavis, C. Laciana, E. Weber, W. Easterling, R. Katz, D. Letson and A. Menendez, Inter-decadal climate variability in the Argentinean pampas: regional impacts of lausable future climate scenarios on agricultural systems, *Climate Research* (accepted), 2009
- ***67. Rojsiraphisal, T., B. Rajagopalan and L. Kantha, The Use of MTM-SVD Technique to Explore the Joint Spatio-temporal Modes of Wind and Sea Surface Variability in the North Indian Ocean during 1993-2005, (accepted), *International Journal of Oceanography*, 2009
- ***66. Apipattanavis, S., G. J. McCabe, B. Rajagopalan and S. Gangopadhyay, Joint Spatio-Temporal Variability of Global Sea-Surface Temperatures and Global Palmer Drought Severity Index Values (accepted) *Journal of Climate*, 2009
- ***65. Gangopadhyay, S., B. Harding, B. Rajagopalan and T. Fulp, A Non-Parametric Approach for Paleo Reconstruction of Annual Streamflow Ensembles, (in press) *Water Resources Research*, 2009
- ***64. Towler, E., B. Rajagopalan, S. Summers and C. Seidel, Simulating Ensembles of Source Water Quality Using a K-Nearest Neighbor Resampling Approach *Environmental Science and Technology*, 43(5), 1407-1411, 2009

- ***63. Block, P. and B. Rajagopalan, Statistical - Dynamical Approach for Streamflow Modeling at Malakal, Sudan, on the White Nile River, *Journal of Hydrologic Engineering*, 185-196, 2009
- ***62. Lee, E., T. N. Chase, P. J. Lawrence, and B. Rajagopalan, Highly improved predictive skill in the forecasting of East Asian summer monsoon, *Water Resources Research*, 44, W10422, doi:10.1029/2007WR006514, 2008, ***
- ***61. Lee, E., T. N. Chase, P. J. Lawrence, and B. Rajagopalan, Model assessment of the observed relationship between El Niño and the northern East Asian summer monsoon using the CCSM Community Atmosphere Model-Community Land Model version 3 (CAM-CLM3), *J. Geophys. Res.*, doi:10.1029/2008JD009926, 2008.
- ***60. Leavitt S. W., T. N. Chase, B. Rajagopalan, E. Lee, P. J. Lawrence, Southwestern U.S. tree-ring carbon isotope indices as a possible proxy for reconstruction of greenness of vegetation, *Geophys. Res. Lett.*, 35, L12704, doi:10.1029/2008GL033894, 2008.
- ***59. Prairie, J., Nowak, K. Rajagopalan, B., Lall, U. and Fulp, T., A stochastic nonparametric approach for streamflow generation combining observational and paleo reconstructed data, *Water Resources Research*, 44, W06423, doi:10.1029/2007WR006684, 2008.
- ***58. Lee, E., T. Chase, and B. Rajagopalan, R. G. Barry, T. W. Biggs and P. J. Lawrence, Effects of irrigation and vegetation activity on early Indian summer monsoon variability, *International Journal of Climatology*, doi: 10.1002/joc.1721, 2008.
- ***57. Lee, E., T. Chase, and B. Rajagopalan, Seasonal forecasting of East Asian summer monsoon based on oceanic heat sources, *International Journal of Climatology*, doi: 10.1002/joc.1551, 2008.
- ***56. Leavitt, S.W., T. Chase, B. Rajagopalan, E. Lee, P. Lawrence and C. Woodhouse, Southwestern U.S. Drought Maps From Pinyon Tree-Ring Carbon Isotopes, EOS, Transactions American Geophysical Union, 88(4), 39, 2007
- ***55. Apipattanavis, S., G. Podesta, B. Rajagopalan and R. Katz, A semiparametric multivariate and multisite weather generator, *Water Resources Research*, 43(W03432), 2007
- ***54. Prairie, J. and B. Rajagopalan, A Basin-wide Stochastic Salinity Model, *Journal of Hydrology*, 344, doi:10.1016, 2007
- ***53. Zachman, B., S. Summers and B. Rajagopalan, Modeling NOM Breakthrough in GAC Adsorbers Using Nonparametric Regression Techniques, *Environmental Engineering and Science*, Nov. 1, 280-1296, 2007***
- ***52. Morin, J., P. Block, B. Rajagopalan and M. Clark, Large Scale Climate Patterns Affecting Snow Variability in the Eastern United States: Identification and Prediction, *International Journal of Climatology*, doi: 10.1002/joc.1534, 2007***
- ***51. Stapleton, S., S. Gangopadhyay and B. Rajagopalan, Improving Streamflow Forecast for the Yakima River Basin by Incorporating Pacific North American Teleconnection Pattern, *Journal of Hydrology*, 341(3), 131-143, 2007
- ***50. Biggs, T., C. Scott, B. Rajagopalan and H. Turrall, Trends and Interannual Variability in Solar Radiation due to Clouds and Aerosols, Krishna River Basin, Southern India, 1952-1997, *International Journal of Climatology*, doi: 10.1002/joc.1487, 2007

- +++49. Prairie, J., B. Rajagopalan, U. Lall and T. Fulp, A Stochastic Nonparametric Technique for Space-Time Disaggregation of Streamflows, *Water Resources Research*, 43(3), W03432, 2007
- +++48. Block, P. and B. Rajagopalan, Interannual Variability and Ensemble Forecast of Upper Blue Nile Basin Kiremt Season Precipitation (accepted) *Journal of Hydrometeorology*, 8, 327-343, 2007
- +++47. Grantz, K., B. Rajagopalan, M. Clark and E. Zagona, Seasonal Shifts in the North American Monsoon, *Journal of Climate*, 1923-1935, 2007
- +++46. Grantz, K., B. Rajagopalan, M. Clark and E. Zagona, Water Management Applications of Climate-Based Hydrologic Forecasts: Case Study of the Truckee-Carson River Basin, Nevada, *ASCE Journal of Water Resources Planning and Management*, 133(4), 339-350, 2007
- +++45. K. Krishna Kumar, B. Rajagopalan, M. Hoerling, G. Bates and M. Cane, Unraveling the Mystery of Indian Monsoon Failure During El Nino, *SCIENCE*, 314, 115-119, 2006
- +++44. Neumann, D., B. Rajagopalan and E. Zagona, A decision support system to manage summer stream temperatures, *Journal of American Water Resources Association*, 42(5), 1275-1284, 2006
- +++43. Regonda, S., B. Rajagopalan, M. Clark and E. Zagona, Multi-model Ensemble Forecast of Spring Seasonal Flows in the Gunnison River Basin, *Water Resources Research*, 42, W09494, 2006
- +++42. Regonda, S., B. Rajagopalan, and M. Clark, A New Method to Produce Categorical Streamflow Forecasts, *Water Resources Research*, 42, W09501, 2006
- +++41. Prairie, J., B. Rajagopalan, T. Fulp and E. Zagona, A modified K-NN Model for Generating Stochastic Natural Streamflows, *Journal of Hydrologic Engineering*, 11(4), 371-378, 2006
- +++40. Clark, M., A. G. Slater, A. P. Barrett, L.E. Hay, G. J. McCabe, B. Rajagopalan and G. Leavesley, Assimilation of snow covered area information into hydrologic and land-surface models, *Advances in Water Resources*, 29, 1209-1221, 2006
- +++39. Gangopadhyay, S., M. Clark, B. Rajagopalan, Statistical Downscaling Using K-Nearest Neighbors, *Water Resources Research*, 41, W02024, 1-23, 2005
- +++38. Regonda, S., M. Clark, B. Rajagopalan and J. Pitlick, Seasonal Cycle Shifts in Hydroclimatology over the Western US., *Journal of Climate*, 18, 372-384, 2005
- +++37. Prairie, J., B. Rajagopalan, T. Fulp, Statistical nonparametric model for natural salt estimation, *ASCE Journal of Environmental Engg*, 131(1), 130-138, 2005
- +++36. Regonda, S., B. Rajagopalan, U. Lall, M. Clark and Y. Moon, Local polynomial method for ensemble forecast of time series, *Nonlinear Processes in Geophysics*, Special issue on "Nonlinear Deterministic Dynamics in Hydrologic Systems: Present Activities and Future Challenges", 12, 397-406, 2005
- +++35. K. Krishna Kumar, M. Hoerling and B. Rajagopalan, Advancing Indian Monsoon Rainfall Prediction, *Geophysical Research Letters*, 32, L08704, 1-4, 2005
- +++34. Singhrattna, N., B. Rajagopalan, K. Krishna Kumar and M. Clark, Interannual and Interdecadal Variability of Thailand Summer Monsoon, *Journal of Climate*, 18, 1697-1708, 2005
- +++33. Singhrattna, N., B. Rajagopalan, M. Clark and K. Krishna Kumar, Forecasting Thailand Summer Monsoon Rainfall, *International Journal of Climatology*, 25, 649-664, 2005

- +++32. Grantz, K., B. Rajagopalan, M. Clark and E. Zagona, A Technique for incorporating large-scale climate information in basin-scale ensemble streamflow forecasts *Water Resources Research*, 41, W10410, 1-13, 2005
- +++31. Clark, M.S., S. Gangopadhyay, D. Brandon, K. Werner, L. Hay, B. Rajagopalan and D. Yates, Development and Application of a resampling procedure to generate conditioned daily weather sequences, *Water Resources Research*, 40, W04304, 2004
- +++30. Gangopadhyay, S., M. Clark, K. Werner, D. Brandon and B. Rajagopalan, Effects of Spatial and Temporal Aggregation on the Accuracy of Statistically Downscaled Precipitation Estimate in the Upper Colorado River Basin, *Journal of Hydrometeorology*, 5, 1192-1206, 2004
- +++29. Clark, M.S., S. Gangopadhyay, L. Hay, B. Rajagopalan and R. Wilby, The Schaake Shuffle: Method for Reconstructing space-time variability in forecasted precipitation and temperature fields, *Journal of Hydrometeorology*, 5, 243-262, 2004
- +++28. Yates, D., S. Gangopadhyay, B. Rajagopalan, and K. Strzepek, A nearest neighbor bootstrap technique for generating regional climate scenarios for integrated assessments, *Water Resources Research*, 2003
- +++27. Neuman, D., B. Rajagopalan and E. Zagona, A regression model for daily maximum stream temperature, *ASCE Journal of Environmental Engg*, 129, 667-674, 2003
26. Rajagopalan, B., U. Lall, and S. Zebiak, Optimal Categorical Climate Forecasts through Multiple GCM Ensemble Combination and Regularization, *Monthly Weather Review*, 130, 1792-1811, 2002
25. Tourre, Y., B. Rajagopalan, Y. Kushnir, M. Barlow and W. White, Patterns of coherence decadal time scale variability in the Pacific Ocean during the twentieth century, *Geophysical Research Letters*, 28(10), 2069-2072, 2001
24. Rajagopalan, B., E. Cook, U. Lall, B. Ray, Temporal Variability of ENSO-drought association in the South West US, *Journal of Climate*, 13, 4244-4255, 2000.
23. Rajagopalan, B., and U. Lall, A Nearest Neighbor Bootstrap Resampling Scheme for Resampling Daily Precipitation and other Weather Variables, *Water Resources Research*, 35(10), 3089-3101, 1999
22. Tourre, Y., B. Rajagopalan, and Y. Kushnir, Dominant patterns of climate variability in the Atlantic ocean region during the last 136 years, *Journal of Climate*, 12, 2285-2299, 1999
21. KrishnaKumar, K., R. Kleeman, M. A. Cane, and B. Rajagopalan, Epochal changes in Indian Monsoon - ENSO Precursors, *Geophysical Research Letters*, 26(1), 75-78, 1999
20. Phillips, J., B. Rajagopalan, M. Cane, and C. Rosenzweig, The Role of ENSO in determining climate and maize yield variability in the US cornbelt, *International Journal of Climatology*, 19, 877-888, 1999
19. Krishna Kumar, K., B. Rajagopalan, and M.A. Cane, On the weakening relationship between the monsoon and ENSO, *Science*, 284, 2156-2159, 1999***
18. Stone, L., A. Huppert, B. Rajagopalan, H. Bhasin, and Y. Loya, Mass coral reef bleaching: A recent outcome of increased El Nino activity?, *Ecology Letters*, 2(5), 325-330, 1999
17. Rajagopalan, B., U. Lall, and M. Cane, Comment on? Reply to the comments of Trenberth and Hoar?, *Bulletin of the American Meteorological Society*, 80, 2724-2726, 1999

16. Kaplan, A., M. A. Cane, Y. Kushnir, A. C. Clement, B. Blumenthal, and B. Rajagopalan, Analyses of Global Sea Surface Temperature, 1856 - 1991, *Journal of Geophysical Research*, 103, 18567-18589, 1998
15. Rajagopalan, B., M. E. Mann and U. Lall, A multivariate frequency-domain approach to long-lead climatic forecasting, *Weather and Forecasting*, 13(1), 58-74, 1998
14. Rajagopalan, B., and U. Lall, Low Frequency Variability in Western U.S. Precipitation, *Journal of Hydrology*, 210, 51-67, 1998
13. Rajagopalan, B., Y. Kushnir, Y. Tourre, Observed decadal midlatitude and tropical Atlantic climate variability, *Geophysical Research Letters*, 25(21), 3967-3970, 1998***
12. Price, C., L. Stone, A. Hupert, B. Rajagopalan, and P. Alpert, A Possible Link Between El Nino and Precipitation in Israel, *Geophysical Research Letters*, 25(21), 3963-3966, 1998***
11. Rajagopalan, B., and U. Lall, Nearest Neighbour Local Polynomial Estimation of Spatial Surfaces, Spatial Interpolation Comparison Contest, *Journal of Geographic Information and Decision Analysis*, 2(2), 48-57, 1998
10. Rajagopalan, B., U. Lall, D.G. Tarboton, and D. S. Bowles, Multivariate Nonparametric Resampling Scheme for Simulation of Daily Weather Variables, *Journal of Stochastic Hydrology and Hydraulics*, 11(1), 65-93, 1997
9. Rajagopalan, B., U. Lall, and D. G. Tarboton, Evaluation of Kernel Density Estimation Methods for Daily Precipitation Resampling, *Journal of Stochastic Hydrology and Hydraulics*, 11(6), 523-547, 1997
8. Rajagopalan, B., U. Lall, and M. A. Cane, Anomalous ENSO occurrences: an alternate view, *Journal of Climate*, 10(9), 2351-2357, 1997
7. Rajagopalan, B., U. Lall, and D. G. Tarboton, A Nonhomogeneous Markov Model for Daily Precipitation Simulation, ASCE, *Journal of Hydrologic Engineering*, 1(1), 33-40, 1996
6. Lall, U., B. Rajagopalan, and D. G. Tarboton, A Nonparametric Wet/Dry Spell Model for Resampling Daily Precipitation, *Water Resources Research*, 32(9), 2803-2823, 1996
5. Rajagopalan, B., and U. Lall, A Kernel Estimator for Discrete Distributions, *Journal of Nonparametric Statistics*, 4, 409-426, 1995
4. Rajagopalan, B., and U. Lall, Seasonality of Precipitation along a meridian in the Western U.S., *Geophysical Research Letters*, 22(9), 1081-1084, 1995***
3. Kshirsagar, M. M., B. Rajagopalan, and U. Lall, Optimal Parameter Estimation for Muskingum Routing with Ungauged Lateral Inflow, *Journal of Hydrology*, 169, 25-35, 1995
2. Moon, Y., B. Rajagopalan, and U. Lall., Estimation of Mutual Information Using Kernel Density Estimators, *Physical Review E*, 52(n3B), 2318-2321, 1995
1. Rajagopalan, B., and D. G. Tarboton, Understanding Complexity in the structure of rainfall, *Fractals*, 1(3), 606-628, 1993

BOOK CHAPTERS

- ***1. Rajagopalan, B., K. Grantz, S. Regonda, M. Clark and E. Zagona, Ensemble streamflow forecasting : Methods and Applications, in Advances in Water Science Methodologies, Ed by U. Aswathanarayana, Taylor and Francis, Netherlands, 2005***.

REVIEWED CONFERENCE PROCEEDINGS

1. B. Zachman, R. S. Summers and B. Rajagopalan, A model to predict TOC breakthrough in small and field-scale GAC adsorbers, published in the proceedings of the 124th AWWA Annual Conference and Exposition, San Fransisco, CA, June 12-16, 2005.
2. Rajagopalan, B., E. Ou, R. Corotis, D. Frangopol, Estimating Structural Reliability Under Hurricane Wind Hazard: Applications to Wood Structures, Proceedings of the 9th ASCE Specialty Conference on Probabilistic Mechanics and Structural Reliability, Albuquerque, NM, July 26-28, 2004. (Abstract published on page 75 in the book of Abstracts).
3. Neumann, D., B. Rajagopalan, E. Zagona, M. Bender, and T. Scott, An Operations Model for Temperature Management of the Truckee River, Proceeding of the *Second Federal Interagency Hydrologic Modeling Conference*, Las Vegas, NV, 2002.
4. Prairie, J., B. Rajagopalan, and T. Fulp, Long-term Salinity Prediction with Uncertainty Analysis, Proceedings of the *Second Federal Interagency Hydrologic Modeling Conference*, Las Vegas, NV, 2002.
5. Saouma, V., E. Hansen, B. Rajagopalan, Statistical and 3D Nonlinear Finite Element Analysis of Schlegeis Dam, *Proceedings of the Sixth ICOLD Benchmark Workshop on Numerical Analysis of Dams*, Salzburg, Austria, Oct 17 - 19, 2001.
6. Rajagopalan, B., U. Lall, and D. G. Tarboton, A Nonparametric Renewal Model for Modeling Daily Precipitation, published in the Proceedings of the *International Conference in Stochastic and Statistical Methods in Hydrology and Environmental Engg.*, Univ. of Waterloo, Waterloo, Canada, Time series analysis and forecasting, Ed by K. Hipel, A. I. McLeod, U.S. Panu and V.P. Singh, Kluwer, Vol. 3, 47-51, 1994
7. Satagopan, J., and B. Rajagopalan, Comparing Spatial Estimation Techniques for Precipitation Analysis, published in the Proceedings of the *International Conference in Stochastic and Statistical Methods in Hydrology and Environmental Engg.*, Univ. of Waterloo, Waterloo, Canada, Time series analysis and forecasting, Ed by K. Hipel, A. I. McLeod, U.S. Panu and V.P. Singh, Kluwer, Vol. 3, 317-330, 1994

RESEARCH REPORTS

1. Block, P., K. Strzepek and B. Rajagopalan, Intergrated Management of the Blue Nile Basin in Ethiopia - Hydropower and Irrigation Modeling, *International Food Policy Research Institute (IFPRI)*, Discussion paper 00700, May, 2007.
2. Xi, Y., B. Rajagopalan, and K. Molenaar, Quantifying construction delays due to weather, Final report of technology study submitted to Federal Highway Administration, Department of Civil, Environmental, and Architectural Engineering, University of Colorado, Boulder, Colorado, 2005.
3. Bowles, D. S., E. Bingham, U. Lall, D. G. Tarboton, E. Malek, B. Rajagopalan, T. Chowdhury, and E. Kluzek, Development of Mountain Climate Generator and Snowpack Model for Erosion Predictions in the Western United States Using WEPP. Four project reports submitted to *USDA/USFS*, 1992, 1993, 1994 and 1995.

PUBLISHED ABSTRACTS AND CONFERENCE PAPER PRESENTATIONS

INVITED Rajagopalan, B., K. Nowak, J. Prairie, B. Hardeing and M. Hoerling, A Streamflow Generation Technique Under Climate Change Using Paleo and Observational Data for Colorado River, presented at the AGU Hydrology Days Conference, Fort Collins, CO, Mar 26-28, 2008

J. Salas and B. Rajagopalan, Predictability of the Upper Colorado River Streamflows, presented at the Colorado Water Congress, Denver, Jan 23-25, 2008

T. Gan, B. Rajagopalan and R. Barry, Changes to North American Snowpacks from 1979-2004 based on the Snow Water, presented at the EGU General Assembly, Vienna, Austria, April 13-18, 2008

Zagona, E., B. Rajagopalan and T. Magee, Riverware decision support tools for planning and sustainable river development with hydropower, presented at the High-level International Forum on Water Resources and Hydropower, Oct 16-18, 2008, Beijing, China.

J. Prairie, L. Brekke, T. Pruitt, B. Rajagopalan and C. Woodhouse, Developing planning hydrologic ensembles that reflect combined paleoclimate and projected climate information sets, presented at the AGU Fall meeting, Dec 15-19, 2008, San Francisco, CA

B. Rajagopalan, K. Nowak, M. Hoerling, B. Harding, A. Ray, J. Barsugli, B. Duall, Climate, Growth and Drought Threat to Colorado River Water Supply, presented at the AGU Fall meeting, San Francisco, CA, Dec 15-19, 2008

L. Brekke, J. Prairie, T. Pruitt, B. Rajagopalan and C. Woodhouse, Comparing Planning Hydrologic Ensembles associated with Paleoclimate, Projected Climate, and blended Climate Information Sets, presented at the Fall AGU meeting, San Francisco, CA, Dec 15-19, 2008

Gan, T., B. Rajagopalan, R. Barry and A. Gobena, Changes to North American Snowpacks from 1979-2004 based on Snow Water Equivalent data of SMMR and SSM/I Passive Microwave and related Climatic factors, presented at the AGU Fall meeting, San Francisco, CA, Dec 15-19, 2008

Podestá, G.P., F. Bert, B. Rajagopalan, S. Apipattanavis, E. Weber, C. Laciana, W. Easterling, R. Katz and D. Letson, Climate and complexity in agricultural production systems of the Argentine Pampas. Intergovernmental Panel on Climate Change, Task Group on Data Scenario Support for Impact and Climate Analyses (IPCC/TGICA) Expert Meeting: Integrating analysis of regional climate change and response options. 20-22 June 2007, Nadi, Fiji.

Podestá, G.P., F. Bert, E. Weber, C. Laciana, B. Rajagopalan, and D. Letson, Adaptation to interannual and interdecadal climate variability in agricultural production systems of the Argentine Pampas. AGU Joint Assembly Meeting, Acapulco, Mexico, 22-25 May 2007. EOS Transactions of the American Geophysical Union 88(23), Joint Assembly Supplement, Abstract U34B-03.

Lee, E., T. Chase, B. Rajagopalan and R. Barry, Effects of spring land cover change on early Indian summer monsoon variability, Presented at the AGU Hydrology Days Conference, Fort Collins, CO, Mar 19-21, 2007

Salas, J. D., C. Fu and B. Rajagopalan, Long Range Streamflow Forecast for Colorado Streams, Presented at the AGU Hydrology Days Conference, Fort Collins, CO, Mar 19-21, 2007

Lee, E., T. Chase and B. Rajagopalan, Highly Improved Predictability in the Forecasting of the East Asian Summer Monsoon, Presented at the AGU Fall meeting, San Francisco, CA, (abstract published in Eos, 88(52)), Dec 10-14, 2007

Bracken, C., B. Rajagopalan and J. Prairie, A Multi-Site Streamflow Forecast Framework: Application to the Upper Colorado River Basin, Presented at the AGU Fall meeting, San Francisco, CA, (abstract published in Eos, 88(52)), Dec 10-14, 2007

Prairie, J., and Rajagopalan, B, Stochastic Streamflow Generation Incorporating Paleo-Reconstruction, Presented at the World Environmental & Water Resources Congress, Tampa, FL, May, 2007

Bert F.E., G.P. Podestá, B. Rajagopalan, and S. Apipattanavis. 2006. Uso de modelos agronómicos de simulación para evaluar un método semi-paramétrico de generación de series climáticas sintéticas, presented at the XI Reunión Argentina de Agrometeorología. Facultad de Ciencias Agrarias y Forestales, Universidad de La Plata, La Plata, Argentina, 6-8 September 2006

Block, P., B. Rajagopalan and K. Strzepek, Interannual Variability and Ensemble Forecast of Upper Blue Nile Basin Kiremt Season Precipitation, presented at the Spring Joint Assembly Meeting of American Geophysical Union, May 23-26, Baltimore, MD, 2006

Apipattanavis, S., G. Podesta, B. Rajagopalan, Semiparametric Multivariate and Multi-site Weather Generator, presented at the Hydrology Days conference of American Geophysical Union, March 20 - 22, 2006, Fort Collins, CO

Block, P., and B. Rajagopalan, Interannual Variability and Ensemble Prediction of Upper Blue Nile Basin Kiremt Season Precipitation, presented at the Hydrology Days conference of American Geophysical Union, March 20 - 22, 2006, Fort Collins, CO

Towler, E., B. Rajagopalan and S. Summers, Simulating influent water quality parameters using a nearest-neighbor technique, presented at the Hydrology Days conference of American Geophysical Union, March 20 - 22, 2006, Fort Collins, CO

Grantz, K., B. Rajagopalan, M. Clark and E. Zagona, Seasonal Shifts in the North American Monsoon, presented at the Hydrology Days conference of American Geophysical Union, March 20 - 22, 2006, Fort Collins, CO

Towler, E.L., Rajagopalan, B., Summers, R.S., and Seidel, C. 2006. Characterizing influent water quality across the United States. Proceedings of the AWWA Water Quality Technology Conference, Denver, CO, November 5-9, 2006. (Erin received the Best Student paper award at this conference for this paper)

Grantz, K., B. Rajagopalan, M. Clark and E. Zagona, "Interannual Variability of North American Monsoon: Precipitation, Streamflow and Water Management", presented at the first Climate Prediction Program for the Americas (CPPA) Pls Meeting, Tucson, AZ, Aug 14-16, 2006 (organized by NOAA).

INVITED TALK, Neumann, D., E. Zagona and B. Rajagopalan, A Statistical Model-based Decision Support System for Managing summer Stream Temperatures with Quantified Confidence Analysis, presented at the Fall Meeting of American Geophysical Union, Dec 5-9, San Francisco, CA, 2005.

INVITED TALK, Rajagopalan, B., J. Prairie and U. Lall, A Stochastic Nonparametric Technique for Space-Time Disaggregation of Streamflows, presented at the Spring Joint Assembly of American Geophysical Union, May 23-27, New Orleans, LA, 2005.

INVITED TALK, Neumann, D., E. Zagona and B. Rajagopalan, "A Statistical Model-Based Decision Support System for Managing Summer Stream Temperatures with Quantified Confidence Analysis", presented at the Fall Meeting of American Geophysical Union, Dec 5-9, San Francisco, CA, 2005.

Bert F.E., G.P. Podestá, B. Rajagopalan, and S. Apipattanavis. 2006. Uso de modelos agronómicos de simulación para evaluar un método semi-paramétrico de generación de series climáticas sintéticas, (to be presented) at the XI Reunión Argentina de Agrometeorología. Facultad de Ciencias Agrarias y Forestales, Universidad de La Plata, La Plata, Argentina, 6-8 September 2006.

Block, P., B. Rajagopalan and K. Strzepek, Interannual Variability and Ensemble Forecast of Upper Blue Nile Basin Kiremt Season Precipitation, presented at the Spring Joint Assembly Meeting of American Geophysical Union, May 23-26, Baltimore, MD, 2006.

Apipattanavis, S., G. Podesta, B. Rajagopalan, Semiparametric Multivariate and Multi-site Weather Generator, presented at the Hydrology Days conference of American Geophysical Union, March 20 - 22, 2006, Fort Collins, CO.

Block, P., and B. Rajagopalan, Interannual Variability and Ensemble Prediction of Upper Blue Nile Basin Kiremt Season Precipitation, presented at the Hydrology Days conference of American Geophysical Union, March 20 - 22, 2006, Fort Collins, CO.

Towler, E., B. Rajagopalan and S. Summers, Simulating influent water quality parameters using a nearest-neighbor technique, presented at the Hydrology Days conference of American Geophysical Union, March 20 - 22, 2006, Fort Collins, CO.

Grantz, K., B. Rajagopalan, M. Clark and E. Zagona, Seasonal Shifts in the North American Monsoon, presented at the Hydrology Days conference of American Geophysical Union, March 20 - 22, 2006, Fort Collins, CO.

Regonda, S., B. Rajagopalan, U. Lall, M. Clark and Y. Moon, Local polynomial method for Ensemble Forecast of Time Series, presented at the Fall Meeting of American Geophysical Union, Dec 5-9, San Fransisco, CA, 2005.

Hwang, Y., Martyn Clark and B. Rajagopalan "Impact of Spatial Interpolation Methods for Precipitation on Ensemble Streamflow Simulation From Watershed Models", presented at the Spring Joint Assembly of American Geophysical Union, May 23-27, New Orleans, LA, 2005.

Regonda, S., B. Rajagopalan, M. Clark and E. Zagona, "Multi-model Ensemble Forecast of Spring Seasonal Flows in the Gunnison River Basin", presented at the Spring Joint Assembly of American Geophysical Union, May 23-27, New Orleans, LA, 2005.

Grantz, K., B. Rajagopalan, M. Clark and E. Zagona, "Spatio-Temporal Trends in the North American Monsoon", presented at the Spring Joint Assembly of American Geophysical Union, May 23-27, New Orleans, LA, 2005.

Chase, T., P. Lawrence and B. Rajagopalan, Interactions between ENSO and tropical landcover change, presented at the Spring Joint Assembly of American Geophysical Union, May 23-27, New Orleans, LA, 2005.

Regonda, S., B. Rajagopalan, U. Lall, M. Clark and Y. Moon, "Local Polynomial Method for Ensemble Forecast of Time Series", presented at the Fall Meeting of American Geophysical Union, Dec 5-9, San Fransisco, CA, 2005.

B. Zachman, R. S. Summers and B. Rajagopalan, A model to predict TOC breakthrough in small and field-scale GAC adsorbers, presented at the 124th AWWA Annual Conference and Exposition, San Fransisco, CA, June 12-16, 2005.

Podestá, G., B. Rajagopalan, J. Brown, M. Skansi, L. Núñez, S. Núñez, UN GENERADOR ESTOCÁSTICO HÍBRIDO PARA ANÁLISIS DE RIESGO CLIMÁTICO, presented at the CONGREGMET IX, 9th Argentine Congress of Meteorology, Buenos Aires, Argentina, October 3-7, 2005.

Lee, E., T. Chase and B. Rajagopalan, "Relationship between East Asian Summer Monsoon Precipitation and the Heat Budgets of Surrounding Lands and Oceans", presented at the 5th International Symposium on Asian Monsoon System, 11-15 October, 2005, Yongpyong Resort, Pheongchang-gun, Gangwon-do, Republic of Korea

Rajagopalan, B., M. Clark, K. Grantz and S. Regonda, Incorporating Large-Scale Climate Information in Water Resources, presented at the HEPEX workshop, NCAR, Boulder, CO, 19-22 July, 2005.

Regonda, S., B. Rajagopalan, U. Lall, M. Clark and Y. Moon, Local Polynomial method for ensemble forecast of time series, presented at the Hydrology Days conference of American Geophysical Union, March 7 - 9, 2005, Fort Collins, CO.

Hwang, Y., Martyn Clark, B. Rajagopalan, and S. Gangopadhyay, "Spatial interpolation schemes for climate variables and applications in hydrologic modeling", International Conference on Hi-Impact Weather and Climate: Understanding, Prediction, and Socio-Economic Consequences, Seoul, KOREA, March 22-24, 2004.

Regonda, S., B. Rajagopalan, M. Clark, and J. Pitlick, "Seasonal Cycle Shifts in Hydroclimatology over the Western US", presented at the 24th, American Geophysical Union, Hydrology Days conference, Fort Collins, CO, Mar 10-12, 2004.

Gangopadhyay, S., M. Clark, B. Rajagopalan, K. Werner, and D. Brandon, "Effects of Spatial and Temporal Aggregation on the Accuracy of Downscaled Precipitation Estimates in the Upper Colorado River Basin", presented at the 84th American Meteorological Society, Annual Meeting, Seattle, WA, Jan 10-16, 2004

Hoerling, M.P., K. Krishna Kumar and B. Rajagopalan, "The fundamental role of air-sea interactions for dynamical seasonal predictions of Indian Monsoon rain", presented at the American Meteorological Society's 16th Symposium on boundary layers and turbulence and 13th conference on interactions of the sea and atmosphere, Portland, ME, Aug 8 - 13, 2004.

K. Krishna Kumar, K., M. Hoerling and B. Rajagopalan, "Dynamical prediction of the Indian summer monsoon and the role of the Indian Ocean", presented at the 6th CLIVAR Asian-Australian Monsoon and 1st CLIVAR/Indian Ocean Climate meeting, Feb 18-20, Pune, India, 2004. (this is sponsored by International CLIVAR, which is part of WMO).

Grantz, K., B. Rajagopalan, M. Clark and E. Zagona, "Spatio-Temporal Variability in Summertime Precipitation over the Southwestern United States", presented at the GEWEX Americas Prediction Project (GAPP) 2004 Pls meeting, Boulder, Aug 30-31, 2004. (this conference was sponsored by NOAA).

Regonda, S., B. Rajagopalan and K. Strzepek, Storage analysis using stochastic nonparametric streamflow simulation: Case study of the proposed Seaman Reservoir expansion in Northern Colorado, presented at the *American Geophysical Union, Hydrology Days, Fort Collins, CO*, Mar 31 - Apr 2, 2003.

Hwang, Y. B. Rajagopalan, M. Clark and S. Gangopadhyay, Inter-comparison of spatial estimation schemes for precipitation and temperature in hydrologic modeling, presented at the *American Geophysical Union, Hydrology Days, Fort Collins, CO*, Mar 31 - Apr 2, 2003

Apipattanavis, S., B. Rajagopalan and U. Lall, Local Regression Quantile Estimate for flood frequency analysis, presented at the *American Geophysical Union, Hydrology Days, Fort Collins, CO*, Mar 31 - Apr 2, 2003

Singhrattna, N., B. Rajagopalan, Interdecadal variability of Thailand summer Monsoon, *IUGG General Assembly, Sopporo, Japan*, (June 30 - July 11), 2003

Robertson, A., U. Lall, S. Zebiak, B. Rajagopalan, Categorical Climate Forecasts through Optimal Combination of Multiple GCM Ensembles, *ASCE, World Water and Environmental Resources Congress, Philadelphia, PA*, June 21-26, 2003

Rajagopalan, B., K. Grantz, N. Singhrattna, K. Krishna Kumar, E. Zagona and M. Clark, Stochastic Nonparametric Tools for Hydroclimate Decision Making Under Uncertainty, presented at the International Conference on Water and Environment, Dec 15-18, Bhopal, India, 2003.

Prairie, J., B. Rajagopalan, T. Fulp and E. Zagona "Modeling framework for long-term salinity with uncertainty in the Colorado river", presented at the *American Geophysical Union, Hydrology Days, Fort Collins, CO*, April 1 -4, 2002

Neumann, D., B. Rajagopalan, E. Zagona, M. Bender, T. Scott, An operations model for temperature Management of the Truckee River, presented at the *Second Federal Interagency Hydrologic Modeling Conference, Las Vegas, NV*, Jul 28 - Aug 1, 2002

Prairie, J., B. Rajagopalan, T. Fulp, and E. Zagona, Long-Term Salinity Prediction with uncertainty, presented at the *Second Federal Interagency Hydrologic Modeling Conference, Las Vegas, NV*, Jul 28 - Aug 1, 2002

Prairie, J., B. Rajagopalan, T. Fulp and E. Zagona, Comparison of natural streamflows generated from Parametric and nonparametric stochastic model, presented at the *American Geophysical Union, Hydrology Days, Fort Collins, CO*, Apr.1-3, 2001

Price, C., P. Alpert, Y. Carmona, L. Stone, A. Huppert and B. Rajagopalan, The connection between ENSO and precipitation in Israel, presented at *IUGG Meeting, Brimingham, UK*, July, 1999.

Lall, U., S. Jain, C. Baldwin and B. Rajagopalan, Changing flood frequency : connections to low frequency climate state, invited talk presented *ASCE International water resources engineering conference, Seattle*, August, 1999.

Krishna Kumar, K., B. Rajagopalan and M.A. Cane, Weakening monsoon-ENSO relationship - is global warming a player?, presented at *EGS : XXIV General Assembly, Hague, Netherlands*, April, 1999.

Zuk, M., B. Rajagopalan, Y. Kushnir, Interannual variability of temperature spells in northeastern U.S. 1951-1998, presented at *Eighth Conference on Climate Variations, Denver, CO*, Sep., 1999.

Rajagopalan, B., Y. Kushnir, J. Miller, and U. Lall, Relationships between climate and named storm frequency in the Atlantic basin, presented at *NOAA Climate Diagnostics Workshop, Tucson, AZ*, Nov., 1999

Mann, M., S. Jain, U. Lall and B. Rajagopalan, Low frequency variability of Midwestern U.S. Precipitation: Diagnosing ENSO and Anthropogenic Influences, presented at *American Geophysical Union Spring Meeting, Boston, MA*, May 26-29, 1998.

Lall, U., B. Rajagopalan and M. Cane, Nonstationarity in ENSO and its Teleconnections: An Exploratory Analysis and a Nonlinear Dynamics Perspective, presented at *PACLIM meeting, Los Angeles, April*, 1998

Lall, U., S. Jain, M. Mann, and B. Rajagopalan, The changing seasons ? trends over the last century, presented at the *7th Conference on Climate Variations*, Long Beach, CA, Feb. 2-7, 1997

Tourre, Y., B. Rajagopalan, and Y. Kushnir, Dominant cycles and patterns of climate variability in the Atlantic ocean region during the last 136 years, presented at the IAMAS - IAPSO symposia, Melbourne, Australia, Jul. 1-9, 1997.

Cane, M.A., B. Rajagopalan, Can Proxy data tell us about ENSO dynamics, presented at *American Geophysical Union Fall Meeting*, San Francisco, CA, Dec 8-12, 1997 (Abstract published in *EOS, Transactions, American Geophysical Union*, Vol. 78, No. 46, pg. F35, 1997)

Kushnir, Y., B. Rajagopalan, and Y. Tourre, Decadal variations in Atlantic SST and sea level pressure, presented at *American Geophysical Union Fall Meeting*, San Francisco, CA, Dec 8-12, 1997 (Abstract published in *EOS, Transactions, American Geophysical Union*, Vol. 78, No. 46, pg. F387, 1997)

Rajagopalan. B., Y. Kushnir, and Y. Tourre, Temporal variability of North Atlantic Oscillation and Tropical Atlantic Dipole, presented at *American Geophysical Union Fall Meeting*, San Francisco, CA, Dec 8-12, 1997 (Abstract published in *EOS, Transactions, American Geophysical Union*, Vol. 78, No. 46, pg. F387, 1997).

Rajagopalan, B., and U. Lall, A Nearest Neighbor Bootstrap for Resampling Daily Precipitation and other Weather Variables, presented at *13th Conference on Probability & Statistics in the Atmospheric Sciences*, San Francisco, CA, Feb. 21-23, 1996

Moon, Y., U. Lall, B. Rajagopalan, and M. Mann, Forecasting Hydroclimatic Variables Using a Nonparametric, Nonlinear Time Series Model, presented at *AMS, 13th Conference on Probability & Statistics in the Atmospheric Sciences*, San Francisco, CA, Feb. 21-23, 1996

Mann, M., B. Rajagopalan, Y. Moon, and U. Lall, Multivariate Forecasting of Hydroclimatic Variables using Frequency and Time Domain Analysis, presented at *13th Conference on Probability & Statistics in the Atmospheric Sciences*, San Francisco, CA, Feb. 21-23, 1996

Rajagopalan, B., and U. Lall, Changing Seasons: Trends in precipitation occurrence in western United States, presented at the *European Geophysical Society, XXI General Assembly*, Hague, Netherlands, 1996.

Lall, U, Y. Moon, B. Rajagopalan, and M. Mann, Forecasting nonlinear time series: locally weighted polynomials with local parameter choice and local error estimate, presented at the *European Geophysical Society, XXI General Assembly*, Hague, Netherlands, 1996

Rajagopalan, B., E. Cook, and M.A. Cane, Joint Spatiotemporal modes of US PDSI and Pacific SST variability, presented at *American Geophysical Union Fall Meeting*, San Francisco, CA, Dec 15-19, 1996 (Abstract published in *EOS, Transactions, American Geophysical Union*, Vol. 77, No. 46, pg. F126, 1996)

Baldwin, C., U. Lall, and B. Rajagopalan, Nonlinear ensemble predictions of hydroclimatic variables: A nonparametric approach, presented at *American Geophysical Union Fall Meeting*, San Francisco, CA, Dec 15-19, 1996 (Abstract published in *EOS, Transactions, American Geophysical Union*, Vol. 77, No. 46, pg. F45, 1996)

Bradley, A. A., U. Lall, K. Potter, and B. Rajagopalan, Interdecadal climate variability and its possible impact on flood frequency in California, presented at *American Geophysical Union Fall Meeting*, San

Francisco, CA, Dec. 15-19, 1996 (Abstract published in EOS, *Transactions, American Geophysical Union*, Vol. 77, No. 46, pg. F270, 1996).

Moon, Y., B. Rajagopalan, and U. Lall, Mutual information vs. Correlation - Identifying Nonlinear Dependence in Hydrologic Time Series, presented at *European Geophysical Society, XX General Assembly*, Hamburg, Germany, April 3-7, 1995

Rajagopalan, B., U. Lall, D.T. Jensen, G. E. Bingham, and D. S. Bowles, Spatial Interpolation of Mountain Temperature, presented at *European Geophysical Society, XX General Assembly*, Hamburg, Germany, April 3-7, 1995

Rajagopalan, B., U. Lall, and D. G. Tarboton, A Nonhomogeneous Markov Model for Daily Precipitation Simulation, presented at *European Geophysical Society, XX General Assembly*, Hamburg, Germany, April 3-7, 1995

Rajagopalan, B., U. Lall, and D.S. Bowles, El Nino signatures in rainfall seen through nonparametric estimation. presented at American Geophysical Union Spring Meeting, Baltimore, MD, May 23 -27, 1994 (Abstract published in EOS, *Transactions, American Geophysical Union*, Vol. 75, No. 16, pg. 160, 1994)

Rajagopalan, B., U. Lall, D.G. Tarboton, and D. S. Bowles, Multivariate Nonparametric Simulation of Weather Variables, presented at *European Geophysical Society, XIX General Assembly*, Grenoble, France, April 25-29, 1994.

Rajagopalan, B., and D. G. Tarboton, Understanding Complexity in the structure of rainfall, presented at the conference on *Fractals in Natural Sciences*, Budapest, Hungary, Aug. 30 - Sep. 2, 1993

Limaye, A. S., B. Rajagopalan, and A. K. Sikka, Use of Watershed Model and Nonparametric Density Estimators for Drought Characterization, presented at 29th Annual Conference, AWRA, Tucson, AZ, Aug. 29-02 Sep. 1993

Rajagopalan, B., A. K. Sikka, D. S. Bowles, and A. S. Limaye, Spatial estimation techniques for Precipitation analysis - application to a region in India, presented at *International Conference on Hydrology and WaterResources*, New Delhi, India, Dec. 20-22, 1993

Rajagopalan, B., A. K. Sikka, and D. S. Bowles, Drought Analysis Using Nonparametric Wet/Dry Spell Model, presented at American Geophysical Union Fall Meeting, Dec 7-11, 1992 (Abstract published in EOS, *Transactions, American Geophysical Union*, Vol. 73, No. 43, pg. 243, 1992)

Rajagopalan, B., U. Lall, and D. S. Bowles, Probabilistic Structure of Mountain Precipitation, presented at *American Geophysical Union Fall Meeting*, Dec 9-13, 1991 (Abstract published in EOS, *Transactions, American Geophysical Union*, Vol. 72, No. 44, pg. 181, 1991).

INVITED TALKS/LECTURES by Topics

On “*Stochastic Methods for Hydroclimate Predictions and Downscaling*”

Denver Water Utility, Denver CO, Feb 1, 2008
Rosenstiel School of Marine Sciences, *University of Miami*, May, 2003
South Florida Water Management District, West Palm Beach, May, 2003
International Research Institute, *Columbia University*, New York, Aug., 2003.

On “*Nonparametric Functional Estimation and Forecasting Techniques - Applications to Geophysical Time Series*”

NCAR, IMAGE seminar, Boulder, CO, October 29, 2008
Dept. of Civil Engineering, *Colorado State University*, Fort Collins, CO, Mar., 2001
Indian Institute of Technology, Madras, Feb., 2001.
Dept. of Applied Mathematics, *University of Colorado*, Boulder, CO, Sep., 2000
Dept. of Decision Sciences, *RPI*, Albany, NY, Jan., 1999.
Great Lakes Environmental Research Laboratory of NOAA, Ann Arbor, MI, Jul., 1998.
Max-Planck Institute for Complex Physical Systems, Dresden, Germany, Feb., 1998.
Dept. of Environmental Sciences, *Rutgers University*, New Brunswick, Apr., 1997.
Dept. of Civil Engg., *Univ. of Florida*, Gainesville, FL, Apr., 1997
Dept. of Statistics and Applied Mathematics, *New Jersey Institute of Technology*, Newark, NJ, Sep., 1996.
Dept. of Statistics, *Univ. of Connecticut*, Storrs, CT, Sep., 1995
Dept. of Geology and Geophysics, *Yale University*, New Haven, CT, Nov., 1995
Dept. of Statistics and OR, *New York University*, New York, Nov., 1995

On “*Atlantic Climate Variability*”

Max-Planck Institute for Meteorology, Hamburg, Germany, Feb., 1998.

On “*Indian Monsoon Variability*”

Global Analytics, Chennai, India, July 17, 2008.
CIRES-CSTP seminar, Boulder, CO, Feb 18, 2008
Institute of Mathematical Sciences, Chennai, India, Jan 15, 2004
Climate Diagnostics Center, *NOAA*, Boulder, CO, Apr., 2000
PAOS, *University of Colorado*, Boulder, CO, Sep., 2000
Symposium on Indo-Pacific Climate, *FRSGC/NASDA/JAMSTEC*, Tokyo, Japan, Mar., 2000.

On “*Long term Salinity Modeling in the Colorado River Basin*”

Dept. of Environmental Engineering, *Colorado School of Mines*, Golden, CO, Mar., 2002
ESI Group, *NCAR*, Boulder, CO, Jun., 2002
Climate Diagnostics Center, *NOAA*, Boulder, CO, Oct., 2002

On “*Bayesian approach to optimal combination of multi-model ensemble for categorical forecast*”

National Center for Environmental Prediction, *NOAA*, Camp Springs, MD, Jul., 2002.
Climate Diagnostics Center, *NOAA*, Boulder, CO, May, 2001

On “*Incorporating Climate Information in Water Resources Management and Decision Making*”

Indian Institute of Tropical Meteorology, Pune, India, July 6-7th, 2006
J.N. Technological University, Hyderabad, India, July 3-4, 2006.
National Center for Atmospheric Research, Boulder, CO, May 25th, 2004

On “*South West US Monsoon Variability*”

Climate Diagnostics Center, *NOAA*, Boulder, CO, Oct, 2005

Invited for participation in the workshop on *Nonlinear Time Series Analysis, at Max-Planck Institute for Complex Physical Systems, Dresden, Germany, Feb. 1998.*

On “Colorado River Climate Management under Climate change and Climate variability”

NCAR ISSE colloquium, Boulder, CO, Nov 3, 2008

NIDIS, workshop, Boulder, CO, Oct 1-2, 2008

TEACHING, EDUCATION AND GRADUATE TRAINING

PRINCIPAL ADVISOR TO GRADUATE STUDENTS

Ph.D

Yeonsang Hwang, Ph.D.

Graduated in May 2005

Dissertation: “Watershed models for seasonal and subseasonal streamflow forecasts using GCM downscaled precipitation and temperature”

Co-Advisor: Dr. Martyn Clark

Currently working as a Postdoctoral Research Scientist at University of South Carolina

Somkiat Apipattanavis

defended his thesis in May, 2006

Dissertation: “Interannual and intra-annual hydroclimate variability in the Western US: Tools for understanding and prediction”

Researcher, Research and Development Office, *Royal Irrigation Department*, Thailand

Paul Block

Graduated in July 2006

Dissertation “Integrated Management of the Blue Nile Basin in Ethiopia: Precipitation Forecast, Hydropower, and Irrigation Modeling”

Co-Advisor: Dr. Kenneth Strzepek

Currently working as Adjunct Faculty at University of Colorado, Boulder, CO

Satish Regonda

Graduated in October, 2006

Dissertation: “Intra-annual to Inter-decadal variability in the Upper Colorado Hydroclimatology: Diagnosis, Forecasting and implications for Water Resources Management”

Co-Advisor: Dr. Edith Zagona and Dr. Martyn Clark

Received the J. Ernest Flack Graduate Fellowship - University of Colorado at Boulder, September, 2006

Secured NRC Postdoctoral Fellowship at NOAA in Washington DC from October 2006

Obtained the competitive AGU student travel grant to present his research results at the Spring AGU meeting in New Orleans, LA, May 2005

Katrina Grantz

Graduated in November 2006

Dissertation: “The North American Monsoon: Diagnosis, Forecasting and Implications for Water Resources Management in the Southwestern US”

James Prairie

Graduated in November 2006

Dissertation: “Stochastic Nonparametric Framework for Basin Wide Streamflow and Salinity Modeling: Application for the Colorado River Basin”

M.S (THESIS)

David Neumann, M.S.

Graduated in December, 2001

Thesis: “An Operations Model for Temperature Management of the Truckee River above Reno, Nevada”

Co-Advisor: Dr. Edith Zagona

Received the College award for best undergraduate researcher, December, 2001

Currently working as Professional Research Assistant with CADSWES/CU, Boulder, CO

James Prairie, M.S.

Graduated in April, 2002

Thesis: “Long-term Salinity Prediction with Uncertainty Analysis: Application for Colorado River above Glenwood Springs, CO”

Co-Advisors: Drs. Edith Zagona and Terry Fulp

Received the J. Ernest Flack Graduate Fellowship - University of Colorado at Boulder, May 2002

And The Star Award - U.S. Bureau of Reclamation, August 2001

Currently employed with U.S. Bureau of Reclamation and working towards a Ph.D under my advising

Katrina Grantz, M.S.

Graduated in December, 2003

Thesis: “Incorporating climate information in Water Resources Decision Making : A case study of the Truckee-Carson System”

Co-Advisor: Dr. Edith Zagona

Received the J. Ernest Flack Graduate Fellowship - University of Colorado at Boulder, December, 2003

Currently working towards a Ph.D under my advising

Nkrintra Singhrattna, M.S.

M.S., Graduated in December, 2003

Thesis: “Interdecadal Variability of Thailand Summer Monsoon”

Royal Thailand Fellowship Holder

Obtained student travel support to present her research results at IUGG General Assembly, Sopporo, Japan, July 2003

Currently working as Engineer in the Thailand Public Works Department, Bangkok, Thailand

Adam Hobson, M.S.

Graduated in December, 2004

Thesis: “Use of Stochastic Weather generator in a Watershed model for Streamflow Simulation”

Co-Advisor: Dr. George Leavesley, USGS, Denver

Currently employed as Hydrologist with Golder Associates Inc

John D. Emmert, M.S.

Graduated in May 2005

Thesis: “Network Stochastic Programming for Valuing Reservoir Storage”

Co-Advisor: Dr. Edith Zagona

Currently employed as “”

Erin Towler

Graduated in November, 2006

Thesis Topic: “Modeling Uncertainty in Water Quality Variables for Simultaneous Compliance Strategies”

Co-Advisor: Dr. Scott Summers

Kenneth Nowak

Graduated in July, 2008

Thesis Topic: “Stochastic Flow Sequence Generation and Aspinall Unit Operations”

M.S (Report)

Akimasa Kuroda, M.S.

Graduated in May 2004

Report: “Temporal Variability and Prediction of Subseasonal Indian Monsoon Rainfall”

Co-Advising

Eungul Lee

Ph.D Candidate in Geography

Graduated in December 2007

Dissertation Topic: “Impacts of land cover changes in the surrounding lands on the East Asian summer monsoon”

Edward Ou

Ph.D Candidate in Structural Engineering

Co-advised with Prof. Frangopol and Corotis 2003-2004

CURRENT STUDENTS

PhD *Erin Towler, James McCreight, Kenneth Nowak, Jason Caldwell and Chongjin Fu (CUS, co-advising)*

MS *Jean Marc-Mayotte*

PRINCIPAL ADVISOR TO UNDERGRADUATE STUDENTS FOR RESEARCH EXPERIENCE

Melissa Merril Summer 2008

NSF Research Experience for Undergraduates Program (REU), University of Colorado, Boulder

Research Topic: “Forecasting of Indian Monsoon for Agricultural Decision Making”

Cameron Bracken Summer 2007

NSF Research Experience for Undergraduates Program (REU), University of Colorado, Boulder

Research Topic: “Seasonal Forecast of Streamflows in the Colorado River Basin”

Laura Condon Summer 2006

NSF Research Experience for Undergraduates Program (REU), University of Colorado, Boulder

Research Topic: “Hydroclimate Variability in the S. Platte Basin”

Noah Fox Summer 2003

NSF Research Experience for Undergraduates Program (REU), University of Colorado, Boulder, (Jointly supervised with Prof. Kenneth Strzepek)

Research Topic: “The future of the World’s Food”

Arun Wahi Summer 2002

NSF, REU Program, University of Colorado, Boulder

Research Topic: “Spatio-temporal variability of summer season precipitation and temperatures over Southwestern US”

Marie Shrieber Summer 2000

NSF, REU Program, Columbia University, New York

Research Topic: “Drought variability over the US”

Sarah Rudd Summer 1999

NSF, REU Program, Columbia University, New York, (Jointly supervised with Dr. Yochanan Kushnir)

Research Topic: “Variability of Precipitation and Temperature spells over the US”

Joseph Casola Summer 1998

NSF, REU Program, Columbia University, New York, (Jointly supervised with Dr. Yochanan Kushnir)

Research Topic: “Variability of Atlantic Hurricanes”

Miriam Zuk Summer 1998
NSF, REU Program, Columbia University, New York, (Jointly supervised with Dr. Yochanan Kushnir)
Research Topic: “Understanding variability of hot and cold spells over the Northeastern US”
In addition, Co-supervised her senior thesis on the same topic, for the Dept. of Earth and
Environmental Sciences, Columbia University, New York
SCIENTIFIC ADVISOR TO RESEARCH SCIENTISTS / POSTDOCTORAL RESEARCH ASSOCIATES

Subhrendu Gangopadhyay, 2002-2004
Research Scientist, CIRES, University of Colorado, Boulder
Topics: Nonparametric weather generators, downscaling techniques, multivariate spectral methods,
interannual climate variability.
Currently employed with Hydrosphere Consultants, Boulder

Krishna Kumar Kanikichala (Indian Institute of Tropical Meteorology, Pune, India)
Visiting Research Fellow, CIRES, University of Colorado, Boulder, Sep 2003 - Aug 2004
Topics: Monsoon variability, downscaling, hydrologic and water management in the Indian
subcontinent

Trent Biggs (International Water Management Institute, Hyderabad, India)
Visiting Scientist, CEAE, University of Colorado, Boulder, Oct 2005-May 2006
Topics: Water and Energy Balance over the Indian subcontinent.
Currently employed with INTERRA, Niwot, CO

DISSERTATION/THESIS COMMITTEE

Serving/served on 25 research advisory / examination committees for Ph.D and M.S. students from
CEAE, PAOS and Environmental Studies

EXTERNAL REVIEWER OF PH.D DISSERTATIONS

Seth Westra Fall 2007
Dissertation Topic: “Multivariate streamflow forecasting using independent component analysis”
Department of Civil Engineering
University of New South Wales, Sydney, Australia

Lochanan Prasad Devkota Fall 2004
Dissertation Topic: “Climate Variability over Nepal”
Central Department of Hydrology and Meteorology
Institute of Science and Technology
Tribhuvan University, Kathmandu, Nepal

Timothy I. Harrold Fall 2002
Dissertation Topic: “Stochastic Generation of Daily Rainfall Catchment Water Management Studies”
Department of Civil Engineering
University of New South Wales, Sydney, Australia

K. Ramasamy Fall 2000
Dissertation Topic: “A Mathematical Model to Measure Technical Efficiency in Crop Production -
Frontier Function Approach”
Department of Mathematics
Bharathiar University, Coimbatore, India

David Barg Fall 1997
Dissertation Topic: “Spatial Models for Real Estate Valuation”

Department of Statistics, Operations Research and Actuarial science
New York University, New York, NY

PRINCIPAL COURSEWORK INSTRUCTOR: EXISTING COURSES

CVEN3323 *Hydraulic Engineering*, service undergraduate course: F01, F02, F03, S04
CVEN4333/5333 *Engineering Hydrology*, required undergraduate course for Environmental
Engineering stream and required for graduates in water resources: S01, S02

PRINCIPAL COURSEWORK INSTRUCTOR: NEW COURSES DEVELOPED

CVEN5333 *Physical Hydrology*, introductory graduate course: F02, F03
CVEN5833 *Advanced Data Analysis Techniques*, upper level graduate course: F00, S02
CVEN5454 *Quantitative Methods*, introductory level graduate course: S03, S04
CVEN5454 *Statistical Methods for Water and Env. Engineers*: S05, S06
CVEN6833 *Understanding and Detecting Hydroclimate Variability*, S04
CVEN6833 *Advanced Data Analysis Techniques*, F05, F06, F07

TEACHNG WORKSHOPS

Attended the *NSF's LEAP* workshop for Junior Faculty at CU Boulder, Jan 5-7, 2005
(to improve negotiation, time management and career planning skills in young faculty, useful in
teaching and research)

Attended the Summer Institute 2004 for *New Media Pedagogy, Scholarship, and Learning
Technologies*, organized by FTEP, CU Boulder, May 10-21, 2004

Attended the *NSF's Engineering Education Scholars Program* at University of Wisconsin, Madison, July
16-20, 1996 (this program was a training on various teaching techniques for science and engineering)

SERVICE AND PROFESSIONAL ACTIVITIES

National / International

EDITORSHIPS

Associate Editor, *Climate Research*, 2008-

Associate Editor, *Geophysical Research Letters*, 2004-

Associate Editor, *Journal of Hydrologic Engineering (ASCE)*, 2004-

COMMITTEES

Member, Predictions, Predictability and Applications Panel, *U.S. Climate Variability and Predictability Research (CLIVAR)*, July 2007 -

(This is organization helps set the climate research agenda that is considered by funding agencies like NSF, NOAA, NASA etc.)

Member, Project Advisory Committee, *American Water Works Association Research Foundation*, March 2006-

Member, Scientific Committee, *International Conference on Environmental Management*, Oct 28-30, Hyderabad, India, 2005

Member, 'Best Paper Award' Committee, for *ASCE Journal of Hydrologic Engineering*, 2005

Invited (and participated) to be on the *Review Panel for NSF proposals submitted to the Structural Systems and Hazard Mitigation program* of CMS/ENG Division, April 5, 2005

Invited (and participated) to be on the *Review Panel for NSF proposals submitted to the Structural Systems and Hazard Mitigation Program* in CMS/ENG, Aug. 2003.

Member, *Precipitation Committee*, American Geophysical Union, 1996 - present.

(This committee is responsible for soliciting and deciding special sessions at the AGU meetings)

Invited to participate in the NOAA Intra-Seasonal to Interannual Prediction Program Workshop, Maryland, August, 2003

(to develop research priorities and program evaluation metrics for long term planning and budgeting)

CONFERENCE AND CONFERENCE SESSION ORGANIZATION

Conceptualized, Proposed and Organized the *Indo-US Workshop on Integrating Climate and Weather Information in Water Management*, July 5-7, 2006, Pune, India. (This workshop was sponsored by the Indo-US Science and Technology Forum)

Organized and chaired an oral and poster special session *North American Summer Monsoon: Understanding Its Interannual and Intra-annual Variability and Implications to Water Resources Management*, at the Spring Joint Assembly, American Geophysical Union Meeting, May 23-27, 2005.

Organized and chaired an oral and poster special session *Ensemble Forecasts for Weather and Seasonal Climate*, at the Spring Joint Assembly, American Geophysical Union Meeting, May 23-27, 2005.

Organized and chaired an oral and poster special session, “*Incorporating climate variability information in water resources decision making*”, at the American Geophysical Union Meeting, San Francisco, Dec 2002.

Organized and chaired an oral and poster special session, *Low Frequency Climate Variability Signatures on Regional Hydrometeorologic Variables - Implications to Hydrologic Forecasting and Planning*, at the American Geophysical Union Meeting, Boston, May 1998

REVIEWER - Journal Papers

AGU, Water Resources Research; ASCE Journal of Hydrologic Engineering; ASCE Journal of Water Resources Planning and Management; AGU, Geophysical Research Letters; AGU, Journal of Geophysical Research; AMS, Journal of Climate; AMS, Journal of Hydrometeorology; AMS, Monthly Weather Review; AMS, Bulletin of American Meteorological Society; AGU Monographs; Climate Dynamics; Journal of Hydrology; Advances in Water Resources; IEEE; Journal of Agriculture and Forest Meteorology; International Journal of Climatology; Quarterly Journal of Royal Meteorological Society; Emerging Infectious Diseases; Tellus; Nature; Science

REVIEWER - GRANT PROPOSALS

National Science Foundation: Hydrologic Sciences program, Climate dynamics program, Structural Systems and Hazard Mitigation program; *National Oceanic and Atmospheric Administration*: Office of Global Programs; *National Aeronautic and Space Agency*: Hydrologic Sciences Program; *United States Bureau of Reclamation*: Science and Technology Program

SERVICE AT THE UNIVERSITY OF COLORADO

CO-OPERATIVE INSTITUTE FOR RESEARCH IN ENVIRONMENTAL SCIENCES (CIRES)

Member, Executive Committee: Spring 2006-

Member, Promotion Committee of Dr. Xinzhao Chu (to Assoc. Prof. without tenure) Fall 2006-

Member, Graduate Student Fellowship Committee: Fall 2004 - Spring 2006

Chair, Graduate Student Fellowship Committee: Fall 2005- Spring 2006

(This committee reviews applications for graduate student fellowships and makes recommendations to the council of Fellows)

Visiting Fellows Committee: Fall 2002-2004

(This committee reviews applications for visiting research fellowships and makes recommendation of potential candidates to the council of Fellows)

Served on two faculty search committees during 2006-2007

DEPT. OF CIVIL, ENVIRONMENTAL AND ARCHITECTURAL ENGINEERING

Operations Committee: Fall 2006-

Curriculum Committee: Fall 2001 - Spring 2006

(This committee is responsible for curriculum evaluation, suggest and co-ordinate changes, respond to ABET comments)

Faculty Meeting Secretary: Spring 2001, Fall 2001, Spring 2002

Served on two faculty search committees during 2003-2004 and 2006-2007