

# ***Winning the AI Space Race*** ***Past, Present and Future***

March 2025

# A Pivotal Moment in History: Exponential Growth in AI Model Size in Last 5 Years

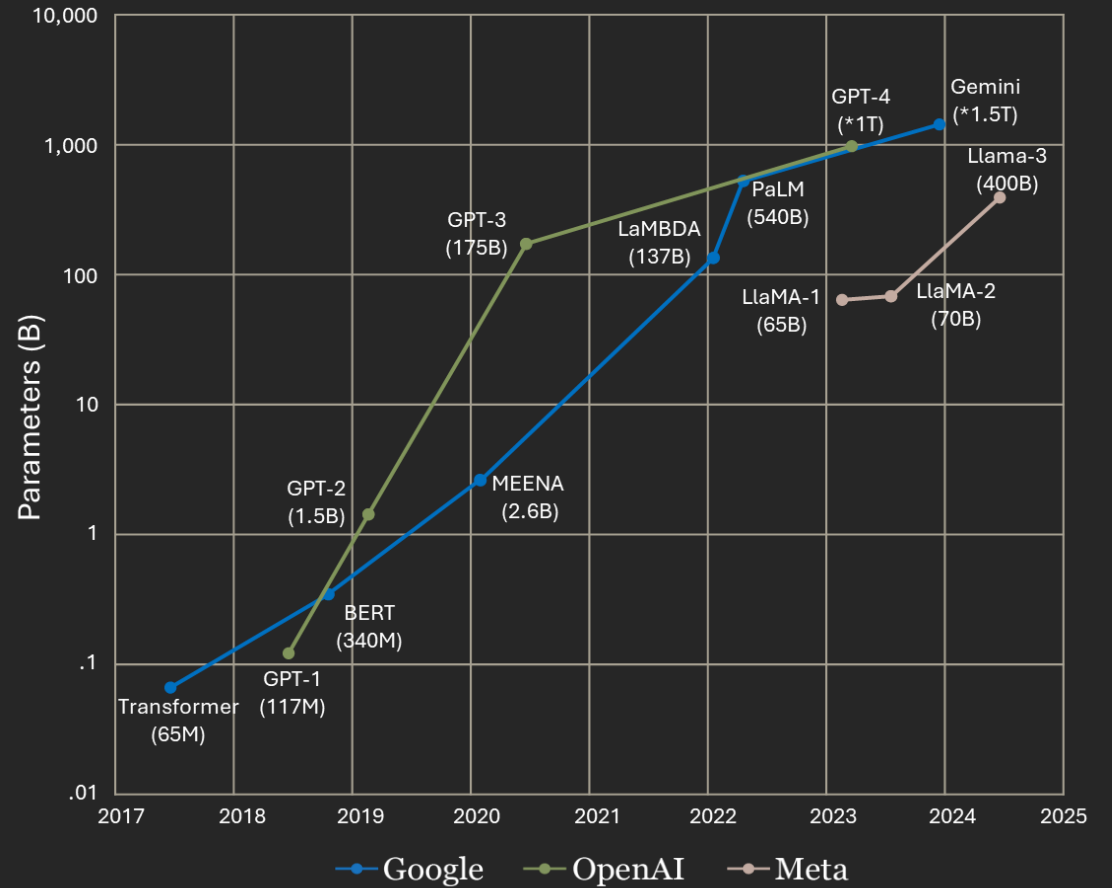
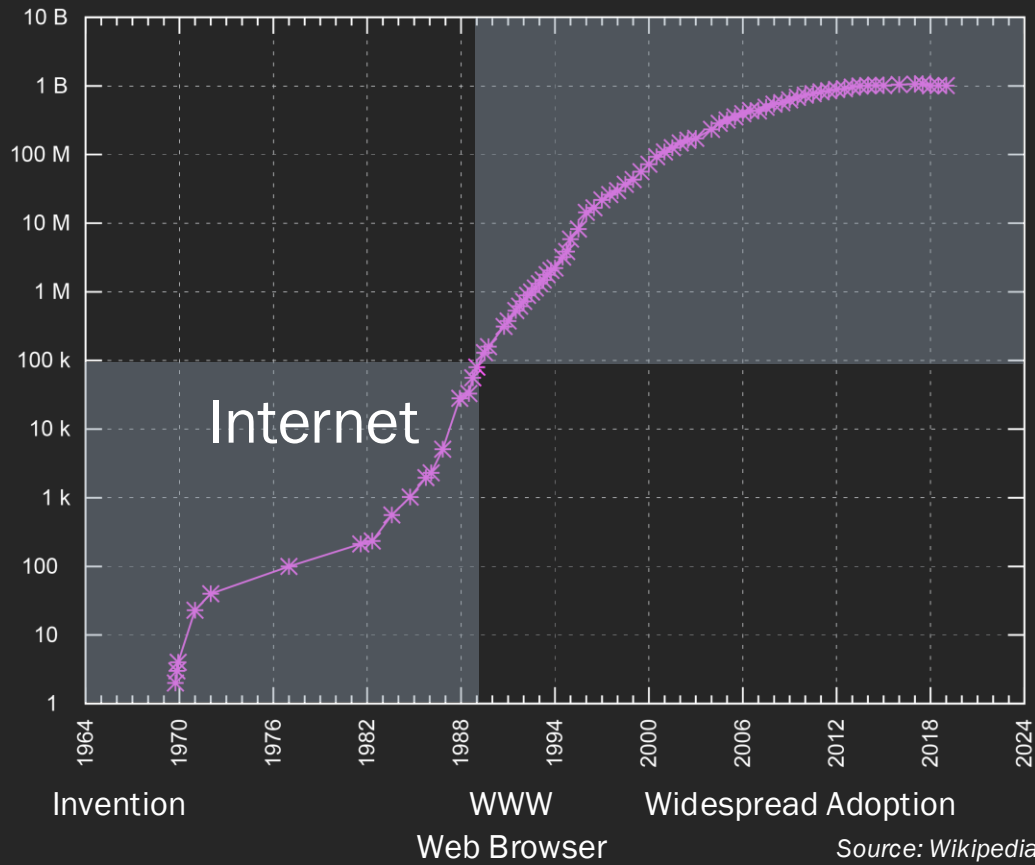
Arpanet → Internet

1960s (1st) → 1989-1991 (http/www/browser) → Present

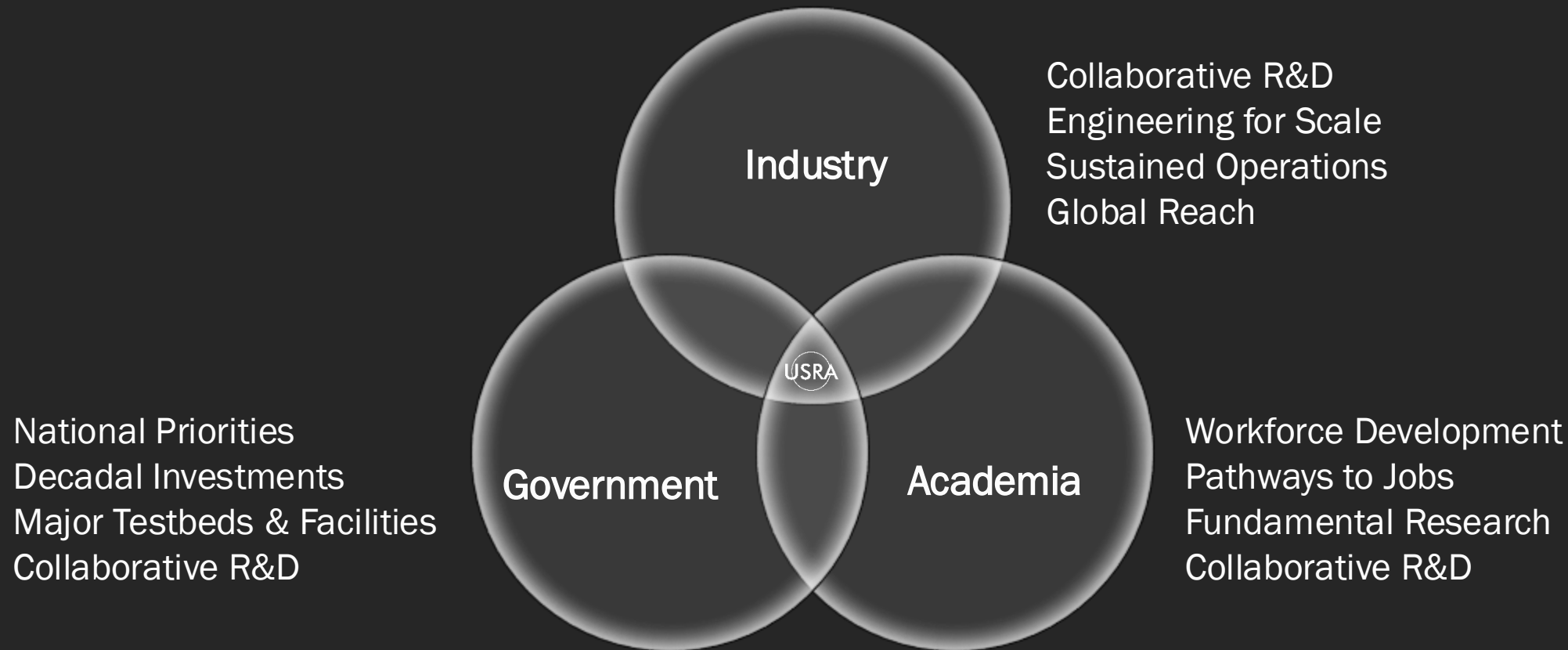
Artificial Neural Networks → Large Foundation Models

1958 (1st) → 2017 (Transformer) → Present

Internet Hosts Count



# Takeaways: Multi-Sector Collaboration is a Proven Model for Success



# STEM Workforce Development at Scale with R&D Projects



University Advanced Design Program

1983-1995

## IMMEDIATE IMPACT

- *ADP Projects directly benefited*
  - *12,656 students*
  - *152 faculty*
  - *69 departments*
  - *55 universities*
- *ADP Program directly led to Capstone Design Programs patterned after ADP being instituted in*
  - *~80 colleges & universities*

## LONG-TERM IMPACT

*Greatly influenced Criterion 3 (Student Outcomes) of ABET Engineering Criteria 2000*



Computing  
Accreditation  
Commission

### Criterion 3. Student Outcomes

*“an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors”*

# STEM Workforce Development with NASA Open Data, Open Source & Open Science

## RIACS Labs Courses



## University Courses

**Berkeley**  
UNIVERSITY OF CALIFORNIA

**CalPolyPomona**

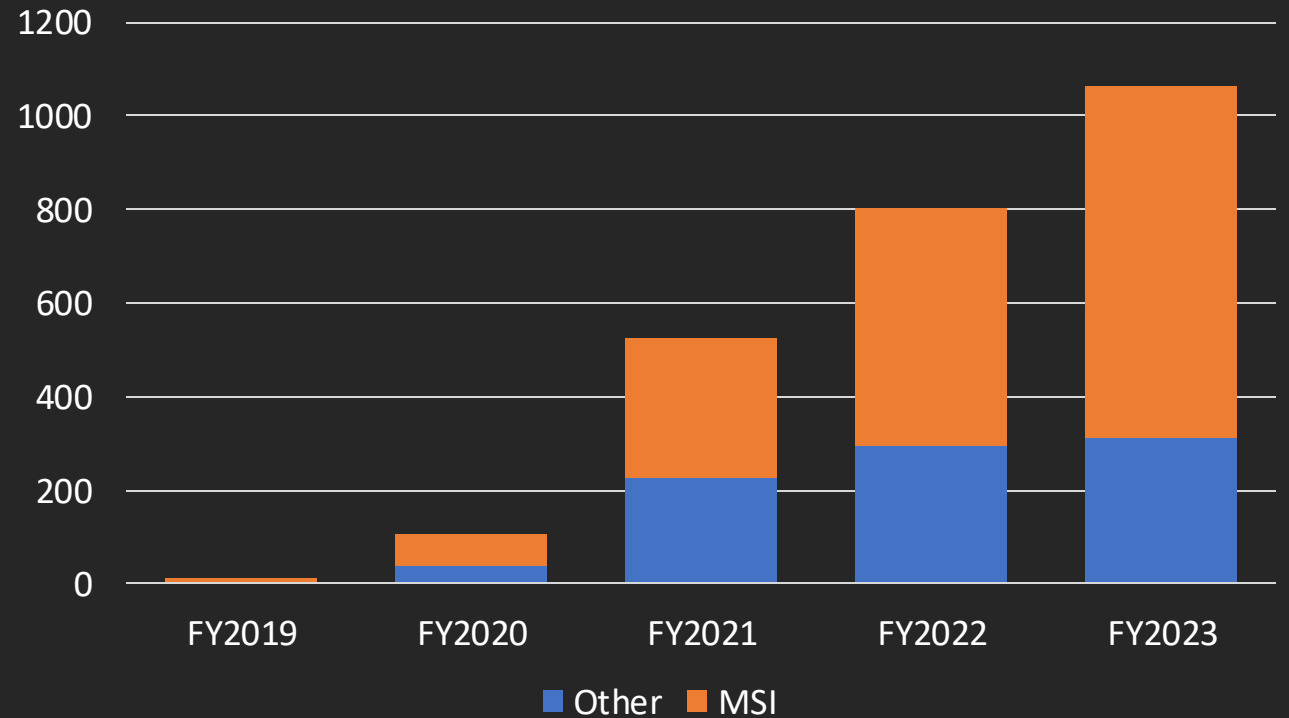
**SAN JOSÉ STATE UNIVERSITY**

**UNIVERSITY OF MARYLAND**

**Carnegie Mellon University**

## Cumulative Participants in RIACS-Developed Courses

1000+ Participants (700+ MSI, 160+ NASA)  
25 Courses Taught



# Let's Win the AI Race Together



## Contact

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*USRA Research Institute for Advanced Computer Science*

# BACKUP

# USRA – Founded in 1969 under Auspices of NASA & the National Academy of Sciences

**Founded at the request of the NASA Administrator  
to the President of the National Academy of Sciences**

**“I would like to propose that the Academy take initiative  
in convening the representatives of a number of appropriate universities  
to discuss the formation of such a consortium.”**

**James E. Webb, NASA Administrator, 1961 – 1968**

In his 1967 letter to Frederick Seitz,  
President of the National Academy of Sciences

## USRA's Mission

- To advance space- and aeronautics-related sciences and exploration through innovative research, technology, and education programs.
- Promote space and aeronautics policy.
- Develop and operate premier facilities and programs by involving universities, governments, and the private sector for the benefit of humanity.

# USRA: Engaging a Diversity of Universities

## 121 PhD Granting University Members

## Recent Annual Metrics

### Region I

- Boston College
- Boston University
- Brandeis University
- Brown University
- University of Connecticut
- Harvard University
- Massachusetts Institute of Technology
- University of New Hampshire
- Tufts University
- Yale University

### Region II

- University at Buffalo, SUNY
- Columbia University
- Cornell University
- Lehigh University
- New Jersey Institute of Technology
- New York University
- The Pennsylvania State University
- Princeton University
- Rensselaer Polytechnic Institute
- University of Rochester
- Rochester Institute of Technology
- The Rockefeller University
- Stony Brook University, SUNY
- University of Pittsburgh

### Region III

- Case Western Reserve University
- University of Delaware
- George Mason University
- The George Washington University
- Georgetown University
- Howard University
- Johns Hopkins University
- University of Maryland
- Ohio University
- The Ohio State University
- University of Virginia
- Virginia Polytechnic Institute & State University

### Region IV

- University of Central Florida
- William & Mary
- Embry-Riddle Aeronautical University
- University of Florida
- Florida Institute of Technology
- Florida State University
- Georgia Institute of Technology
- Hampton University
- North Carolina A&T State University
- North Carolina State University
- Old Dominion University
- University of Tennessee, Knoxville
- Vanderbilt University

### Region V

- The University of British Columbia
- University of Canterbury
- The Chinese University of Hong Kong
- Indian Institute of Space Science and Technology
- Korea Advanced Institute of Science and Technology
- Seoul National University
- The University of Sydney
- Technion - Israel Institute of Technology
- Tel Aviv University
- University of Toronto

### Region VI

- The University of Chicago
- University of Illinois at Urbana-Champaign
- Indiana University
- The University of Iowa
- Iowa State University
- University of Michigan
- Michigan Technological University
- University of Minnesota
- Montana State University
- The University of Nebraska-Lincoln
- Northwestern University
- University of Notre Dame
- Purdue University
- University of Wisconsin - Madison

### Region VII

- Alabama A&M University
- The University of Alabama in Huntsville
- Auburn University
- Baylor University
- University of Houston
- Louisiana State University
- Mississippi State University
- Rice University
- Texas A&M University
- Texas Tech University
- University of Texas at Arlington
- University of Texas at Austin
- University of Texas at Dallas
- University of Texas at El Paso
- University of Texas at San Antonio
- University of Texas Medical Branch at Galveston

### Region VIII

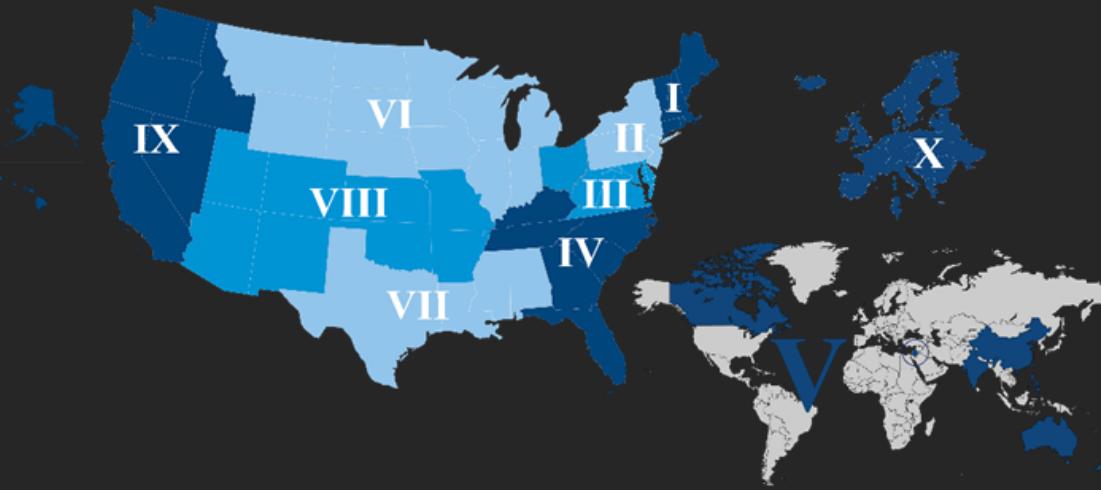
- The University of Arizona
- Arizona State University
- University of Arkansas
- University of Colorado Boulder
- Colorado School of Mines
- University of Denver
- The University of Kansas
- The University of New Mexico
- New Mexico State University
- The University of Oklahoma
- Oklahoma State University
- Utah State University
- Washington University in St. Louis

### Region IX

- University of Alaska Fairbanks
- University of California - Berkeley
- California Institute of Technology
- University of California, Los Angeles
- University of California, San Diego
- University of California, Santa Barbara
- University of Hawai'i
- University of Southern California
- Stanford University
- University of Washington

### Region X

- University of Bern
- University of Cologne
- École Polytechnique Fédérale de Lausanne
- Polytechnic University of Turin
- University of Leicester
- University of Padua
- The University of Sheffield
- University of Stuttgart
- University of Zurich



260+  
Universities Engaged

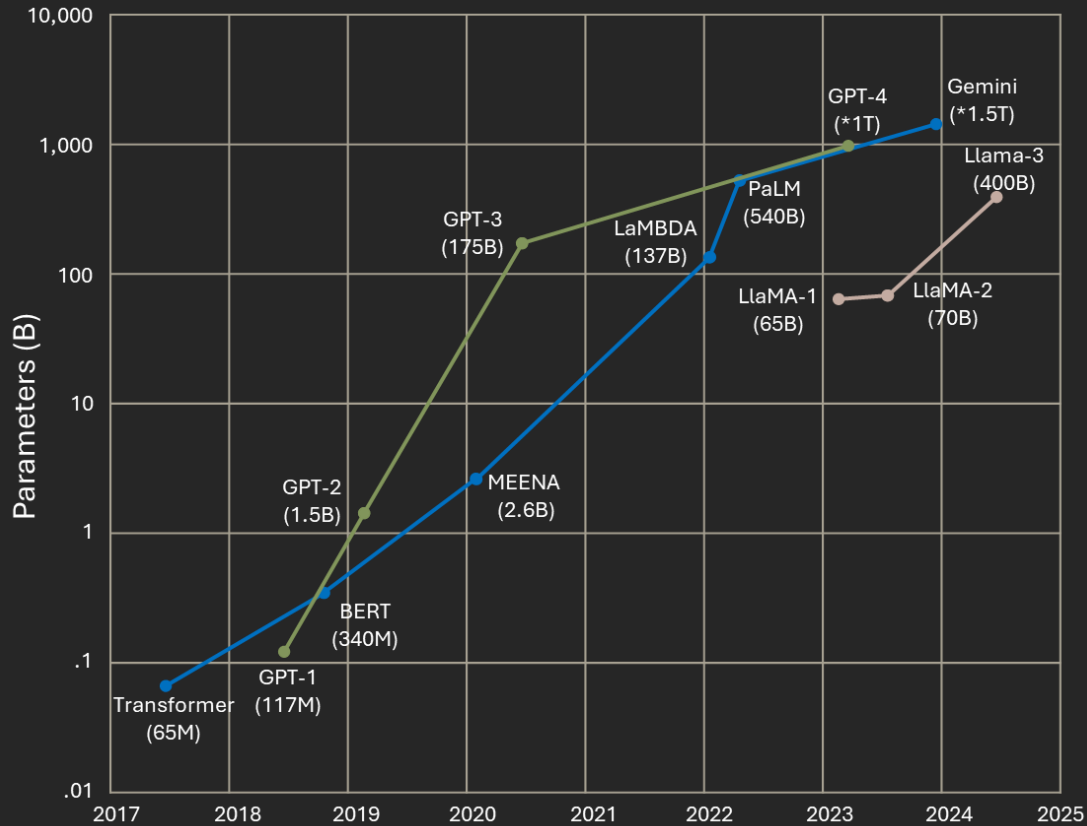
800+  
University Research Engagements

400+  
Total Organizations Engaged

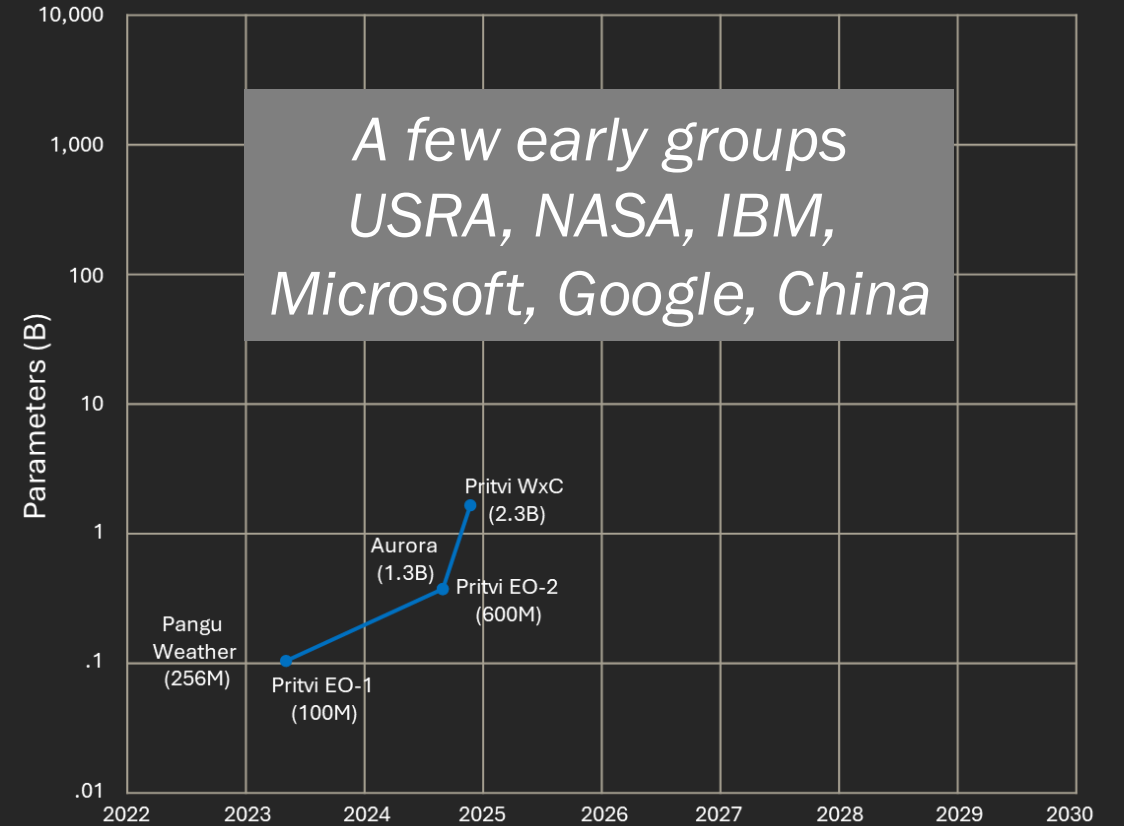
1300+  
Total Research Engagements

# Early Days of Satellite FMs Parallels Early Days & Exponential Growth of LLMs

*Exponential Growth in LLMs  
In last 7+ years*



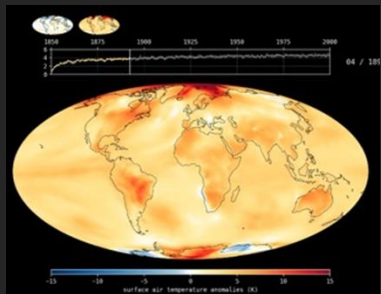
*Exponential Growth in Satellite FMs  
Has begun in last 2+ years*



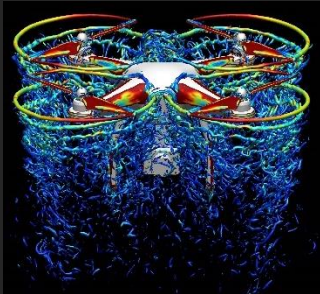
# Computer Science Program at NASA's Ames Research Center

## NASA Advanced Supercomputing (NAS) Division & Facility

Computational  
Physics



Computational  
Aerosciences



Advanced Computing



## NASA Intelligent Systems Division & Facility

Autonomous Systems  
& Robotics



Discovery  
& Systems Health



Robust Software  
Engineering



Collaborative  
& Assistant Systems



## NASA Human Systems Integration Division & Facility

Human-Machine  
Interaction



Human  
Performance



Integration & Training

