Genesis Mission: Transforming Science and Energy with AI

Forrest M. Hoffman, Oak Ridge National Laboratory

May 19, 2026

U.S. DEPARTMENT of ENERGY

The Genesis Mission

The **Genesis Mission** is a historic national effort to catalyze new industries, create high-skill jobs, and usher a new golden era of American discovery by fully embracing AI and the ongoing computing revolution.

The Genesis Mission's **American Science and Security Platform** will connect the world's best supercomputers, AI systems, and next-generation quantum computers with the most exquisite scientific instruments in the nation, and its intelligence layer will be trained with the singular scientific datasets and expertise housed in the National Laboratories. Once complete, it will be the world's most complex and powerful scientific instrument ever built.

Through the Genesis Mission's **National Science and Technology Challenges**, the scientific community will develop and deploy the technologies necessary to demonstrate true AI advantage for science and energy.

Genesis Mission: Transforming Science and Technology through AI

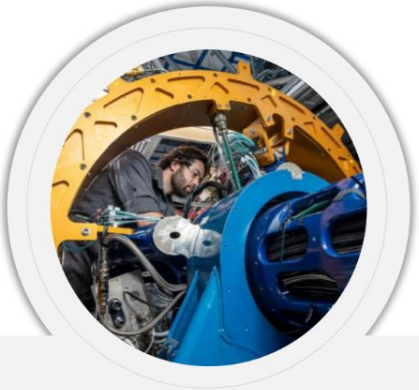
AI will be used to address grand challenges, ignite innovations, and drive unprecedented progress for national and global impact.

Energy Dominance

AI will be used to accelerate sustainable fusion power, optimize advanced nuclear reactor design and operation, and enable a more intelligent and resilient electrical grid.

Discovery Science

AI will be used to illuminate molecular dynamics, unify data to understand the universe from quarks to cosmos, and generate new quantum algorithms.



National Security

AI will be used to secure critical materials, accelerate advanced manufacturing, and discover mission-ready materials for defense and industry.

Bringing Together World-Class Innovators Across Sectors

Under the leadership of DOE and the White House Office of Science and Technology Policy, the Genesis Mission brings together **DOE's National Laboratories** with America's **leading universities**, **non-profits**, and **industry**, including pioneers in artificial intelligence, computing, materials, and energy.

Executive Order: Launching the Genesis Mission for U.S. Leadership in AI

- Dedicated, coordinated national effort to unleash a new age of AI-accelerated innovation and discovery that can solve the most challenging problems of this century
- Synergistic effort to bring together U.S. research and development resources to achieve dramatic acceleration in AI development and utilization
- Development and operation of the American Science and Security Platform to serve as the infrastructure of the mission integrating high-performance computing, AI modeling and agents, computational and simulation tools, secure data access, and experimental and production tools
- Identification and prioritization of national science and technology challenges where AI will make the most significant impact (i.e., demonstrate AI advantage) on national security, economic competitiveness, and technological leadership

Participating Offices

The RFA "The Genesis Mission: Transforming Science and Energy with AI" is a cross-Departmental solicitation. The following offices are accepting proposals:

- The Office of Science (SC)
- The Office of Critical Minerals and Energy Innovation (CMEI)
- The Office of Environmental Management (EM)
- The Office of Nuclear Energy (NE)
- The Office of Electricity (OE)
- The Hydrocarbons and Geothermal Office (HGEO)

The National Nuclear Security Administration will be addressing the security-focused National Science and Technology Challenges through a separate mechanism.

Genesis Mission Consortium

- The Genesis Mission Consortium, announced February 6, 2026, is a public-private partnership supporting the strategic direction of the Genesis Mission, working collaboratively to rapidly advance progress in science, energy and other emerging technologies, and national security
- Consortium members intend to contribute computing power, AI tokens, technical expertise, and/or in-kind support to advance Mission goals and build community
- The Consortium will connect leading industry and academic organizations with DOE and the National Laboratories and their resources, identifying high value partnerships among members to catalyze data flows and promote novel data applications
- For this RFA, the Consortium is providing an optional partnership initiative to help members and non-members collaborate on applications. See the Consortium website for additional information (https://genesismissionconsortium.org/).
- Applicants interested in leveraging the Consortium's partnership service are encouraged to do so as soon as possible
- Membership in the consortium **is not** a pre-requisite for eligibility under this RFA, and receipt of an award does not grant membership in the Consortium

AmSC is a First-of-a-Kind Integrated Platform for Transformative Science

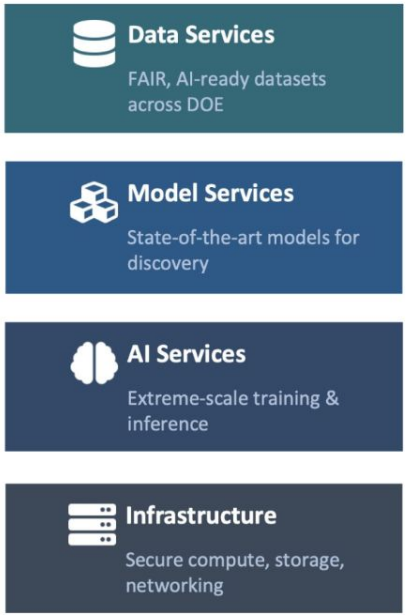
- Deliver a **common fabric** for scientists to build on
- Provide **modular services and abstractions** used to accelerate discovery cycles
- Leverage **science and industry innovations** rapidly as they are integrated into the platform
- Build a science-focused platform through **co-design**

AI-driven scientific discovery in the Genesis Mission

AmSC enables DOE scientists and collaborating teams to

- Create, access, and integrate world-class AI-ready datasets
- Run scalable model training on contributed compute infrastructure
- Perform large-scale modeling-simulation and AI
- Control instruments
- Move data efficiently across sites

AmSC enables custom science workflows to run across secure compute, storage, and data providers connected via high-speed networks



DOE Labs and Infrastructure Partners

ANL · BNL · FNAL · INL · JLab · LBNL · NETL · NLR · ORNL · PNNL · PPPL · SLAC

AmSC works closely with ModCon
Transformational AI Models Consortium

ModCon Mission

- Establish a consortium to accelerate the technical development and scientific discovery of the Model Teams
- Develop and deliver domain cross-cutting services as an engine for transformational AI model development
- Convene partners from industry, academia, and internationally to accelerate AI development and adoption

Four Core Teams

deliver support to Genesis Teams

IPPF
Partnerships and IP Management

DBS
Data Brokers & Standards

BPSW
Best Practices for Scientific Workflows

BASE
Cross-Cutting AI Capabilities

ModCon to Deliver

AI-Ready Data Pipelines
Transform raw scientific data into training-ready datasets

Scientific Workflows
Leaderboards, workflows, and upskilling for continuous discovery

Transformational Capabilities
- Core Agentic Framework
- Self-Improving Models Harness
- Multimodal Reasoning Frontends
- Safety, Security, Assurance
- Evaluation

Deployed on Genesis Mission Infrastructure
The American Science Cloud

Partners
17 DOE Labs + Industry + Academia

Genesis Mission Mapping
Data and Model Teams

AmSC is a cornerstone of the Genesis Mission platform

- **National Science and Technology Challenges:** High-impact scientific efforts to address Genesis Mission priorities, selected in response to the current RFA. These projects may be users of the Genesis Mission platform and therefore AmSC.
- **The Model Consortium (ModCon):** developing tools and frameworks that will be hosted by AmSC infrastructure
- **AmSC is a coalition of Infrastructure Partners (IPs):** DOE labs that contribute and integrate core capabilities into AmSC

National S&T Challenges:
Leverage ModCon and AmSC services to accelerate scientific discovery

Model Consortium:
Develop AI models & workflows that are supported by AmSC

AmSC Infrastructure Partners:
Integrate core capabilities into AmSC

AmSC Organization Chart

Science Council

Chair:Andreas Kronfeld (FNAL)
Kevin Yager (BNL)
Michael Begel (BNL)
Kjiersten Fagnan (LBNL)
Oliver Gutsche (FNAL)
Joel England (SLAC)
Todd Satagota (JLAB)
Jana B. Thayer (SLAC)
Neeraj Kumar (PNNL)

Industry Council

AWS
AMD
Cisco
Dell
Google
HPE
Microsoft
NVIDIA
Nokia
Cornelis

IP Council

Infrastructure Partner PoCs

AmSC Project Leadership Office

DIRECTOR: **Gina Tourassi** (ORNL)

DEPUTY: **Arjun Shankar** (ORNL)
DEPUTY: **Inder Monga** (LBNL)

CTO: **Sarp Oral** (ORNL)
Product Manager: **Deborah Bard** (LBNL)
PMO: **Denise Hoomes** (ORNL)
CISO: **Ryan Adamson** (ORNL)
Integration Architect: **Zach Mayes** (ORNL)

ModCon CoDesign Liaisons

Wahid Bhimji (LBNL)
Venkat Vishwanath (ANL)
Feiyi Wang (ORNL)

IRI Liaisons

Deborah Bard (LBNL)
Thomas Uram (ANL)

OPERATIONS

L1: **Ashley Barker** (ORNL)

Virtual Organization
Veronica Vergara (ORNL)
Adam Slagell (LBNL)

Intelligent Operations
Ed Balas (LBNL)
Eric Pershey (ANL)

User Engagement
Haritha Siddabathuni Som (ANL)
Chris Fuson (ORNL)

INTERFACES AND SERVICES

L1: **Mike Brim** (ORNL)

AmSC Interfaces
Taylor Childers (ANL)
John MacAuley (LBNL)

Infrastructure Services
Zach Mayes (ORNL)
Shane Canon (LBNL)
P. Shyamshankar (ANL)

Data Services
Ilya Baldin (TJNAF)
Rajesh Kalyanam (ORNL)

AI SERVICES

L1: **Thomas Uram** (ANL)

Model Services
John Gounley (ORNL)
Huihuo Zheng (ANL)

At-Scale Services
Murali Emani (ANL)
Steven Farrell (LBNL)

Intelligent Interfaces
Wahid Bhimji (LBNL)
Shreyas Cholia (LBNL)

AmSC PARTNER INTEGRATION

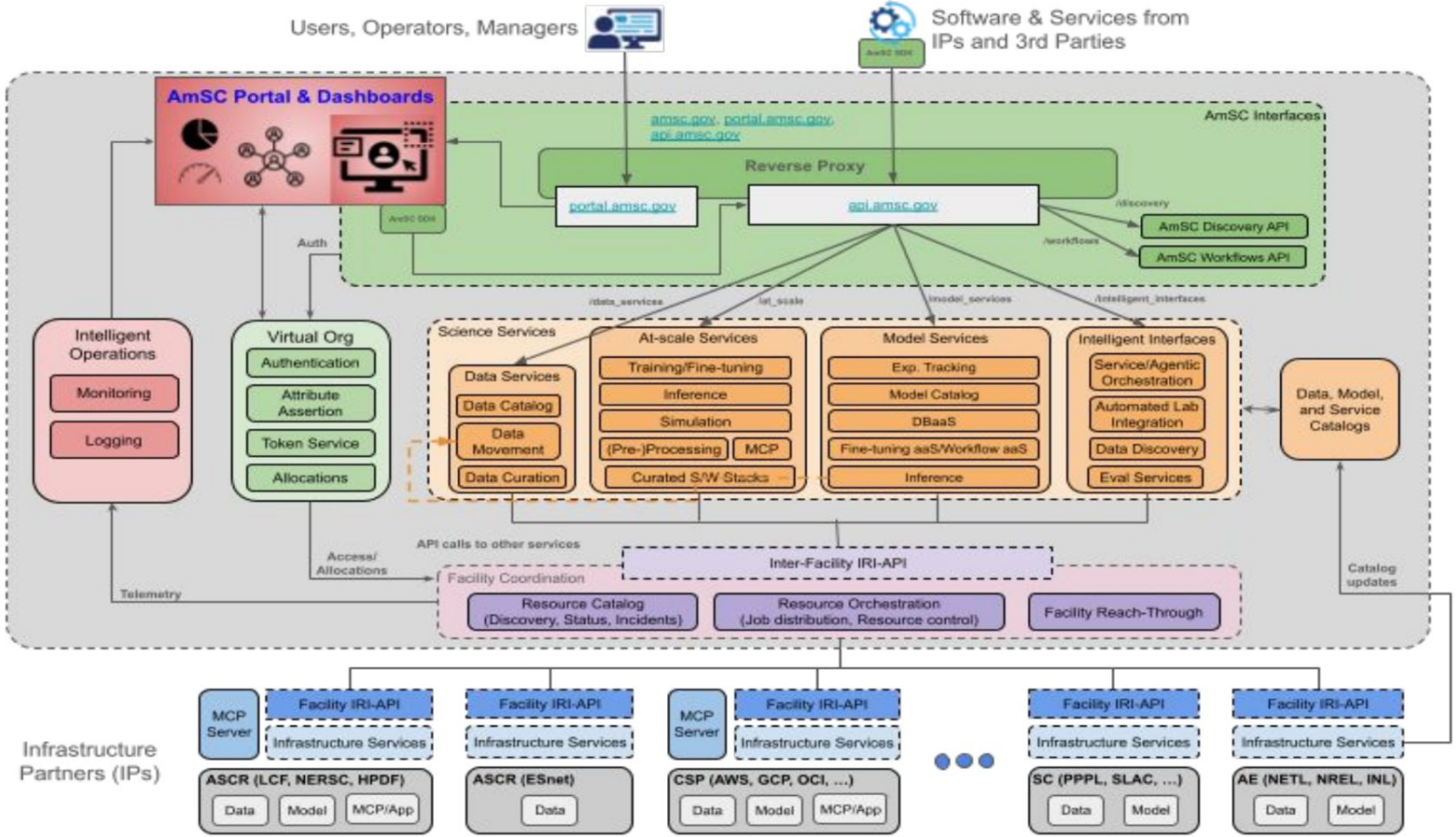
L1: **Chin Guok** (LBNL)

IRI Integration
John MacAuley (LBNL)
Paul Rich (ANL)

CSP Integration
Roger Cass (PNNL)
Jack Deslippe (LBNL)

Industry & Gov IP Integration
David Martin (LBNL)
Rebecca Hartman-Baker (LBNL)
Ben Mintz (ORNL)

Scalable architecture incorporates multiple DOE/non-DOE providers



Collaborating Infrastructure Partners in AmSC

Infrastructure Partner(s)	Lab(s)	Key Contacts (POC/PI, Leads)
OLCF	ORNL	Arjun Shankar
ALCF	ANL	Mike Papka
ESnet	LBNL	Inder Monga
NERSC	LBNL	Sudip Dosanjh
HPDF	TJNAF, LBNL	Graham Heyes, Anna Kupresanin
C3	PNNL	Robert Rallo
Scientific User Facilities	LBNL, ANL, TJNAF, BNL, FNAL, SLAC, ORNL	Paolo Calafiura, Nicholas Schwarz

Infrastructure Partner(s)	Lab(s)	Key Contacts (POC/PI, Leads)
DeepLynx	INL	Peter Suyderhoud
DIII-D Digital Twin	GA	Sterling Smith
EDX	NETL	Kelly Rose, Chad Rowan, Jack Searle
FemtoMind	TJNAF, FNAL	Robert Edwards
Fermi Data Platform	FNAL	James Amundson
HAIDIS	TJNAF	Ilya Baldin
SCDF	BNL	Adolfy Hoisie
S3DF	SLAC	Jay Srinivasan
Stellar-AI	PPPL	Shantenu Jha
VEE-ARIES/HERO	NLR	Kristi Potter

Engage with DOE Laboratory Facilities and Infrastructure Partners

Infrastructure and Services

HPDF
High Performance Data Facility
A Partnership of Jefferson Lab & Berkeley Lab

EDX
Energy Data eXchange

C3

ARIES
by NATIONAL LABORATORY OF THE ROCKIES

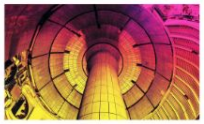
DeepLynx nexus

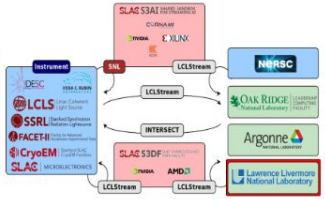
aws

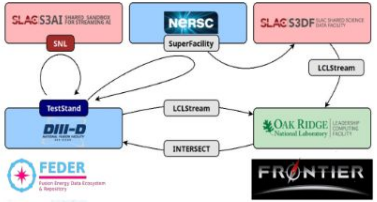
Azure

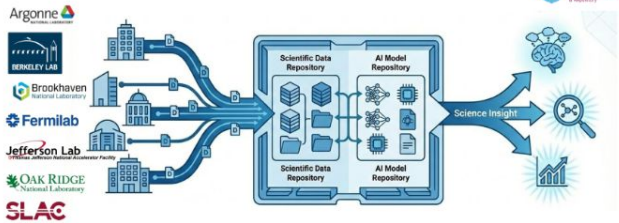
Google Cloud

Scientific Facilities and Workflows









Foundation for future expansion

AmSC is designed to be a fabric that people can build on. Beyond the MVP, Science teams will be able to bring their models, connect their datasets and plug in their infrastructure.

Example: Connect a new data source to AmSC, make datasets available to all DOE

- Register with the Data Catalog and support Data Movement API to provide access to AmSC users
- Integrate with AmSC FedID for auth and access control
- Data source may send data and compute tasks to AmSC computing sites via the API

Example: Science team develops a new tool/capability, useful for all AmSC users

- Register with the Service Catalog
- Provide AmSC API endpoints for other AmSC services, interfaces and users to make use of it

Example: Expose a new compute resource to AmSC users

- Register site with the Resource Catalog; support endpoints to AmSC API.
- Integrate with AmSC FedID for auth and access control
- Deploy AmSC software and services, accessible to all AmSC users/agents via API

ORBIT-2: AMD and ORNL Advancing Earth System Intelligence at Exascale

The ORBIT-2 collaboration between AMD and Oak Ridge National Laboratory exemplifies the transformative potential of AI-for-Science at exascale. By combining AMD's cutting-edge GPU and CPU technologies with ORNL's deep scientific expertise, we're not just accelerating Earth system modeling—we're redefining what's possible in scientific discovery. This partnership reflects AMD's commitment to pushing the boundaries of high-performance computing and delivering scalable, energy-efficient AI solutions that address some of the world's most pressing challenges. ORBIT-2 is a milestone in our journey to harness AI for the greater good.

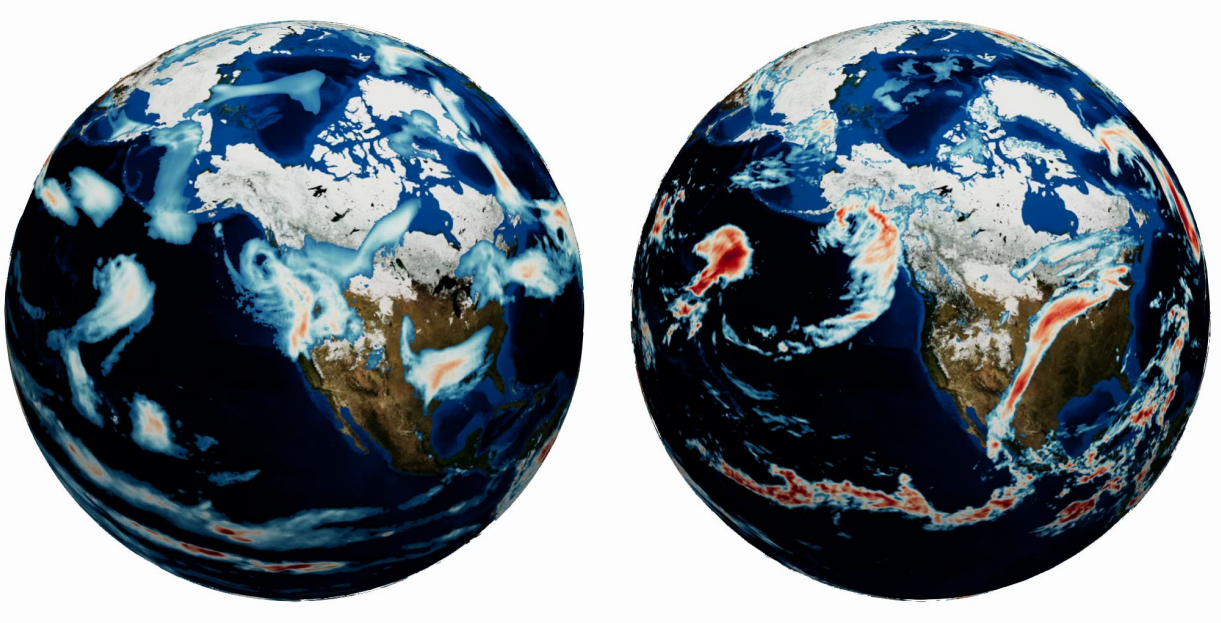
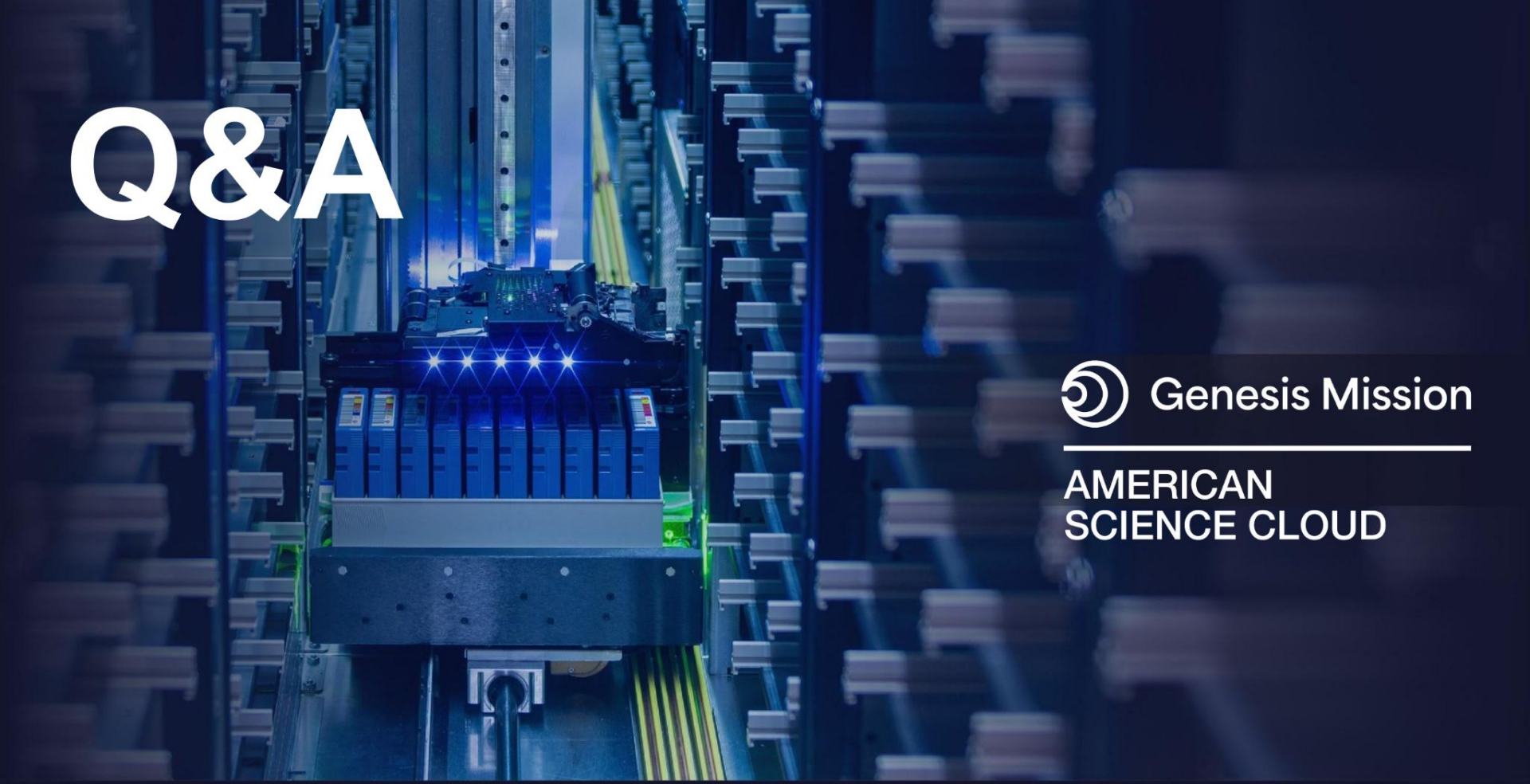


Figure. Left: Input Image at 28 km resolution. Right: ORBIT-2 downscaled prediction at 7 km resolution (Image Courtesy of ORNL). See blog post at https://www.amd.com/en/blogs/2025/earth-system-modeling-with-orbit-2.html

Xiao Wang, Jong-Youl Choi, Takuya Kurihaya, Isaac Lyngaas, Hong-Jun Yoon, Nasik Muhammad Nafi, Aristeidis Tsaris, Ashwin M. Aji, Maliha Hossain, Ming Fan, Mohamed Wahib, Dali Wang, Peter Thornton, Moetasim Ashfaq, Prasanna Balaprakash, Dan Lu. (2025). ORBIT-2: Scaling Exascale Vision Foundation Models for Weather and Climate Downscaling. SC25 Conference Proceedings. ACM Gordon Bell Prize Finalist. St. Louis, Missouri.

Q&A



Genesis Mission

AMERICAN
SCIENCE CLOUD