


Sayantana Majumdar, Ph.D.

+1 (775)673-7663 • sayantana.majumdar@dri.edu
www.dri.edu/directory/sayantana-majumdar • [montimaj](#)
[in sayantanmajumdar](#) •  Sayantan Majumdar

About Me

I am currently an Assistant Research Professor of Hydrologic Sciences and Remote Sensing at the Desert Research Institute, Reno, Nevada. My research interests include hydrology, remote sensing, machine learning, geospatial data science, and scientific software development.

Research/Work Experience

- Desert Research Institute** **Reno, NV, USA**
Assistant Research Professor *Jun 2023–Present*
Working as an Assistant Research Professor of Hydrologic Sciences and Remote Sensing.
- Colorado State University** **Fort Collins, CO, USA**
Postdoctoral Fellow *Sep 2022–Jun 2023*
Worked with the U.S. Geological Survey (USGS) and Dr. Ryan Smith on hydrologic remote sensing and machine learning techniques to estimate agricultural water use in the Mississippi Alluvial Plain.
- Meta Platforms, Inc.** **Menlo Park, CA, USA**
Research Scientist Intern *May 2022–Aug 2022*
Worked with the Physical Modeling Team on their sustainability efforts related to nature-based carbon credits. Integrated high-resolution satellite imagery, LiDAR data sets, and deep learning for developing global reforestation monitoring products.
- Missouri University of Science and Technology** **Rolla, MO, USA**
Graduate Research Assistant *Fall 2021–Spring 2022*
Worked on hydrologic remote sensing involving large-scale geospatial data analysis and machine learning at the Remote Sensing Hydrology Lab, under the supervision of Dr. Ryan Smith. Also collaborated with the USGS to develop the Aquaculture and Irrigation Water-Use Model (AIWUM) version 2.0.
- Planet Labs** **Remote, USA**
Analytics Modeling Intern *Jun 2021–Aug 2021*
My primary focus area was on computer vision modeling using advanced remote sensing and machine learning (deep) techniques for high-resolution global inland surface water mapping. Developed an automated pipeline on the Google Cloud Platform which uses PlanetScope scenes and deep learning to monitor surface water bodies.
- Missouri University of Science and Technology** **Rolla, MO, USA**
Graduate Research Assistant *Spring 2021*
Graduate Teaching Assistant (Lab Instructor, GIS Class, GE 3148/GEOL 3811) *Fall 2020*
Student Research Assistant (Full-Time) *Summer 2020*
Graduate Teaching Assistant (Lab Instructor, Remote Sensing Class, GE 5144) *Spring 2020*
Graduate Research Assistant *Fall 2019*
- Indian Institute of Remote Sensing (IIRS), ISRO** **Dehradun, India**
Officer Trainee *Sep 2017–Mar 2019*
IIRS is an ISRO training center for capacity building and promoting space education. During this time, I was enrolled as an MSc student in the Geoinformatics department under the IIRS-ITC Joint Education Program.

Education & Research

Academic Qualifications

- **Missouri University of Science and Technology** **USA**
Ph.D. Geological Engineering, CGPA: 3.75/4 *Aug 2019–Sep 2022*
- **Faculty ITC, University of Twente** **Netherlands**
M.Sc. Geoinformatics, Graduated Cum Laude, CGPA: 8.9/10 *Sep 2017–Mar 2019*
- **St. Xavier's College (Autonomous) Kolkata** **India**
M.Sc. Computer Science, Graduated First Class, CGPA: 8.43/10 *Jul 2015–Jun 2017*
B.Sc. Computer Science (Hons.), Graduated First Class, CGPA: 7.08/10 *Jul 2012–Jun 2015*

Ongoing Projects

- ***Improving remote sensing and machine learning-driven groundwater withdrawal estimation in Arizona: Insights into surface water deliveries, irrigation efficiency, and long-term forecasts***
Major Goals: To enhance our existing machine learning and remote sensing-based model estimates in Arizona. The existing model will be improved to provide actionable withdrawal estimates in light of ongoing and future reductions in the Colorado River and other surface water bodies.
Status of Support: Current, **PI:** Dr. Ryan Smith, **Co-I:** Dr. Sayantan Majumdar
Source of Support: NASA
Project/Proposal Start and End Date: 01/2024 – 12/2024
Total Award Amount (including Indirect Costs): \$121,821, **Majumdar share:** \$105,343
- ***OpenET Planning***
Major Goals: The goal of the project is to enhance and work toward operationalizing the use of OpenET, a satellite-based ET-based cloud computing and data services platform co-led by the Desert Research Institute (DRI), and integrate OpenET data into a national scale hydrologic model to support the goals of the National Water Census and Water Availability and Use Science Program. The OpenET web application and data services provide equal access to information by all parties, helping stakeholders feel comfortable with the data while promoting better understanding of inherent uncertainties with respect to water use and supply planning.
Status of Support: Current, **PI:** Dr. Justin Huntington, **Majumdar role:** Faculty
Source of Support: DOI – USGS
Project/Proposal Start and End Date: 10/2023 – 09/2025
Total Award Amount (including Indirect Costs): \$875,000
- ***Nevada Water Resources Initiative***
Major Goals: The primary goals will be to estimate water use across the state associated with agriculture and natural groundwater discharge areas, and perform data collection and monitoring that will be used for water use model development and validation. These estimates will be foundational for updating groundwater withdrawals, consumptive use, water budgets, and future hydrologic modeling activities across the state. Additional activities in collaboration with Nevada Division of Water Resources (NDWR) and USGS will focus on providing climate, water use, and GIS data and analyses to support groundwater recharge, water availability, and water demand assessments across the state, and water budget assessments in priority basins.
Status of Support: Current, **PI:** Dr. Justin Huntington, **Majumdar role:** Faculty
Source of Support: State of Nevada / U.S. Dept. of the Treasury
Project/Proposal Start and End Date: 01/2023 – 12/2026
Total Award Amount (including Indirect Costs): \$3,128,748

Pending Projects

- ***Machine Learning-driven Assessment of Groundwater Level Changes in the Western U.S. using Remote Sensing and Climate Data: Developing Sustainable Research-PUI Partnership and Student Pathways into NASA-Themed Research***
Status of Support: Pending, **PI:** Dr. Sayantan Majumdar
Co-Is: Ms. Meghan Collins (DRI), Mr. Roger Putnam (TMCC), and Dr. JT Reager (JPL)

Source of Support: NASA

Project/Proposal Start and End Date: 07/2024 – 06/2026

Total Award Amount (including Indirect Costs): \$319,714

○ *Drinking Water Arsenic, Blood Pressure, and Ischemic Stroke in the REGARDS Study*

Status of Support: Pending, **PI:** Dr. Matthew Gribble (UCSF), **Co-Is:** Dr. Sayantan Majumdar (DRI), Dr. Ryan Smith (CSU)

Source of Support: NIH

Project/Proposal Start and End Date: 11/2023 – 07/2024

Total Award Amount to Majumdar (including Indirect Costs): \$43,002

Technical Skills

- **Programming Languages:** Proficient: Python, R, Java, C++. Familiar: Linux, MATLAB, SQL, Git, L^AT_EX.
- **Tools/IDEs:** Google Cloud, Kubeflow, Docker, Google Earth Engine, JIRA, ENVI, ERDAS IMAGINE, QGIS, ArcGIS, GMTSAR, ISCE2, SNAP, PyCharm, Jupyter Notebook, Google Colab, IntelliJ IDEA, VS Code, Android Studio.

Journal Publications

- [1] T. J. Ott*, **S. Majumdar***, J. L. Huntington, C. Pearson, M. Bromley, B. Minor, P. ReVelle, C. G. Morton, S. Sueki, J. P. Beamer, and R. Jasoni, "Toward field-scale groundwater pumping and improved groundwater management using remote sensing and climate data." Under review in Elsevier Agricultural Water Management. <http://doi.org/10.22541/essoar.170800918.86740881/v1> [*Equal contribution], 2024.
- [2] R. Bailey, S. Abbas, N. Čerkasova, J. Arnold, M. White, **S. Majumdar**, and R. Smith, "Quantifying agricultural groundwater pumping using an integrated watershed modeling approach." Under review in AGU Water Resources Research, 2024.
- [3] **S. Majumdar**, R. G. Smith, M. F. Hasan, J. L. Wilson, V. E. White, E. Bristow, J. R. Rigby, W. Kress, and J. A. Painter, "Improving crop-specific groundwater use estimation in the Mississippi Alluvial Plain: Implications for integrated remote sensing and machine learning approaches in data-scarce regions," *Journal of Hydrology: Regional Studies*, vol. 52, p. 101674, 2024. <https://doi.org/10.1016/j.ejrh.2024.101674>.
- [4] J. Tolan, H.-I. Yang, ..., **S. Majumdar**, *et al.*, "Very high resolution canopy height maps from rgb imagery using self-supervised vision transformer and convolutional decoder trained on aerial lidar," *Remote Sensing of Environment*, vol. 300, p. 113888, 2024. <https://doi.org/10.1016/j.rse.2023.113888>.
- [5] M. F. Hasan, R. Smith, S. Vajedian, R. Pommerenke, and **S. Majumdar**, "Global land subsidence mapping reveals widespread loss of aquifer storage capacity," *Nature Communications*, vol. 14, p. 6180, 2023. <https://doi.org/10.1038/s41467-023-41933-z>.
- [6] **S. Majumdar**, R. Smith, B. D. Conway, and V. Lakshmi, "Advancing remote sensing and machine learning-driven frameworks for groundwater withdrawal estimation in Arizona: Linking land subsidence to groundwater withdrawals," *Hydrological Processes*, vol. 36, no. 11, 2022. <https://doi.org/10.1002/hyp.14757>.
- [7] **S. Majumdar**, R. Smith, J. J. Butler Jr, and V. Lakshmi, "Groundwater withdrawal prediction using integrated multitemporal remote sensing data sets and machine learning," *Water Resources Research*, vol. 56, 2020. <https://doi.org/10.1029/2020WR028059>.
- [8] R. Smith and **S. Majumdar**, "Groundwater storage loss associated with land subsidence in western US mapped using machine learning," *Water Resources Research*, 2020. <https://doi.org/10.1029/2019WR026621>.

Data & Software Publications

- [1] **S. Majumdar**, R. G. Smith, M. F. Hasan, J. L. Wilson, V. E. White, E. L. Bristow, J. R. Rigby, W. H. Kress, and J. A. Painter, "Aquaculture and Irrigation Water Use Model (AIWUM) 2.0 input and output datasets," 2024. U.S. Geological Survey data release. <https://doi.org/10.5066/P9CET25K>.

- [2] **S. Majumdar**, R. G. Smith, M. F. Hasan, J. L. Wilson, V. E. White, E. L. Bristow, J. R. Rigby, W. H. Kress, and J. A. Painter, "Aquaculture and Irrigation Water Use Model 2.0 software," 2024. U.S. Geological Survey software release. <https://doi.org/10.5066/P137FIUZ>.
- [3] J. Tolan, H.-I. Yang, ..., **S. Majumdar**, *et al.*, "High Resolution Canopy Height Maps by WRI and Meta," 2023. Meta and World Resources Institute (WRI) - 2023. High Resolution Canopy Height Maps (CHM). Source imagery for CHM © 2016 Maxar. Data: <https://registry.opendata.aws/dataforgood-fb-forests/>, Code: <https://github.com/facebookresearch/HighResCanopyHeight>.

Conference Publications

- [1] **S. Majumdar**, R. Smith, B. D. Conway, J. J. Butler, V. Lakshmi, and C. H. Dagli, "Estimating local-scale groundwater withdrawals using integrated remote sensing products and deep learning," in *2021 IEEE Int. Geosci. and Remote Sens. Symp. (IGARSS)*, pp. 4304–4307, 2021. <https://ieeexplore.ieee.org/document/9554784> [Oral presentation: S. Majumdar].
- [2] **S. Majumdar**, P. K. Thakur, L. Chang, and S. Kumar, "X-band polarimetric SAR copolar phase difference for fresh snow depth estimation in the northwestern Himalayan watershed," in *2019 IEEE Int. Geosci. and Remote Sens. Symp. (IGARSS)*, pp. 4102–4105, 2019. <https://doi.org/10.1109/IGARSS.2019.8898884> [Poster presentation: S. Majumdar].
- [3] R. Ghosh, P. K. Gupta, V. Tolpekin, S. K. Srivastav, and **S. Majumdar**, "The potential of channel specific reflectance in Landsat 8 OLI sensor for retrieving coal fire affected pixels," in *2019 IEEE Int. Geosci. Remote Sens. Symp. (IGARSS)*, pp. 9968–9971, 2019. <https://doi.org/10.1109/IGARSS.2019.8900618> [Poster presentation: S. Majumdar].
- [4] A. Maiti, **S. Majumdar**, S. Shukla, S. R. Koti, and P. K. Gupta, "An open source WebGIS-based precise satellite tracking and visualisation tool using two line element data," in *ISPRS Ann. Photogramm. Remote Sens. Spat. Inf. Sci.*, vol. IV-5, pp. 109–114, 2018. <https://doi.org/10.5194/isprs-annals-IV-5-109-2018> [Oral presentation: A. Maiti].
- [5] **S. Majumdar**, S. Shukla, and A. Maiti, "Open agent based runoff and erosion simulation (OARES): A generic cross platform tool for spatio-temporal watershed monitoring using climate forecast system reanalysis weather data," in *ISPRS Ann. Photogramm. Remote Sens. Spat. Inf. Sci.*, vol. IV-4, pp. 125–132, 2018. <https://doi.org/10.5194/isprs-annals-IV-4-125-2018> [Oral presentation: S. Majumdar].
- [6] S. Shukla, **S. Majumdar**, A. Maiti, and S. Kumar, "New insights into solar wind implanted volatiles for lunar regolith characterization: A simulation based approach," in *ISPRS Ann. Photogramm. Remote Sens. Spat. Inf. Sci.*, vol. IV-4, pp. 199–206, 2018. <https://doi.org/10.5194/isprs-annals-IV-4-199-2018> [Oral presentation: S. Shukla].
- [7] S. Gupta, C. Shah, D. Shah, P. Deore, **S. Majumdar**, A. Maiti, S. Shukla, J. Mehta, and M. Shah, "A grass root oriented urban planning approach to uplift the socio-economic facet of a city using 2D and 3D GIS: Case study on Mehmedabad City, India," in *ISPRS Ann. Photogramm. Remote Sens. Spat. Inf. Sci.*, vol. IV-4, pp. 73–80, 2018. <https://doi.org/10.5194/isprs-annals-IV-4-73-2018>.
- [8] A. Maiti, **S. Majumdar**, S. Bhattacharjee, and A. Nath, "Smart input: Provide mouse and keyboard input to a PC from android devices," in *2017 7th Int. Conf. Commun. Syst. Netw. Technol.*, pp. 314–319, IEEE, 2017. <https://doi.org/10.1109/CSNT.2017.8418558> [Oral presentation: A. Nath].
- [9] **S. Majumdar**, A. Maiti, and A. Nath, "New secured steganography algorithm using encrypted secret message inside QRTM code: System implemented in android phone," in *2015 Int. Conf. Comput. Intell. Commun. Networks*, pp. 1130–1134, IEEE, 2015. <https://doi.org/10.1109/CICN.2015.329> [Oral presentation: A. Nath].

Conference Abstracts

- [1] **S. Majumdar**, T. J. Ott, J. L. Huntington, R. G. Smith, C. Pearson, M. Bromley, B. Minor, C. G. Morton, P. ReVelle, M. F. Hasan, J. P. Beamer, and B. D. Conway, "Tracking groundwater pumping, consumptive use,

- and irrigation efficiencies in the Western U.S. through OpenET," in *AGU WaterSciCon24*, (Minneapolis, MN), 2024. [Oral presentation on June 25, 2024: S. Majumdar].
- [2] **S. Majumdar**, "Regional and field scale estimates of groundwater withdrawals using remote sensing and climate data," in *OpenET Applications Conference*, (Albuquerque, NM), 2024. [Oral presentation].
- [3] **S. Majumdar**^{*}, T. J. Ott^{*}, J. L. Huntington, C. Pearson, M. Bromley, B. Minor, C. G. Morton, S. Sueki, J. P. Beamer, and R. Jasoni, "Assessing statistical and machine learning approaches to estimate field-scale groundwater pumping using Landsat-based evapotranspiration, irrigation, and climate data," in *AGU Chapman Conference: Remote Sensing of the Water Cycle*, (Honolulu, HI), 2024. [*Equal contribution, Poster presentation: S. Majumdar].
- [4] T. J. Ott, J. L. Huntington, M. Bromley, C. G. Morton, S. Sueki, and **S. Majumdar**, "Estimating field-scale groundwater pumping using Landsat evapotranspiration and climate data: Insights into Diamond Valley, Nevada," in *NWRA Annual Conference*, (Las Vegas, NV), 2024. [Oral presentation: T.J. Ott].
- [5] **S. Majumdar**^{*}, T. J. Ott^{*}, J. L. Huntington, R. Smith, B. Fang, and V. Lakshmi, "Toward field scale groundwater withdrawals in the Western U.S. using remote sensing and climate data," in *AGU Fall Meet.*, (San Francisco, CA), 2023. <https://doi.org/10.22541/essoar.170688858.81127989/v1> [*Equal contribution, Poster presentation: S. Majumdar, T.J. Ott].
- [6] D. Asfaw, R. Smith, **S. Majumdar**, B. Lakshmi, V. Fang, K. Grote, J. J. Butler, and B. B. Wilson, "Capturing the spatio-temporal variability of groundwater pumping using remote sensing products and machine learning techniques: An assessment of training data quality and quantity implications on model performance," in *AGU Fall Meet.*, (San Francisco, CA), 2023. [Poster presentation: D. Asfaw].
- [7] **S. Majumdar** and R. Smith, "Integrating remote sensing and machine learning for high-resolution groundwater use estimation," in *AGU Hydrology Days*, (Fort Collins, CO), 2023. https://hydrologydays.colostate.edu/wp-content/uploads/2023/04/AGU-Hydrology-Days_2023_Proceedings.pdf [Oral presentation: S. Majumdar].
- [8] **S. Majumdar**, R. Smith, M. F. Hasan, V. E. White, E. Bristow, W. Kress, and J. R. Rigby, "High-resolution groundwater use estimation at annual and monthly scales in the Mississippi Alluvial Plain using remote sensing and machine learning," in *AGU Fall Meet.*, (Chicago, IL), 2022. <https://ui.adsabs.harvard.edu/abs/2022AGUFM.H25T1359M/abstract> [Poster presentation: S. Majumdar].
- [9] M. F. Hasan, R. Smith, S. Vajedian, R. Pommerenke, and **S. Majumdar**, "Linking subsidence and groundwater storage loss: Investigating drivers and trends using big data," in *AGU Fall Meet.*, (Chicago, IL), 2022. <https://ui.adsabs.harvard.edu/abs/2022AGUFMNS23A..08H/abstract> [Oral presentation: M.F. Hasan].
- [10] D. Asfaw, R. Smith, **S. Majumdar**, V. Lakshmi, K. Grote, and J. J. Butler, "Towards generalizable groundwater withdrawal predictions: How much data do we need?," in *AGU Fall Meet.*, (Chicago, IL), 2022. <https://ui.adsabs.harvard.edu/abs/2022AGUFM.H25T1364A/abstract> [Poster presentation: D. Asfaw].
- [11] **S. Majumdar**, R. Nair, A. Kapadia, J. M. Manso, C. Bronstein, B. Neuberg, S. Roy, B. Goldenberg, J. Davis, K. Jordahl, and R. Smith, "High-resolution global inland surface water monitoring using PlanetScope data and supervised learning with bootstrapped noisy labels," in *AGU Fall Meet.*, (New Orleans, LA), 2021. <https://doi.org/10.1002/essoar.10508281.1> [Poster presentation: S. Majumdar].
- [12] **S. Majumdar**, R. Smith, M. F. Hasan, J. L. Wilson, E. Bristow, L. Oyler, and J. R. Rigby, "Using remote sensing and machine learning to estimate groundwater use in the Mississippi Alluvial Plain," in *AGU Fall Meet.*, (New Orleans, LA), 2021. <https://doi.org/10.1002/essoar.10508282.1> [Poster presentation: S. Majumdar].
- [13] R. Smith, **S. Majumdar**, L. Oyler, R. Pommerenke, J. Li, M. F. Hasan, J. J. Butler, V. Lakshmi, B. D. Conway, J. R. Rigby, R. Knight, and M. Goebel, "Modeling hydrogeologic fluxes and their impact on natural and human systems," in *AGU Fall Meet.*, (New Orleans, LA), 2021. <https://ui.adsabs.harvard.edu/abs/2021AGUFMNS43A..02S> [Oral presentation: R. Smith].
- [14] M. F. Hasan, R. Smith, R. Pommerenke, and **S. Majumdar**, "Mapping global land subsidence using remote sensing and machine learning," in *AGU Fall Meet. 2021*, (New Orleans, LA), 2021. <https://ui.adsabs.harvard.edu/abs/2021AGUFMNS25B0425H> [Poster presentation: M.F. Hasan].

- [15] R. Smith, **S. Majumdar**, M. F. Hasan, J. J. Butler, V. Lakshmi, B. D. Conway, and J. R. Rigby, "Mapping groundwater use with satellite sensor fusion and machine learning," in *GSA Connects*, (Portland, OR), 2021. <https://doi.org/10.1130/abs/2021AM-369568> [Oral presentation: R. Smith].
- [16] **S. Majumdar**, R. Smith, B. D. Conway, J. J. Butler, and V. Lakshmi, "Integrating remote sensing and machine learning for groundwater withdrawal estimation in Arizona," in *AGU Fall Meet.*, (Online), 2020. <https://ui.adsabs.harvard.edu/abs/2020AGUFMH030.0018M> [Poster presentation: S. Majumdar].
- [17] **S. Majumdar**, R. Smith, B. D. Conway, J. J. Butler, and V. Lakshmi, "Estimating groundwater withdrawals using multi-temporal remote sensing products and machine learning," in *USGIF GeoConnect Series*, (Online), 2020. <https://doi.org/10.13140/RG.2.2.32065.92009> [Oral presentation: S. Majumdar].
- [18] R. Smith, **S. Majumdar**, L. Oyler, J. J. Butler, and V. Lakshmi, "A machine learning approach for estimating groundwater use with satellite data," in *AGU Chapman Conf.*, (Valencia, Spain), 2019. <https://agu.confex.com/agu/19chapman5/meetingapp.cgi/Paper/488318> [Poster presentation: S. Majumdar].
- [19] R. Smith, **S. Majumdar**, L. Oyler, J. J. Butler, and V. Lakshmi, "Estimating groundwater extraction with integrated satellite datasets and machine learning," in *GSA Annual Meet.*, (Phoenix, AZ), 2019. <https://doi.org/10.1130/abs/2019AM-340862> [Oral presentation: R. Smith].
- [20] **S. Majumdar**, P. K. Thakur, L. Chang, S. Kumar, and R. Smith, "Spaceborne polarimetric SAR interferometry for snow depth retrieval in the northwestern Himalayan watershed," in *GSA Annual Meet.*, (Phoenix, AZ), 2019. <https://doi.org/10.1130/abs/2019AM-338916> [Oral presentation: S. Majumdar].

Dissertation and Thesis

- [1] **S. Majumdar**, *Groundwater Withdrawal Estimation using Integrated Remote Sensing Products and Machine Learning*. Ph.D. Dissertation, Missouri University of Science and Technology, Rolla, MO, 2022. Available at https://scholarsmine.mst.edu/doctoral_dissertations/3230/.
- [2] **S. Majumdar**, "Snow depth and SWE estimation using Spaceborne Polarimetric and Interferometric Synthetic Aperture Radar," M.Sc. Thesis, ITC, University of Twente, Enschede, Netherlands, 2019. Available at <https://essay.utwente.nl/83533/1/majumdar.pdf>.

Professional Service and Volunteering Activities

- **NASA Panelist**, Oct-Nov 2023: Panel Reviewer for the NASA Early Career Investigator Program in Earth Science (ECIP-ES).
- **Journal Reviewer**: Reviewed manuscripts for AGU Water Resources Research, Elsevier Journal of Hydrology, Journal of Hydrology: Regional Studies, Science of The Total Environment (STOTEN), Environmental Modelling & Software, Advances in Space Research, Springer Hydrogeology Journal, ASCE Journal of Hydrologic Engineering, EGU Hydrology and Earth System Sciences (HESS), IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTARS), IEEE Transactions on Geoscience and Remote Sensing (TGRS), Taylor & Francis Imaging Science, and others.
- **DRI STEM Educator & Student Partnership PD Workshop**, Nov 18, 2023: I volunteered as one of the three DRI faculty members selected for this workshop. I interacted with twenty University of Nevada Reno (UNR) undergraduate and graduate students and shared my research experience, answered their questions, and listened to their interesting project ideas and presentations.
- **Colorado State University**, Nov 16, 2022: Volunteered as a judge at the Fall Graduate Student Showcase.
- **The Nature Conservancy**, Dec 2021- Jul 2023: Participated as a Conservation Champion to tackle climate change.
- **IEEE IGARSS 2021**, Jul 12-16, 2021: Co-chaired the conference session WE2.MM-10: Parameter Retrieval with SAR, LiDAR and New Systems.
- **Frontier Development Lab (FDL)**, Jun 2021-Aug 2021: Participated as an external reviewer (on behalf of Planet Labs) on the FDL 2021 ML Payload for PhiSat2 and Beyond challenge.

- **American Society for Photogrammetry and Remote Sensing (ASPRS)**, Heartland Region, Sep 2020-May 2022: Volunteered as the Secretary in the ASPRS Heartland Region. Primary activities included briefing the board on monthly meetings and taking notes in such meetings.
- **American Geophysical Union (AGU) Fall Meeting**, Dec 1-17, 2020: Student volunteering responsibilities included attending three specific sessions on remote sensing and hydrology, taking notes, and engaging in Q&A.
- **Semi-Automatic Classification Plugin for QGIS**, Apr 2020: Fixed a bug in this popular QGIS plugin used for remote sensing image classification.
- **National Service Scheme (NSS)**, Jul 2012-June 2015: Involved in the NSS program at St. Xavier's College (Autonomous) Kolkata. Primarily taught basic English and Mathematics to underprivileged children from different villages in southern West Bengal, India.

Scientific, Technical, and Management Experience

My primary contribution to the field of hydrology lies in developing open-source tools for high-resolution groundwater use estimation integrating remote sensing and machine learning. The approach I developed during my Ph.D. is the first work on estimating groundwater withdrawals at local scales using data-driven methodologies. Moreover, I compared modeled groundwater withdrawals and InSAR-derived subsidence data in Arizona, which is the first study to explore the relationship between withdrawals and subsidence across a vast geographical area. I also improved an existing USGS-developed groundwater use model in the Mississippi Alluvial Plain and developed the first field-scale groundwater use estimation model integrating remote sensing and hydroclimate data in a machine learning workflow.

As an early career faculty member at the Desert Research Institute, my goal is to build a Geospatial Analytics research group with students and postdoctoral researchers working on problems at the intersection of remote sensing, machine learning, and geospatial data science focusing on hydrology, as well as other related Earth science domains. Over the years, I have collaborated with the USGS, Kansas Geological Survey (KGS), Arizona Department of Water Resources (ADWR), Nevada Division of Water Resources (NDWR), and Oregon Water Resources Department (OWRD). I have also successfully led and co-authored multiple publications, including conference presentations with these agencies and other university faculties and industries (Meta, Planet Labs), showcasing my efficient research project management skills.

Academic Achievements

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| 2024 | AGU Chapman Conference Early Career Travel Grant, Honolulu, Hawaii, USA |
| 2023 | Selected as a panel reviewer for the NASA Early Career Investigator Program in Earth Science (ECIP-ES) |
| 2023 | Research proposal selected as part of the NASA ROSES 2022 Applications-Oriented Augmentations for Research and Analysis solicitation |
| 2023 | Feature story in the Department of Civil and Environmental Engineering (CIVE), Colorado State University news |
| 2023 | Feature story in the Desert Research Institute news and announcements |
| 2020 | 4 th prize, Poster Competition, Council of Graduate Students, Missouri S&T |
| 2020 | Winner of 2020 GGF/G-RES Poster Competition, USGIF |
| 2020 | AGU Fall Meeting Virtual Student Travel Grant |
| 2020 | Research work showcased in popular science news platform, phys.org |
| 2020 | Research work highlighted in Missouri S&T News and Events |
| 2020 | Research article showcased in AGU Editors' Highlights |
| 2020 | Geological Society of America (GSA) CARES Grant, USA |
| 2019 | AGU/NSF Student Travel Grant, AGU Chapman Conference, USA/Spain |
| 2019 | GSA North-Central Section Student Travel Grant, GSA Annual Meeting, USA |
| 2019 | IGARSS 2019 Student Travel Grant, IEEE/GRSS, USA/Japan |
| 2018-19 | Golden Jubilee Fellowship, IIRS, ISRO, India (1 st position in Blocks I-IV) |
| 2016 | Summer Research Fellowship, Indian Academy of Sciences, IIT Madras |