

Opportunity Title: USDA-ARS SCINet/AI-COE Postdoctoral Fellowship in Bridging Local Measurements to Management Scales Using Machine Learning
Opportunity Reference Code: USDA-ARS-SCINet-2023-0229

Organization U.S. Department of Agriculture (USDA)

Reference Code USDA-ARS-SCINet-2023-0229

How to Apply *Connect with ORISE...on the GO!* Download the new ORISE GO mobile app in the [Apple App Store](#) or [Google Play Store](#) to help you stay engaged, connected, and informed during your ORISE experience and beyond!

A complete application consists of:

- An application
- Transcript(s) – For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. Click [here](#) for detailed information about acceptable transcripts.
- A current resume/CV, including academic history, employment history, relevant experiences, and publication list.
- Two educational or professional recommendations

All documents must be in English or include an official English translation.

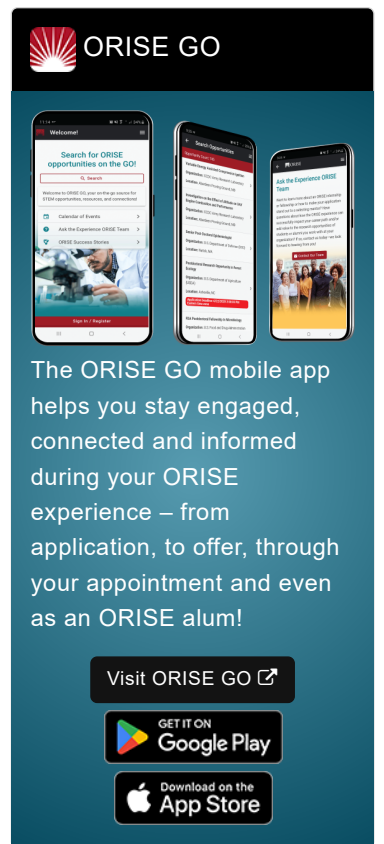
Application Deadline 12/31/2023 3:00:00 PM Eastern Time Zone

Description *Applications are reviewed on a rolling basis.

ARS Office/Lab and Location: A postdoctoral fellowship opportunity is currently available with the U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS) located in Beltsville, Maryland.

Research Project: The SCINet/Big Data Research Participation Program of the USDA ARS offers research opportunities to motivated postdoctoral fellows interested in solving agriculture-related problems at a range of spatial and temporal scales, from the genome to the continent, and sub-daily to evolutionary time scales. One of the goals of the SCINet Initiative is to develop and apply new technologies, including AI and machine learning, to help solve complex agricultural problems that also depend on collaboration across scientific disciplines and geographic locations. In addition, many of these technologies rely on the synthesis, integration, and analysis of large, diverse datasets that benefit from high-performance computing (HPC) clusters. The objective of this fellowship is to facilitate cross-disciplinary, cross-location research through collaborative research on problems of interest to each applicant and amenable to or requiring the HPC environment. Training will be provided in data science, scientific computing, AI/machine learning, and related topics as needed for the fellow to complete their research.

Throughout the course of this research project, the postdoctoral fellow will develop and test novel machine-learning approaches to infer process understanding from point-scale measurements and use this information to improve model performance at larger scales. Despite increasing data availability and computational power, the mismatch of spatial scales between observations and models – the so-called ‘scaling problem’ –often



ORISE GO

The ORISE GO mobile app helps you stay engaged, connected and informed during your ORISE experience – from application, to offer, through your appointment and even as an ORISE alum!

Visit ORISE GO [↗](#)

GET IT ON
Google Play

Download on the
App Store

Opportunity Title: USDA-ARS SCINet/AI-COE Postdoctoral Fellowship in Bridging Local Measurements to Management Scales Using Machine Learning

Opportunity Reference Code: USDA-ARS-SCINet-2023-0229

prevents scientists from using in-situ data for larger-scale models. To address the ongoing challenge of modeling environmental dynamics, process-based methods are needed to evaluate in-situ data, that can be applied to diagnose and transfer information observed at point/site scales to model and remote sensing scales.

Machine learning approaches provide a tool to gain process understanding from limited data, and Long Short-Term Memory (LSTM) networks – a type of recurrent neural network that includes dedicated memory cells that store information over long time periods – have been shown to yield unprecedented accuracy in hydrologic applications. LSTM networks offer an approach to integrate field observations of hydrometeorological time series (dynamic variables) and location site characteristics (static variables) and learn directly from the input data, embedding no assumptions about the underlying physics. The fellow will learn to use LSTM networks to relate high-frequency in-situ data to larger-scale observations, recognizing that both scales are subject to the same regional hydro-meteorological variability, with larger-scale observations reflecting integration over the complexity and heterogeneity of the landscape at smaller scales. The fellow will join efforts to bridge soil moisture sensor data to larger scales, leveraging data available from ARS labs and the Long Term Agricultural Research Network (LTAR). The fellow will also examine methods to infer local soil properties (e.g., preferential flow, soil repellency) from high-frequency soil moisture data, using synthetic model-generated data and data from soil moisture networks such as NEON. The fellow will have opportunities to conduct research with several collaborators, present their research at professional conferences, publish their findings, and participate in artificial intelligence workshops hosted by USDA Scinet.

Learning Objectives: The fellow will receive hands-on mentoring and training in machine learning and supercomputing tools, as well as scientific training in remote sensing tools and hydrologic modeling, as determined by the fellow's prior training and experience. The fellow will take advantage of SCINet training materials and attend any future in-person training. The fellow will interact with scientists in the HRSL and ACSL units in Beltsville, MD, the SAWS unit in Davis, CA, and the WGEW LTAR in Tucson, AZ, and learn about collaborating with a multidisciplinary research team distributed across the US. They will have opportunities to expand their knowledge and network through planned events with other SCINet Fellows, participation in SCINet working groups, and other interactions with SCINet community of science colleagues. The participant will have opportunities to present their research in the SCINet Newsletter, at workshops and professional conferences, and in peer-reviewed journal publications. Project-specific training will be provided on the use of ML/AI tools and geospatial data sources.

Mentor(s): The mentor(s) for this opportunity is Octavia Crompton (Octavia.Crompton@usda.gov). Please contact the mentor if you have questions about this opportunity.

Opportunity Title: USDA-ARS SCINet/AI-COE Postdoctoral Fellowship in Bridging Local Measurements to Management Scales Using Machine Learning

Opportunity Reference Code: USDA-ARS-SCINet-2023-0229

Anticipated Appointment Start Date: 2023; start date is flexible and will depend on a variety of factors.

Appointment Length: The appointment will initially be for two years but may be renewed upon recommendation of ARS and is contingent on the availability of funds.

Level of Participation: The appointment is full-time.

Participant Stipend: The participant will receive a monthly stipend commensurate with educational level and experience. The current stipend range for this opportunity is \$85,000 - \$95,000/year plus a supplement to offset a health insurance premium.

Citizenship Requirements: This opportunity is available to U.S. citizens, Lawful Permanent Residents (LPR), and foreign nationals. Non-U.S. citizen applicants should refer to the [Guidelines for Non-U.S. Citizens Details](#) page of the program website for information about the valid immigration statuses that are acceptable for program participation.

ORISE Information: This program, administered by ORAU through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and ARS. Participants do not become employees of USDA, ARS, DOE or the program administrator, and there are no employment-related benefits. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE.

Questions: Please visit our [Program Website](#). After reading, if you have additional questions about the application process, please email ORISE.ARS.SCINet@orau.org and include the reference code for this opportunity.

Qualifications The qualified candidate should have received a doctoral degree in one of the relevant fields or be currently pursuing the degree with completion before December 31, 2023.

Preferred Skills:

- Experience developing, testing, and refining machine learning models.
- Experience developing HPC workflows.
- Excellent written and oral communication skills.
- Experience in team and collaborative scientific environments.

- Eligibility Requirements**
- **Degree:** Doctoral Degree.
 - **Discipline(s):**
 - **Computer, Information, and Data Sciences** ([17](#))
 - **Earth and Geosciences** ([5](#))
 - **Engineering** ([4](#))
 - **Environmental and Marine Sciences** ([6](#))