

Research Scientist
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Appointments

- Research Scientist, Computational Sciences and Engineering Division, Oak Ridge National Laboratory from February 1st, 2024 to present. Research topics: *Reservoir sedimentation modeling through the Soil and Water Assessment Tool (SWAT); remote sensing-based estimation of reservoir storage; machine learning-based application in water quality; data analysis and application development for large-scale health data; Python-based tools for automated data processing*
- Postdoctoral Research Associate, Environmental Sciences Division, Oak Ridge National Laboratory from June 14, 2021 to January 31, 2024. Research topics: *Research on fully distributed hydrological model, Advanced Terrestrial Simulator (ATS), semi-distributed model, Soil and Water Assessment Tool (SWAT) and deep learning-based approaches in High Performance Computing (HPC) systems to reduce computational cost of complex physical models. GPU-resources of different DoE HPCs are utilized in this work. I have been working with developing Python-based tools for automated data processing*
- C. V. Raman Postdoctoral Fellow, Interdisciplinary Centre for Water Research (ICWaR), Indian Institute of Science (IISc) from August 22, 2019 to June 4, 2021. Research topic: *Groundwater storage quantification and biogeochemical model development (FORTRAN-based) for simulating water quality parameters*
- Postdoctoral Fellow, Athabasca University, Canada from August 15, 2017 to July 31, 2019. Research topic: *Biogeochemical model development (FORTRAN-based) in SWAT framework. Coded the processes of chemical changes associated with major soil chemical reactions, soil organic matter decomposition and oxygen diffusion in soil-water environment from scratch. This enables simulations of oxidation-reduction potential, pH, water quality as well as multiple soil greenhouse gas emissions*
- CSIR- Shyama Prasad Mukherjee Fellow (SPMF), Department of Geology and Geophysics, Indian Institute of Technology (IIT) Kharagpur from July 2, 2012 to June 19, 2017. Research topic: *Groundwater recharge and storage using in situ measurements, satellite-based observations and numerical simulations. Use large-scale data from numerous in-situ groundwater level measurements, Gravity Recovery and Climate Experiment (GRACE) satellite sensor observations, land surface models*
- Science Collaborator at Hydrological Sciences Laboratory, Goddard Space Flight Center (GSFC), NASA between August 24, 2015 and May 23, 2016. Research topic: *Remote sensing applications in water resources and land surface modeling. Worked on GRACE-based groundwater storage estimation and land surface model-based data assimilation*
- Research Intern, Department of Geosciences, University of Calgary from February 27 to March 30, 2014. Research topic: *Estimation of frost depth by electromagnetic induction (EMI) technique. Operated a newly acquired electromagnetic (EM) Profiler to estimate frost depth in Calgary, Canada and the results were compared with electrical resistivity-based estimations*
- Junior Research Fellow (CSIR) from January 2, 2012 to July 1, 2012 in Department of Geology and Geophysics, Indian Institute of Technology (IIT) Kharagpur. Research topic: *Groundwater recharge and storage using in situ measurements, satellite-based observations and numerical simulations*
- Project Assistant at the Civil Engineering department, Indian Institute of Technology (IIT) Kharagpur from September 24, 2009 to December 14, 2011. Research topic: *Chemical composition, optical properties and climate impacts of aerosols. Worked on instrumentation, data analyses, modeling of aerosol properties and their influence on climate*

- Summer intern at the Centre for Oceans, Rivers, Atmosphere and Land sciences (CORAL), Indian Institute of Technology (IIT) Kharagpur in 2009. Research topic: *Regional warming over India*

Research Interests

1. Machine learning and remote sensing-based applications in Earth Sciences in high performance computing (HPC) platforms
2. Groundwater storage quantification, groundwater-surface water interaction, water management
3. Distributed and semi-distributed hydrological model application and development
4. Biogeochemical model development for simulating the water quality applications and soil greenhouse gas emissions

Funding Activities

- Numerical Modeling Framework for Future Projections of Sedimentation under Climate and Land Use Change at Federal Hydropower Reservoirs. Task lead. WPTO, DOE. Total budget \$250,000 (my part \$68,000) 2025-26.
- Artificial Intelligence Models for Land Cover Forecasting. Co-Investigator. SEED, ORNL. Total budget \$190,000 (my part \$20,000) 2023-24.

Education

Doctor of Philosophy (Ph.D.) from Department of Geology and Geophysics, Indian Institutes of Technology (IIT) Kharagpur (June-2017)

Thesis title: *Groundwater recharge and storage across parts of the Indian sub-continent by in situ measurements, satellite-based observations, and numerical simulations*

Master of Science (M.Sc.) in Environmental Science from the University of Calcutta (November-2009)

Thesis title: *Regional warming over India*

Bachelor of Science (B.Sc.) in Chemistry (Hons.), Physics and Mathematics from the University of Calcutta (July-2007)

Awards/Honors/Grants

- Article was highlighted in Nature Asia page: <https://www.natureasia.com/en/nindia/article/10.1038/nindia.2020.6>
- C. V. Raman Postdoctoral Fellowship 2019 from Indian Institute of Science (IISc), India. Total approved grant: INR 40,00,000 (~\$53,000) for 2 years
- Postdoctoral fellowships from NASA Jet Propulsion Laboratory (JPL), USA; International Institute for Applied Systems Analysis (IIASA), Austria; Natural Resources Research Institute (LUKE), Finland; University of Guelph, Canada. (Offered)
- Article was highlighted in Nature Asia page: <https://www.natureasia.com/en/nindia/article/10.1038/nindia.2018.121>
- Article was highlighted in NASA's "IMAGE of the Day" blog: <https://earthobservatory.nasa.gov/IOTD/view.php?id=91008>
- Publication recognized by Ministry of Water Resources, River Development and Ganga Rejuvenation and Ministry of Rural Development, Government of India
- National Postdoctoral Fellowship 2017, India. Total approved grant for two years: INR 19,20,000 (~\$27,500) (Offered)
- Won 'Best Poster Award' in 'Best Science Story' category at NASA Goddard Space Flight Center (GSFC)'s annual poster event, Annual Poster Blowout party, 2016, after competing with more than 150 NASA scientists and engineers
- Fulbright-Nehru Doctoral Research fellowship 2015-16 and worked as a Science Collaborator at Hydrological Sciences Laboratory, Goddard Space Flight Center (GSFC), NASA between August 24, 2015 and May 23, 2016. Total approved grant: \$23,000 for 9 months
- Shastri Indo-Canadian Institute (SICI) Student mobility award 2013-14 for doing an Internship in a Canadian University for 5 weeks. Total approved grant: ~CAD 5,000 for 5 weeks
- CSIR- Shyama Prasad Mukherjee Fellowship (SPMF) in Earth sciences. SPM fellowship is awarded to the toppers of the National Eligibility Test (NET) conducted by the Council of Scientific & Industrial Research (CSIR) to

pursue doctoral research in India. Approximately 50 students from all the science and engineering disciplines are selected in India based on their performance in the examination

- UGC NET June (2012), Junior Research Fellowship in Environmental Sciences (All India Rank within top 10 out of approximately 8500 students)
- Secured an All India Rank 4th out of approximately 6000 students on Joint CSIR UGC NET June (2011), Junior Research Fellowship in Earth Sciences
- Joint CSIR UGC NET December (2010), Lectureship in Earth Sciences (All India Rank: 64 out of approximately 6000 students)

Publications

Citation details (Google Scholar): <https://scholar.google.com/citations?user=74-FyiAAAAAJ&hl=en>

Citations: **2514**; h-index: **26**; i-10 index: **38**; 1st-authored: **17**

SCOPUS profile: <https://www.scopus.com/authid/detail.uri?authorId=56797910500>

Peer reviewed journal articles (Published/Accepted):

Biogeochemical model development for water quality applications and soil greenhouse gas emissions

1. **S. N. Bhanja**, J. Wang, R. Bol (2022). Soil CO₂ emission largely dominates the total ecosystem CO₂ emission at Canadian boreal forest. *Frontiers in Environmental Science*.
2. **S. N. Bhanja**, J. Wang (2021). Influence of environmental factors on autotrophic, soil and ecosystem respirations in Canadian boreal forest. *Ecological Indicators*, 125, 107517.
3. J. Wang, N. K. Shrestha, M. A. Delavar, T. W. Meshesha, **S. N. Bhanja** (2021). Modelling watersheds and river basins in cold climate regions: A review. *Water*, 13(4), 518.
4. **S. N. Bhanja**, J. Wang (2020). Estimating influences of environmental drivers on terrestrial heterotrophic respiration. *Environmental Pollution*, 257, 113630.
5. **S. N. Bhanja**, J. Wang, N. Shrestha, X. Zheng (2019). Modelling microbial kinetics and thermodynamic processes for quantifying soil CO₂ emission. *Atmospheric Environment*, 209, 125-135.
6. **S. N. Bhanja**, J. Wang, N. Shrestha, X. Zheng (2019). Microbial kinetics and thermodynamic (MKT) processes for soil organic matter decomposition and dynamic oxidation-reduction potential: Model descriptions and applications to soil N₂O emissions. *Environmental Pollution*, 247, 812-823.

Groundwater recharge, storage and its controlling factors; hydrologic modeling

7. M. Shamsudduha, **S. N. Bhanja**, and S. Nowreen (2024). Water supply sustainability and challenges in Asian megadeltas under global change. *Frontiers in Water*, 6, 1415097.
8. A. Mukherjee, **S. N. Bhanja**, M. Rodell, Y. Wada, P. Malakar, D. Saha, and A.M. MacDonald, 2023. Contesting with the Ganges Water Machine in South Asia: Theory versus Reality. *ACS ES&T Water*.
9. **S. N. Bhanja**, E. T. Coon, D. Lu, S. L. Painter (2023). Evaluation of distributed process-based hydrologic model performance using only a priori information to define model inputs. *Journal of Hydrology*.
10. P. Malakar, **S. N. Bhanja**, A. A. Dash, D. Saha, R. K. Ray, S. Sarkar, A. Zahid, A. Mukherjee (2022). Delineating variabilities of groundwater level prediction across the agriculturally intensive transboundary aquifers of South Asia. *ACS ES&T Water*.
11. **S. N. Bhanja**, M. Sekhar (2022). Short-Term and Long-Term Replenishment of Water Storage Influenced by Lockdown and Policy Measures in Drought-Prone Regions of Central India. *Remote Sensing*, 14(8), 1768.
12. P. Malakar, A. Mukherjee, **S. N. Bhanja**, D. Saha, S. Sarkar, R. Ray (2021). Deep learning-based forecasting of groundwater level trends over India: Implications for crop production and drinking water supply. *ACS ES&T Engineering*.
13. P. Malakar, A. Mukherjee, **S. N. Bhanja**, A. R. Ganguly, R. K. Ray, A. Zahid, S. Sarkar, D. Saha, and S. Chattopadhyay (2021). Three decades of depth-dependent groundwater response to climate variability and human regime in the transboundary Indus-Ganges-Brahmaputra-Meghna mega river basin aquifers. *Advances in Water Resources*, 149, 103856.

14. P. Malakar, A. Mukherjee, **S. N. Bhanja**, D. Saha, R. Ray, S. Sarkar, A. Zahid (2021). Machine learning-based regional-scale groundwater level prediction using GRACE. *Hydrogeology Journal*, 29, 1027-1042.
15. P. Malakar, A. Mukherjee, **S. N. Bhanja**, D. Saha, R. Ray, S. Sarkar, A. Zahid (2020). Importance of spatial and depth-dependent drivers in groundwater level modeling through machine learning. *Hydrology and Earth System Science Discussions*.
16. **S. N. Bhanja**, A. Mukherjee, M. Rodell (2020). Groundwater storage change: Estimates from major river basins across India. *Hydrological Sciences Journal*, 65(4), 650-659.
17. B. Li, M. Rodell, S. Kumar, H. Beaudoin, A. Getirana, B. Zaitchik, L. DeGoncalves, C. Cossetin, **S. N. Bhanja**, A. Mukherjee, S. Tian, N. Tangdamrongsub, Di Long, J. Nanteza, J. Lee, F. Policelli, I. Goni, D. Daira, M. Bila, G. Delannoy, D. Mocko, S. Steele-Dunne, H. Save, S. Bettadpur (2019). Global GRACE data assimilation for groundwater and drought monitoring: Advances and challenges. *Water Resources Research*, 55, 7564-7586.
18. **S. N. Bhanja**, P. Malakar, A. Mukherjee, M. Rodell, P. Mitra, S. Sarkar (2019). Using satellite-based vegetation cover as indicator of groundwater storage. *Geophysical Research Letters*, 46(14), 8082-8092
19. **S. N. Bhanja**, A. Mukherjee (2019). In situ and satellite-based estimates of usable groundwater storage across India: implications for drinking water supply and food security. *Advances in Water Resources*, 126.
20. **S. N. Bhanja**, A. Mukherjee, R. Rangarajan, B. R. Scanlon, P. Malakar and S. Verma (2019). Long-term groundwater recharge rates across India by in situ measurements. *Hydrology and Earth System Sciences*, 23.
21. A. Y. Sun, D. Walling, B. R. Scanlon, Z. Zhang, **S. N. Bhanja**, A. Mukherjee, Z. Zhong (2019). Combining Physically-Based Modeling and Deep Learning for Fusing GRACE Satellite Data: Can We Learn from Mismatch? *Water Resources Research*, 55(2), 1179-1195.
22. **S. N. Bhanja**, X. Zheng, and J. Wang (2018). Estimating long-term groundwater storage and its controlling factors in Alberta, Canada. *Hydrology and Earth System Sciences*, 22, 6241-6255.
23. A. Mukherjee*, **S. N. Bhanja*** and Y. Wada (2018). Groundwater depletion causing reduction of baseflow triggering Ganges river drying. *Scientific Reports*, 8, 12049 [*Joint first author]
24. **S. N. Bhanja**, A. Mukherjee, M. Rodell, Y. Wada, S. Chattopadhyay, I. Velicogna, K. Pangaluru, and J. S. Famiglietti (2017). Groundwater rejuvenation in parts of India influenced by water-policy change implementation. *Scientific Reports*, 7, 7453.
25. M. Giroto, G. J. De Lannoy, R. H. Reichle, M. Rodell, C. Draper, **S. N. Bhanja**, and A. Mukherjee (2017). Benefits and pitfalls of GRACE data assimilation: A case study of terrestrial water storage depletion in India. *Geophysical Research Letters*, 44(9), 4107-4115.
26. **S. N. Bhanja**, M. Rodell, B. Li, D. Saha, A. Mukherjee (2017). Spatio-temporal variability of groundwater storage in India. *Journal of Hydrology*, 544, 428-437.
27. **S. N. Bhanja**, A. Mukherjee, D. Saha, I. Velicogna, and J. Famiglietti (2016). Validation of GRACE based groundwater storage anomaly using in-situ groundwater level measurements in India. *Journal of Hydrology*, 543(B), 729-738.
28. A. Mukherjee, D. Saha, C. F. Harvey, R. G. Taylor, K. M. Ahmed and **S. N. Bhanja** (2015). Groundwater systems of the Indian Sub-Continent. *Journal of Hydrology: Regional Studies*, 4, 1-14.

Remote sensing applications in earth sciences

29. S. Sarkar, A. Mukherjee, S. Duttgupta, **S. N. Bhanja**, A. Bhattacharya. Predicting Regional-Scale Elevated Groundwater Nitrate Contamination Risk Using Machine Learning on Natural and Human-Induced Factors (2022). *ACS ES&T Engineering*.
30. S. Sarkar, A. Mukherjee, S. Duttgupta, **S. N. Bhanja**, A. Bhattacharya, S. Chakraborty (2021). Emerging spatiotemporal trends of groundwater nitrate pollution across India. *Journal of Contaminant Hydrology*.
31. S. Duttgupta*, **S. N. Bhanja***, A. Dutta*, S. Sarkar, M. Chakraborty, A. Ghosh, A. Mukherjee (2021). Impact of Covid-19 lockdown on river and groundwater-sourced drinking water sustainability in the arsenic-affected Ganges river basin. *International Journal of Environmental Research and Public Health*, 18(6), 2832. [*Joint first author].
32. A. Singhal, S. Sahu, S. Chattopadhyay, A. Mukherjee, **S. N. Bhanja** (2020). Using night time lights to find regional inequality in India and its relationship with economic development. *PLOS One*, 15 (11), e0241907.

33. S. Duttagupta, A. Mukherjee, **S. N. Bhanja**, S. Chattopadhyay, S. Sarkar, K. Das, S. Chakraborty, D. Mondal (2020). Achieving sustainable development goal for clean water in India: influence of natural and anthropogenic factors on groundwater microbial pollution. *Environmental Management*, 66, 742–755.
34. A. Mukherjee, S. Dutta Gupta, S. Chattopadhyay, **S. N. Bhanja**, A. Bhattachayra, S. Chakraborty, S. Sarkar, T. Ghosh, J. Bhattacharya, S. Sahu (2019). Impact of sanitation and socio-economy on groundwater fecal pollution and human health towards achieving sustainable development goals across India from ground-observations and satellite-derived nightlight. *Scientific Reports*, 9, 15193.
35. Y. Yoon, S. V. Kumar, B. A. Forman, B. Zaitchik, Y. Kwon, Y. Qian, S. Rupper, V. Maggioni, P. Houser, D. Kirschbaum, A. Richey, A. Arendt, D. Mocko, J. Jacob, **S. N. Bhanja**, A. Mukherjee (2019). Evaluating the uncertainty of terrestrial water budget components over High Mountain Asia. *Frontiers of Earth Science*, 7.
36. S. Dutta Gupta, A. Bhattacharya, A. Mukherjee, S. Chattopadhyay, **S. N. Bhanja**, S. Sarkar, P. Malakar, J. Bhattacharya (2019). Groundwater faecal pollution observation in parts of Indo-Ganges-Brahmaputra river basin from in-situ measurements and satellite-based observations. *Journal of Earth System Science*, 128.

Aerosols and climate change

37. S. Verma, B. Priyadarshini, S. K. Pani, D. Bharath Kumar, A. R. Faruqi, **S. N. Bhanja**, M. Mandal (2016). Aerosol extinction properties over coastal West Bengal Gangetic plain under inter-seasonal and sea breeze influenced transport processes. *Atmospheric Research*, 167, 224-236.
38. S. Verma, **S. N. Bhanja**, A. Misra and S. K. Pani (2014). Aerosol optical and physical properties during winter monsoon pollution transport in an urban environment. *Environmental science and pollution research*, 21 (7), 4977-4994.
39. S. Verma, S. K. Pani and **S. N. Bhanja** (2013). Sources and Radiative Effects of Wintertime Black Carbon Aerosols in an urban atmosphere in east India. *Chemosphere*, 90, 260–269.

Book chapters (peer reviewed)

1. **S. N. Bhanja** and J. Wang (2021). Emerging groundwater and surface water trends in Alberta, Canada. In: A. Mukherjee Eds. *Global Groundwater*. Elsevier, Netherlands, 73-80.
2. **S. N. Bhanja** and A. Mukherjee (2021). Groundwater sustainability and security in South Asia. In: A. Mukherjee Eds. *Global Groundwater*. Elsevier, Netherlands, 469-476.
3. P. Malakar, S. Sarkar, A. Mukherjee, **S. N. Bhanja**, A. Sun (2021). Use of machine learning and deep learning methods in groundwater. In: A. Mukherjee Eds. *Global Groundwater*. Elsevier, Netherlands, 545-558.
4. A. Mukherjee and **S. N. Bhanja** (2019). An Untold Story of Groundwater Replenishment in India: Impact of Long-Term Policy Interventions. In: A. Singh et al. Eds. *Water Governance: Challenges and Prospects*. Springer Nature Singapore Pte Ltd, 205-218.
5. **S. N. Bhanja**, A. Mukherjee and M. Rodell (2018). Groundwater storage variations in India. In: A. Mukherjee Ed. *Groundwater of South Asia*. Springer Nature Singapore Pte Ltd, 49-59.
6. A. Mukherjee and **S.N. Bhanja** (2018). Estimating Present-Day Groundwater Recharge Rates in India. In: A. Mukherjee Ed. *Groundwater of South Asia*. Springer Nature Singapore Pte Ltd, 37-47.
7. S. A. Hussain, K. Das, **S. N. Bhanja**, and A. Mukherjee (2018). Potential Impact of Climate Change on Surface Water and Groundwater Interactions in lower reaches of Ganges river, India. In: A. Mukherjee Ed. *Groundwater of South Asia*. Springer Nature Singapore Pte Ltd, 583-591.

Conference and Workshop Participations

1. S. N. Bhanja, D. Lu, E. Coon, S. L. Painter. Exploring Interpretability and Performance of an Attention-based Long Short-Term Memory (LSTM) Network for Rainfall-runoff Modeling. *AGU Fall meeting*, San Francisco, USA (December, 2023).
2. S. N. Bhanja, S. L. Painter, E. T. Coon, D. Lu, J.D. Gomez-Velez. Deep learning-based surrogate models for process-based integrated surface-subsurface hydrologic models. HydroML symposium organized by Lawrence Berkeley National Laboratory, Berkeley, USA (May, 2023).
3. S. N. Bhanja, D. Lu, E. Coon, S. L. Painter. Exploring Interpretability and Performance of an Attention-based Long Short-Term Memory (LSTM) Network for Rainfall-runoff Modeling. *AGU Fall meeting*, Chicago, USA (December, 2022).

4. C. Varadharajan, S. L. Painter, J. Kumar, D. Lu, C. Shen, X. Chen, J. D. Moulton, S. N. Bhanja, W. P. Tsai, D. Feng, M. Ombadi, H. Weierbach, J. Willard, W. Zhi and A. Y. Sun. Opportunities for using Artificial Intelligence and Machine Learning to Address Hydrological Grand Challenges. *AGU Fall meeting*, Chicago, USA (December, 2022).
5. S. N. Bhanja. Approaches to high-resolution, regional-scale groundwater storage quantification. NSF-sponsored workshop on groundwater security at the University of Alabama, Tuscaloosa, USA (October, 2022). **[Invited talk]**
6. S. N. Bhanja, S. L. Painter, E. T. Coon. Evaluating a high-resolution integrated hydrological model on multiple diverse catchments. *AGU Frontiers in Hydrology meeting*, San Juan, USA (June, 2022).
7. S. N. Bhanja, S. L. Painter, E. T. Coon. Evaluating the performance of a high-resolution integrated hydrological model with and without catchment-specific subsurface structure information. *MODFLOW and More at the Princeton University*, New Jersey, USA (June, 2022).
8. S. N. Bhanja, J. Wang, R. Bol. Estimating ecosystem respiration and its components through a new modeling approach in the Soil and Water Assessment Tool (SWAT). *AGU Fall meeting*, New Orleans, USA (December, 2021).
9. S. N. Bhanja. 11th INDOGFOE-Symposium on “Groundwater storage quantification in India and its influence in food security” organized by DST, India and Alexander von Humboldt Foundation, Germany (February, 2021). **[Invited poster in virtual mode]**
10. S. N. Bhanja. Brainstorming session on Satellite Observations and Modelling of GRACE Data for Terrestrial Applications on “Improving spatial resolution of GRACE products in India” organized by NGRI Hyderabad, India (February, 2021). **[Invited talk in virtual mode]**
11. S. N. Bhanja, A. Mukherjee. Meteorological drought and groundwater storage: Insights from the Indian river basins. Indo-US bilateral symposium on “The study of decadal scale droughts and mega-droughts in semi-arid tracts of India and North America” at IISER Mohali, India (January, 2020). **[Invited talk]**
12. S. Werth, S. F. Sherpa, M. Shirzaei, K. X. Whipple, S. N. Bhanja, A. Mukherjee. Climate Sensitivity of the Glacier Mass Budget of High Mountain Asia Based on Satellite Gravimetry. *AGU Fall meeting*, San Francisco, USA (December, 2019).
13. S. N. Bhanja, J. Wang, N. Shrestha, X. Zheng. Soil CO₂ emission quantification – A new modelling approach. *EGU General Assembly*, Vienna, Austria (April, 2019).
14. P. Malakar, A. Mukherjee, S. N. Bhanja, A. Ganguly, D. Saha, R. Ray, S. Sarkar, A. Zahid. Groundwater-Climatic variability link in the transboundary aquifer system of south Asia. *EGU General Assembly*, Vienna, Austria (April, 2019).
15. S. N. Bhanja, J. Wang, N. Shrestha, X. Zheng. Modelling microbial kinetics and thermodynamic (MKT) processes for soil organic matter decomposition and its application to soil N₂O emission. *AGU Fall meeting*, Washington D.C., USA (December, 2018).
16. B. Li, M. Rodell, S. Kumar, H. Beaudoin, A. Getirana, B. Zaitchik, L. DeGoncalves, C. Cossetin, S. N. Bhanja, A. Mukherjee, S. Tian, N. Tangdamrongsub, Di Long, J. Nanteza, J. Lee, F. Policelli, I. Goni, D. Daira, M. Bila, G. Delannoy, D. Mocko, S. Steele-Dunne, H. Save, S. Bettadpur. Global groundwater storage estimates through assimilation of GRACE data into a land surface model. *AGU Fall meeting*, Washington D.C., USA (December, 2018).
17. S. N. Bhanja, M. Rodell, A. Mukherjee, and B. Li. Variability of groundwater storage in India: Spatial and temporal aspects. *AGU Fall meeting*, New Orleans, USA (December, 2017).
18. P. Malakar, A. Mukherjee and S. N. Bhanja. Groundwater Recharge under varied land use regions in the semi-arid parts of western West Bengal, India. *AGU Fall meeting*, San Francisco, USA (December, 2016).
19. M. Giroto, G. J. M. De Lannoy, R. H. Reichle, M. Rodell, C. Draper, S. Bhanja, A. Mukherjee. Changes in India’s land surface water balance during the GRACE mission years: A data assimilation perspective. *AGU Fall meeting*, San Francisco, USA (December, 2016).
20. S. N. Bhanja, A. Mukherjee, M. Rodell, J. Famiglietti. Estimating the performance of GRACE based groundwater storage anomaly using in-situ groundwater level measurements in India. *Indo-US workshop*, Hyderabad, India (November, 2016). **[Invited talk]**
21. S. N. Bhanja, A. Mukherjee. Groundwater recharge estimation in India. *Geological Society of India annual meeting* (September, 2016).

22. S. N. Bhanja, A. Mukherjee, Y. Wada, B. Scanlon, R. Taylor, M. Rodell, P. Malakar. Present-day groundwater recharge estimation in parts of the Indian Sub-Continent. *AGU Fall meeting*, San Francisco, USA (December, 2015).
23. S. N. Bhanja, A. Mukherjee, M. Rodell, I. Velicogna, K. Pangaluru and J. S. Famiglietti. Groundwater storage changes over Indian Sub-Continent, A quantitative approach. *NSF Workshop on Development and Application of Analytical Tools in Support of Food-Energy-Water Nexus Planning*, Washington D. C. (October, 2015).
24. S. N. Bhanja, A. Mukherjee, M. Rodell, I. Velicogna, K. Pangaluru and J. S. Famiglietti. Regional groundwater storage changes in the Indian subcontinent: The role of anthropogenic activities. *AGU Fall meeting*, San Francisco, USA (December, 2014).
25. S. N. Bhanja, A. Mukherjee and M. Rodell. Potential delineation of groundwater storage using satellite-based vegetation index over parts of the Indian subcontinent. *GSA Annual Meeting*, Vancouver, Canada (October, 2014).
26. S. N. Bhanja and A. Mukherjee. Climate change impact on groundwater storage over parts of Indian subcontinent. *AGU Fall meeting*, San Francisco, USA (December, 2013).
27. S. N. Bhanja, A. Mukherjee and M. Rodell. Abstraction-triggered long term groundwater storage depletion in parts of the Ganges basin of the Indian subcontinent. *GSA Annual Meeting in Denver, USA: 125th Anniversary of GSA* (October 27-30, 2013).
28. S. N. Bhanja and A. Mukherjee. Satellite based estimates of groundwater storage depletion and its connection to climate change over Indian region. *Fourth National Research Conference on Climate Change*, presented in IIT Madras on October 26 and 27, 2013.
29. S. N. Bhanja, S. K. Pani and S. Verma. Wintertime Variability of Aerosol Properties over an Urban Location in east India: Implications for Shortwave Aerosol Radiative Forcing. *Conference of Indian Aerosol Science and Technology Association*, BARC, Mumbai, Dec 11-13 (2012).
30. S. Das Khan, D. Dutta, S. N. Bhanja and S. Verma. Seasonal Variation of Carbonaceous Aerosols at an Urban Region (Kolkata) in east India. *Conference of Indian Aerosol Science and Technology Association*, BARC, Mumbai, Dec 11-13 (2012).
31. S. K. Pani, S. Verma and S.N. Bhanja. Contribution of black carbon to the composite aerosol radiative forcing in an urban atmosphere in east India. *Conference of Indian Aerosol Science and Technology Association*, BARC, Mumbai, Dec 11-13 (2012).
32. S. K. Pani, S.N. Bhanja and S. Verma. Aerosol optical properties over Kolkata. *National Conference on Recent Advances in Chemical and Environmental Engineering* at NIT Rourkela, January 20-21 (2012).
33. S. N. Bhanja. Impact of natural and anthropogenic aerosols on hydrological cycle and climate change. *Workshop cum seminar series on "Challenges and opportunities in Air Pollution and Climate Change" (CHOP-C) under Germany-India-2012, "Infinite Opportunities" programme* at IITM Pune, January 16-18 (2012).
34. S. N. Bhanja, S. Verma and S. K. Pani. Wintertime aerosol properties and their implications to radiative forcing over Eastern India. *European Aerosol Conference*, Manchester, September 04-09 (2011).
35. S. Verma, S. N. Bhanja, M. Schulz and Y. Balkanski. Source evaluation of aerosols measured over the Indian subcontinent and ocean from combined measurement and modeling platforms. *European Aerosol Conference*, Manchester, September 04-09 (2011).
36. S. Verma, M. Schulz, Y. Balkanski, S. N. Bhanja and S. K. Pani. Source evaluation of the seasonal variation in aerosol optical depth distribution over the Indian subcontinent from combined measurement and modeling platforms. *Asian Aerosol Conference*, Xi'an (China), August 17-20 (2011).
37. S. K. Pani, S. Verma, and S. N. Bhanja. Variation in Wintertime Black Carbon Aerosols at an Urban Center in the Eastern India. *Asian Aerosol Conference*, Xi'an (China), August 17-20 (2011).
38. S. N. Bhanja and S. Verma. Seasonal Variation of aerosol Radiative forcing over the east coast of India. *Conference of Indian Aerosol Science and Technology Association, Aerosol and Clouds: Climate change perspective*, Darjeeling, Mar 24-26 (2010).
39. S. Nayak, M. Mandal, and S. Bhanja. Regional warming or cooling over India due to land use and land cover changes. *TROPMET, Advances in Weather and Climate Services*, Kolkata, May 19-21 (2010).

Other Academic Activities

1. Associate Editor for *Frontiers in Water* journal (<https://www.frontiersin.org/journals/water>)

2. Associate Editor for *Journal of Coastal and Riverine Flood Risk* (<https://journals.open.tudelft.nl/jcrfr>)
3. Edited a journal volume on topic "Water Supply Sustainability and Challenges in Asian Mega-deltas under Global Change" for *Frontiers in Water* journal.
4. Session chair at the American Geophysical Union (AGU) Annual Meeting 2024
5. Program committee member of Urban-AI 2023: 1st ACM SIGSPATIAL International Workshop on Advances in Urban-AI. Hamburg, Germany, November 13, 2023 (<https://easychair.org/cfp/UrbanAI-2023>)
6. Discovery grant proposal reviewer for the NSERC, Canada, 2022 – present.
7. Reviewer for journals (<https://www.webofscience.com/wos/author/record/P-9865-2018>):
 - Nature Geoscience (1)
 - Nature Communications (4)
 - Nature Water (2)
 - Geophysical Research Letters (5)
 - Journal of Hydrology (36)
 - Water Resources Research (14)
 - Hydrology and Earth System Sciences (1)
 - Journal of Hydrology: Regional Studies (17)
 - Advances in Water Resources (3)
 - Journal of Hydrometeorology (4)
 - Environmental Research Letters (7)
 - Science of the Total Environment (13)
 - Earth System Dynamics (2)
 - Remote Sensing (10)
 - Advances in Space Research (3)
 - Communications in Earth and Environment (3)
 - NPJ Climate and Atmospheric Science (1)
 - Hydrogeology Journal (3)
 - Water Resource Management (1)
 - International Soil and Water Conservation Research (2)
 - Environmental Development (1)
 - Hydrological Sciences Journal (10)
 - Scientific Reports (5)
 - ASCE Journal of Hydrologic Engineering (6)
 - Global Change Biology (2)
 - Journal of Earth System Science (3)
 - Applied Water Science (1)
 - Current Science (6)
 - Groundwater for Sustainable Development (9)
8. Played key role to set up the **Environmental Sciences Laboratory**, School of Environmental Sciences and Engineering, IIT Kharagpur. The lab has high-end analytical instruments worth over INR 28 crores (~USD 4 million). I was involved in preparation of technical specifications, tendering to procurement of multiple high-end instruments.
9. Reviewed an article on GRACE satellite mission for **National Academy of Sciences, USA**. Weblink: https://www.nap.edu/read/25754/pdf/frtr_annotated_amazinggrace.pdf
10. Experience in mentoring >10 Master's and Doctoral level students.

Skills

1. Machine learning (including deep learning) applications using PyTorch, TensorFlow in both CPUs and GPUs of high-performance computing (HPC) platforms
2. Code development using Python, R, Ferret (NOAA), FORTRAN, C/C++
3. Geo-spatial statistics, remote sensing and GIS applications using Python, R, Ferret (NOAA), QGIS, ArcGIS, Surfer
4. Software development platforms: Visual Studio Code, Jupyter Notebook, Xcode, Microsoft Visual Studio

5. Distributed hydrological model: Advanced Terrestrial Simulator (ATS)
6. Watershed to global scale hydrological model development and operation: SWAT, CLSM
7. Python-based automated input file creation: Watershed Workflow development
8. Experience in working on various US (DoE, NASA), French, and Indian high-performance computing (HPC) platforms
9. Plot creation and graphics software: Adobe Photoshop, Corel DRAW, Origin Pro, Inkscape, GIMP, Python
10. CFD-based visualization software: Paraview and Visit
11. Operating Systems- MacOS, LINUX (Fedora, Redhat, Ubuntu), Windows

Instruments Operated

1. Ion Chromatograph (models 761 and 883, Metrohm, Switzerland).
2. Electromagnetic Profiler (Geophysical Survey Systems Inc., USA).
3. Microtops II Sunphotometer (Solar Light Co., USA).
4. Optical particle counter (OPC, model 1.108, Grimm Aerosol Technik, GmbH, Germany).
5. Aethalometer (model AE-42, Magee Scientific, USA).
6. Submicron Aerosol sampler (fabricated at the Indian Institute of Technology Kharagpur).
7. Other instruments like: High Volume sampler, Atomic absorption Spectrophotometer (AAS), Laser Ablation Inductively Coupled Plasma Mass Spectrometer (LA ICP MS), X-Ray Fluorescence (XRF), X-Ray Diffraction (XRD), Electron Probe Micro-Analyzer (EPMA), Geiger Muelar (GM) counters, AC and DC resistivity meter.

Co-curricular Activities

1. Volunteer, Fulbright National Capital Area Chapter (NCAC), Washington D. C. 2015
2. President of Earth Science Study Circle (ESSC)- The official student organization of the Department of Geology and Geophysics, Indian Institute of Technology Kharagpur in the academic session 2013-14.

Member of Scientific/Professional Organizations

1. American Geophysical Union (AGU)
2. Geological Society of America (GSA)
3. European Geophysical Union (EGU)
4. International Association of Hydrogeologists (IAH)