

Opportunity Title: USDA-ARS Fellow on Hydrologic and Biogeochemical Modeling

Opportunity Reference Code: USDA-ARS-NEA-2024-0333

Organization U.S. Department of Agriculture (USDA)

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How to Apply *To submit your application, scroll to the bottom of this opportunity and click **APPLY**.*

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.

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Application Deadline 1/3/2025 3:00:00 PM Eastern Time Zone

Description ***Applications are reviewed on a rolling-basis.**

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

The Agricultural Research Service (ARS) is the U.S. Department of Agriculture's chief scientific in-house research agency with a mission to find solutions to agricultural problems that affect Americans every day from field to table. ARS will deliver cutting-edge, scientific tools and innovative solutions for American farmers, producers, industry, and communities to support the nourishment and well-being of all people; sustain our nation's agroecosystems and natural resources; and ensure the economic competitiveness and excellence of our agriculture. The vision of the agency is to provide global leadership in agricultural discoveries through scientific excellence.

Research Project: Agriculture-based net emissions technologies, such as uptake and storage by agricultural soils and bioenergy production, are recognized as important components of future emission pathways to limit global warming and avert unprecedented climate risks. Conservation tillage and cover crop hold promise to cut substantial carbon emissions and are widely adopted and planned in the Chesapeake Bay Watershed to improve water quality. However, the impacts of those conservation practices on the carbon cycle in the coupled terrestrial and aquatic ecosystems are largely unknown.



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This project is funded by NASA to research the development of a Carbon Monitoring System for the Chesapeake Bay Watershed (CMS-CBW) to monitor the changes in major carbon budget components on land and in freshwaters. Under the guidance of a mentor participant tasks may include:

- Enhance Soil and Water Assessment Tool - Carbon (SWAT-C) to better represent the coupled terrestrial-aquatic carbon cycling at the watershed scale;
- Develop cropland tillage and cover crop maps over the entire CBW by leveraging multi-source remote sensing data (e.g., Landsat, Sentinel-2, WorldView-3) and field observations;
- Integrate the newly developed tillage and cover crop maps and other remote sensing data (e.g., MODIS, ECOSTRESS, ICESat-2, GEDI, OCO-2 and -3, SWOT, and SMAP) to constrain the SWAT-C model;
- Assess impacts of historical and future agricultural conservation on carbon sources and sinks in both terrestrial (e.g., biomass, soil organic carbon, and lateral carbon fluxes) and freshwater (e.g., burial, outgassing, and export) ecosystems; and
- Collaborate to prioritize critical ecosystem restoration projects that maximize synergies while limiting trade-offs among climate and other social and environmental goals (e.g., water quality).

Learning Objectives: This fellowship affords the opportunity for the participant to gain experience in:

- Conducting research within a group of scientists applying agricultural, hydrologic, and ecosystem modeling to inform sustainable agricultural management and conservation.
- Contributing to multi-disciplinary, multi-institution collaborative research projects investigating the sustainability of agricultural landscapes, ecosystem carbon cycling, and the potential impacts of climate change.
- Contributing science to decision-making on challenges of watershed management under climate change and facilitating collaboration and integration across disciplines.

Mentor(s): The mentor for this opportunity is Dr. Xuesong Zhang (Xuesong.Zhang@usda.gov). If you have questions about the nature of the research, please contact the mentor(s).

Anticipated Appointment Start Date: January 2025. 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.

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](#)

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[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.Northeast@orau.org and include the reference code for this opportunity.

Qualifications The qualified candidate should possess or currently be pursuing a doctoral degree in the one of the relevant fields, degree anticipated to be received by the start of appointment.

Preferred skills:

- Experience with operating ecosystem models (e.g., SWAT-Carbon (<https://sites.google.com/view/swat-carbon>), CLM, EPIC, DNDC, and DayCent)
- Experience with analysis of geospatial data and time series data
- Experience with GIS/RS and database environments (e.g., ArcGIS and Quantum GIS)
- Experience with machine learning and statistical learning
- Experience working with large, diverse datasets
- Familiarity with statistical modeling (ideally Bayesian statistics)
- Proficiency in Fortran, R, Python, Matlab, or ideally other common languages (e.g., C/C++)
- Strong computational skills
- Strong oral and written communication skills

- Eligibility Requirements**
- **Degree:** Doctoral Degree.
 - **Discipline(s):**
 - **Chemistry and Materials Sciences** ([4](#) )
 - **Communications and Graphics Design** ([6](#) )
 - **Computer, Information, and Data Sciences** ([17](#) )
 - **Earth and Geosciences** ([18](#) )
 - **Engineering** ([18](#) )
 - **Environmental and Marine Sciences** ([14](#) )
 - **Mathematics and Statistics** ([11](#) )
 - **Physics** ([4](#) )
 - **Social and Behavioral Sciences** ([2](#) )

Affirmation I affirm that:

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I am a US Citizen, OR;
I am a non-US citizen currently living in the United States