# Blue Waters Annual Report 2018 – Research Summary Submission

**Due: May 22, 2018**

Submit online at: <https://bluewaters.ncsa.illinois.edu/annual-report>

## About this report

### Who is the Audience?

The audience for the Blue Waters annual report book includes your peers, scientists in different disciplines, the general public, and funding agencies. Where possible, write in a manner that a layperson would understand and avoid relying on terms and acronyms known only to other scientists in your discipline.

### Primary contact email and name:

Please provide a name and email for the primary contact for any questions we have about your submission.

Name:

Email:

## Your work condensed

In one sentence explain your work and the importance of Blue Waters as you would to an elected official, i.e. a member of congress.

Reply:

## Information about your allocation

Title:

PSN of project:

Allocation hours:

PI Information:

Name:

Institutional Affiliation:

Co-PI(s): Name of any co-principal investigators and their affiliation(s) [leave blank if none]

Names:

Collaborator(s):Name of any collaborators and their affiliation(s) [leave blank if none]

Names:

## Subject:

Please choose one of these subject classifications:

**Space science:**

Astronomy

Astrophysics

Cosmology

Heliophysics

Other (list)

**geoscience**

Weather

Climate

Geology

Environment

Other (list)

**physics & engineering**

Materials

Quantum

Fluids

Nanotechnology

Other (list)

**computer science & engineering**

Optimization

Scalability

Parallel Functionality

Other (list)

**biology, chemistry, & health**

Molecular

Cellular

Medicine

Health

Biophysics

Other (list)

**social science, economics, & humanities**

Social science

Economics

Humanities

Political Science

Other (list)

**Please indicate which classification(s), if any, are relevant to your research:**

Data-intensive - uses large numbers of files, large disk space/bandwidth, automated workflows/off-site transfers, etc.

Please provide a brief explanation (with data where possible):

GPU-accelerated - runs faster on XK nodes than on XE nodes

Please provide a brief explanation (with data where possible):

Thousand-node (or "Highly scalable") - scales to at least 1000 nodes for production science input

Please provide a brief explanation (with data where possible):

Memory-intensive - requires large aggregate memory (e.g., at least 50% of available memory on 1000-node run)

Please provide a brief explanation (with data where possible):

Only on Blue Waters - not practical on other currently-deployed US resources

Please provide a brief explanation (with data where possible):

Multi-physics/multi-scale - spans multiple length/time scales or physical/chemical processes

Please provide a brief explanation (with data where possible):

Machine learning/Deep Learning - employs deep learning or other techniques (includes "big data”)

Please provide a brief explanation (with data where possible):

Communication-intensive - requires high-bandwidth/low-latency interconnect for frequent tightly coupled messaging

Please provide a brief explanation (with data where possible):

Industrial application: private sector collaborators or results directly applicable to industry

Please provide a brief explanation (with data where possible):

First of its kind Frontier Science outcome

**Please indicate if your research ties into any NSF “Big Ideas” (for more information see: https://www.nsf.gov/news/special\_reports/big\_ideas/)**

Harnessing the Data Revolution

The Future of Work at the Human-Technology Frontier

Navigating the New Arctic

Windows on the Universe: The Era of Multi-Messenger Astrophysics

The Quantum Leap: Leading the Next Quantum Revolution

Understanding the Rules of Life: Predicting Phenotype

Mid-scale Research Infrastructure

NSF 2026: Seeding Innovation

Growing Convergence Research at NSF

NSF INCLUDES (Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science): Enhancing STEM through Diversity and Inclusion

## Article Content

### Preferred article title:

The title should be brief yet descriptive of your research. Consider using a headline and including a subhead that is descriptive to readers not familiar with your research area.

Title:

### Executive Summary (Word limit = 150 words)

The Executive Summary should be about 150 words long and should highlight key points of the research project. Use this section to focus on one or two takeaways that members of the public or funding agencies should remember about your work, especially in the areas of your research challenge and results and impact.

Summary:

**TOTAL WORD LIMIT FOR THE BODY OF THE REPORT IS 800 WORDS.**

### Research Challenge

This section should describe your research problem. Why and to whom is this problem important?

Text:

### Methods & Codes

Briefly explain how you approached the problem. If you used codes and external data in your work you can include recognition of them here.

Text:

### Results & Impact

The main focus of this section should be your results thus far and how they may impact your field, HPC, education, or society. How is this work changing your field of science? How is this frontier science (e.g.: is it enabling something in a year that otherwise might have taken a decade)?

Text:

### Why Blue Waters

How was access to Blue Waters, both the system and project staff, essential for your research?

Text:

### Number of images:

Indicate the number of images you are submitting with your report. List captions for each image below. Limit: 2 images.

For captions: Briefly explain what the image illustrates. Try to limit the length to 2-3 sentences. If needed, credit the owners or creators of the image. Be sure to submit each image file separately from your report. Ideally images should be 300 dpi (dots per inch) and at least 2,625 pixels wide; however, 300 dpi quality resolution is more important than width. Color images are encouraged. Images work best as uncompressed files (i.e. vector image or TIFF).

No images

Figure 1

Caption (limit 50 words):

Figure 2

Caption (limit 50 words):

### References (as noted in text)

Keep references distinct from publications, use numbers in the text, and a numbered list at the end of the document with the first reference in the text numbered [1]. Do not include presentations. Do not include your Blue Waters Project report(s). Do not include websites.

Format for references:

(1-3 authors) Last Name 1, First Initial 1., FI2. LName2, and FI3. LName3, Title. *Journal Name*, volume:issue (year), pp. [page numbers] or document ID (DOI).

(more than 4 authors) Last Name 1, First Initial 1., et al., Title. *Journal Name*, volume:issue (year), pp. [page numbers] OR document ID (DOI).

Text:

### Publications and data sets

List publications, reports, and data sets that resulted from your work on Blue Waters, including DOIs if available. Please note that the publications need to credit the Blue Waters Project to include them on your publication list. Do not include presentations or Blue Waters Project reports. Only include websites for data sets if they are in a repository location accessible to others.

Format for publications:

(1-3 authors) Last Name 1, First Initial 1., FI2. LName2, and FI3. LName3, Title. *Journal Name*, volume:issue (year), pp. [page numbers] or document ID (DOI).

(more than 4 authors) Last Name 1, First Initial 1., et al., Title. *Journal Name*, volume:issue (year), pp. [page numbers] OR document ID (DOI).

Text: