Raghavendra B. Jana, Ph. D.

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Skolkovo Institute of Science and Technology
Skolkovo Innovation Centre
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Curriculum Vitae

EXPERTISE

Enviromics & Envirotyping	Data Science
Hydrology	Digital Agriculture
Soil Physics	Remote Sensing Applications
Physical and Statistical Modeling	AI/ML Applications

EDUCATION

Ph. D., Biological and Agricultural Engineering, 2010
Texas A&M University, College Station, TX
Focus: Soil Hydrology
Dissertation Title: Scaling Characteristics of Soil Hydraulic Parameters at Varying Spatial Resolutions
Advisor: Dr. Binayak P. Mohanty

M. E., Civil Engineering, 2004
Texas A&M University, College Station, TX
Focus: Pavement Materials
Thesis Title: Surface Energy Characteristics of Bitumen Additives
Advisor: Dr. Dallas N. Little

B. Eng., Civil Engineering, 2001
M. S. Ramaiah Institute of Technology, Bangalore University, India

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EMPLOYMENT

Assistant Professor [July 2023 onwards]
Skolkovo Institute of Science and Technology, Center for AgroTechnologies, Moscow, Russia.

- Leading the Envirotyping and Digitalization thrust area of the Center;
- Generating demand-driven research solutions for the agro industry;
- Fusion of process- and data-based modeling and analyses for enhancement of agricultural productivity and sustainability;
- Improving the level of agricultural knowledge and technology adoption in the industry;
- Developing and executing industrial collaboration projects;
- Teaching courses related to environmental science, remote sensing, GIS, and digital agriculture within the Agro Track of the Life Sciences Program and Scientific Training Center (Bayer-funded);
- Mentoring Ph. D. and Masters' students;

- Analyzing environmental dynamics, crop health and growth patterns, irrigation and fertigation requirements for efficient resource management;
- Integrating AI/ML techniques with agro-environmental processes for better yield prediction;
- Incorporating environmental effects in seed breeding studies;
- Designing and implementing a decision support system to assist managers in enhanced management effectiveness for agricultural and ecological applications.

Co-Founder and Chief Technology Officer [May 2023 onwards]
EnvAgro, Skoltech spinoff startup, Moscow, Russia.
- Development and implementation of a holistic platform for
  - intelligent, environment-augmented crop yield forecasts;
  - time-specific recommendations for agronomic operations;
  - early warnings on disease/pest infestations.

Adjunct Professor [March 2020 onwards]
SRM Institute of Science and Technology, Department of Computer Science and Engineering, Chennai, India.
- Collaborating/advising on research projects related to hydrology, agriculture, or environmental science;
- Teaching cross-disciplinary courses on environmental and data sciences;
- Mentoring undergraduate and graduate students.

Senior Research Scientist [January 2021 – July 2023]
Skolkovo Institute of Science and Technology, Project Center for AgroTechnologies (previously Digital Agriculture Laboratory), Moscow, Russia.

- Leading the Envirotyping and Digitalization thrust area of the Center;
- Developing and executing industrial collaboration projects;
- Analyzing environmental dynamics, crop health and growth patterns, irrigation and fertigation requirements for efficient resource management;
- Integrating AI/ML techniques with agro-environmental processes for better yield prediction;
- Incorporating environmental effects in seed breeding studies;
- Designing and implementing a decision support system to assist managers in enhanced management effectiveness for agricultural and ecological applications;
- Teaching within the Agro Track of the Life Sciences Program and Scientific Training Center (Bayer-funded);
- Mentoring Ph. D. and Masters' students.

EMPLOYMENT
(CONTINUED)

Senior Research Scientist [May 2018 – December 2020]

Skolkovo Institute of Science and Technology, Center for Computational and Data Intensive Science and Engineering, Moscow, Russia.

- Integrating AI/ML techniques with soil hydrology for better state and flux estimation;
- Identification and application of AI/ML techniques to solve agro-hydrological problems;
- Implementing AI for 3D soil mapping from sparse measurements;
- Deploying new IoT networks of field-based sensors and data-loggers;
- Analyzing resulting data for soil moisture dynamics, crop health and growth patterns, irrigation and fertigation requirements;
- Implementing a decision support system to assist managers in enhanced water management for agricultural, domestic and ecological applications;
- Mentoring one Ph. D. and one Masters' student.

Research Associate [April 2017 – March 2018]

Indian Institute of Science, Department of Civil and Environmental Engineering, Bengaluru, India.

- Developing approaches, tools & models for advanced hydrological assessment to deliver downscaled hydrological data at sub-and micro-watershed scales;
- Implementing new field-based sensors and data-loggers, and analyzing resulting data;
- Improving a decision support system to assist managers in enhanced water management for agricultural, domestic and ecological applications;
- Mentoring a graduate student in their research efforts.

Post-Doctoral Fellow [December 2014 – December 2016]

King Abdullah University of Science and Technology, Water Desalination and Reuse Center, Biological and Environmental Science and Engineering Division, Saudi Arabia.

- Analysis of data pertaining to soil moisture and other hydrological processes;
- Modeling of relationships between soil moisture and salinity data in arid regions;
- Developing a decision support system to aid farmers in more efficient irrigation and fertilizer application based on analysis of history data and numerical modeling;
- Validating evapotranspiration models using alternative intermediate resolution datasets;

EMPLOYMENT (CONTINUED)

- Assimilating coarse resolution observations with high resolution modeling for scaling of soil moisture maps.

Visiting Scientist *[May – June 2015]*

University of Stuttgart, Non-linearities and Upscaling in Porous Media (NUPUS), Institute for Water and Hydrosystems Modeling, Germany.

- Collaborative research on development of a new modeling environment for subsurface moisture and salinity dynamics in arid regions;
- Co-supervising a Masters student.

Post-Doctoral Fellow *[December 2012 – December 2014]*

King Abdullah University of Science and Technology, Numerical Porous Media SRI Center, Computer, Electrical, and Mathematical Sciences and Engineering Division, Saudi Arabia.

- Developing innovative algorithms for soil hydrologic parameters scaling;
- Integrating multi-platform, multi-scale data into scaling algorithms;
- Exposure to cutting-edge mathematical techniques such as mode decomposition and iso-geometric analysis;
- Utilizing novel mathematical and computational techniques to address hydrological issues, such as sensor location and efficient simulations;
- Assessing effects of soil hydrophobicity on infiltration processes in arid climates;
- Mentoring a graduate student in their research efforts.

Post-Doctoral Research Associate *[May 2010 – December 2012]*

Texas A&M University, Biological and Agricultural Engineering, College Station, Texas, USA.

- Developing a comprehensive software for scaling of soil hydraulic parameter data with multiple methodologies;
- Improving performance of hydrologic parameter scaling algorithms;
- Integrating multi-platform data into scaling algorithms;
- Incorporating scale-specific dominant physical processes into scaling algorithms;
- Developing new research proposals for external funding;
- Managing laboratory operations, scheduling, budgeting, and procurement;
- Mentoring four graduate students in their research efforts.

Graduate Research Assistant *[September 2004 – May 2010]*

Texas A&M University, Biological and Agricultural Engineering, College Station, Texas, USA.

EMPLOYMENT (CONTINUED)	• Scaling and characterization of soil hydraulic properties at multiple spatial scales – from point-scale to watershed/regional-scale;
	• Developing new techniques to estimate soil hydraulic parameters;
	• Developing multi-scale 3D-models for vadose zone hydrology;
	• Developing a Bayesian neural networks framework for estimation of soil water content values at varying resolutions from secondary data.

Graduate Research Assistant [January 2003 – May 2004]
Texas A&M University, Civil Engineering, College Station, Texas, USA.

- Analyzing surface energy characteristics of bitumen additives;
- Developing a framework for measurement of contact angles between bitumen additives and wetting medium.

GRANTS AWARDED	*Industrial Research Funding*
	Exploratory Research Grant [2021]*
	JSC Rassvet (Unit of Progress Agro), Krasnodar, Russia
	Amount: ₽ 1,230,000
* - PI	Title: Prediction of crop yield using drought index analysis
** - PROJECT LEAD	Lead Institute: Skoltech, Moscow, Russia
	External Research Funding
*** - KEY TEAM MEMBER	**Competition for conducting fundamental scientific research and exploratory scientific research by small separate scientific groups** [2022-2024]***
	Russian Science Foundation, Russia
	Amount: ₽ 3,000,000
	Title: Determination of porosity, moisture saturation and soil hydraulic parameters with ultrasonic methods
	Lead Institute: Kuban State University, Krasnodar, Russia
	AI for Earth Azure Compute Grant [2020 – 2021]**
	Microsoft, USA
	Amount: $ 15,000
	Title: Digital Soils: 3D reconstruction of soil properties to aid water and contaminant transport modeling
	Lead Institute: Skoltech, Moscow, Russia
	NASA Earth System Science Fellowship [2006 – 2009]*
	National Aeronautics and Space Administration (NASA), USA
	Amount: $ 78,000
	Title: Use of Satellite Data for Soil Parameter Estimation in the Rio Grande Basin.
	Lead Institute: Texas A&M University, College Station, Texas, USA.

GRANTS **A**WARDED (CONTINUED)	***Start-up Seed Funding***

Exploratory Research Grant [2024]***
Foundation for Assistance to Small Innovative Enterprises (FASIE), Russia
Amount: ₽ 4,000,000
Title: Development and testing of a prototype of a new generation intelligent platform for yield forecasting
Recipient: EASY LLC, Moscow, Russia

Intramural Funding

Skoltech Translational Research and Innovation Program (STRIP)
[2023 – 2024]**
Amount: ₽ 5,000,000
Title: Environment-Augmented Smart Yield (EASY)
Institution: Skoltech, Moscow, Russia.

KAUST – Water Desalination and Reuse Center [2014 – 2016]*
Amount: $ 90,000
Title: Modeling Soil Water and Salinity Dynamics Under Central Pivot Irrigated Fields for Enhanced Water Use Efficiency
Institution: KAUST, Thuwal, Saudi Arabia.

* - PI

** - PROJECT LEAD

*** - KEY TEAM MEMBER

INNOVATION / **T**ECHNOLOGY **T**RANSFER

Co-Founder and Chief Technology Officer
EnvAgro LLC
Skoltech spinoff startup established to commercialize agro-tech products.

Co-Founder
EASY LLC
Skoltech spinoff startup established to commercialize the Environment-Augmented Smart Yield prediction platform.

PEER **R**EVIEWED **J**OURNAL **A**RTICLES

(CLICK ON DOI TO ACCESS ARTICLE SOURCE)

1. Busari, I., D. Sahoo, and **R. B. Jana** (2024), Prediction of Harmful Algal Blooms using Deep Learning with Bayesian Approximation for Uncertainty Assessment, *Journal of Hydrology*, 630, 130627, doi: 10.1016/j.jhydrol.2024.130627. (Journal Ranking: Q1; IF: 6.400)

2. Fomenko, S. I., **R. B. Jana**, and M. V. Golub (2023), Numerical modeling of elastic wave propagation in porous soils with vertically inhomogeneous fluid contents due to infiltration, *Mathematics*, 11(19), pp 4131, doi: 10.3390/math11194131. (Journal Ranking: Q2; IF: 3.400)

3. Poornima, S., M. Pushpalatha, **R. B. Jana**, and L. A. Patti (2023), Rainfall Forecast and Drought Analysis for Recent and Forthcoming Years in India, *Water*, 15(3), pp 592, doi: 10.3390/w15030592. (Journal Ranking: Q1; IF: 3.530)

4. Djouider, S. I., L. Gentzbittel, **R. B. Jana**, M. Rickauer, C. Ben, and M. Lazalli (2022), Contribution to improving chickpea (Cicer arietinum L.) efficiency in low-phosphorus farming systems: Assessment of the relationships between P and N nutrition, nodulation capacity and productivity performance in P-deficient field conditions, *Agronomy*, 12, pp 3150, doi: 10.3390/agronomy12123150. (Journal Ranking: Q1; IF: 3.949)

5. Petrovskaia, A., **R. B. Jana**, and I. V. Oseledets (2022), A single image deep learning approach to restoration of corrupted remote sensing products, *Sensors*, 22, pp 9273, doi: 10.3390/s22239273. (Journal Ranking: Q1; IF: 3.847)

6. Matvienko, I., M. Gasanov, A. Petrovskaia, M. Kuznetsov, **R. B. Jana**, M. Pukalchik, and I. V. Oseledets, (2022), Bayesian aggregation improves traditional single image crop classification approaches, *Sensors*, 22, pp 8600, doi: 10.3390/s22228600. (Journal Ranking: Q1; IF: 3.847)

7. Pourshamsaei, H., A. Nobakhti, and **R. B. Jana** (2021), Adaptive Proper Orthogonal Decomposition for large scale reliable soil moisture estimation, *Measurement Science and Technology*, 32, pp 10, doi: 10.1088/1361-6501/ac16af. (Journal Ranking: Q2; IF: 2.398)

8. Shadrin, D., A. Nikitin, P. Tregubova, V. Terekhova, **R. B. Jana**, S. Matveev, and M. Pukalchik (2021), An automated approach to groundwater quality monitoring – Geospatial mapping based on combined application of Gaussian Process Regression and Bayesian Information Criterion, *Water*, 13(4), pp 400, doi: 10.3390/w13040400. (Journal Ranking: Q1; IF: 3.530)

9. Spiridonov, D., M. Vasilyeva, E. T. Chung, Y. Efendiev, and **R. B. Jana** (2020), Multiscale model reduction of unsaturated flow problem in heterogeneous porous media with rough surface topography, *Mathematics*, 8(6), pp 904, doi: 10.3390/math8060904. (Journal Ranking: Q2; IF: 2.592)

10. Arora, B., D. Dwivedi, B. A. Faybishenko, **R. B. Jana**, and H. M. Wainwright (2019), Understanding and predicting vadose zone processes, *Reviews of Mineralogy and Geochemistry*, 85 (1), pp 303, doi: 10.2138/rmg.2019.85.10. (Journal Ranking: Q1; IF: 5.630)

11. **Jana, R. B.**, A. Ershadi, and M. F. McCabe (2016), Examining the relationship between intermediate scale soil moisture and terrestrial evaporation within a semi-arid grassland, *Hydrology and Earth System Sciences*, 20(10), pp 3987, doi: 10.5194/hess-20-3987-2016. (Journal Ranking: Q1; IF: 6.617)

12. **Jana, R. B.**, and B. P. Mohanty (2012), On topographic controls of soil hydraulic parameter scaling at hill-slope scales, *Water Resources Research*, 48(2), doi: 10.1029/2011WR011204. (Journal Ranking: Q1; IF: 6.159)

PEER REVIEWED JOURNAL ARTICLES (CONTINUED)	13. **Jana, R. B.**, and B. P. Mohanty (2012), A topography-based scaling algorithm for soil hydraulic parameters at hill-slope scales: Field testing, *Water Resources Research*, 48(2), doi: 10.1029/2011WR011205. (Journal Ranking: Q1; IF: 6.159)

13. **Jana, R. B.**, and B. P. Mohanty (2012), A topography-based scaling algorithm for soil hydraulic parameters at hill-slope scales: Field testing, *Water Resources Research*, 48(2), doi: 10.1029/2011WR011205. (Journal Ranking: Q1; IF: 6.159)

14. **Jana, R. B.**, and B. P. Mohanty (2012), A comparative study of multiple approaches to soil hydraulic parameter scaling applied at the hill-slope scale, *Water Resources Research*, 48(2), doi: 10.1029/2011WR010185. (Journal Ranking: Q1; IF: 6.159)

15. **Jana, R. B.**, B. P. Mohanty, and Z. Sheng (2012), Upscaling soil hydraulic parameters in the Picacho Mountain region using Bayesian Neural Networks, *Transactions of the ASABE*, 55(2), pp 463, doi: 10.13031/2013.41396. (Journal Ranking: Q2; IF: 1.238)

16. **Jana, R. B.**, and B. P. Mohanty (2011), Enhancing PTFs with remotely sensed data for multi-scale soil water retention estimation, *Journal of Hydrology*, 399(3-4), pp 201, doi: 10.1016/j.jhydrol.2010.12.043. (Journal Ranking: Q1; IF: 6.708)

17. **Jana, R. B.**, B. P. Mohanty, and E. P. Springer (2008), Multiscale Bayesian neural networks for soil water content estimation, *Water Resources Research*, 44(8), W08408, doi: 10.1029/2008WR006879. (Journal Ranking: Q1; IF: 6.159)

18. **Jana, R. B.**, B. P. Mohanty, and E. P. Springer (2007), Multiscale pedotransfer functions for soil water retention, *Vadose Zone Journal*, 6(4), 868-878, doi: 10.2136/vzj2007.0055. (Journal Ranking: Q1; IF: 2.945)

BOOK CHAPTERS	1. Mohanty, B. P., A. V. M. Ines, Y. Shin, N. Gaur, N. N. Das, and **R. B. Jana** (2016), A Framework for Assessing Soil Moisture Deficit, and Crop Water Stress at Multiple Space and Time Scales Under Climate Change Scenarios Using Model Platform, Satellite Remote Sensing, and Decision Support System. In: *Remote Sensing of Hydrological Extremes*, Lakshmi, V. (Ed.), Springer Remote Sensing/Photogrammetry, Springer, doi: 10.1007/978-3-319-43744-6_9.

OTHER PEER REVIEWED PUBLICATIONS	1. Busari, I., D. Sahoo, **R. B. Jana**, and C. Privette (2023), Chlorophyll a Predictions in a Piedmont Lake in Upstate South Carolina Using Machine-Learning Approaches, *Journal of South Carolina Water Resources*, 9(1), https://tigerprints.clemson.edu/jscwr/vol9/iss1/9.

2. Fomenko, S. I., and **R. B. Jana** (2023), The influence of water evaporation on surface acoustic waves in soils, *Proc. 2023 Days on Diffraction (DD)*, St. Petersburg, Russian Federation, 2023, pp. 1-4, IEEE, doi: 10.1109/DD58728.2023.10325755.

OTHER PEER REVIEWED PUBLICATIONS (CONTINUED)

3. Petrovskaia, A., **R. B. Jana**, and I. V. Oseledets (2020), A single image deep learning approach to restoration of corrupted remote sensing products, Spotlight paper in Computer Vision for Agriculture (CV4A), workshop at *International Conference on Learning Representations (ICLR) 2020*, (April 26 – 30, 2020), doi: 10.48550/arXiv.2004.04209. (Conference Ranking: A*)

4. Matvienko, I., I. V. Oseledets, M. Gasanov, A. Petrovskaia, M. Pukalchik, and **R. B. Jana** (2020), Bayesian aggregation improves traditional single image crop classification approaches, Computer Vision for Agriculture (CV4A), workshop at *International Conference on Learning Representations (ICLR) 2020*, (April 26 – 30, 2020), doi: 10.48550/arXiv.2004.03468. (Conference Ranking: A*)

5. Altaf**,** M. U., **R. B. Jana**, I. Hoteit, and M. F. McCabe (2016), Continuous data assimilation for downscaling large-footprint soil moisture retrievals, *Proc. SPIE 9998, Remote Sensing for Agriculture, Ecosystems, and Hydrology XVIII*, 99981O (October 25, 2016), doi:10.1117/12.2241042.

6. Singh, G., R. K. Panda, B. P. Mohanty, and **R. B. Jana** (2016), Soil moisture variability across different scales in an Indian watershed for satellite soil moisture product validation, *Proc. SPIE 9877, Land Surface and Cryosphere Remote Sensing III*, 98772B (May 5, 2016), doi:10.1117/12.2222743.

7. **Jana, R. B.**, A. Ershadi, and M. F. McCabe (2015), Hydrological links between cosmic-ray soil moisture retrievals and remotely sensed evaporation across a semi-arid pasture site, in Weber, T., McPhee, M.J. and Anderssen, R.S. (eds) MODSIM2015, *21st International Congress on Modelling and Simulation. Modelling and Simulation Society of Australia and New Zealand*, December 2015, pp. 1372–1378, ISBN: 978-0-9872143-5-5, doi: 10.36334/MODSIM.2015.F11.jana.

8. Qu, Z., X. Li, D. Tian, **R. B. Jana**, and B. P. Mohanty (2011), Development of regional-scale pedotransfer functions based on Bayesian Neural Networks in the Hetao Irrigation District of China, *Proc. 7th International Conference on Natural Computation, ICNC 2011* (Vol. 2), IEEE, doi:10.1109/ICNC.2011.6022191.

RESEARCH REPORTS

1. **Jana, R. B.**, and B. P. Mohanty (2009), Use of Satellite Data for Soil Parameter Estimation in Rio Grande Basin, Report submitted to NASA Earth System Science Graduate Student Fellowship Program.

2. **Jana, R. B.**, B. P. Mohanty, and E. P. Springer (2005), Soil Hydrologic Properties for Simulation of Semi-Arid River Basin Water Balance: A Report, Joint Texas A&M University and Los Alamos National Laboratory Report.

INVITED TALKS

1. Gentzbittel, L., and **R. B. Jana,** (2023), World Agritech, Public discussion and interview as part of World Science Day, Zaryadye Park, Moscow, Russia, November 11, 2023.

2. **Jana, R. B.** (2023), Unleashing Envirotyping: Empowering Agricultural Sustainability with Processes-Driven Data Science, International Forum Kazan Digital Week 2023, Kazan, Russia, September 20 – 22, 2023.

3. **Jana, R. B.** (2023), Envirotyping – Better understanding of nature's dynamics through a data+process approach, keynote at International Conference on Recent Trends in Data Science and its Applications (ICRTDA-2023), SRM Institute of Science and Technology, Chennai, India, Mar. 31, 2023.

4. **Jana, R. B.** (2022), Envirotyping: A vital tool for better understanding of nature's dynamics, 4th Youth School on "Monitoring of Natural and Man-Made Systems", Perm Federal Research Center, Russian Academy of Sciences – Ural Branch, Perm, Russia, November 30 – December 01, 2022.

5. **Jana, R. B.** (2022), Envirotyping: A critical tool for better productivity in agriculture, International Forum Kazan Digital Week 2022, Kazan, Russia, September 21 – 24, 2022.

6. **Jana, R. B.** (2022), Envirotyping: Linking Environmental Data, AI/ML, Genomics, and Food Security, keynote at International Conference on Recent Trends in Science and Technology (ICRTST-2022), ATME College of Engineering, Mysuru, India, Jul. 14, 2022.

7. **Jana, R. B.** (2020), Convergence of hydrology, agriculture, and artificial intelligence, International Knowledge Sharing Week, IExpert Academy of Business, Innovations and Management, Moscow, Russia, Dec. 04, 2020.

8. **Jana, R. B.** (2020), Introduction to remote sensing and agro/environmental applications, International Online Certificate Program "Introduction to Rocket and Satellite Engineering", Science festival NAUKA 0+, Moscow, Russia, Apr. 12-17, 2020.

9. **Jana, R. B.** (2020), IoT and AI for agro-environmental issues, keynote at 2nd SRM International Conference on IoT, SRM Institute of Science and Technology, Chennai, India, Feb. 17-21, 2020.

10. **Jana, R. B.** (2018), Soil Moisture Measurement – Necessity and Opportunities, V. V. Dokuchaev Soil Science Institute, Moscow, Russia, May 10, 2018.

11. **Jana, R. B.** (2017), Validation of satellite derived ET with COSMOS, India-UK Joint Workshop on COSMOS India Network, Indian Institute of Science, Bangalore, India, Oct. 12, 2017.

INVITED TALKS (CONTINUED)	12. **Jana, R. B.** (2014), Understanding Vadose Zone hydrology in arid regions, Workshop on Arid Zone Hydrology under Climate Change Scenarios for the 21st Century, Texas A&M University, College Station, TX, Feb. 27, 2014. 13. **Jana, R. B.** (2013), Multiple approaches to scaling of soil moisture, Department of Earth Science and Engineering, King Abdullah University of Science and Technology, Saudi Arabia, Apr. 16, 2013. 14. **Jana, R. B.** (2013), Multiple approaches to scaling of soil moisture, Invited Seminar, Indian Institute of Science, Bengaluru, India, Mar. 28, 2013. 15. **Jana, R. B.**, and B. P. Mohanty (2012), A comparison of multiple scaling approaches for soil hydraulic parameters, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec. 3 – 7, 2012. 16. **Jana, R. B.** (2012), Water in the environment, Invited Seminar, Acharya College of Engineering, Bengaluru, India, Aug. 3, 2012. 17. **Jana, R. B.**, and B. P. Mohanty (2010), Scaling Characteristics of Soil Hydraulic Parameters at Varying Spatial Resolutions, Invited Seminar, Indian Institute of Science, Bengaluru, India, Jun. 3, 2010.
PRESENTATIONS AT INTERNATIONAL CONFERENCES Note: * denotes presenting author.	1. Fomenko, S. I.*, and **R. B. Jana** (2023), Surface acoustic waves in porous solid with inhomogeneous fluid saturation, International Congress on Ultrasonics (ICU), Beijing, China, Sep. 18 – 21, 2023. 2. Fomenko, S. I.*, and **R. B. Jana** (2022), The Simulation of Elastic Waves Propagation in Poroelastic Medium and Effective Modules Identification, International Conference on Mathematical Modeling in Natural Sciences (MMEN), Perm, Russia, Oct. 5 – 8, 2022. 3. Fomenko, S. I.*, A. D. Khanazaryan, D. A. Sverkunova, and **R. B. Jana** (2022), The influence of porosity and fluid saturation of soils on guided waves and the soils parameter estimation by ultrasound methods, Days on Diffraction 2022 (DD'22), St. Petersburg, Russia, May 30 – Jun. 3, 2022. 4. Petrovskaia, A.*, **R. B. Jana**, and I. V. Oseledets (2020), A single image deep learning approach to restoration of corrupted remote sensing products, Spotlight paper in Computer Vision for Agriculture (CV4A), workshop at International Conference on Learning Representations (ICLR) 2020, Apr. 26 – 30, 2020. 5. Matvienko, I.*, I. V. Oseledets, M. Gasanov, A. Petrovskaia, M. Pukalchik, and **R. B. Jana** (2020), Bayesian aggregation improves traditional single image crop classification approaches, Computer Vision for Agriculture (CV4A), workshop at International Conference on Learning Representations (ICLR) 2020, Apr. 26 – 30, 2020.

6. **Jana, R. B.***, and I. V. Oseledets (2018), Multi-scale modeling and big-data analysis opportunities in vadose zone hydrology, II International Conference on Multiscale Methods and Large-Scale Computing, Moscow, Russia, Aug. 15 – 17, 2018.

7. **Jana, R. B.***, A. E. Ershadi, and M. F. McCabe (2015), Hydrological links between cosmic-ray soil moisture retrievals and remotely sensed evaporation across a semi-arid pasture site, MODSIM2015, 21st International Congress on Modelling and Simulation, Modelling and Simulation Society of Australia and New Zealand, Broadbeach, Australia, Nov. 29 – Dec. 5, 2015.

8. **Jana, R. B.***, and B. P. Mohanty (2014), Incorporating topography into soil hydraulic parameter scaling algorithms, IMPA-InterPore Workshop on Porous Media, IMPA, Rio de Janeiro, Brazil, Oct. 19 – 21, 2014.

9. **Jana, R. B.***, and B. P. Mohanty (2012), A comparison of multiple scaling approaches for soil hydraulic parameters, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec. 3 – 7, 2012.

10. **Jana, R. B.**, and B. P. Mohanty* (2011), Dominant Physical Controls of Soil Hydrology at Different Spatial Scales, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec. 5 – 9, 2011.

11. **Jana, R. B.***, and B. P. Mohanty (2011), Physical Controls on Soil Hydraulic Parameter Scaling, ASA-CSSA-SSSA 2011 International Annual Meetings, San Antonio, TX, Oct. 17 – 19, 2011.

12. Mohanty, B. P.*, and **R. B. Jana** (2010), A Topography–Based Scaling Algorithm for Soil Hydraulic Parameters at Hill-Slope Scales, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec. 13 – 17, 2010.

13. **Jana, R. B.***, and B. P. Mohanty (2007), Multiscale Soil Property Estimation Using Artificial Neural Networks and Remotely Sensed Data, ASA-CSSA-SSSA 2007 International Annual Meetings, New Orleans, LA, Nov. 4 – 8, 2007.

POSTERS
PRESENTED AT
INTERNATIONAL
CONFERENCES

Note:
* denotes
presenting
author.

1. **Jana, R. B.***, A. Petrovskaia, and I. V. Oseledets (2019), Restoration of Landsat-7 images using Deep Image Prior, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec. 9 – 13, 2019.

2. Petrovskaia, A., **R. B. Jana***, and I. V. Oseledets (2019), 3D representation of soil structure using Generative Adversarial Networks, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec. 9 – 13, 2019.

3. **Jana, R. B.***, and I. V. Oseledets (2019), Dimension reduction approaches to assist IoT implementation in agro-hydrology, CUAHSI Conference on

Hydroinformatics. Consortium of Universities for the Advancement of Hydrological Science, Inc., Provo, Utah, USA, Jul 29 – 31, 2019.

4. Altaf**,** M. U., **R. B. Jana***, I. Hoteit, and M. F. McCabe (2016), Continuous data assimilation for downscaling large-footprint soil moisture retrievals, SPIE Remote Sensing 2016. International Society for Optics and Photonics, Edinburgh, United Kingdom, Sep 26 – 29, 2016.

5. **Jana, R. B.***, Y. Efendiev, and B. P. Mohanty (2014), Mode Decomposition Methods for Soil Moisture Prediction, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec. 15 – 19, 2014.

6. **Jana, R. B.***, and B. P. Mohanty (2013), Dominant Physical Controls of Soil Hydrology at Different Spatial Scales, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec. 9 – 13, 2013.

7. **Jana, R. B.***, and B. P. Mohanty (2013), Dominant Physical Controls of Soil Hydrology at Different Spatial Scales, Catchments through the looking glass: From microscopes to telescopes, Gordon Research Conference, Proctor Academy, Andover, NH, USA, Jun. 16 – 21, 2013.

8. **Jana, R. B.***, B. P. Mohanty, and Y. Efendiev (2010), Physical Controls of Soil Hydraulic Parameter Scaling at Multiple Scales, Interpore Conference and Annual Meeting, College Station, TX, Mar. 14 – 17, 2010.

9. **Jana, R. B.***, and B. P. Mohanty (2009), Physical Controls of Soil Hydraulic Parameter Scaling, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec. 14 – 18, 2009.

10. **Jana, R. B.***, and B. P. Mohanty (2009), On the Influence of Topography Upon Scaling Characteristics of Soil Hydraulic Parameters, Institute for Applied Mathematics and Computational Science (IAMCS) Spring Symposium, Texas A&M University, College Station, TX, May 28 – 29, 2009.

11. **Jana, R. B.***, and B. P. Mohanty (2008), On the Influence of Topography Upon Scaling Characteristics of Soil Hydraulic Parameters, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec. 15 – 19, 2008.

12. Mohanty, B. P.*, **R. B. Jana**, N. N. Das, A. V. M. Ines, and J. Zhu (2008), Effective Soil Hydraulic Parameters at Multiple Scales, Gordon Research Conference, Magdalen College, Oxford, U. K., Aug. 10 – 15, 2008.

13. Mohanty, B. P.*, A. V. M. Ines, N. N. Das, **R. B. Jana**, and J. Zhu (2007), Effective Soil Hydraulic Parameters – State-of-the-art!, ASA-CSSA-SSSA 2007 International Annual Meetings, Nov. 4 – 8, 2007.

14. Mohanty, B. P.*, A. V. M. Ines, J. Zhu, **R. B. Jana**, N. N. Das, and S. K. Sharma (2006), Effective Soil Hydraulic Parameters Across Scales for Land-

POSTERS PRESENTED AT INTERNATIONAL CONFERENCES (CONTINUED)	Atmosphere Interaction, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec. 11 – 15, 2006.

15. **Jana, R. B.***, B. P. Mohanty, and E. P. Springer (2006), Neural Network-Based Multi-Scale Pedotransfer Functions for Soil Water Retention, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec. 11 – 15, 2006.

OTHER POSTER PRESENTATIONS

Note:
* denotes presenting author.

1. **Jana, R. B.***, and I. V. Oseledets (2018), Soil Moisture Monitoring: Necessity and Opportunities, 3rd Annual MIT-Skoltech Conference – Collaborative Solutions for Next Generation Education, Science and Technology, Skolkovo Institute of Science and Technology, Moscow, Russia, Oct. 15-16, 2018.

2. Petrovskaia, A.*, **R. B. Jana,** and I. V. Oseledets (2018), 3D Representation of Soil Physical Properties Using Generative Adversarial Networks, 3rd Annual MIT-Skoltech Conference – Collaborative Solutions for Next Generation Education, Science and Technology, Skolkovo Institute of Science and Technology, Moscow, Russia, Oct. 15-16, 2018.

3. **Jana, R. B.***, and M. F. McCabe (2015), Modeling Water Dynamics Under Central Pivots for Better Resource Management, Annual Scientific Advisory Board Meeting, Water Desalination and Reuse Center, King Abdullah University of Science and Technology, Saudi Arabia, Nov. 22, 2015.

4. **Jana, R. B.***, and B. P. Mohanty (2013), Dominant Physical Controls of Soil Hydrology at Different Spatial Scales, SRI Center for Numerical Porous Media, Second Annual Meeting, King Abdullah University of Science and Technology, Saudi Arabia, Mar. 2, 2014.

5. **Jana, R. B.***, and B. P. Mohanty (2008), Multiscale Hydraulic Parameter Estimation for Better Water Resources Management, Texas A&M AgriLife Conference, Texas A&M University, College Station, TX, Jan. 7 – 11, 2008.

6. **Jana, R. B.**, B. P. Mohanty*, and E. P. Springer (2006), Multi-Scale Pedotransfer Functions for Soil Water Retention, Sustainability of Semi-Arid Hydrology and Riparian Areas (SAHRA) Annual Meeting, Phoenix, AZ, Oct. 2006.

7. **Jana, R. B.***, and B. P. Mohanty (2006), Soil Hydraulic Properties for Simulation of Semi-Arid River Basin Water Balance, 9th Annual Student Research Week, Texas A&M University, College Station, TX, Mar. 28, 2006.

8. **Jana, R. B.***, B. P. Mohanty, and E. P. Springer (2005), Soil Hydraulic Properties for Simulation of Semi-Arid River Basin Water Balance, Sustainability of Semi-Arid Hydrology and Riparian Areas (SAHRA) Annual Meeting, Tucson, AZ, Oct. 2005.

OTHER POSTER PRESENTATIONS (CONTINUED)	9. Zhu, J., B. P. Mohanty, and **R. B. Jana*** (2004), Hydraulic Parameter Upscaling in Heterogeneous Soil, Topography, and Vegetation, Sustainability of Semi-Arid Hydrology and Riparian Areas Annual Meeting, Albuquerque, NM, Oct. 2004.

FIELD AND LABORATORY EXPERIENCE	**Tawdiheeya, Saudi Arabia** *[2015]*

Tawdiheeya, Saudi Arabia *[2015]*

- Vegetation and soil hydraulic characteristics sampling in an agricultural farm situated in the Saudi desert.

Saq Aquifer area, Saudi Arabia *[2014]*

- Insight into water quality measurement and sample collection techniques.

Little Washita Watershed, OK, USA *[2010, 2011]*

- Designed, supervised, and participated in field sampling of soil properties for moisture and hydraulic parameter estimation.

Rio Grande Basin, NM and TX, USA *[2008]*

- Designed and conducted field sampling at locations near El Paso, TX and Picacho Arroyo, NM, for soil properties estimation and vadose zone characterization.

SGP Cloud and Land Surface Interaction Campaign (CLASIC), OK, USA *[2007]*

- Field campaign conducted jointly by DOE, USDA, and NASA.
- Designed and carried out field measurements for vadose zone characterization and monitoring.
- Received extensive insight of field measurement and site selection techniques in agricultural and pastoral landscapes.

Soil Moisture Experiment (SMEX'05), IA, USA *[2005]*

- Exposure to logistics of scientific field campaigns.
- Received insight into field measurement techniques and site selection in an agricultural landscape.

Honey Creek, TX, USA *[2004]*

- Site experiment to study juniper tree infiltration characteristics at Edwards plateau.
- Acquired knowledge and insight of karst hydrology.

Soil Physics Wet Lab, Texas A&M University, TX, USA *[2004 – 2012]*

- Designing and conducting lab experiments for multiple soil hydraulic and physical properties.
- Planning and supervising complete refurbishment and installation of laboratory setup.

TEACHING EXPERIENCE

Agro-BioTech, Skoltech

Environmental Dynamics for Agriculture (Graduate Level) [2024]
- Hydrologic cycle and water dynamics
- Energy cycle
- Soil health and nutrient management
- Environmental impacts of agriculture
- Climate change and agriculture
- Envirotyping and environmental interaction
- Measurement, and analysis of environmental data
- Modeling of environmental processes
- AI/ML in environmental data analysis

Life Sciences, Skoltech

Modern Plant Breeding Workshop (Graduate Level) [2022, 2023]
- Lectures on envirotyping, environmental data analysis, remote sensing, geostatistics, and GIS
- Theory and hands-on practice

Plant Genetic Diversity and Adaptation to Stress (Graduate Level) [2021, 2022, 2023]
- Guest lectures on remote sensing, geostatistics, and GIS
- Theory and hands-on practice

Educational and Scientific Center of Plant Biotechnology, Skoltech + Bayer
Modern Technologies in Plant Breeding (Advanced Level) [2022, 2023]
- Lectures on envirotyping, environmental data analysis, and applications in breeding

AgroTech MBA, Skoltech + IBS RANEPA
Technologies for Agribusiness (Graduate Level) [2021]
- Lectures on remote sensing technologies for agro/environmental analysis

School of Computing, SRMIST
Visualizing and Analyzing Geospatial Datasets (Graduate Level) [2023]
- Independent workshop on introduction to spatial data analysis, geospatial datasets, remote sensing, geostatistics, and analysis using Google earth Engine
- Theory and hands-on practice

Environmental Hydrology for Data Scientists (Undergraduate Level) [2021]
- Hydrology: Earth's water distribution, the hydrologic cycle, global water budgets, scarcity, major consumers and polluters, different hydrological processes (surface, sub-surface, groundwater)

TEACHING EXPERIENCE (CONTINUED)

- Soils: Why soils are important, carbon storage, soil moisture, soil water dynamics, Darcy flow, Richards equation, modeling water movement through soils
- Remote Sensing: History of remote sensing, applications, types of remote sensing platforms, sensor types, resolution (spatial, temporal, and spectral), use in earth observation, challenges, and limitations
- Geostatistics: History of geostatistics, characterizing spatial processes, covariance, correlation, variograms, transformations, kriging
- GIS: Basics of GIS, layers, vector and raster formats, digitizing, performing geostatistical analyses in GIS
- Data analytics: Modeling and prediction using data science, machine learning, and earth observation, example case studies

Dept. of Environmental Science and Engineering, KAUST
Surface Hydrology (Graduate Level) [2013, 2014, 2015]
- Guest lectures on soil moisture and flow through unsaturated soils
- Theory and measurement
- GIS techniques

Dept. of Biological and Agricultural Engineering, Texas A&M University
Vadose Zone Hydrology (Graduate Level) [2005, 2007, 2009, 2011]
- Field and lab measurement techniques for soil hydraulic properties
- Numerical modeling of unsaturated zone systems using HYDRUS software – theory and practice

Hydrology Across Scales (Graduate Level) [2008, 2010, 2012]
- Scaling techniques for soil moisture and hydraulic parameters
- Multiple approaches and algorithms
- Theory and application

Theory of Research (Graduate Level) [2011]
- Guest lectures on sources of research funding
- What do funding agencies look for?
- Proposal preparation and formatting

Dept. of Civil Engineering, Texas A&M University
Plane Surveying (Undergraduate Level) [2002, 2003]
- Labs for leveling and earthworks
- Theodolite surveying
- Traverse and Mapping
- Horizontal and vertical curves

MODELING TOOLS AND SKILLS	• GIS, and programming in GIS • Google Earth Engine for environmental/agricultural applications • Geostatistics, conventional and Bayesian statistical analysis • Modeling packages: HYDRUS (1D, 2D, 3D), SWAP, ParFlow • Machine learning (NN, RF, GAN, Regression, Clustering, Dimension Reduction) • Monte Carlo techniques, Wavelets, Kalman filter, Fourier analysis • Proficient in Python, R, Matlab, FORTRAN, Visual Basic, C, C++, Java, HTML
PROFESSIONAL DEVELOPMENT	• How to find funding, Office of Proposal Development, Texas A&M University [2006] • The craft of grant writing, Office of Proposal Development, Texas A&M University [2009]
AWARDS AND ACHIEVEMENTS	**Robert E. Stewart Graduate Excellence Award** [2009] Biological and Agricultural Engineering Department, Texas A&M University **Bill A., and Rita L. Stout International Graduate Student Achievement Award** [2007] Biological and Agricultural Engineering Department, Texas A&M University **NASA Earth Systems Science Graduate Fellowship** [2006 – 2009] National Aeronautics and Space Administration, Washington, DC **Joseph A. Orr Graduate Fellowship** [2002] Civil Engineering Department, Texas A&M University
MENTORING	• Oluwafemi Adejumobi, Research Intern, Skoltech [2024 -] • Anton Bibin, Junior Research Engineer, Skoltech [2022 - 2023] • Kirill Bubenchikov, Research Intern, Skoltech [2022] • Jean Andrade DiCarli, Ph. D. student, Skoltech [2021] • Varvara Shushkova, Masters student, Skoltech [2020 – 2021] • Yash Joshi, Undergraduate student, SRMIST [2020 – 2021] • Sachit Mishra, Undergraduate student, SRMIST [2020 – 2021] • Ivan Matvienko, Masters student, Skoltech [2019 – 2020] • Mikhail Gasanov, Ph. D. student, Skoltech [2019 – 2022] • Anna Petrovskaia, Ph. D. student, Skoltech [2018 – 2021] • Deepti Upadhyaya, Ph. D. student, Indian Institute of Science [2017 – 2019] • Gurjeet Singh, Ph. D. student, Indian Institute of Technology [2014 – 2017] • Sandeep Chakraborty, Masters student, University of Stuttgart [2014 – 2015] • Eden Furtak-Cole, Masters student, KAUST [2013 – 2014] • Yongchul Shin, Ph. D. student, Texas A&M University [2010 – 2013]

MENTORING (CONTINUED)	• Nandita Gaur, Ph. D. student, Texas A&M University [2010 – 2013] • Maheshwari Neelam, Ph. D. student, Texas A&M University [2010 – 2013] • Eduardo Anzueto, Masters student, Texas A&M University [2010 – 2011]
COMMUNITY AND STUDENT ACTIVITIES	• Subject Judge (Hydrology), Student Research Week, Texas A&M University [March 2010, 2011] • Judge, 12th Student Research Week, Texas A&M University [March 2009] • Organizer, Weekly research interaction meetings, Department of Biological and Agricultural Engineering, Texas A&M University [2008 – 2012] • President, University Apartments Community Council, Texas A&M University [2007] • Representative, Student Government, Texas A&M University [2006 – 2007] • Representative, Graduate Student Council, Texas A&M University [2007] • Vice President, University Apartments Community Council, Texas A&M University [2006] • Member, Dean's Graduate Housing Committee, Texas A&M University [2006 – 2010]

PROFESSIONAL ASSOCIATION MEMBERSHIPS	• American Geophysical Union (AGU) [2004 – present]
	   o Director – Communications, Unsaturated Zone Technical Committee, Hydrology Section [2019 – 2022]
	   o Member, Unsaturated Zone Technical Committee, Hydrology Section [2015 – present]
	• Soil Science Society of America (SSSA) [2006 – present]
	• European Geosciences Union (EGU) [2016 – present]
	• Alpha Epsilon (Honor society for agricultural, food, and biological engineering) [2009 – present]

EDITORIAL ROLES	• Editor, Inaugural Research Topic on "Artificial Intelligence and Machine Learning Approaches in the Vadose Zone", Frontiers in Artificial Intelligence – AI for Food, Water, and Agriculture, 2019; • Reviewing Editor, Frontiers in Artificial Intelligence – AI for Food, Water, and Agriculture.
JOURNAL REFEREE	• Water Resources Research • Advances in Water Resources • Vadose Zone Journal • Hydrology and Earth System Science • Geoderma • Remote Sensing of Environment • Water • Geoscience and Remote Sensing Letters • Journal of Hydrology • Transactions of the ASABE • Journal of Hydrometeorology • Journal of Applied Remote Sensing • Hydrological Processes • Scientific Reports • Sensors

JOURNAL REFEREE (CONTINUED)	- Frontiers in Water - Remote Sensing - Frontiers in Artificial Intelligence
CONFERENCE ORGANIZATION	- Convener, "Environmental Vadose Zone Hydrology", e-Lightning sessions at AGU Fall Meeting, 2020, Dec. 16, 2020. - Session Chair and Convener, "Application of Artificial Intelligence/Machine Learning to enhance process understanding of pristine and agriculture-intensive watersheds", Oral and Poster sessions at AGU Fall Meeting, 2019, San Francisco, CA, Dec. 9 – 13, 2019. - Convener, "Estimation of Spatial and Temporal Variability of Land Surface Hydrological and Thermal Processes", Oral and Poster sessions at AGU Fall Meeting, 2015, San Francisco, CA, Dec. 14 – 18, 2015. - Session Chair and Primary Convener, "Characterizing Hydrological and Linked Processes in Arid and Semi-Arid Regions", Oral and Poster sessions at AGU Fall Meeting, 2014, San Francisco, CA, Dec. 15 – 18, 2014. - Session Chair and Primary Convener, "Biophysical Functions and Process Dynamics in Soil", Oral and Poster sessions at AGU Fall Meeting, 2013, San Francisco, CA, Dec. 9 – 13, 2013. - Session Chair and Primary Convener, "Understanding Process Dynamics in the Critical Zone at Different Scales", Oral and Poster sessions at AGU Fall Meeting, 2012, San Francisco, CA, Dec. 3 – 7, 2012.
SERVICE TO COMMUNITY	**Mentor**, Russian-Indian Autumn Design School "Big Challenges in the Field of Sustainable Development" SIRIUS Talent and Success Education Foundation (Russia), in partnership with Atal Tinkering Labs (under Atal Innovation Mission) (India), Sochi, Russia, Nov-Dec 2019.
RELEVANT ONLINE PROFILES (CLICK TO ACCESS ONLINE PROFILES)	**ORCID**: Raghavendra Jana (0000-0001-8113-1990) (orcid.org) **Web of Science**: Jana, Raghavendra - Web of Science Core Collection **Scopus Author ID**: Jana, Raghavendra B. - Author details - Scopus **Google Scholar**: Raghavendra B. Jana - Google Scholar **Research Gate**: Raghavendra Belur Jana (researchgate.net) **Loop**: Loop	Raghavendra Belur Jana (frontiersin.org) **Skoltech**: Skoltech Faculty	Raghavendra Jana (Assistant Professor)
BIO DATA	- Date of Birth – 07 July 1977 - Citizenship – India
EXTRA-CURRICULAR	- Founding President, Brazos Kannada Association, Texas [2010 – 2012] - Organized cultural activities at Texas A&M [2004 – 2012] - President, MSRIT Society of Civil Engineers [1999 – 2000]
INTERESTS	Photography, travel, martial arts, cricket, reading, history.

LANGUAGES

Native: English, Hindi, Kannada
Intermediate: Tamil, Telugu, Sanskrit
Beginner: Russian, Spanish, Arabic