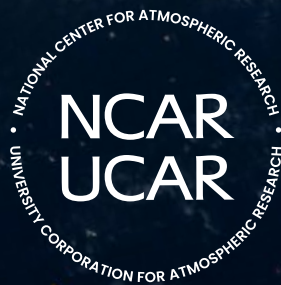


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# NCAR UCAR 101

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JANUARY 2023



# UCAR

## BRIEF HISTORY OF UCAR

In the late 1950s, Atmospheric Scientists from 14 universities came together with a common vision to create an organization where they could share resources and build collaborations to transform the understanding of weather, water, climate and the Sun. The University Corporation for Atmospheric Research (UCAR) was incorporated as a nonprofit organization on March 16, 1959; shortly after the incorporation and in partnership with the National Science Foundation, UCAR established the National Center for Atmospheric Research (NCAR) as a Federally Funded Research and Development Center. UCAR's founding mission was to operate the National Center for Atmospheric Research on behalf of NCAR's sponsor, the National Science Foundation, for the benefit of the atmospheric and related sciences community.



## UCAR TODAY

Today UCAR has grown to include 122 North American universities with programs in the atmospheric sciences and related Earth system sciences. UCAR is the legal entity that receives funding for all NCAR and UCAR's Community Programs (UCP) awards, grants and contracts. We have 1403 employees, an operating budget of \$224.8 million and staff and facilities in Colorado, Wyoming, Hawaii, and Washington D.C. UCAR provides central management functions and expertise in: finance, human resources, contracts, facilities, information technology, insurance, export compliance, food and event services, communications, diversity/equity/inclusion, business development, legal, and corporate governance and university relations.



# UCAR'S MISSION, VISION AND VALUES

While UCAR's activities have expanded and diversified, our core purpose continues to guide us through our

## VISION:

Earth system science for a better world

## MISSION:

Leading world-class Earth system science through partnerships, innovation, and service

## GUIDING VALUES:

Community, Creativity, Excellence, Inclusivity, and Integrity



UCAR Strategic Plan 2019-2028

# UCAR'S GOALS

## UCAR Strategic Plan 2019-2028

**Provide exemplary management of NCAR and UCP**

- Maintain a modern, effective, and efficient infrastructure together with business systems and practices that enable world-class research, promote collaboration and support community needs
- Provide an environment that embraces innovation, inclusions, and respect

**Be an advocate, convener, and enabler of the community to advance breakthroughs that solve complex Earth system science problems**

- Amplify the capabilities of UCAR Members and be the center of innovation for efforts that lie beyond the scope of any single institution
- Facilitate partnerships among NCAR, colleges and universities, and the private sectors

**Enable the transition of Earth system science research to operations and applications, resulting in the support of lives and property protection, economic development and national security**

- Provide state-of-the-art scientific computational and data facilities that meet the needs of stakeholders across the air, water, weather, and climate enterprise
- Extend the reach and impact of Earth system science research by leveraging investments through partnerships and collaborations.

**Be an employer of choice in Earth system science by promoting a welcoming, innovative, inclusive culture that maximizes the talent, skills, and diversity with the broad Earth system science community**

- Be an exemplar of diversity and inclusion, learning from sharing best practices within and beyond our community
- Provide relevant, fair, comprehensive, and proactive policies that reward and value each person's contributions

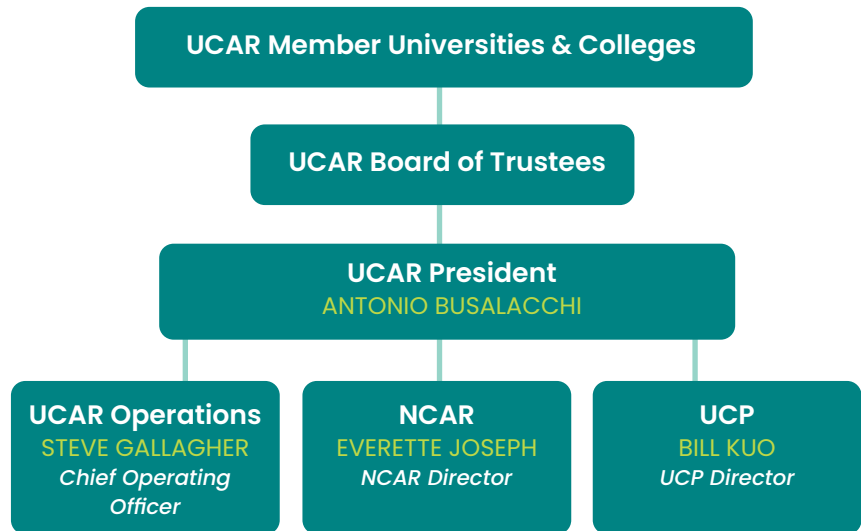
**Champion and extend Earth system science education and outreach**

- Provide activities that enrich education and training of the next generation, fostering an environment that increases the size and diversity of the talent pool in Earth system science
- Extend the reach and engagement of our world-class scientific research to improve public and student literacy and career pathways

# UCAR'S ORGANIZATIONAL STRUCTURE

UCAR is a member organization. Each Member university appoints two Member Representatives, one of which casts the vote on behalf of the Member in UCAR elections. The Members elect the Board of Trustees. The Board of Trustees hires the UCAR President.

The Chief Operating Officer, the Director of UCP, the NCAR Director and other members of senior management staff in the President's Office report to the UCAR President.



## UCAR PRESIDENT'S OFFICE

Within the President's office is the Office of General Counsel; Corporate Governance and Membership; Government Relations; External Engagement; the Office of Diversity, Equity and Inclusion; UCAR/NCAR Communications and the office of Friends of the National Center.

### Office of General Counsel

The Office of General Counsel (OGC) provides legal advice and solutions to UCAR/NCAR/UCP that facilitates the achievement of goals, minimizes legal exposure, and protects the organization's personnel and assets. OGC is also responsible for the organization's export compliance and oversees the management of the UCAR Exchange organization.

### Governance and Membership

Governance and Membership is responsible for the management and coordination of the UCAR Member Universities, their Member Representatives and the corporate governance committees including the UCAR Board of Trustees and its committees, the President's Advisory Committee on University Relations (PACUR), the Membership Committee, the Members Nominating Committee, and the NCAR Non-NSF Proposal Review Panel (PRP). The Governance office also oversees the UVisit and Next Generation Fellowship Programs, the biennial Members Salary Survey, UCAR Commons, and the PACUR Community Engagement Fund.

### Office of Government Relations

The Office of Government Relations is responsible for the organization's legislative activities in Colorado and Washington D.C. Government Relations serves the science community by highlighting the value and implications of our science for policy and legislative issues; identifying and advocating for research priorities critical to our nation and planet; acting as a neutral, fact-based voice on Earth system research policies; helping scientists effectively engage in the policy process; and building consensus for initiatives that enhance the community's success and standing in Washington D.C.

### UCAR/NCAR Communications

The Communications Office handles science communication, media relations, and internal communication for executive staff across the organization. The Communications staff is responsible for all the landing pages on the organization's websites; the structure and trainings for organization's internal web portal called Sundog; and manages the UCAR & NCAR Twitter, Facebook, Instagram, YouTube, and LinkedIn accounts, and strategizes with the labs and programs in coordination with their social media accounts. The Communication Office also drafts news releases, develops and maintains organization-wide branding and style standards, writes feature stories, conducts media training for staff and manages all media relations.

## Office of Diversity, Equity and Inclusion

The Office of Diversity, Equity and Inclusion (ODEI) is focused on helping the organization reach its goals of creating an inclusive workplace that values all individuals and their perspectives, contributions, and ideas in pursuit of the organization's mission. ODEI provides and coordinates staff training including bystander intervention/difficult conversations, coaching for social justice, supervisor training, the Leadership Exploration and Development (LEAD) training and the UCAR/NCAR Equity and Inclusion (UNEION) 101 and 102 training. ODEI also supports the development of Employee Resource Groups (ERG) and every four years, in collaboration with independent researchers, conducts the UCAR Workforce Culture Survey. The purpose of the survey is to: gain a better understanding of the workplace environment and experience for our staff; get recommendations from expert consultants in ways to create a more inclusive, supportive, and welcoming culture throughout UCAR for everyone; and establish a baseline for measuring the effectiveness of the actions that are put in place in response to those recommendations. At the conclusion of the survey, ODEI works with every lab, program, or office across the organization to develop plans to improve the workplace culture within the individual groups.

## Friends of the National Center

Friends of the National Center was established in 2017 to build on fundraising efforts that began in the mid 1990s. Fundraising efforts were minimal and primarily came from estate giving. Funds were usually used to support UCAR Center of Science Education's development of science education and public science literacy. In late 2022, UCAR hired the first Executive Director for the Friends of the National Center to broaden fundraising efforts and create an alumni network.

# UCAR OPERATIONS

The UCAR Operations offices provide business support that helps ensure that the scientific and educational work done at NCAR and UCP can thrive. UCAR Operations includes Enterprise Information Technology (EIT); Enterprise Risk Management (ERM); the Office of the Chief Financial Officer (OCFO); Facilities Management (FM); Health, Environment, and Safety Services (HESS); Office of the Chief Human Resources Offices; and Internal Audit (IA).

## Enterprise Information Technology

EIT provides secure, reliable, and effective fiscal and operational information technology (IT), security, and network infrastructure to support the organization.

## Enterprise Risk Management

UCAR's Enterprise Risk Management is a comprehensive program to proactively and continuously identify and manage risk that could affect the organization's ability to achieve its goals and objectives.

## Office of the Chief Financial Officer

The Office of the Chief Financial Officer includes Finance, Accounting and Contracts. It provides financial, project, and property accounting support to our internal and external customers in accordance with applicable rules, regulations, and UCAR policies and procedures. This includes sponsors, vendors, auditors, divisions, labs and programs, staff, and visitors.

## Health, Environment, and Safety Services

Health Environment, and Safety Services is responsible for the health and environmental safety of the organization.

## Internal Auditor

UCAR's Internal Auditor provides an independent, objective assurance and consulting designed to add value and improve the organization's operations. The Internal Auditor: monitors, assesses, and analyzes organizational risk and controls (people, processes, policies, procedures, and technology) that help the organization manage risks; conducts audits, assessments, reviews and investigations; evaluates compliance with applicable laws, regulations, award/contract terms and conditions, and policies and procedures; assesses the reliability and integrity of financial and operational information; assures safeguarding of assets; increases the efficiency and effectiveness of the control environment; and provides insights to management and advocate improvements. The Internal Auditor provides regular updates and reports to the Board of Trustees' Audit and Finance Committee.

## Human Resources

The Human Resources department advances partnerships with internal and external stakeholders to enhance UCAR as a leading employer within the Earth Systems Science community. This is accomplished by: providing excellence through agile, innovative and cost effective policies and programs; recruiting a diverse and talented next generation workforce; creating a culture that embraces inclusivity; serving as an advocate for diversity within Earth systems science; positively engaging employees and the community; promoting a work environment in which employees are recognized, rewarded, valued and respected; and fostering personal and professional excellence and innovation.

## Facilities Management

Facilities Management is responsible for building services, space planning, sustainability, transportations and logistics.

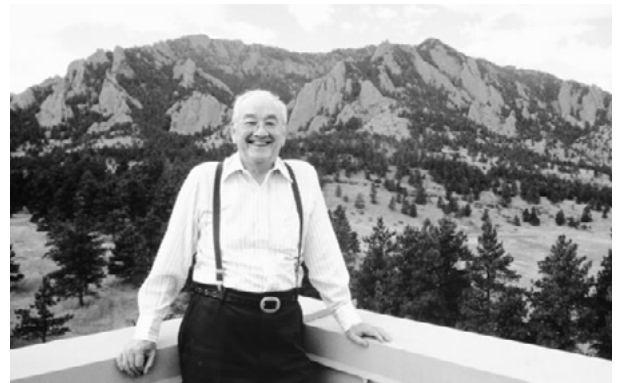
# NCAR

## BRIEF HISTORY OF THE NATIONAL CENTER FOR ATMOSPHERIC RESEARCH (NCAR)

In 1956, the National Academy of Sciences convened a committee of distinguished scientists to investigate the state of meteorology. Noting the size and complexity of atmospheric problems and the inadequate resources for solving them, the committee recommended an exponential increase in support for basic research. Coupled with new funding, the committee planned to establish a national institute (later called a national center) for atmospheric research to be operated by a consortium of universities with support from the National Science Foundation (NSF). The mission of the institute would be to: attack the fundamental problems of the atmosphere on a scale commensurate with their global nature; aggregate the large-scale research facilities necessary for such an attack; provide a coordinated, interdisciplinary approach to these problems on a scale not possible in individual university departments; and preserve the natural alliance between research and education, without unbalancing university departments.

In 1960, NCAR began operations in Boulder, Colorado, as a program of the National Science Foundation managed by UCAR.

Today, NCAR provides the university research and teaching community with tools such as aircraft and portable ground-based systems to observe the atmosphere with the technology and assistance to interpret and use these observations, including supercomputer access, and user support. NCAR is also the leader in community developed Earth system models. NCAR and university scientists work together on research topics in weather, water, climate, atmospheric chemistry, interactions between Sun and Earth, and more.



## NCAR Mission & Vision

Soon after the center opened its doors in 1960, NCAR leadership and staff began summarizing our purpose as “science in service to society”, words often heard in the broad community as well. In a time of dramatic environmental change, we are inspired by urgent scientific and societal needs to chart a path forward for NCAR within the Earth science community, and to renew our purpose going forward as “science with and for society”.

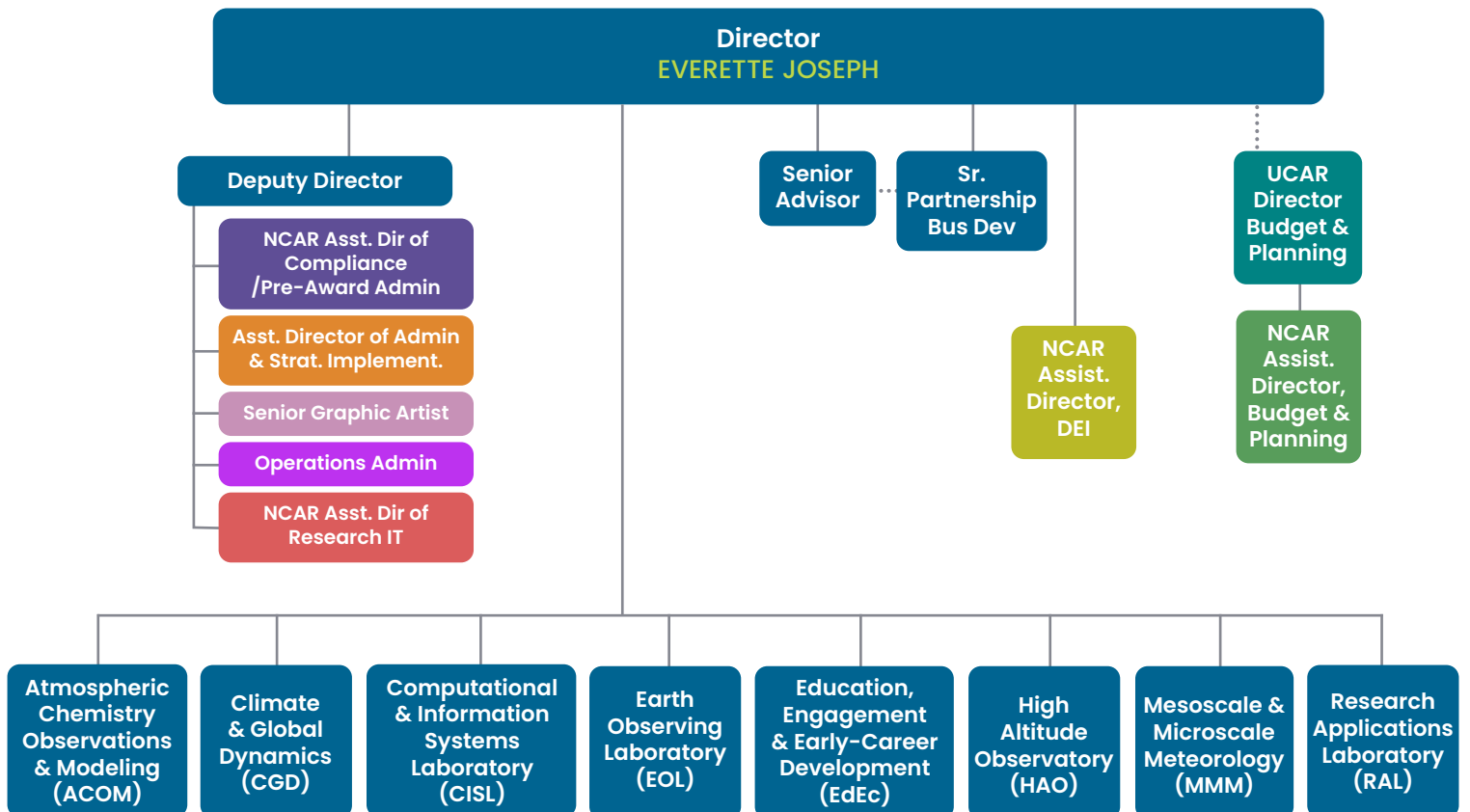
## NCAR’s Vision:

Accelerated progress toward a thriving and sustainable society, empowered by the fundamental science and resulting applications made possible by NCAR’s leadership and collaboration within the academic and broader community.

## NCAR’s Mission:

- To understand the behavior of the atmosphere and related Earth and geospace systems.
- To support, enhance, and extend the capabilities of the university community and the broader scientific community, nationally and internationally.
- To foster the transfer of knowledge and technology for the betterment of life on Earth.

# NCAR ORGANIZATIONAL STRUCTURE



# NCAR LABS

NCAR's seven labs collectively cover a breadth of research topics in the Earth System Sciences, from the effects of the Sun on Earth's atmosphere to the role of the ocean in weather and climate prediction.

## Atmospheric Chemistry Observations & Modeling (ACOM)

ACOM's research focuses on advancing understanding and predictive capability for atmospheric composition and related processes. Research is organized around two major themes – Air Quality Prediction and Weather-Chemistry-Climate Interactions – and includes for example, a focus on issues related to the interaction of anthropogenic and biogenic chemical emissions, the effects of wildfires on air quality, and the impacts of upper troposphere/lower stratosphere (UT/LS) and middle atmosphere composition on climate. The synthesis of observations with atmospheric chemistry models is central to progress, with a focus on understanding and modeling fundamental processes. ACOM scientists work closely with the wider research community, providing intellectual leadership and facility support for measurement capabilities, laboratory and field experiments and community atmospheric chemistry models.

### Research Themes

- Chemical Climate
- Chemical Weather

Four cross-cutting working groups focus on the development of models and of instrumentation, to improve the interactions between the experimental and modeling groups, to enhance communication, to carefully disseminate the results of the research, and facilitate staff development.

- Multi-Scale Model Development (MUSICA)
- Instrumentation Development
- Cross-scale Observations & Modelling Integration
- Education, Communication & Professional Development



### Website:

<https://www2.acom.ucar.edu/>

### Point of Contact:

Pieter Levelt  
levelt@ucar.edu

### Advisory Board(s):

ACOM Science Advisory Board,  
ACOM Instrumentation Advisory Board,  
Advisory Panel for MUSICA



## Climate & Global Dynamics (CGD)

The Climate and Global Dynamics Laboratory has a mission to discover the key processes in each component of the Earth's climate system and the interactions among them, represent this understanding in models and thereby provide a basis for prediction of climate, and apply this understanding and these models to scientific problems of societal relevance.

This research focuses to increase the understanding of atmospheric and climate variability and climate change through parallel development and analysis of observational, assimilated, model-generated and model-forcing datasets.

- Datasets & Resources
- Modeling
  - Community Earth System Model (CESM)
  - Earth System Modeling (ESM)
- Interdisciplinary Projects
- Publications
- Software
- Visitor Program
- Research Integration
  - CESM Software Engineering Group
  - Information Systems Group (ISG)
- Research Sections
  - Atmospheric Modeling & Predictability
  - Climate Analysis
  - Climate Change Research
  - Oceanography
  - Paleo & Polar Climate Section
  - Terrestrial Sciences



**Website:**  
<https://www.cgd.ucar.edu/>

**Point of Contact:**  
David Lawrence  
[dlawren@ucar.edu](mailto:dlawren@ucar.edu)

**Advisory Board(s):**  
CGD Advisory Panel

## Computational & Information Systems Laboratory (CISL)

CISL's mission is to support and advance the Earth system sciences by providing world-class computing environments, data services, and research in computational science. Each year, CISL provides computing resources, services, and support to more than 1,500 users at over 500 universities and research institutions. CISL data services are used by tens of thousands of researchers worldwide.

### **NCAR-Wyoming Supercomputing Center (NWSC)**

The NWSC opened its doors in Cheyenne, Wyoming, in 2012. Since then, more than 4,000 users from more than 575 universities and other institutions across the nation and overseas have used its advanced computing and data storage resources for research in the Earth system sciences. The center is part of CISL's mission to support and advance the geosciences with world-class computing, data management and research in computing science. The NWSC facility houses the computing and data storage resources including the new Derecho supercomputer.

Derecho is expected to more than triple the scientific throughput of the Cheyenne supercomputer system by providing a peak speed of 19.87 petaflops (nearly 20 quadrillion floating-point operations per second). This improved capability will enable scientists to enhance the resolution and complexity of Earth system models, improve climate and weather research, and provide more accurate data to decision makers.



New Derecho Super Computer



**Website:**  
<https://www2.cisl.ucar.edu/>

**Point of Contact:**  
Thomas Hauser  
thauser@ucar.edu

**Advisory Board(s):**  
CISL HPC Allocations Panel,  
NCAR CISL Advisory Panel

## Earth Observing Laboratory (EOL)

The Earth Observing Laboratory (EOL) is NCAR's end-to-end observational enterprise, responsible for supporting research of the Earth's atmosphere. EOL leverages world-leading technology and expertise to provide leadership in observational research, field project support, and data collection.

EOL manages and deploys most of NCAR's Lower Atmosphere Observing Facilities (LAOF) across projects of varying scale and complexity. We deploy LAOF instruments and facilities to support field campaigns for research by scientists from universities, NCAR, and government agencies, while developing leading-edge technologies to drive research frontiers.

EOL is at the core of NSF's atmospheric research community for collecting observational data and transferring knowledge of instrumentation, measurements, and scientific observations. EOL features state-of-the-art instruments and equipment for collaborative analysis, including radar, aircraft, and light and sounding systems.

### Research Aviation Facility (RAF)

RAF houses and manages two NSF/NCAR research aircraft: the NSF/NCAR HIAPER GV, a Gulfstream V (GV) business jet that has been highly modified for research, and the NSF/NCAR C-130, a versatile and capable research platform that carries a wide variety of scientific payloads. These two aircraft are part of NSF's Lower Atmosphere Observing Facility (LAOF) deployment pool and are available for request to the research community.

### In-Situ Sensing Facility (IFS)

EOL's In-Situ Sensing Facility serves the atmospheric science community's advanced observational needs by providing a flexible, state-of-the-art backbone measurement capability applicable to a wide range of experimental needs - emphasizing advanced sensor capabilities, sensor integration, system mobility, and the ability to deploy to remote or rugged locations.

We provide in-situ and remote measurement systems for observations that target the lower atmosphere. We collect insitu data directly at the Earth's surface, on towers, on balloons and on packages dropped from research aircraft. Remote profiling measurements are made utilizing vertically pointed radar, lidar, and acoustic sensors.

### Remote Sensing Facility (RSF)

EOL's Remote Sensing Facility serves the observational needs of the atmospheric science community by developing and deploying state-of-the-art radar and lidar instrumentation. RSF is committed to providing and analyzing cross-cutting measurements in interdisciplinary research, thereby continuing EOL's leadership in the discipline of remote sensing. The combination of ground-based scanning and airborne remote sensors provides measurements of atmospheric parameters essential for realization of the societal and scientific benefits outlined in the NCAR Strategic Plan. These high-resolution, large-domain, remotely-sensed observations of clear air and precipitation are otherwise unobtainable.



## Data Management and Services (DMS)

EOL's Data Management and Services facility offers comprehensive data management, archival, and stewardship services to the observational research community. NSF-funded research teams rely on DMS to facilitate the development and implementation of tailored but comprehensive data management plans that comply with NSF expectations.

DMS provides data management support through all phases of a field campaign, including the long-term data analysis phase. DMS provides a secure, easily accessible archive of the collected data at the completion of a field deployment, including those from non-EOL sources. DMS is also responsible for developing and stewarding EOL's data services and collaborative tools. Together, the software engineers, archivists, and data services providers design and implement data management systems that allow less time spent worrying about the data and more time devoted to interpreting it.

## Design and Fabrication Services (DFS)

Scientific programs from all over the world rely on the capabilities of EOL's Design and Fabrication Services to create innovative engineering solutions and highest quality machining and repair services of new and existing highly-specialized instrumentation used on every imaginable platform.

We provide an unmatched set of skills and capabilities uniquely tailored to meet the development needs and requirements of the atmospheric research community. Through closely interacting with scientists and other engineers across our community, our staff utilizes the latest in solid modeling and computer-aided design software to achieve innovative solutions to complex and challenging instrumentation requirements.

### Website:

<https://www.eol.ucar.edu/>

### Point of Contact:

Scott McIntosh (interim)  
mscott@ucar.edu

### Advisory Board(s):

EOL External Advisory  
Committee

## Mesoscale & Microscale Meteorology (MMM, or M<sup>3</sup>)

MMM strives to produce the most accurate and effective computational models, data assimilation systems, and representations of unresolved weather and climate model processes.

With extensive external contributions, MMM's efforts include advancements in the Weather Research Forecasting (WRF) model, the Model for Prediction Across Scales (MPAS), and sophisticated codes for cloud-resolving and eddy-resolving simulations.

MMM continues to emphasize boundary-layer, turbulence and cloud-microphysics research. Eddy-resolving simulations of mesoscale phenomena such as tropical cyclones, general moist convection and fronts in the upper ocean enable us to address multi-scale dynamics, and compare our models with observations of turbulent flows. Thus, contributing to a deeper understanding of interactions across a continuous spectrum of mesoscale and microscale atmospheric motions.

### Research Sections:

- Capacity Center for Climate & Weather Extremes
- Dynamical & Physical Meteorology
- Prediction, Assimilation & Risk Communication
- Weather Modeling & Research
- Geophysical Turbulence Program

### Models:

- Weather Research & Forecasting Model (WRF)
- Model for Prediction Across Scales (MPAS)
- Antarctic Weather Research & Forecasting Model (WRF)  
Mesoscale Prediction System (AMPS)



### Website:

<https://www.mmm.ucar.edu/>

### Point of Contact:

Gretchen Mullendore  
gretchen@ucar.edu

### Advisory Board(s):

MMM Advisory Panel

## Education, Engagement & Early-Career Development (EdEc)

NCAR Education, Engagement & Early-Career Development (EdEc) aims to directly support NCAR's mission and the National Science Foundation's vision to support, enhance, and extend the capabilities of the university community and the broader scientific community, nationally and internationally to foster the transfer of knowledge and technology for the betterment of life on Earth. Specifically, EdEc is committed to:

**Goal 1:** Inspire, engage and inform the public about the atmospheric and related sciences conducted by NCAR and the university community.

**Goal 2:** Entraining and preparing a highly skilled and diverse workforce for careers in the atmospheric and Earth related sciences.

**Goal 3:** Supporting the university community in educating students in the atmospheric and related sciences.

### Programs:

- ASP Colloquia
- ASP Postdoctoral Fellowship Program
- Boulder Space Weather Summer School
- Career Development for Postdocs
- CISL Summer Internships in Parallel Computational Science
- CPAESS Discovery Seminars
- CPAESS/NOAA OER Explorer
- Early Career Faculty Innovators Program
- Early Career Scientist Assembly
- Educational Services and Support at Unidata
- EOL Summer Undergraduate Program for Engineering Research
- EOL's Technical Internship Program
- Explore the Sun-Earth Connection
- GEO REU Community
- Graduate Visitor Program
- GVP Bridge Program
- HAO Postdoctoral Fellowships
- Heliophysics Summer School
- Haskell-NCAR Environment Assessment Training (HERS) at NCAR
- Jack Eddy Postdoctoral Fellowship
- MetEd
- Najeeb E. Halaby Graduate Student Fellowship
- NCAR 360 Virtual Visits
- NCAR Distinguished Post-doctoral Career Guidance and Lecture Series
- NCAR Earth System Science Internship
- NCAR Explorer Series Field Campaigns
- NCAR Explorer Series Lectures
- NCAR Explorer Series Science, Arts, and Culture
- Newkirk Fellowship
- NOAA Bill Lapenta Internship
- NOAA Climate & Global Change Postdoctoral Program
- Ralph Cicerone Fellowship
- Research Experience for Undergraduates in Solar and Space Physics
- Significant Opportunities in Atmospheric Research and Science (SOARS)
- Traveling Climate Exhibit
- UCAR Next Generation Fellowships
- Undergraduate Leadership Workshop
- Unidata Summer Internships
- Weather Program Office Innovation for Next Generation Scientists Dissertation Fellowship



**Website:**  
<https://edec.ucar.edu/>

**Point of Contact:**  
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[rhaacker@ucar.edu](mailto:rhaacker@ucar.edu)

**Advisory Board(s):**  
EdEc Advisory Panel

## High Altitude Observatory (HAO)

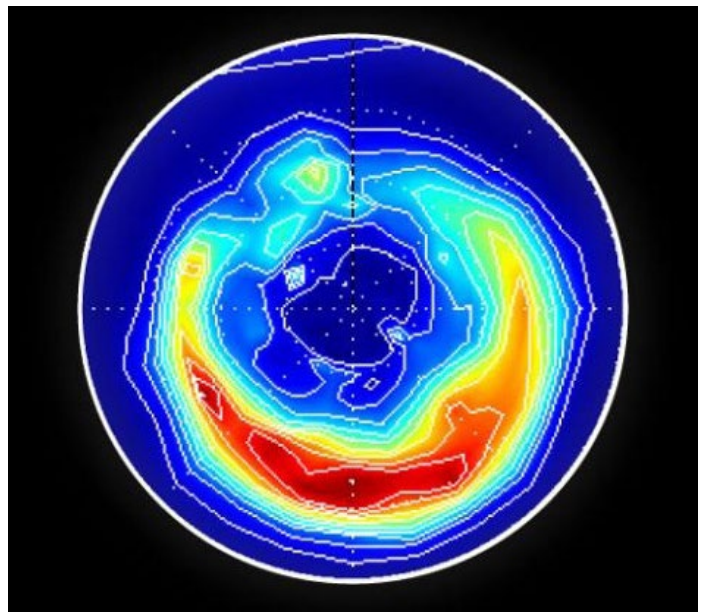
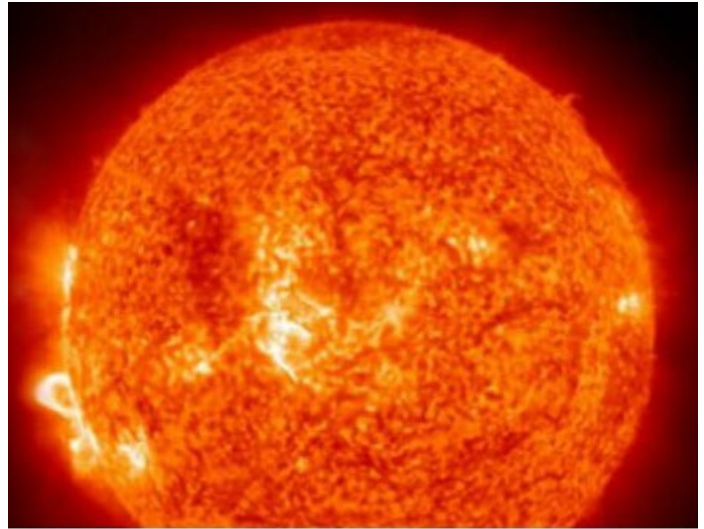
The High Altitude Observatory (HAO) of NCAR is located in Boulder, Colorado, at the foot of the Rocky Mountains. HAO conducts research and provides community support and facilities in Geospace Frontiers and Solar Frontiers.

It is HAO's mission to understand and quantify the impact of Solar variability on Earth's atmosphere across temporal scales. By fostering the transfer of knowledge and technology, HAO will lead, support, enhance, and extend the capabilities of the university and broader scientific communities nationally and internationally.

To meet HAO's community service goals, they have identified and defined 8 strategic working groups that represent what they feel are important research and educational areas of focus.

- Solar Flux Origins, Emergence, and Eruptions
- Observing and Quantifying Solar Magnetism
- The Bz Challenge
- Geospace Community Modeling
- Data Assimilation Across Disciplines
- Space Climate: Radiation, Particles, & Responses
- Diversity, Outreach, Mentoring, & Education (DOME)
- Community, Partnerships, & Data Stewardship

Topics of interest include the solar interior, lower solar atmosphere, corona and heliosphere, terrestrial and planetary atmosphere, and ionosphere and magnetosphere. Radiative transfer, hydrodynamics, magnetohydrodynamics, radiation hydrodynamics, and plasma physics are pursued for both their fundamental physical interests and their applications in the above areas of research.



Website:  
<https://www2.hao.ucar.edu/>

Point of Contact:  
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[hgilbert@ucar.edu](mailto:hgilbert@ucar.edu)

Advisory Board(s):  
COSMO Steering Committee,  
HAO External Advisory Committee,  
Mauna Loa Users' Committee,  
Director's Strategic Advisory Committee,  
HAO Instrumentation Advisory Committee,  
Visitor Committee,  
Appointments Committee

## Research Applications Laboratory (RAL)

The Research Applications Laboratory (RAL) is a world leader in community-driven, end-to-end research. RAL continually expands the reach of actionable Earth system sciences, and applies our discoveries to solving problems that impact society. Achieving this requires the leadership, inspiration, and diversity of talent to work in a multidisciplinary way with collaborators and stakeholders, building strategic partnerships that flourish well into the future. Just as important as RAL's technology development is their reputation for transferring solutions to society for deployment. This distinction underpins the robust convergent and actionable science RAL studies and delivers.

No matter the meteorological challenge, the goal is the same: to provide information and tools to end users and the broader public to improve safety and health, while saving time and money. From airline pilots, to truck drivers, to energy managers, to healthcare managers, to troops protecting the nation from chemical releases, experts in NCAR's Research Applications Laboratory are committed to supporting all sectors in meeting meteorological challenges with creative, practical solutions. Here, scientists and engineers innovate solutions that directly serve society.

### Expertise and Technologies

- Artificial Intelligence and Machine Learning
- Atmospheric Surface Measurements and Evaluation
- Cloud Computing and Software Containers
- Data Assimilation
- Datasets
- Decision Support Systems
- Forecasting Systems
- Geographic Information Systems (GIS) Science
- Measuring Forecast Quality
- Regional Climate Analysis and Impact
- Specialty Models



**Website:**  
<https://ral.ucar.edu/>

**Point of Contact:**  
Bill Mahoney  
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**Advisory Board(s):**  
RAL Advisory Panel

# UCAR Community Programs

## BRIEF HISTORY OF UCP

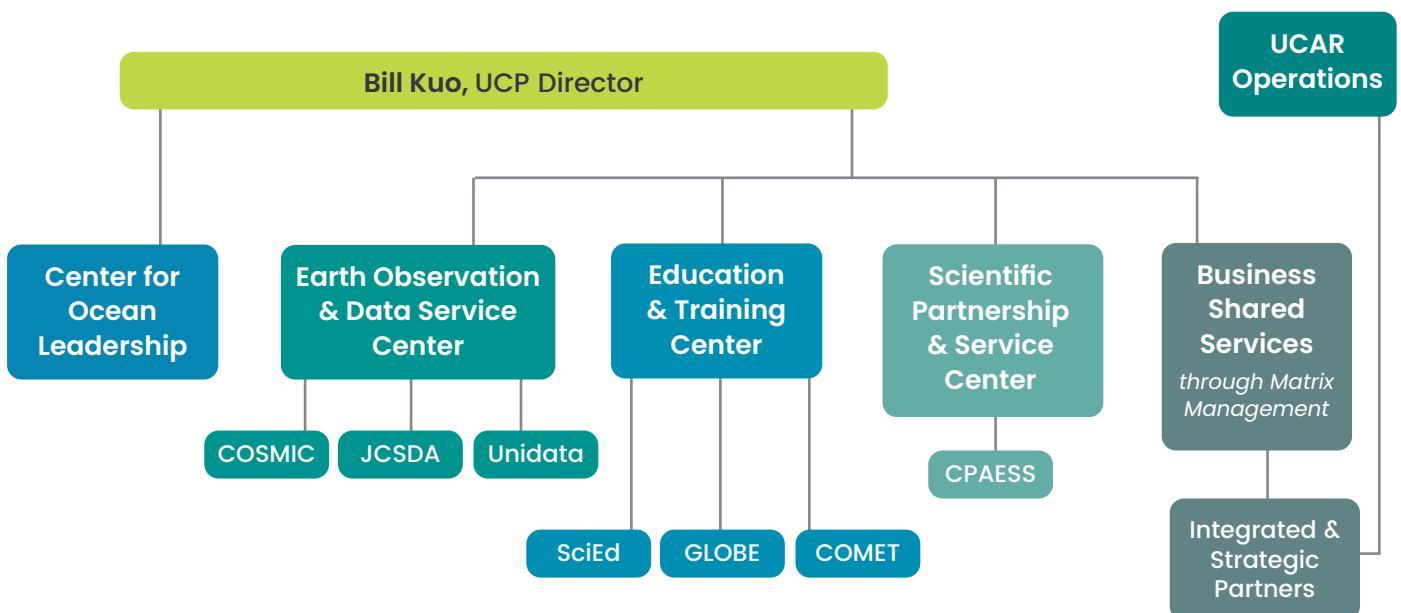
In 1992, UCAR launched the Office of Programs (UOP), later to become UCAR Community Programs (UCP), and charged it with the mission of providing service in support of science and science-based activities. The office pulled together a number of activities already being undertaken by UCAR, aside from the management of NCAR.

UCP programs are more service oriented than research oriented, focusing on education, training, data delivery, scientist services, scientist exchange, and novel observational systems. A major focus for UCP is ensuring that the science from NCAR and UCAR member institutions is translated in unique ways to a variety of audiences and stakeholders.

UCP provides a suite of innovative resources, tools, and services to researchers, educators, and practitioners in the Earth System Science community.

Activities in UCP include everything from training weather forecasters, firefighters, and emergency managers to supporting a constellation of atmosphere-observing satellites. UCP also develops internship programs, educational resources, provides real-time data and software analysis tools, and manages projects and staffing for scientific programs across the country and around the world. UCP's programs are organized under four unique centers and are supported by its Business Shares Services.

## ORGANIZATIONAL STRUCTURE







## University Data for Research and Education (referenced as UNIDATA)

Unidata is a diverse community of education and research institutions with the common goal of sharing geoscience data and the tools to access and visualize that data. For more than 30 years, Unidata has been providing data, software tools, and support to enhance Earth system education and research.

The Unidata program exists to serve a community of researchers and educators dedicated to advancing the frontiers of Earth System Science. While we share a set of long-term goals with our community, we are keenly aware that we play a significant, but supporting role, in their ongoing scientific and educational endeavors. As a practical matter, we look for things we can do now to help build the future our community seeks to achieve, realizing that the goals will evolve and our approach must be flexible. We also aim to sustain and enhance a community that capitalizes on new technology and approaches to advance our understanding of the Earth System, providing community leadership and support. With these things in mind, Unidata's mission is *"To transform the geosciences community, research, and education by providing innovative data services and tools."*

- Established in 1984
- Primary Funder: NSF
- 50,000+ registered users and 7,000+ organizations
- Serving about 1,500 academic institutions worldwide
- More than 100,000 annual downloads of Network Common Data Form (netCDF) from more than 150 countries and territories
- More than two terabytes of data distributed daily
- **Website:** [www.unidata.ucar.edu/](http://www.unidata.ucar.edu/)
- **Point of Contact:**  
Mohan Ramamurthy, [mohan@ucar.edu](mailto:mohan@ucar.edu)



## Constellation Observing System for Meteorology, Ionosphere, and Climate (COSMIC)

The COSMIC Program provides innovative and cost-effective remote sensing observations, data products, and data utilization support, focusing primarily on Global Navigation Satellite Systems (GNSS), to benefit scientific research to operations, and education and training in the atmospheric and related sciences.

The UCAR COSMIC Program has been a leader in the retrieval and scientific application of GNSS, e.g. GPS, data since COSMIC led the GPS/MET GPS radio occultation (RO) mission in the mid 1990s. It contributed to the design, management, and operation of the Constellation Observing System for Meteorology Ionosphere and Climate/FORMOSAT-3 (COSMIC-1) mission from 2006 to 2020. The mission is still providing high-quality RO profiles that are having a significant positive impact on weather and space weather forecasting and research. The success of COSMIC has prompted U.S. agencies (led by NOAA) and Taiwan's National Space Organization to execute a COSMIC follow-on operational mission called COSMIC-2/FORMOSAT-7 (COSMIC-2) that places six satellites with next generation GNSS RO payloads into low Earth orbit.

- Established in 1997
- Radio occultation for atmospheric remote sensing (weather, space weather, and climate)
- Primary funders: NSF, NASA, NOAA, USSF
- COSMIC-1: six satellites operated from 2006-2020
- COSMIC-2: launched in 2019 and currently operating
- 25+ years of data processing for operations and science
- 23+ million RO profiles
- 4,250+ researchers & 95 countries
- **Website:** [www.cosmic.ucar.edu/](http://www.cosmic.ucar.edu/)
- **Point of Contact:**  
Jan-Peter Weiss, [weissj@ucar.edu](mailto:weissj@ucar.edu)



## Joint Center for Satellite Data Assimilation (JCSDA)

The JCSDA is a multi-agency research center, hosted by the University Corporation for Atmospheric Research (UCAR) and UCAR Community Programs (UCP), committed to improving and accelerating the quantitative use of research and operational satellite data in weather, ocean, climate and environmental analysis and prediction systems. The inter-agency partnership assimilates many types of data from conventional and satellite sources by creating integrated modeling systems. The JCSDA transitions this research to operational and university communities through a robust data infrastructure and open-source software.



This diagram illustrates GNSS, e.g. GPS, radio occultation geometry as the low Earth orbit (LEO) satellite orbits the Earth.

- Established in 2001
- Primary Funder: NOAA, NASA, U.S. Navy, U.S. Air Force
- Built and distributed a Community Radiative Transfer Model (CRTM) to enable partners and collaborators to effectively test and assimilate a variety of satellite data.
- Established a common data assimilation structure at NASA and NOAA.
- Prepared to assimilate GPS data from the Constellation Observing System for Meteorology, Ionosphere, and Climate (COSMIC & COSMIC-2).
- Website: <https://www.jcsda.org/>
- Point of Contact: Tom Auligne, [auligne@ucar.edu](mailto:auligne@ucar.edu)



## Global Learning and Observations to Benefit the Environment (GLOBE)

Since its founding on Earth Day 1994, the Global Learning and Observations to Benefit the Environment (GLOBE) Program has been providing students and the public worldwide with the opportunity to meaningfully contribute to our understanding of the Earth system and global environment. As an international science and education program, GLOBE is dedicated to supplying the science, technology, engineering and mathematics (STEM) professionals of tomorrow with the scientific knowledge necessary to tackle Earth's biggest mysteries.

**Vision:** A worldwide community of students, teachers, scientists and citizens working together to better understand, sustain, and improve Earth's environment at local, regional and global scales.

**Mission:** To increase awareness of individuals throughout the world about the global environment, contribute to increased scientific understanding of the Earth, and support improved student achievement in science and mathematics.

- Established in 1994
- Primary Funder: NASA
- 127 participant countries
- Approximately 39,000 participant schools and over 44,000 teachers
- Almost 235 million measurements in a global database
- Website: <https://www.globe.gov/>
- Point of Contact: Tony Murphy, [tmurphy@ucar.edu](mailto:tmurphy@ucar.edu)



The roots of the UCP program SciEd extend back to NCAR's early public and K-12 education activities in the 1980s. Staff within this function have developed innovative websites, school and public visitor programs, hands-on museum exhibits, and the NCAR Undergraduate Leadership Workshop. The UCAR Office of Education & Outreach joined UCP in 2010 and took on the name SciEd in 2014.

SciEd serves the geoscience community by amplifying and complementing the work of the National Science Foundation's National Center for Atmospheric Research (NCAR) and University Corporation for Atmospheric Research (UCAR) member universities by reaching our audiences: K-12 educators, university faculty, students, and the public through excellence in educational programs and experiences.

**Mission:** To develop state-of-the-art educational experiences that connect NCAR|UCAR science to diverse learners, creating pathways towards a scientifically literate society.

**Vision:** Engaging all learners to explore and understand our changing world.

**Goals:** UCAR SciEd works directly with NCAR to support the implementation of three broad goals.

**Goal 1:** To inspire, engage, and inform the public about the atmospheric and related science conducted by NCAR and the university community.

**Goal 2:** To entrain and prepare a highly skilled and diverse workforce in careers in the atmospheric and related sciences.

**Goal 3:** To support the university community in educating students in the atmospheric and related sciences.

- 3.9 million user sessions on SciEd website in 2020 (6.3 million page views)

#### **FY22 Virtual Reach:**

In FY22, the SciEd SPP team delivered a total of 137 live virtual programs, reaching a global audience of 6,231 people of all ages. We increased the efficiency and production quality of our programs with a new state-of-the-art green screen studio and increased the virtual outreach skillsets of our SPP team. This year we saw tremendous growth in our reach, with a 34% increase in the number of programs delivered and 260% growth in attendance compared to FY21. Between the FY22 Virtual Field Trips and Meet the Experts programs, we also served the same number of students that we typically served with our in-person school field trips prior to the pandemic.

We welcomed new audiences, with only a 3% overlap between our pre-pandemic school audience and our FY22 school audience. This is likely because we greatly expanded our geographic reach, connecting with more people in more places around the globe. Through virtual programs and events in FY22, we reached 37 unique US states and territories. We also reached audiences in a total of 9 countries around the globe (i.e., United States, Australia, Belgium, Belize, Brazil, Canada, Costa Rica, India, and Mexico).

- Established in 2000
- Primary Funder: UCAR
- Formerly known as E&O (UCAR Education & Outreach) and Spark
- 85,000–100,000 visitors to Mesa Lab annually (before COVID)
- 60% of visitors from out of state (before COVID)
- 25 school field trips per month (before COVID)
- Website: <https://scied.ucar.edu/>
- Point of Contact: John Ristvey, [jristvey@ucar.edu](mailto:jristvey@ucar.edu)

### FY22 number of Virtual Programs

(based on current reservations as of 5/9/22):

- Total number of virtual programs in 2021–22 School Year (Sept–Aug): 137
- Virtual field trips: 105
- Meet the Experts: 17
- Explore NCAR: Live Virtual Tour: 11
- Virtual Events: 4 (Virtual Super Science Saturday - all day event & Sound the Solutions: Centering Justice in Climate Change Action; 2 WOR events)



### FY22 Virtual Program Attendance

(based on current reservations as of 5/9/22):

- Total attendance for virtual programs in 2021–22 School Year (Sept–Aug): 6,231
- Virtual field trips: 3,936
- Meet the Experts: 1,166
- Live virtual tour of the Mesa Lab: 290
- Virtual Events: 839
- Virtual programs attendance saw immense growth in FY22. In FY22 we reached a total of 6,231 people, in comparison to 1730 people in FY21.



### Significant Opportunities in Atmospheric Research and Science (SOARS)

The acclaimed SOARS (Significant Opportunities in Atmospheric Research and Science) Program was established at UCP in 1996 and joined SciEd in 2004. SOARS works to broaden the participation of historically marginalized communities in ESS through a multiyear undergraduate-to-graduate internship program with intensive mentorship from NCAR and UCP staff and Earth system science colleagues.



## Cooperative Program for Operational Meteorology Education and Training (COMET)

COMET develops scientifically relevant, instructionally progressive education, training, and capacity development for the environmental sciences, including online self-guided instruction, tailored classroom experiences, and specialized hazard communication programs.

**Mission:** Advancing geoscience workforce expertise worldwide through innovative, customized training solutions, and capacity building tailored to community needs.

**MetEd:** The MetEd website, COMET’s signature offering, is a free collection of hundreds of training resources intended for the geoscience community. We deliver over 240,000 hours of online education each year in disciplines such as aviation weather, climate, convective weather, emergency management, hydrology, numerical modeling, satellite meteorology, and winter weather, among many others.

**Capacity Development:** In collaboration with international partners in many global regions, COMET implements customized technology and training solutions to improve forecasting operations, observation networks, forecast and warning dissemination systems, and data access in under-developed nations and small island developing states.

**University Partnerships:** University Partnerships, also known as the Outreach Program, promotes partnerships between forecast offices and universities by providing funding for collaborative research projects that will transfer science into practice and serve the public good.

- Established in 1989
- Primary Funder: NOAA
- 750,000+ MetEd Users Worldwide
- 190+ Countries and Territories served
- 1,000+ Lessons Published on MetEd
- 100+ Custom Interactions
- 9 Languages Offered on MetEd
- **Website:**  
<https://www.comet.ucar.edu/>  
and <https://www.meted.ucar.edu/index.php>
- **Point of Contact:**  
Liz Page, [epage@ucar.edu](mailto:epage@ucar.edu)

## PROGRAMS & CENTERS

## SCIENTIFIC PARTNERSHIP AND SERVICES



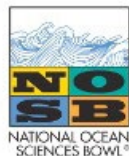
## The Cooperative Programs for the Advancement of Earth System Science (CPAESS)

CPAESS serves the Earth System Science community in three distinct areas of service. We partner with federal agencies and businesses to hire critical scientific staff enabling a more robust workforce. Through our scientific programs we seek to edify new research with our postdoctoral programs, our visiting scientist and internship programs, along with our interagency support programs. We also help build the Earth System Science community by convening and managing summer schools and institutes, conferences, and advisory committees.

Through our Scientific Partnerships CPAESS supports large-scale partnerships and initiatives in the Earth System Science (ESS) community. Currently we have about 100 scientists in a variety of federal agencies and laboratories across the U.S.

- Established in 2016 (out of a merger of JOSS and VSP)
- Primary Funder: NOAA
- Manage 5 educational programs (2 postdoctoral fellowships, doctoral fellowship, summer school, and summer internship)
- About 85 scientific publications from CPAESS scientists annually
- 30+ university mentor institutions
- 22 federal partners
- 100+ employees at 35 locations across the US
- Manage around 150 meetings and workshops per year
- 1,100+ travel requests processed annually
- **Website:** <https://cpaess.ucar.edu/>
- **Point of Contact:** Hanne Mauriello, [hanne@ucar.edu](mailto:hanne@ucar.edu)

At the end of September 2022, the nonprofit Consortium for Ocean Leadership (COL) dissolved. Its programs found a new home at UCAR within UCP.



## National Ocean Science Bowl

The National Ocean Sciences Bowl (NOSB) is a nationally-recognized high school academic competition and COL's flagship education program. For 20 years, the NOSB has provided a forum for students to excel in science, technology, engineering, and math (STEM).



## Ocean Exploration: 2020 Workshop to Identify National Ocean Exploration Priorities in the Pacific

COL organizes and facilitates engagement activities to improve strategic coordination and planning across the ocean exploration enterprise, such as the 2020 Workshop to Identify National Ocean Exploration Priorities in the Pacific.



## Ocean Exploration BluePrint 2032: 2022 National Ocean Exploration Forum

In partnership with NOAA's Office of Ocean Exploration and Research, COL organized the 2022 National Ocean Exploration Forum, which focused on envisioning short-term and long-term milestones to guide the ocean exploration community in identifying shared priorities over the next decade.



## Interagency Ocean Observation Committee (IOOC)

The Interagency Ocean Observation Committee (IOOC) oversees efforts to develop the National Integrated Coastal and Ocean Observing System. Led by three federal co-chairs, composed of agency representatives, and supported by COL staff, the committee carries out various provisions of the ICOOS Act for implementing procedural, technical, and scientific requirements to ensure full execution of the system.



## Marine Life 2030

Marine Life 2030 will establish a globally coordinated system to deliver actionable, transdisciplinary knowledge of ocean life to those who need it, promoting human well-being, sustainable development, and ocean conservation. Marine Life 2030 will unite existing and frontier technologies and partners into a global, interoperable network and community of practice advancing observation and forecasting of marine life. This network will link technical, management, and policy stakeholders to build and exchange capacity for advancing society's grand challenges of managing activities for a healthy and resilient ocean and the vibrant and healthy society that depends on it.



## Ocean Air-Sea Interactions Strategy (OASIS)

Bringing together the vast community of researchers and experts on air-sea interactions, the Observing Air-Sea Interactions Strategy (OASIS) aims to further the field by harmonizing observational strategies and developing a practical, integrated approach to observing air-sea interactions through capacity development, leveraging of multi-disciplinary activities, and advancement of understanding. OASIS will provide observational-based knowledge to fundamentally improve weather, climate and ocean prediction, and promote healthy oceans, the blue economy, and sustainable food and energy.



## Underwater Glider User Group (UG2)

This community-based coalition is aimed at bolstering scientific collaboration and information/resource sharing for glider operators, data users, manufacturers, academia, and government agencies. The overarching goal of UG2 is to establish a community that facilitates sharing and cooperation.

# UCAR MEMBERS

Appalachian State University  
Arizona State University  
Brown University  
California Institute of Technology  
Central Michigan University  
Clemson University  
Coastal Carolina University  
Colorado State University  
Columbia University  
Cornell University  
Dartmouth College  
Drexel University  
Duke University  
Embry Riddle Aeronautical University  
Florida Institute of Technology  
Florida State University  
George Mason University  
Georgia Institute of Technology  
Hampton University  
Harvard University  
Howard University  
Indiana University  
Iowa State University  
Jackson State University  
Johns Hopkins University  
Louisiana State University  
Massachusetts Institute of Technology  
McGill University  
Metropolitan State University of Denver  
Michigan State University  
Michigan Technological University  
Millersville University of Pennsylvania  
Mississippi State University  
Naval Postgraduate School  
Nevada Sys. of Higher Ed-Desert Research Institute  
New Mexico Institute of Mining and Technology  
New York University  
North Carolina A&T State University  
North Carolina State University  
Northern Vermont University-Lyndon  
Old Dominion University  
Oregon State University  
Pennsylvania State University  
Plymouth State University  
Princeton University  
Purdue University  
Rice University  
Rutgers, The State University of New Jersey  
Saint Louis University  
San Diego State University  
San Francisco State University  
San José State University  
Scripps Institution of Oceanography, UCSD  
South Dakota School of Mines and Technology  
St. Cloud State University  
Stanford University  
State University of New York - Oswego  
State University of New York - Stony Brook University  
State University of New York - The College at Brockport  
State University of New York, University at Albany  
Texas A&M University  
Texas A&M University, Corpus Christi  
Texas State University, San Marcos  
Texas Tech University  
United States Naval Academy  
Universidad Metropolitana  
University of Alabama in Huntsville  
University of Alabama, Tuscaloosa  
University of Alaska Fairbanks  
University of Arizona  
University of British Columbia  
University of California, Berkeley  
University of California, Davis  
University of California, Irvine  
University of California, Los Angeles  
University of Chicago  
University of Colorado Boulder  
University of Connecticut  
University of Delaware  
University of Denver  
University of Georgia  
University of Hawai'i  
University of Houston  
University of Illinois, Urbana-Champaign  
University of Iowa  
University of Kansas  
University of Louisiana at Monroe  
University of Maine  
University of Maryland at College Park  
University of Maryland, Baltimore County  
University of Massachusetts, Amherst  
University of Massachusetts, Lowell  
University of Miami  
University of Michigan  
University of Minnesota  
University of Missouri  
University of Nebraska-Lincoln  
University of New Hampshire  
University of North Carolina Asheville  
University of North Dakota  
University of Northern Colorado  
University of Oklahoma  
University of Rhode Island  
University of Saskatchewan  
University of Texas at Arlington  
University of Texas at Austin  
University of Texas at El Paso  
University of Toronto  
University of Utah  
University of Virginia  
University of Washington  
University of Wisconsin-Madison  
University of Wisconsin-Milwaukee  
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Utah State University  
Valparaiso University  
Virginia Agricultural and Mechanical College and Polytechnic Institute  
Washington State University  
Western Illinois University  
Woods Hole Oceanographic Institution  
Yale University  
York University