

Opportunity Title: USDA-FS Predicting Fire Containment Opportunities: A Forest Service-Microsoft Research Collaboration

Opportunity Reference Code: USDA-FS-RMRS-2024-0193

Organization U.S. Department of Agriculture (USDA)

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A complete application package 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. Selected candidate must provide proof of completion of the degree before the appointment can start. Click [Here](#) for detailed information about acceptable transcripts.
- A current resume/CV
- Two educational or professional recommendations. At least one recommendation must be submitted in order for the mentor to view your application.

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

Application Deadline 6/7/2024 3:00:00 PM Eastern Time Zone

Description ***Applications will be reviewed on a rolling-basis.**

USDA Forest Service Office/Lab and Location: A fellowship opportunity is available with the US Department of Agriculture (USDA) Forest Service (FS) within the Rocky Mountain Research Station (RMRS). **This opportunity is remote.**

At the heart of the U.S. Forest Service's mission is their purpose. Everything they do is intended to help sustain forests and grasslands for present and future generations. Why? Because their stewardship work supports nature in sustaining life. This is the purpose that drives the agency's mission and motivates their work across the agency. It's been there from the agency's very beginning, and it still drives them. To advance the mission and serve their purpose, the U.S. Forest Service balances the short and long-term needs of people and nature by: working in collaboration with communities and our partners; providing access to resources and experiences that promote economic, ecological, and social vitality; connecting people to the land and one another; and delivering world-class science, technology and land management.

Research Project: This project builds on eight years of applied research on predicting fire containment opportunities for large fire decision support in the western United States. The team is developing a next-generation Potential Control Location suitability model that incorporates dynamic data streams.

The candidate will be part of a Forest Service and Microsoft team exploring technologies to 1) Improve datasets for wildfire prediction and suppression, 2) Develop AI-enhanced process-based simulators, and 3) document and publish study results and engage with end users to facilitate science



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delivery of outputs from the Forest Service and Microsoft R&D collaboration. The objective of this collaboration is to develop novel modeling and prediction systems that integrate high spatial and temporal resolution weather, fire behavior, suppression actions, and landscape conditions to improve prediction of fire containment opportunities and challenges.

Over the past seven years, the Potential Control Location Suitability model has been adopted by incident command teams as an important situational awareness tool that can be used to weigh strategic tradeoffs and help inform where the best opportunities and greatest challenges for containing a wildfire are likely to be. In its current state the model is produced annually at a coverage of the western United States and is available prior to the onset of fire season. As such, the model does not incorporate the variability in control opportunities and challenges that evolve over the course of a fire event. For this reason, scientists from the Forest Service Rocky Mountain Research Station are partnering with Microsoft Research and Development to explore the potential to incorporate new methods and new data that will allow the model to adapt to changing conditions and dramatically improve its utility to support tactical decision making on large wildfires.

The team is using machine learning and other modeling techniques to integrate existing fire behavior and effects models with our understanding of where and under what conditions containment strategies are likely to succeed or fail. This will require research and development of new fire containment predictors, improved characterization of conditions on recent fires from the past, and integration with predictive modeling forecasts of fire containment opportunities and challenges.

The candidate will become proficient in running existing national fire modeling systems: 1) Potential Control Location Suitability, 2) Suppression Difficult Index, 3) National Fire Danger Rating System, and 4) Severe Fire Weather Potential. Additionally, they will develop or improve upon skillsets accessing and summarizing archived and real-time weather and other remotely sensed data, spatial data analysis, computer programming, fire behavior modeling, machine learning methods, and development of end user applications with feedback from fire managers.

The candidate will collaborate with researchers to develop and test modelling methods, data quality, model sensitivity, accuracy, and stability, and to develop workflows and scripting to improve model scalability, calculation speed, and if possible to develop a user interface that can be hosted as part of the national fire management infrastructure.

Learning Objectives:

1. Develop a basic understanding of and ability to run the current suite of Wildfire Behavior and decision support models.
2. Collaborate with USDA Forest Service Research and MS Research to identify, collect, develop, or improve upon dynamic daily datasets that

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can be used in a dynamic PCL Model.

3. Explore modeling approaches, data structures, and techniques to assist with modeling efforts
4. Develop methods to assess model accuracy, scalability, and utility for use in wildland fire decision making.
 1. Model sensitivity analysis and testing on independent data
 2. Development of automated scripts to streamline production and scalability
 3. Collect feedback for fire managers and decision makers on model performance and ease of use.
5. Collaborate with R&D teams and fire managers to develop technology transfer tools
 1. Explore options for
 1. Integration into WFDSS NextGen
 2. Automation with NOAA weather data and fire progression products
 3. Development of a GUI to customize inputs to meet user needs.

Mentor: The mentor for this opportunity is Christopher O'Connor (christopher.d.oconnor@usda.gov). If you have questions about the nature of the research, please contact the mentor.

Anticipated Appointment Start Date: July 1, 2024. Start date is flexible and will depend on a variety of factors.

Appointment Length: The appointment will initially be for one year but may be extended upon recommendation of USDA Forest Service 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 only.

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 USDA Forest Service. Participants do not become employees of USDA, USDA Forest Service, 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.USFS.RMRS@ornl.gov and include the reference code for this opportunity.

Qualifications The qualified candidate should have received a master's degree in one of

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the relevant fields.

Preferred skills:

- Experience in data science, computer programming, machine learning and other AI technologies.
- Familiarity with fire behavior modeling, climatology data, wildland fire research, and fire management operations.

**Eligibility
Requirements**

- **Citizenship:** U.S. Citizen Only
- **Degree:** Master's Degree.
- **Discipline(s):**
 - **Computer, Information, and Data Sciences** ([7](#) 👁)
 - **Earth and Geosciences** ([3](#) 👁)
 - **Environmental and Marine Sciences** ([2](#) 👁)
 - **Mathematics and Statistics** ([2](#) 👁)