

ACCESS Program & Allocations Overview

*MS-CC All Hands Meeting
Stephen Deems
Principal Investigator*

Supported by National Science Foundation grants #2138259,
#2138286, #2138307, #2137603, and #2138296.



The image features decorative geometric patterns in the corners. The top-right and bottom-left corners contain clusters of shapes including triangles, circles, and semi-circles in shades of teal, orange, and yellow. Some shapes are filled with concentric lines. The text 'ACCESS Program' is centered in a dark teal font.

ACCESS Program

National Cyberinfrastructure Program



TeraGrid™

2001 - 2011

<https://en.wikipedia.org/wiki/TeraGrid>



XSEDE

Extreme Science and Engineering
Discovery Environment

2011 - 2022

https://www.nsf.gov/news/news_images.jsp?cntn_id=121181&org=NSF



 **ACCESS**

Advancing Innovation

2022 -

<https://access-ci.org>

A - C - C - E - S - S

- Advanced Cyberinfrastructure
- Coordination Ecosystem
- Services & Support
- Beyond-your-laptop → supercomputers; data storage; datasets; models; software
- Rich collection of NSF-funded resources working together
- Services: Requesting accounts; operating equipment; reporting/metrics
Support: Assistance; training; consulting

“Outgrowing” Your Laptop

When and why to use shared cyberinfrastructure resources:

- If your tasks for research and/or coursework should take minutes but are taking hours or days to complete
- If your laptop regularly freezes due to high computational loads
- If the laptop’s CPU, memory limitations, and storage requirements are consistently maxed out
 - e.g. when you run out of storage for program
 - e.g. when you don’t have the hardware to run certain software
- When you need to share work with others
 - Collaborative projects
 - Classroom activities




Cyberinfrastructure Available

- Computing systems
 - Varying core counts & memory sizes
 - Cloud resources (persistent services)
- Accelerators
 - GPUs, vector processors, FPGAs
- Data storage systems
 - Archival, object, tiered
- Data repositories
- Software & workflow managers
- High performance networking
- CI Professionals & support tools
- System performance monitoring



Current ACCESS Resource Providers (more to come!)
<https://access-ci.org/resource-providers/>

 *available on many ACCESS machines

Science Gateways

- User-friendly web-based portals or platforms developed by a community that provide researcher and educators with access to advanced computing resources, data, software, and tools.
- Over 40 active community gateways currently running on ACCESS resources
 - **Domains:** quantum chemistry, genomics, computational anatomy, cryo-EM, climate research, music education research, earth and planetary materials, water education, natural hazards engineering, biomedical research, flood monitoring, proteomics, topography, protein structure, and more!
 - See [all active Science Gateways](#) powered by ACCESS



Currents ACCESS Projects (Howard University)

Materials Science (Dr. Silvina Gatica)

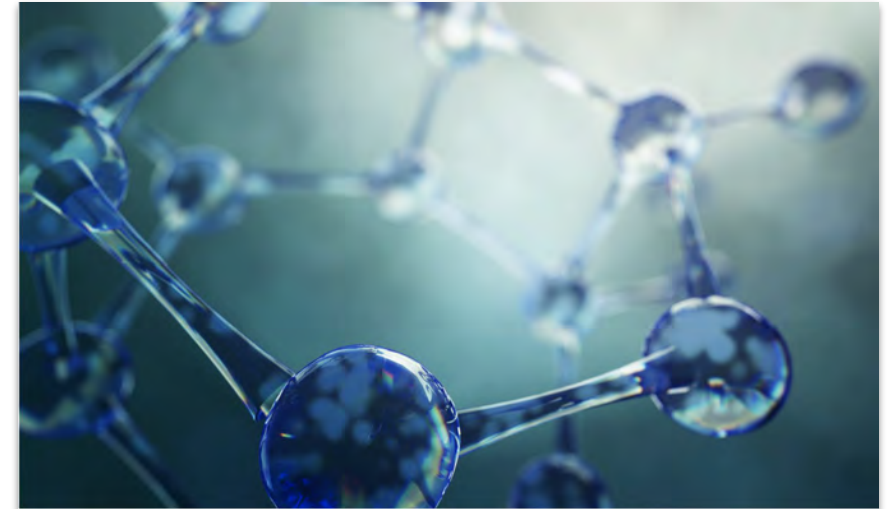
- Advising undergraduate students interested in learning how to perform molecular dynamics simulations of molecules adsorbed on substrates utilizing their own codes and LAMMPS software package

Medical Images Machine Learning (Dr. Kofi Deh)

- Synthesizing high-resolution images from acquired low resolution images

Modeling Salinity Near Coastal Aquifers (LaKeta Kemp - *Graduate Student*)

- This study examines the growing issue of saltwater intrusion, focusing on its disproportionate impact on Indigenous communities leading to displacement and further discrimination



Currents ACCESS Projects (Prairie View A&M)

Real-time Irrigation Scheduling for Crops (Dr. Ripendra Awal)

- Teaching students how to utilize a web-based tool that calculates plant irrigation needs – using data from several weather stations from different weather station networks

Deep Fake Detection (Dr. Yonghui Wang)

- Developing robust algorithms to detect fake images/videos

Enhancing HPC Teaching Materials with Novel Accelerators (Dr. Suxia Cui)

- Introducing intelligent processing unit (IPU) techniques into a graduate level courses in HPC



Currents ACCESS Projects (U. of New Mexico)

Modeling of extreme events in oceans (Dr. Pavel Lushnikov)

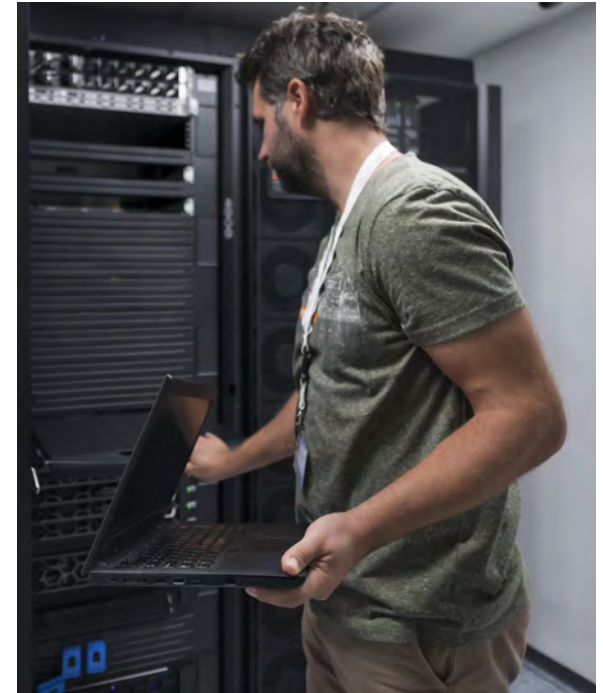
- Toward better dynamical and statistical forecasting of such events resulting in cargo and cruise ships and lowered risks in oil platforms operations

Seismic imaging of volcanic structures (Dr. Brandon Schmandt)

- Generating more accurate pictures of both volcanoes and the magma hidden underneath

Predictive Performance Modeling for HPC Systems (Dr. Patrick Bridges)

- As cyberinfrastructure becomes more powerful and more complex, how to schedule multiple jobs to work on shared resources can become increasingly complex
- When you're sharing processors, memory, bandwidth, processes can interfere with one another



Program Structure

- Set of *distinct core services* to support diverse research and educational communities:
 - Allocation Services
 - End User Support Services
 - Operations & Integration Services
 - Monitoring & Measurement Services
 - Coordination Office

Working Across Programs

- Support a broad and **diverse set of requirements, users, and usage modes** from all areas of S&E research and education
 - Training-based Workforce Development for Advanced Cyberinfrastructure
 - Strengthening the Cyberinfrastructure Professionals Ecosystem (SCIPE)
 - Cyberinfrastructure for Sustained Scientific Innovation (CSSI)
- **Agile services that can evolve and adapt** to respond to emerging requirements and technology landscapes
 - Minority Serving - Cyberinfrastructure Consortium (MS-CC)
 - Campus Cyberinfrastructure (CC*)
 - Major Research Instrumentation (MRI)
 - Leadership Class Computing System (LCCF)
 - Partnership to Advance Throughput Computing (PATH)
 - National Artificial Intelligence Research Resource (NAIRR) Pilot

ACCESS Impact Highlights – Program Year 2

- Many science successes from the researcher community
- Outreach at many community events
- Essential support for NAIRR Pilot
- Working Groups and Standing Committees delivering results
- Deeper engagement with Resource Providers
- *And more...*
 - Website consistency improvements
 - Resource recommender systems

12,575

new ACCESS accounts

12,624

unique users running jobs

21,454

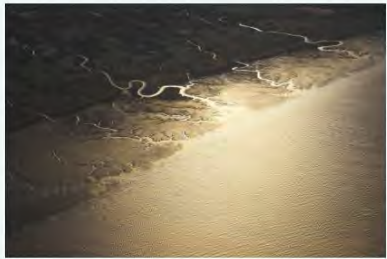
Support newsletter recipients

5,886

help tickets resolved

Enabling Science & Engineering Research and Education

Success is measured by impact in Science & Engineering



Using Deep Learning to Understand Permafrost Thaw

ACCESS allocations enhance efficiency in arctic remote sensing research.

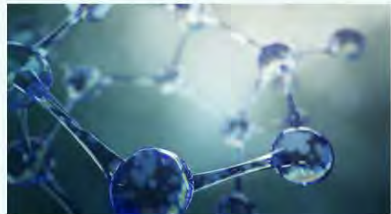
2/27/2024



Bringing Supercomputers into the Classroom

A professor from Kingsborough Community College uses ACCESS resource Jetstream for computational biology lessons.

3/20/2024



Howard University, Oak Ridge National Lab Use ACCESS Resources to Study Crystal Structures of Solids

TMD research findings show promise for improved flexible electronics, spintronics, optoelectronics, and more!

9/28/2023



Applications for STEP Program Now Open

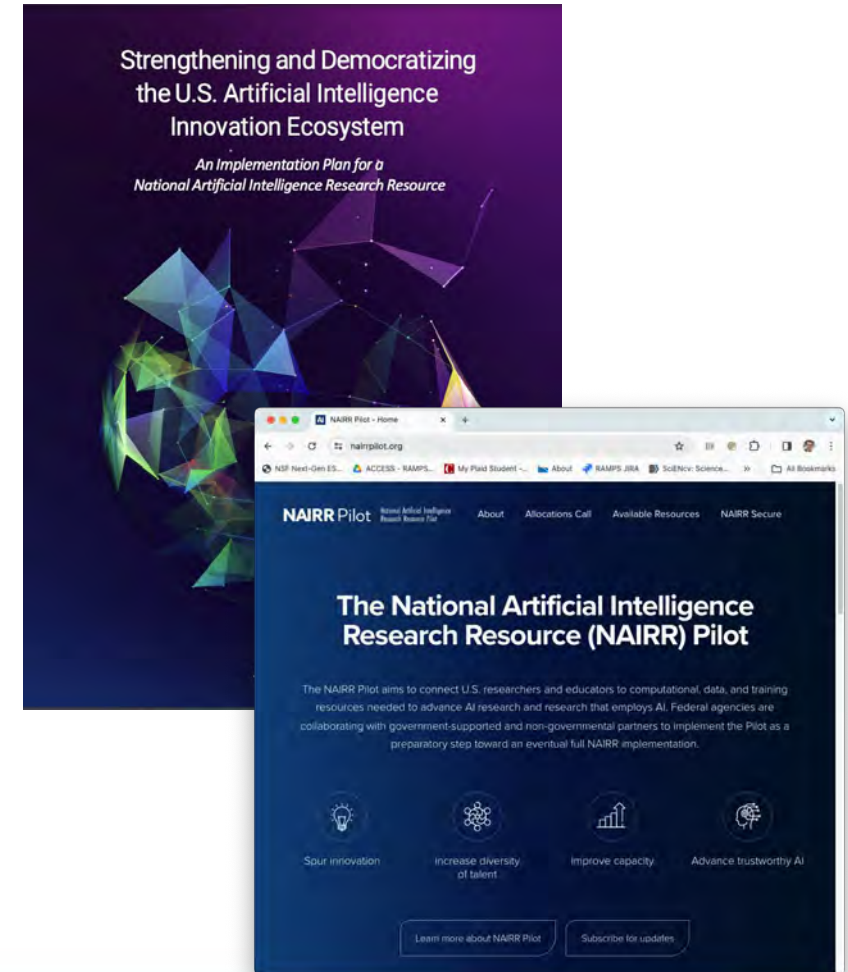
If you've ever been interested in what it's like to work in the world of cyberinfrastructure, now is your chance to apply.

2/06/2024

More stories at <https://access-ci.org/news/>

National Artificial Intelligence Research Resource Pilot

- NAIRR Task Force established by National AI Initiative Act of 2020, [launched in June 2021](#), co-chaired by OSTP and NSF
- NAIRR Task Force's [final report issued](#) in Jan. 2023
 - Report provides a roadmap for standing up a national research infrastructure
- White House issued [Executive Order](#) on Oct. 30, 2023, with 90-day window to launch NAIRR Pilot
 - Among many AI-related directives to federal agencies



Private Sector Resources in NAIRR

- AI2: Allen Institute for AI
- AMD
- Amazon Web Services (AWS)
- Anthropic
- Cerebras
- Databricks
- Datavant
- EleutherAI
- Google
- Groq
- Hewlett Packard Enterprise (HPE)
- Hugging Face
- IBM
- Intel
- Meta
- Microsoft
- MLCommons
- NVIDIA
- Omidyar Networks
- OpenAI
- OpenMined
- Palantir
- Regenstrief Institute
- SambaNova Systems
- Vocareum
- Weights & Biases

Extending the use of resources and services available via ACCESS to under-represented communities, under-resourced institutions, and non-traditional domains

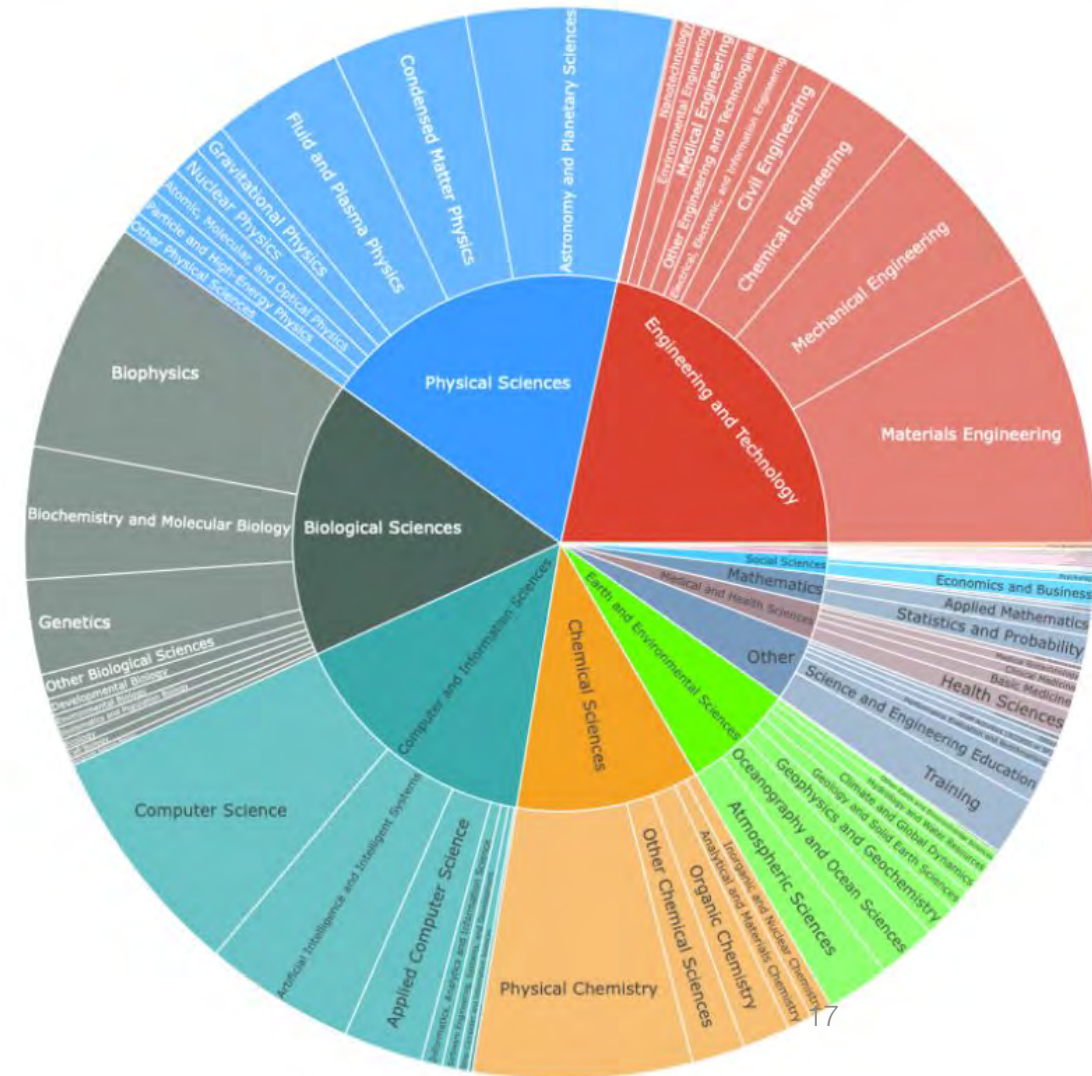
31.4%
 Year 2 projects from non-R1 institutions
 (ACCESS Central Database)

67% male
27% female
 Gender diversity
 (Community Survey)

Racial diversity

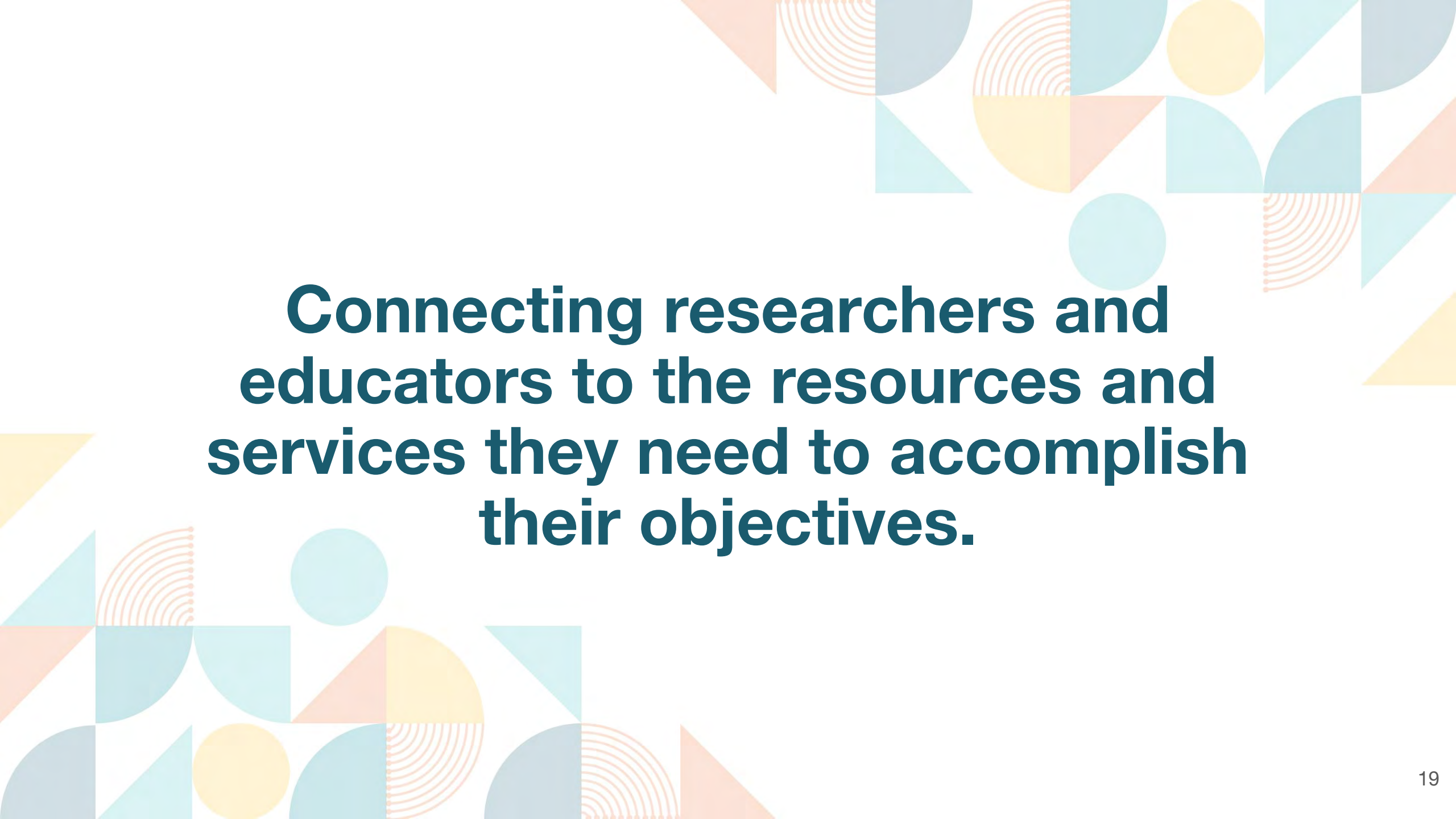
Race	Percentage
White	50%
Asian	31%
Hispanic	8%
Black	5%
Middle Eastern	3%
Indigenous	1%
Other	2%

Field of science diversity for ACCESS-allocated projects



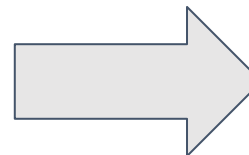
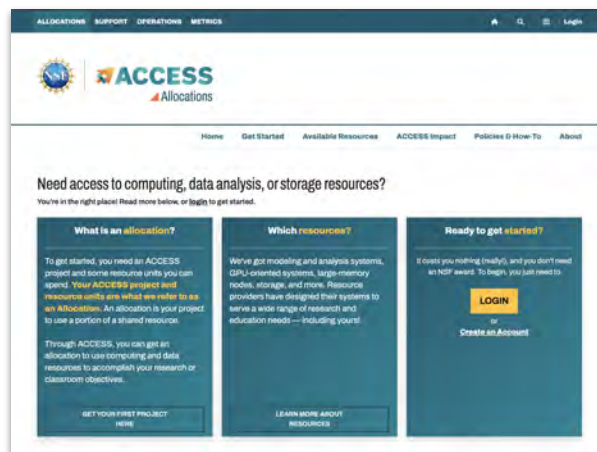
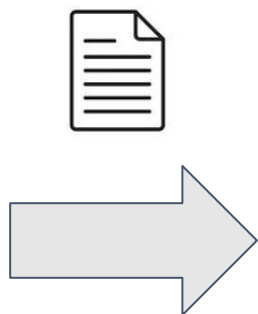
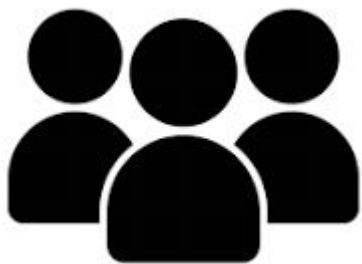
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Allocations

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Connecting researchers and educators to the resources and services they need to accomplish their objectives.

Research & Educational Community



Cutting-edge
Hardware,
Software +
Expertise

Allocation Services Vision & Goals

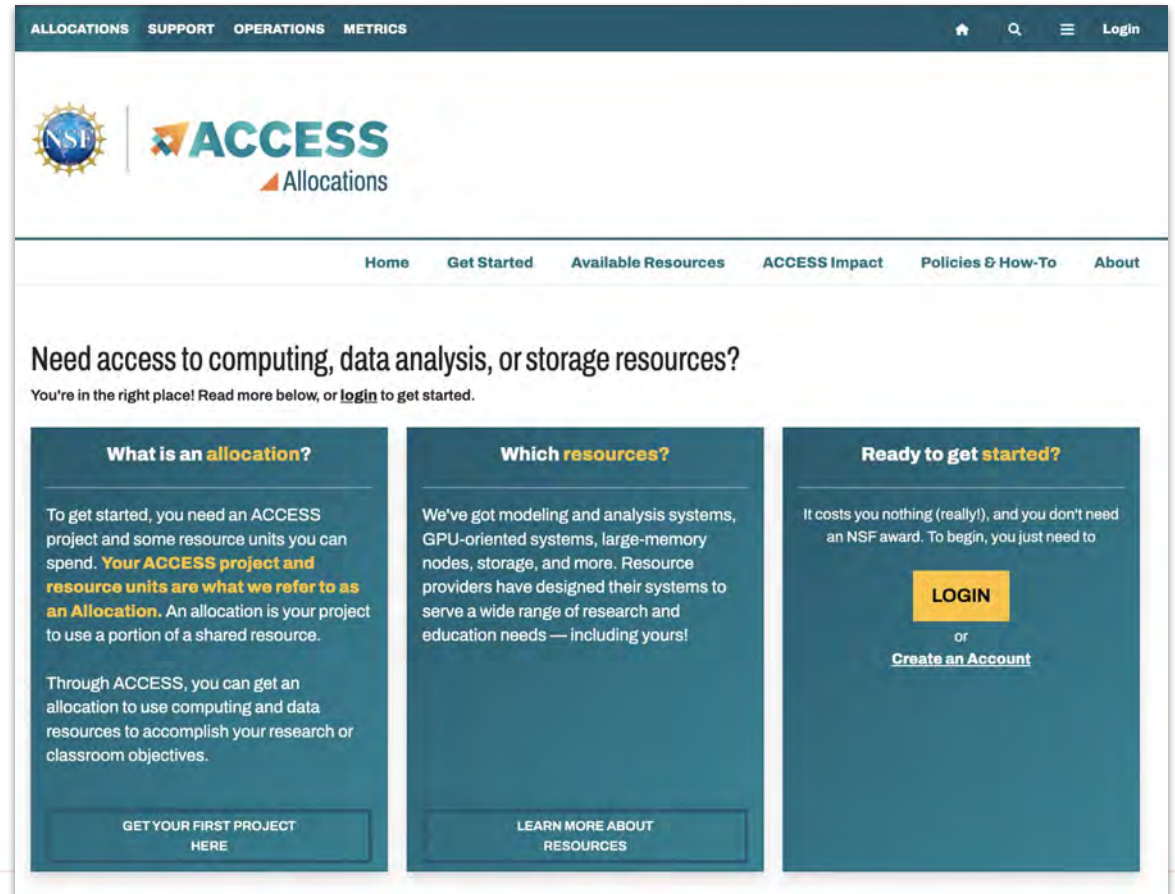
Allocations Vision: The NSF-funded national CI must be accessible and equitable for all researchers no matter the size of the institution, the scale of the planned work, the discipline of the research, or the demographics of the requestor.

Our Goals:

- Create an **open, inviting, and democratized allocations marketplace**
 - With our emphasis on continuous improvement and DEI
- ...with an **efficient, scalable, and simplified request and review framework**
 - Through our policies and procedures
- ...built on a **robust, decentralized, and flexible software platform**
 - Made possible by the eXtensible Resource Allocation System (XRAS)

Open, Inviting, and Democratized Allocations Marketplace

- Welcoming gateway that inspires collaboration and participation
- Equitable access across disciplines, institutions, and demographic groups
- DEI & Continuous Improvement built-in to every aspect of the project



The screenshot shows the homepage of the ACCESS Allocations website. The header includes navigation links for ALLOCATIONS, SUPPORT, OPERATIONS, and METRICS, along with a home icon, search icon, menu icon, and a Login link. The main content area features the NSF and ACCESS Allocations logos. Below the navigation is a secondary menu with links for Home, Get Started, Available Resources, ACCESS Impact, Policies & How-To, and About. The main heading asks, "Need access to computing, data analysis, or storage resources?" and provides a sub-heading: "You're in the right place! Read more below, or [login](#) to get started." There are three columns of content: 1. "What is an allocation?" with a "GET YOUR FIRST PROJECT HERE" button. 2. "Which resources?" with a "LEARN MORE ABOUT RESOURCES" button. 3. "Ready to get started?" with a "LOGIN" button and a link to "Create an Account".

Simplified Request & Review Framework

- **Explore ACCESS** — for getting started, evaluating resources, dissertations, small-scale activities
 - Only requires an abstract, reviewed by RPs for suitability
- **Discover ACCESS** — for modest-scale work, opportunity to request courtesy review of their plans
 - One-page write-up, reviewed by RPs for suitability
- **Accelerate ACCESS** — for more experienced researchers with mid-scale needs
 - Three-page proposal, subject to panel and RP review
- **Maximize ACCESS** — for largest-scale projects, continued close scrutiny of most demanding computational work
 - 10-page proposal subject to panel and RP review

Policies and practices are designed for easier entry.

RPs are engaged in each request for their resource(s).

Robust, Decentralized, and Flexible Software Platform

eXtensible Resource Allocations Service (XRAS) Software - *our foundation for innovation*

- Allocation management, resource integration, data sharing, and resource accounting
- Flexible, established platform used by multiple programs
- Identity management and user management

My Projects REQUEST NEW PROJECT GET HELP

TRA190018: Campus Champion Allocation for PSC (Pitt/CMU) Active

Discover: Feb 11, 2023 to Aug 10, 2024 EXTEND END DATE

Overview Credits + Resources Users + Roles History

319,717 ACCESS Credits available Exchange credits for resources!

Resource	Status	Balance	End Date	Users	My Username
Indiana Jetstream2 CPU	Active	51.3K of 120K SUs remaining (43%)	Aug 10, 2024	8	deems
Indiana Jetstream2 GPU	Active	49.8K of 50K SUs remaining (100%)	Aug 10, 2024	8	deems
PSC Bridges-2 EM	Active	1K of 1K Core-hours remaining (100%)	Aug 10, 2024	11	deems
PSC Bridges-2 GPU	Active	2.44K of 2.5K GPU Hours remaining (98%)	Aug 10, 2024	11	deems
PSC Bridges-2 RM	Active	46.9K of 115K Core-hours remaining (41%)	Aug 10, 2024	11	deems
PSC Ocean	Active	1.05K of 10K GB remaining (10%)	Aug 10, 2024	11	deems

Role **Users** **Action Details** **Status**

PI Stephen Deems Exchange: Feb 11, 2023 Approved

User Benjamin Commeau, Joanmarie Del Vecchio and 9 others Extension: Jan 17, 2024 Approved

*Interface to manage an allocation

Allocations Policies

Available at no cost!

- U.S.-based investigators are eligible to lead projects
- Graduate students can now lead projects
- Multiple supporting grants? → Multiple projects
 - Separate projects for research, exploration, and classroom activities
- Standardized project types for flexibility
 - The “paperwork” required to request a project ranges from:
 - 1 paragraph; 1 page; 3 pages; 10 pages
- Universal credits that can be exchanged for any available resource
- Award duration aligns with supporting grant

Policies and practices are designed for easier entry.

RPs are engaged in each request for their resource(s).

No supporting grants required!

KPI: Ecosystem Access Time

A “typical” project now takes ~10 days to go from submitting a project request to recording their first use of an ACCESS resource.

Accounts on resources are available in ~3 days.

<i>KPI: Ecosystem Access Time (days)</i>	2022	2023
	12.8	10.5
<i>Preparation time (satisfaction)</i>	4.1	4.23
Preparation time (days)	-	0.6
Median days to request decision	0.6	0.7
Median days to first credit exchange	4.0	1.9
Median days to approved exchange	1.1	1.0
Median days to first resource use	7.1	6.3

Step-by-Step Allocations Request

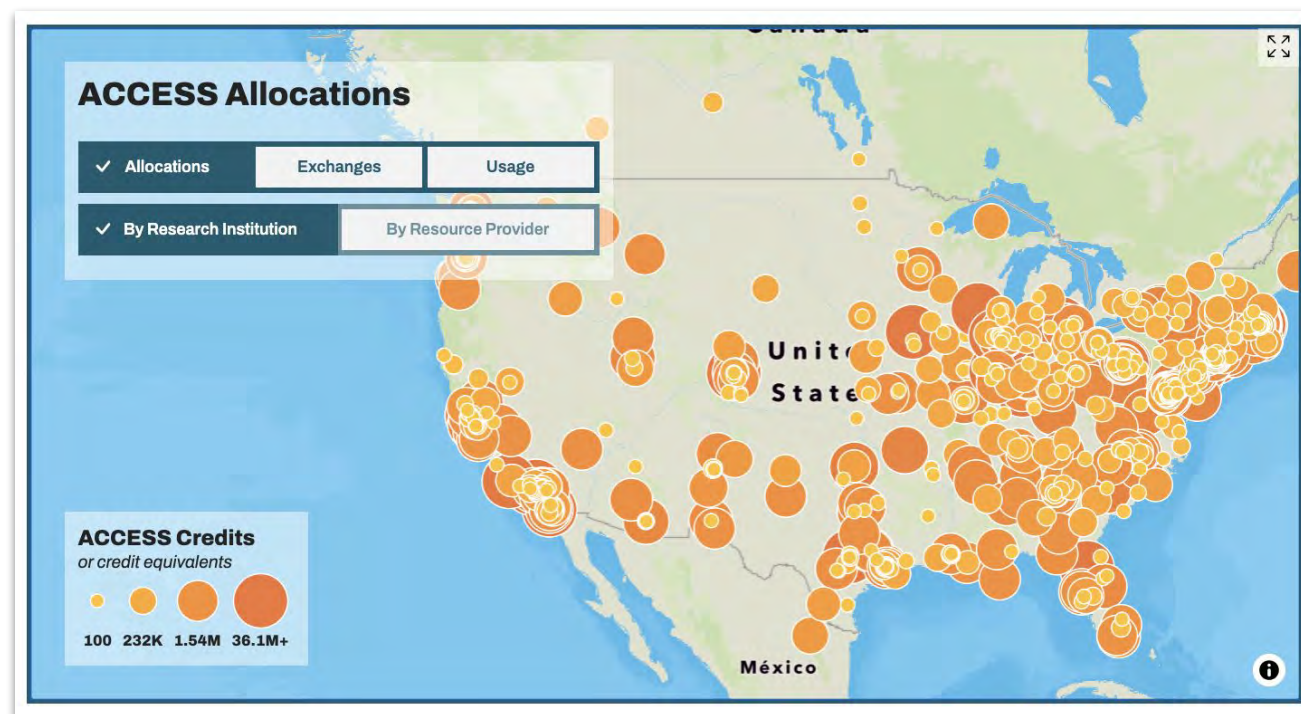
- [Register for an ACCESS ID](#)
- Select the [Project Type](#) that best fits your needs
 - If you're new, start with **Explore** and upgrade when you need more resources!
- Complete the Request Form
 - Add co-PIs, Allocation Managers, and other Users (make sure they have an ACCESS ID)
- Exchange your allocated credits for the [Available Resources](#)
- Start your research, development, or educational (classroom) work!

Link to full "[Get Your First Project](#)" guide



Who's Utilizing ACCESS?

Clark Atlanta University, Howard University, Florida A&M University, Jackson State University, Morgan State University, North Carolina A&T State University, North Carolina Central University, Prairie View A&M University, Tennessee State University, West Virginia State University, Navajo Technical University, and more!



[Explore the map](#)

In-depth ACCESS Metrics (XDMod)

- Maintain a pulse on *usage*, *performance*, and *behavior* of NSF-funded *systems within ACCESS*
- General Public can obtain general information about NSF-funded cyberinfrastructure usage without signing in
- End Users can sign in to obtain information on the jobs that they run and to help improve job performance and efficiency.
- Optimize *resource utilization* and *system performance*
- Explore data from researchers at your institution at: <https://xdmod.access-ci.org/>



Other ACCESS Items of Interest

Community Engagement Program (CCEP)

- Provides travel rewards to community members for a multitude of opportunities (community engagement, feedback forums, documentation) and more!

Student Training and Engagement Program (STEP)

- Three-part internship for undergraduates and early-career graduate students in cyberinfrastructure. Two-week introductory session, a full-time summer program with projects in various tech fields, and a part-time continuation during the academic year.
- Participants receive travel coverage, accommodations, stipends, and professional development opportunities. The program prioritizes historically underrepresented populations in STEM

Where to Find Help

[Ticket System](#)

- Anything ACCESS related
 - Must register for an [ACCESS ID](#) to open a ticket

Resource Providers (Directly)

- The [Resource Catalog](#) has links to user guides with contact information

[Knowledgebase](#)

- Search, documentation, forums

Match Services

- connecting researchers with consultants, mentors, and students to help solve their research problems
 - [Request an Engagement](#)

Contact the Presenter

- Drop me a line! (email on next slide)





Thank you!

deems@psc.edu
access-ci.org