

# Sanjiv Kumar

NRC Research Associate  
NOAA/ESRL/PSD, Boulder CO

## Work Address

National Oceanic and Atmospheric Administration (NOAA)  
Earth System Research Laboratory (ESRL)  
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## Research Interests

Hydroclimatology, Hydrological processes in climate models, effects of climate change and land use change on water resources, land-atmosphere interactions and feedback, watershed modeling, and water sustainability

## Research Skills

Global climate model, climate analysis, land surface modeling using community land model (CLM), watershed modeling using soil and water assessment tool (SWAT), Geographic Information System (GIS), nonparametric trends and long-term persistence analysis, NCAR Command Language (NCL), parallel computing using matlab, high-performance computing for climate model simulation on NCAR Yellowstone machines.

## Education

**Doctor of Philosophy**, Hydroclimatology, School of Civil Engineering, Purdue University, West Lafayette, IN USA (2011). Dissertation Title: Land use land cover change and atmospheric feedback: impact on regional water resources. Supervisor: Dr. Venkatesh Merwade.

**Master of Science**, Civil Engineering, Purdue University, West Lafayette, IN USA (2008). Thesis Title: Studying the effect of spatial scaling on hydrologic model calibration using Soil and Water Assessment Tool (SWAT). Supervisor: Dr. Venkatesh Merwade

**Bachelor of Technology**, Civil Engineering, Indian Institute of Technology, Banaras Hindu University, Varanasi, India (2001)

## Current Employment

**NRC Research Associate**, NOAA Boulder CO (08/2015 to present)

## Past Employments

**Research Associate**, Pacific Climate Impacts Consortium, University of Victoria, BC Canada (05/2014 to 07/2015)

**Affiliate Research Faculty**, College of Science, George Mason University, Fairfax, VA USA (06/2013 to 04/2014).

**Visiting Scientist**, National Center for Atmospheric Research, Boulder, CO USA (07/2012 to 04/2014).

**Post-doctoral Research Scientist**, Center for Ocean-Land-Atmosphere Studies, Fairfax, VA USA (05/2011 to 04/2014)

**Graduate Research Assistant**, Department of Civil Engineering, Purdue University, West Lafayette, IN USA (01/2007 to 04/2011)

**Engineer**, Bharat Heavy Electricals Limited, Bangalore, India (09/2002 to 07/ 2006)

**Engineer Trainee**, Bharat Heavy Electricals Limited, Bangalore, India (09/2001 to 08/2002)

### Research Productivity

**Peer Reviewed Journal Publications:** 25 (published/accepted) + 2 (in review or revision)  
Total Citations: 592, h-index: 12, i-10 index: 14 (source: Google Citations).

**Technical Reports:** 3

**Conference Proceedings/Presentations/Posters:** 37

### Current Research Grant

**National Academies of Sciences**, Washington DC: Understanding the uncertainties and predictability of the coupled climate-hydrologic system on sub-seasonal to multi-year time scales. NRC post-doctoral award to Sanjiv Kumar, 138K, 08/2015 to 07/2017

**Strategic Environmental Research and Development Program (SERDP)**, Developing an experimental predictive framework for climate regime shifts and their impacts within a 2-20 year outlook window. PI: Michael Alexander (NOAA/ESRL/PSD), 200K that include SK's contribution: 37.5K. Funded, project starts in January 2017.

### Completed Research Grant

**National Science Foundation RAPID grant:** Initial assessment of IPCC AR5 multi-model ensembles for hydroclimatic features at global and Regional scales. Co PIs: Venkatesh Merwade and Dev Niyogi, Investigator: Sanjiv Kumar. AGS 1128164, \$30K. June 2011-May 2013.

### Research Experience

**Soil moisture predictability (2015 to present):** Research goal is to quantify uncertainties and predictability of soil moisture in a coupled climate-hydrological system.

**Detection and Attribution of Hydrologic Change at High Latitudes Basins (2014 to 2015):** This research deals with the analysis and modeling of observed hydrologic changes and distinguishing it from the natural climate variability using statistical techniques.

**CFSv2 re-forecasts evaluations (2013 to 2014):** Seasonal to inter-annual forecasts evaluations from user's perspective, i.e. what is the best possible information available in the forecast.

**CMIP5 model evaluations (2011 to present):** Temperature and precipitation trends and long-term persistence evaluations and regional climate uncertainties, specifically the warming hole in the eastern United States.

**Land-atmosphere interactions and climate extremes (2012 to present):** Future water resource availability and roles of land-atmosphere interactions in changing climate.

**Intra-Seasonal to Inter-Annual (ISI) climate predictability Experiments** (2011 to 2014): Role of land surface in ISI predictability in a changing climate.

**Analysis of Indiana Department of Transport Hydraulic Policy** (2010 to 2011): Review of Indiana's culvert hydrologic design guidelines with those of neighboring states. Cost-benefit analysis for suggested policy change – relaxation in backwater limit.

**Unit Hydrograph Parameters for Indiana Watersheds** (2010 to 2010): Preparation of high-resolution unit hydrograph parameters using topographic, soil, and vegetation data.

**Cyber-Infrastructure for End-to-End Environmental Exploration** (c4e4, 2007 to 2009): Science supports and inputs for Cyber-infrastructure development of computationally intensive water quantity and water quality modeling, e.g. calibration of Soil Water and Assessment Tools

### Teaching and Mentoring Experience

**CLM Tutorial**, training to students and researchers for land/climate data analysis using NCL, Sept. 12 to 16, 2016 at NCAR Boulder, CO.

**CLM Tutorial**, training to students and researchers for land/climate data analysis using NCL, February 18 to 21, 2014 at NCAR Boulder, CO.

**NCL training** to students and researchers during NCL workshop at NCAR, Boulder, CO, June 11 to 13, 2013.

**Teaching Assistant** for Engineering Hydraulics course (CE 340) in School of Civil Engineering, Purdue University, West Lafayette, IN USA (Fall 2008).

**Instructor** for Undergraduate Hydraulics Laboratory course (CE 343) in School of Civil Engineering, Purdue University, West Lafayette, IN USA (Fall 2008).

**Graduate Mentor** for two undergraduate students in Summer Undergraduate Research Fellowship program (SURF), 2007, Purdue University, West Lafayette, IN USA (Summer 2007).

### Honors/Awards

**Editor's Award of Advances in Atmospheric Sciences** (2015): For insightful and thorough reviews of a manuscript through several rounds of revision.

**A COLA Performance Award** (2012): Awarded for his excellent scientific, publishing, and community service accomplishments during year 2012.

**Outstanding Presentation Award**, Future Leaders of Research Event, University of Colorado Boulder (2012): One of the three awardees out of 13 post-doctoral presenters.

**A Multi-Institutional Post-doctoral Fellowship in Earth-System Modeling** supported by National Science Foundation and Department of Energy (2011 to 2013): One of the two awardees for this prestigious fellowship.

**Civil Engineering Outstanding Dissertation Award**, Purdue University (2011): Every year Purdue Civil Engineering School selects the best dissertation based on faculty recommendation.

**American Geophysical Union Outstanding Student Paper Awards**, Hydrology Section (Fall 2010, Spring 2009, and Fall 2008): Awarded to top 3-5% student presenters in each section/focus group.

**Fellowship from North East Consortium for Hydrologic Synthesis** (2008): One of the ten awardees to study hydrologic landscape of Northeastern United States during the colonial

period (1600 to 1800). Six weeks of intensive research activity was organized at MIT Boston.

**First prize in Student Poster Competition**, Tera-Grid Conference (2008): Selected out of graduate student presenters at the conference.

**Best Engineer Trainee Award**, Bharat Heavy Electricals Limited, Bangalore, India (2002): One of three awardees out of 40 newly inducted engineers.

### Reviewer for Following Professional Journals

Nature, Geophysical Research Letters, Journal of Climate, Journal of Geophysical Research (Atmosphere), Climate Dynamics, International Journal of Climatology, Advances in Atmospheric Sciences, Theoretical and Applied Climatology, Geoscientific Model Development, Climate Research, Hydrological Science Journal, Water Resources Research, Hydrology and Earth System Sciences.

Reviewer for IPCC-AR5 WGII First and Second Order Draft

### Synergetic Activity

**Convener for AGU Fall meeting 2016 GEC session:** Quantitative Methods for Addressing Model Uncertainties in Climate and Hydrology Projections and Prioritizing Measurement Needs

**Primary convener for AGU Fall meeting 2015 GEC session:** Quantifying model uncertainties and robustness in climate projections for hydrological applications: Perspectives from climate and hydrologic scientists

### Collaborators

Richard Allan (University of Reading, UK), Paul Dirmeyer (COLA/GMU), Jonghun Kam (NOAA-GFDL), Jim Kinter (COLA/GMU), David Lawrence (NCAR), Min-Hui Lo (National Taiwan University), Venkatesh Merwade (Purdue), Dave Niyogi (Purdue), Zaito Pan (St. Louis University), Justin Sheffield (Princeton).

### Professional Organization Membership

**Member of American Meteorological Society** (2016 to present)

**Member of American Geophysical Union** (2007 to present)

**Member of NOAA CMIP5 Task Force** (2012 to 2014)

**Member of Environmental and Water Resources Institute** (2012 to 2013).

### Industry Experience

**Design and construction of Five Solar Photovoltaic Power Plants** in West Bengal, India (2003 to 2006): Civil design and construction of the power plants, supervision of construction jobs at remote islands (Sundervan Islands), interaction with the customer on day to day basis.

**Construction supervision of 300 KLD Waste Water Treatment Plants** at Bharat Heavy Electricals Limited, Bangalore, India (2001 to 202): Site supervision.

**Factory Services and Maintenance** at Bharat Heavy Electricals Limited, Bangalore, India (2001 to 2003): Supervision of regular factory maintenance activities.

*Hobby*

Jogging/Running, Yoga, Exploring the surrounding environment, Cooking simple food.

**Refereed Publications****2016**

1. Hsu, H., M.-H. Lo, B. P. Guillod, D. G. Miralles, and **S. Kumar** (2016). Relation between precipitation location and antecedent/subsequent soil moisture spatial patterns, *J. Geophys. Res. Atmos.*, (submitted).
2. Dewes, C. F., I. Rangwala, J. Barsugli, M. Hobbins, and **S. Kumar** (2016), Drought risk assessment under climate change is sensitive to methodological choices for the estimation of evaporative demand, *PLOS ONE*, (under review).
3. Pan, Z., S. Liu, and **S. Kumar**, North Pacific SST forcing on the central US “warming hole” as simulated in CMIP5 coupled historical and uncoupled AMIP experiments, *Atmosphere-Ocean*, (accepted).
4. Lan, C.-W., M.-H. Lo, C. Chou, and **S. Kumar** (2016), Terrestrial water flux responses to global warming in tropical rainforest areas, *Earth's Future*, 4, 210–224, doi:10.1002/2015EF000350.
5. **Kumar, S.**, J. L. Kinter III, Z. Pan, and J. Sheffield (2016), Twentieth century temperature trends in CMIP3, CMIP5, and CESM-LE climate simulations: Spatial-temporal uncertainties, differences, and their potential sources, *J. Geophys. Res. Atmos.*, 121, doi:10.1002/2015JD024382.
6. Lee W., and **S. Kumar** (2016), Software-Defined Storage Based Data Infrastructure Supportive of Hydroclimatology Simulation Containers: A Survey, *Data Science and Engineering*, 1(2): 65-72, DOI 10.1007/s41019-016-0008-y
7. **Kumar, S.**, F. Zwiers, P. A. Dirmeyer, D. M. Lawrence, R. Shrestha, and A. T. Werner (2016), Terrestrial contribution to the heterogeneity in hydrological changes under global warming, *Water Resour. Res.*, 52, 3127–3142, doi:10.1002/2016WR018607.

**2015**

8. **Kumar, S.**, R. P. Allan, F. Zwiers, D. M. Lawrence, and P. A. Dirmeyer (2015), Revisiting trends in wetness and dryness in the presence of internal climate variability and water limitations over land, *Geophys. Res. Lett.*, 42, doi:10.1002/2015GL066858.

**2014**

9. **Kumar, S.**, P. Dirmeyer, D. Lawrence, T. DelSole, E. L. Altshuler, B. A. Cash, M. J. Fennessy, Z. Guo, J. L. Kinter III, and D. M. Strauts (2014). Effects of Realistic Land Surface Initializations on Sub-seasonal to Seasonal Soil Moisture and Temperature predictability in North America and in Changing Climate simulated by CCSM4. *Journal of Geophysical Research (Atmospheres)*, 119m 13, 250-12, 270 doi:10.1002/2014JD022110.
10. **Kumar, S.**, P. Dirmeyer, and J. Kinter III (2014). Usefulness of Ensemble Forecasts from NCEP Climate Forecast System in Sub-seasonal to Intra-annual Forecasting. *Geophysical Research Letters*, 41, 10, 3586-3593.
11. **Kumar, S.**, D. Lawrence, P. Dirmeyer, and J. Sheffield (2014). Less Reliable Water Availability in the 21st Century Climate Projections. *Earth's Future*, 2, 3, 152-160.
12. Maloney, E. D., S. J. Camargo, E. Chang, B. Colle, R. Fu, K. L. Geil, Q. Hu, X. Jiang, N. Johnson, K. B. Karnauskas, J. Kinter, B. Kirtman, **S. Kumar**, B. Langenbrunner, K. Lombardo, L. N. Long, A. Mariotti, J. E. Meyerson, K. C. Mo, J. D. Neelin, Z. Pan, R. Seager, Y. Serra, A. Seth, J. Sheffield, J. Stroeve, J. Thibeault, S.-P. Xie, C. Wang, B. Wyman, and M. Zhao (2013): North American climate in CMIP5 experiments: Part III: Assessment of 21st Century projections. *J. Climate*, 27, 2230-2270.

**2013**

13. **Kumar, S.**, J. Kinter, P. A. Dirmeyer, Z. Pan, J. Adams (2013). Multidecadal Climate Variability and the “Warming Hole” in North America: Results from CMIP5 Twentieth- and Twenty-First-Century Climate Simulations. *Journal of Climate*, Vol. 26, Issue 11, 3511–3527.

14. **Kumar S.**, V. Merwade, J. Kinter III, D. Niyogi (2013). Evaluation of Temperature and Precipitation Trends and Long-term Persistence in CMIP5 20th Century Climate Simulations. *Journal of Climate*, Vol. 26, Issue 12, 4168-4185.
15. **Kumar S.**, P. A. Dirmeyer, V. Merwade, T. DelSole, J. M. Adams, and D. Niyogi (2013). Land use/cover change impacts in CMIP5 climate simulations: A new methodology and 21st century challenges, *J. Geophys. Res. Atmos.*, 118, 6337–6353, doi:10.1002/jgrd.50463.
16. **Kumar S.**, V. Merwade, S. Rao, and B. C. Pijanowski (2013). Characterizing Long-Term Land Use/Cover Change in the United States from 1850 to 2000 Using a Nonlinear Bi-analytical Model. *AMBIO – A journal of the Human Environment*, 42 (3), 285-297.
17. Dirmeyer, P., **S. Kumar**, M. Fennessy, E. Altshuler, T. DelSole, Z. Guo, B. Cash, and D. Straus, 2013: Model Estimates of Land-Driven Predictability in a Changing Climate from CCSM4. *J. Climate*, Vol. 26, Issue 21, 8495–8512.
18. Pan, Z., X. Liu, **S. Kumar**, Z. Gao, and J. Kinter, 2013: Inter-model variability and mechanism attribution of central and southeastern U.S. anomalous cooling in the 20th century as simulated by CMIP5 models. *J. Climate*, Vol. 26, Issue 17, 6215–6237.
19. Sheffield, J., A. Barrett, B. Colle, D. Fernando, R. Fu, K. Geil, Q. Hu, J. Kinter, **S. Kumar**, B. Langenbrunner, K. Lombardo, L. Long, E. Maloney, A. Mariotti, J. Meyerson, K. Mo, D. Neelin, S. Nigam, Z. Pan, T. Ren, A. Ruiz-Barradas, Y. Serra, A. Seth, J. Thibeault, J. Stroeve, Z. Yang, and L. Yin, 2013: North American Climate in CMIP5 Experiments. Part I: Evaluation of Historical Simulations of Continental and Regional Climatology. *J. Climate*, Vol. 26, Issue 23, 9209-9245.
20. Sheffield, J., S. Camargo, R. Fu, Q. Hu, X. Jiang, N. Johnson, K. Karnauskas, S. Kim, J. Kinter, **S. Kumar**, B. Langenbrunner, E. Maloney, A. Mariotti, J. Meyerson, D. Neelin, S. Nigam, Z. Pan, A. Ruiz-Barradas, R. Seager, Y. Serra, D. Sun, C. Wang, S. Xie, J. Yu, T. Zhang, and M. Zhao, 2013: North American Climate in CMIP5 Experiments. Part II: Evaluation of Historical Simulations of Intra- Seasonal to Decadal Variability. *J. Climate*, Vol. 26, Issue 23, 9247-9290.

### 2012 or earlier publications

21. **Kumar S.**, and V. Merwade (2011), Evaluation of NARR and CLM3.5 outputs for surface water and energy budgets in the Mississippi River Basin. *Journal of Geophysical Research (Atmosphere)*, 116, D08115, doi:10.1029/2010JD014909
22. **Kumar S.**, V. Merwade, W. Lee, L. Zhao, and C. Song (2010), Hydroclimatological impact of century-long drainage in midwestern United States: CCSM sensitivity experiments, *Journal of Geophysical Research (Atmosphere)*. 115, D14105, doi:10.1029/2009JD013228
23. **Kumar S.**, and V. Merwade (2009), Impact of watershed subdivision and soil data resolution on SWAT model calibration and parameter uncertainty. *Journal of American Water Resources Association*, 45(5):1179-1196.
24. **Kumar S.**, V. Merwade, J. Kam and K. Thurner (2009), Streamflow trends in Indiana: effects of long term persistence, precipitation and subsurface drains. *Journal of Hydrology*, Vol. 374 (1-2), pp. 171–183.
25. Basu, N. B., P.S.C. Rao, E. H. Winzeler, **S. Kumar**, P. Owens, and V. Merwade (2010), Parsimonious modeling of hydrologic responses in engineered watersheds: structural heterogeneity vs. functional homogeneity. *Water Resources Research*, 46, W04501, doi:10.1029/2009WR007803
26. Govindaraju, R.S., B. Engel, D. Ebert, B. Fossum, M. Huber, C. Jafvert, **S. Kumar**, V. Merwade, D. Niyogi, L. Oliver, S. Prabhakar, G. Rochon, C. Song, L. Zhao (2009). A vision of cyberinfrastructure for end-to-end environmental explorations (C4E4). *Journal of Hydrologic Engineering*, Vol.14(1), pp. 53-64
27. Pastore, C. L., M. B. Green, D. J. Bain, A. Munoz-Hernandez, C. J. Vorosmarty, J. Arrigo, S. Brandt, J. Duncan, F. Greco, H. Kim, **S. Kumar**, M. Lallay, A. Parolari, B. Pellerin, N. Salant, A. Schlosser, K. Zalzal (2010), Tapping environmental history to recreate America colonial hydrology, *Environmental Science & Technology*, 44, 23, 8798-8803

**Technical Reports**

1. Sheffield, J., A. Barrett, D. Barrie, S. J. Camargo, B. Colle, D. N. Fernando, R. Fu, K. L. Geil, Q. Hu, X. Jiang, N. Johnson, K. B. Karnauskas, S. T. Kim, J. Kinter, **S. Kumar**, B. Langenbrunner, K. Lombardo, L. N. Long, E. Maloney, A. Mariotti, J. E. Meyerson, K. C. Mo, J. D. Neelin, S. Nigam, Z. Pan, T. Ren, A. R.-Barradas, R. Seager, Y. L. Serra, A. Seth, D.-Z. Sun, J. M. Thibeault, J. C. Stroeve, C. Wang, S.-P. Xie, Z. Yang, L. Yin, J.-Y. Yu, T. Zhang, M. Zhao, Regional Climate Processes and Projections in CMIP3 and CMIP5 for N. America: Differences, Attribution and Outstanding Issues, NOAA Technical Report, OAR CPO-2, 47pp.
2. Strauts, D. M., M. J. Fennessy, E. L. Altshuler, Z. Guo, T. DelSole, P. A. Dirmeyer, **S. Kumar**, B. A. Cash, and J. L. Kinter, The COLA Intraseasonal-to-Interannual Predictability Project Scientific Motivation and Technical Approach. 31pp. July 2013.
3. Merwade, V., and **S. Kumar**, Analysis of INDOT Current Hydraulic Policies. Publication FHWA/IN/JTRP-2011/14. Joint Transportation Research Program, Indiana Department of Transportation and Purdue University, West Lafayette, Indiana, 2011. doi: 10.5703/1288284314628

**Conference Proceedings/Presentations/Posters**

1. **Kumar, S.**, M. Newman, D. M. Lawrence, and B. Livneh (2017). The GLACE-Hydrology Experiment: Advancing Understanding of Land Processes in Coupled Climate –Hydrological System. AMS 97th Annual Meeting, Seattle, WA, 22-26 January, 2017.
2. Lan, C.-W., M.-H. Lo, and **S. Kumar** (2016). Terrestrial Water Flux Responses to Global Warming in Tropical Rainforest Area. AGU Fall meeting, San Francisco, 12-16 Dec. 2016 (accepted for poster presentation).
3. **Kumar, S.**, M. Newman, D. M. Lawrence, and B. Livneh (2016). Intensified multi-year droughts in California due to land-atmosphere interactions and land-memory processes, AGU Fall meeting, San Francisco, 12-16 Dec. 2016 (accepted for oral presentation).
4. **Kumar, S.**, R. Allan, F. Zwiers, D. Lawrence, and P. Dirmeyer (2016). Revisiting Trends in Wetness and Dryness in the Presence of Internal Climate Variability. AMS 96th Annual Meeting, New Orleans, 10-14 January 2016 (oral presentation).
5. **Kumar, S.**, F. Zwiers, P. A. Dirmeyer, D. M. Lawrence, R. Shrestha, and A. T. Werner (2015). Robust and heterogeneous hydrological changes under global warming, AGU Fall meeting, San Francisco, 14-18 Dec. 2015.
6. Newman, M., Y. Wang, S. Kumar, and B. Livneh (2015). Seasonal and spatial dependence of soil moisture memory over North America. 40th Annual Climate Diagnostics and Prediction Workshop, Denver, Colorado, October 26-29, 2015.
7. **Kumar, S.**, J. Kinter, Z. Pan, and J. Sheffield (2015). Twentieth Century Warming Rates in CMIP3, CMIP5, and Large Ensemble Climate Simulations –Spatial and Temporal Variability, Differences and their Attribution, 40th Annual Climate Diagnostics and Prediction Workshop, Denver, Colorado, October 26-29, 2015.
8. **Kumar, S.** (2015). Robust hydrologic change under global warming – Theory and its application, CanSISE Workshop meeting, Toronto, ON., 11-13 Mar.
9. **Kumar, S.**, P. A. Dirmeyer, and D. M. Lawrence (2015). Trends in wetness and dryness – revisited, Land Model and Biogeochemistry Working Group Meeting, Boulder, CO, 2-4 Mar.
10. **Kumar, S.**, M. R. Najafi, M. Schnorbus, R. Shrestha, and A. Warner (2014), Asymmetry in hydrologic response of climate change in Western North America – A Land-Atmosphere Interactions Perspective, AGU Fall Meeting, 15-19 Dec., 2014.
11. **Kumar, S.**, (2014), Usefulness of Ensemble Forecasts from NCEP Climate Forecast System in Sub-seasonal to Intra-annual Forecasting, Bias Corrections in Subseasonal to Interannual Predictions Virtual Workshop, NOAA Climate Program Office, 30 Sept. – 2 Oct., 2014.
12. **Kumar, S.**, J. L. Kinter III, P. A. Dirmeyer, and D. M. Lawrence (2014). Climate Processes in CMIP5: The “Warming Hole” simulations in CMIP5 models – role of natural climate variability versus anthropogenic effects. AMS 94th Annual Meeting, 2-6 February 2014, Atlanta, Georgia.



13. **Kumar, S.**, P. A. Dirmeyer, and J. L. Kinter III (2013). CFSv2 Reforecasts: Where is the observations in the Forecast Ensemble Space? Accepted to oral presentation in NOAA's 38<sup>th</sup> Climate Diagnostic and Prediction Workshop, 21-24 October 2013, College Park, MD.
14. **Kumar, S.**, Kinter, III, J., and Dirmeyer, P. (2013) Role of Natural Climate Variability in Regional Climate Change and its Application to Water Resources. World Environmental and Water Resources Congress 2013: pp. 1224-1233. doi: 10.1061/9780784412947.120
15. Sagarika, S., A. Kalra, **S. Kumar**, and S. Ahmad, 2013, Analyzing long-term trends in hydrologic variables over the Colorado River basin, Presented at Nevada Water Resources Association, Reno, Nevada, January 29-31, (2nd Place in Best Poster Competition, student co-author is underlined).
16. **Kumar, S.**, P. A. Dirmeyer, and D.M. Lawerence. Twenty-first century challenges in water resources – A land-atmosphere interaction perspective. Abstract GC41A-0954, AGU Fall Meeting, San Francisco, CA, December 2012.
17. **Kumar, S.**, Managing Water in Changing Climate: Moving Beyond the Downscaling Era. Future Leaders of Research Event, University of Colorado Boulder, November 16, 2012. **(Outstanding Presentation Award)**
18. **Kumar, S.**, P. Dirmeyer, Z. Guo, T. DelSole, J. L. Kinter III, B. A. Cash, M. J. Fennessy, E. L. Altshuler, D. M. Straus. Sub-seasonal to seasonal climate predictability in a changing climate: effects of land cover change. 1<sup>st</sup> pan-GASS meeting, Boulder, CO, 10- 14 September 2012.
19. **Kumar, S.**, P. Dirmeyer, V. Merwade, and D. Niyogi. Robust impacts of land use land cover change in a changing climate: results from CMIP5 climate models. CUAHI 3<sup>rd</sup> Biennial meeting, Boulder, CO, 16-18 July 2012.
20. **Kumar, S.**, V. Merwade, and D. Niyogi. Evaluation of IPCC-AR5 climate models for inter-annual variability, long-term persistence, and trends in precipitation. World Environmental and Water Resources Congress, Albuquerque, New Mexico, 20-24 May 2012.
21. **Kumar, S.**, and V. Merwade, Evaluation of NARR and CLM3.5 outputs for surface water and energy fluxes in the Mississippi River Basin. 4<sup>th</sup> World Climate Research Programme International Conference on Reanalyses, Silver Spring, MD, 7-11 May 2012.
22. **Kumar, S.**, V. Merwade, B. Pijanowski and S. Rao, Use of GIS for Investigation of Land Cover Change Determinants in the United States, Proceedings of the American Water Resources Association 2012 Spring Specialty Conference GIS and Water Resources VII, New Orleans, LA, March 2012.
23. **Kumar S.**, V. Merwade, D. Niyogi, and P. Dirmeyer, Evaluation of hydroclimatic variables from IPCC-AR5 climate models using observation, reanalysis, and land data assimilation system, W177B, WCRP Open Science Conference, Denver, 24-28 October 2011.
24. **Kumar, S.**, V. Merwade and B. C. Pijanowski, Future water resource scenarios for USA: effects of land use/cover change, climate change, and human disturbances. Abstract H43F-1319, presented at 2010 Fall Meeting, AGU, San Francisco, CA, 13-17 Dec. **(Outstanding Student Paper Award)**
25. **Kumar, S.**, and V. Merwade, Evaluation of NARR and CLM3.5 outputs for surface water and energy budgets in the Mississippi River Basin, CUAHSI Biennial Meeting, Boulder, CO, July 2010.
26. **Kumar, S.**, V. Merwade, S. Fall, and D. Niyogi, Effects of land cover on hydrology of Indiana, Proceedings of the 31st Annual IWRA Spring Symposium, West Lafayette, IN, May 2010.
27. **Kumar, S.**, and V. Merwade, Evaluation of evapotranspiration component in global climate model, Eos Trans. AGU, 90(52), Fall Meet. Suppl., Abstract H51B-0767, AGU Fall Meeting, San Francisco, CA, December 2009.
28. Zhao, Lan, C. Song, I. Chaubey, **S. Kumar**, V. Merwade and R. S. Govindaraju, A web-based interface for SWAT modeling on the TeraGrid. Proceedings of the 2009 5th International SWAT Conference, Boulder, CO, 2009.
29. **Kumar, S.**, W. Lee, V. Merwade, L. Zhao, and C. Song. Using TeraGrid to explore historical hydro-Climatic changes in U.S. Midwest Region. Proceedings of the TeraGrid 2009 Conference, Arlington, VA, June 2009.

30. **Kumar, S.**, and V. Merwade, CCSM modeling for studying the impact of wetland drainage on hydro-climatology of the Midwest USA. Eos Transactions, American Geophysical Union, 90(22), Joint Assembly Supplement, Abstract H12B-07, AGU Spring Assembly, Toronto, Canada, May 2009 (**Outstanding Student Paper Award**)
31. **Kumar S.**, Merwade V., Bain, D. J., Hydro-climatological Impact of century long drainage in midwestern United States. Eos Transactions, American Geophysical Union, 89(53), Fall Meeting Supplement, Abstract H11F-0828, AGU Fall Meeting, San Francisco, CA, December 2008 (**Outstanding Student Paper Award**)
32. Kim, H., J. Duncan, **S. Kumar**, C. Pastore, D. Bain, M. Green, B. Pellerin., Reconstructing colonial land cover changes across the northeastern United States to understand hydrologic changes. Eos Transactions, American Geophysical Union, 89(53), Fall Meeting Supplement, Abstract H11F-0835, AGU Fall Meeting, San Francisco, CA, December 2008.
33. Basu N., Rao P. C., Winzeler H. E., Owens P., **Kumar S.**, Merwade V., Green T., Maringati C., and Chaubey I. C., Multi-scale modeling of water and chemicals loads in midwestern watersheds using the TELM approach. Eos Transactions, American Geophysical Union, 89(53), Fall Meeting Supplement, Abstract H33D-1044, AGU Fall Meeting, San Francisco, CA, December 2008.
34. **Kumar S.**, V. Merwade, L. Zhao and C. Song, Cyberinfrastructure for environmental data and modeling, Proceedings of the TeraGrid 2008 Conference, Las Vegas NV, June 2008 (**First prize winner in Student poster competition**).
35. **Kumar S.**, and V. Merwade, Studying the effects of spatial scale on hydrologic model calibration using Soil Water Assessment Tool (SWAT), Proceedings of the ASCE World and Environmental Resources Congress, Honolulu, HI, May 2008.
36. Merwade V., **Kumar S.**, Song C., Zhao L., Govindaraju R., and Niyogi D., Cyberinfrastructure for End-to-End Environmental Explorations. Eos Transactions, American Geophysical Union, 88(52), Fall Meeting Supplement, Abstract H13A-0985, AGU Fall Meeting, San Francisco, CA, December 2007.
37. **Kumar S.**, Kam J., Thurner, K., and Merwade, V., Exploring the link between streamflow trends and climate change in Indiana, USA. Eos Transactions, American Geophysical Union, 88(52), Fall Meeting Supplement, Abstract GC33A-0953, AGU Fall Meeting, San Francisco, CA, December 2007.