



# USGS NSF GRIP Opportunity

10-06-2015

- Point of Contact Name:** Janice Gordon
- USGS Center:** Core Science Analytics, Synthesis, and Libraries
- Project Title:** USGS Earth System High-performance Computing Scientist
- Project Hypothesis or Objectives:**

The U.S Geological Survey has been collaborating with a number of Universities, Federal Agencies, and the private sector to bring improved computational and data management capabilities to its Scientists and Data Managers over the past several years. In 2014, the USGS Core Science Analytics, Synthesis, and Libraries organization established an Applied Research Computing focus to improve, access, and utilize high performance computing capabilities in response to USGS Scientists growing needs for data analysis, visualization, modeling, and big data demands. The activity has supported on average over 20 projects per year throughout USGS and demand for these capabilities has been growing exponentially. By providing easier, streamlined access and support to USGS Scientists, this activity will allow USGS Scientists to improve the analysis and potentially expanded the scope of their research.
- Duration:** 9 - 12 months
- Internship Location:** Denver, CO
- Area of Discipline:** Computer Science, Earth Science, Information Science, Physical Sciences, Remote Sensing Technology, Geography
- Expected Outcome:**

This research and intended results will have a direct impact on a number of USGS projects and research currently trying to implement improved computational capabilities via emerging high-performance computing capabilities in USGS. The USGS Applied Research Computing (ARC) high-performance computing program has supported several projects varying from volcano ash plum modeling to species prediction over the last year. Resources are needed to address the growing demand for support and continued implementation of these applied research computing methods,

techniques, tools, cyberinfrastructure, and capabilities in support of USGS science.

**● Special skills/training Required:**

Typical tasks require translating existing expertise in MATLAB, R code development or sometimes conversion to Python, adapting existing C or Fortran codes for use within MATLAB, R, or Python algorithms, incorporating existing USGS scientific algorithms (i.e. related to earthquakes, water, species, or climate research), helping to parallelize new and existing codes, and helping to implement algorithms on large computer clusters.

Completion of a bachelors or masters degree in computer science, earth sciences related discipline (geology, biology, hydrology, etc), applied mathematics, or related field. Applicant must be proficient in computer programming and have the ability to program in R, MATLAB and Python, have expertise with parallel processing tools, computational clusters, and proficiency with the Linux operating system.

**● Duties/Responsibilities:**

1.) Development of computational models, transformation of data, performance tuning of algorithms, application of parallel programming methods, and exploration of advanced concepts of automation and information processing in support of the utilization of High Performance Computing (HPC) approach's to transform and support USGS research.

2.) Research in computational complexity and the analysis of algorithms to explore data structures that lead to highly efficient combinatorial algorithms will also be performed.

3.) Provide support, education to USGS scientists and data managers related to HPC tools, techniques, methodologies and capabilities.

**● Point of Contact or Mentor:**

Marcia McNiff

**● Point of Contact e-mail:**

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