

Introduction to NCAR and the Research Applications Laboratory

Science in Service to Society

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National Center for Atmospheric Research (NCAR)



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NCAR's Mesa Laboratory



Designed by modernist architect I. M. Pei in 1961
Boulder, Colorado

Anasazi-inspired architecture





Mesa Lab



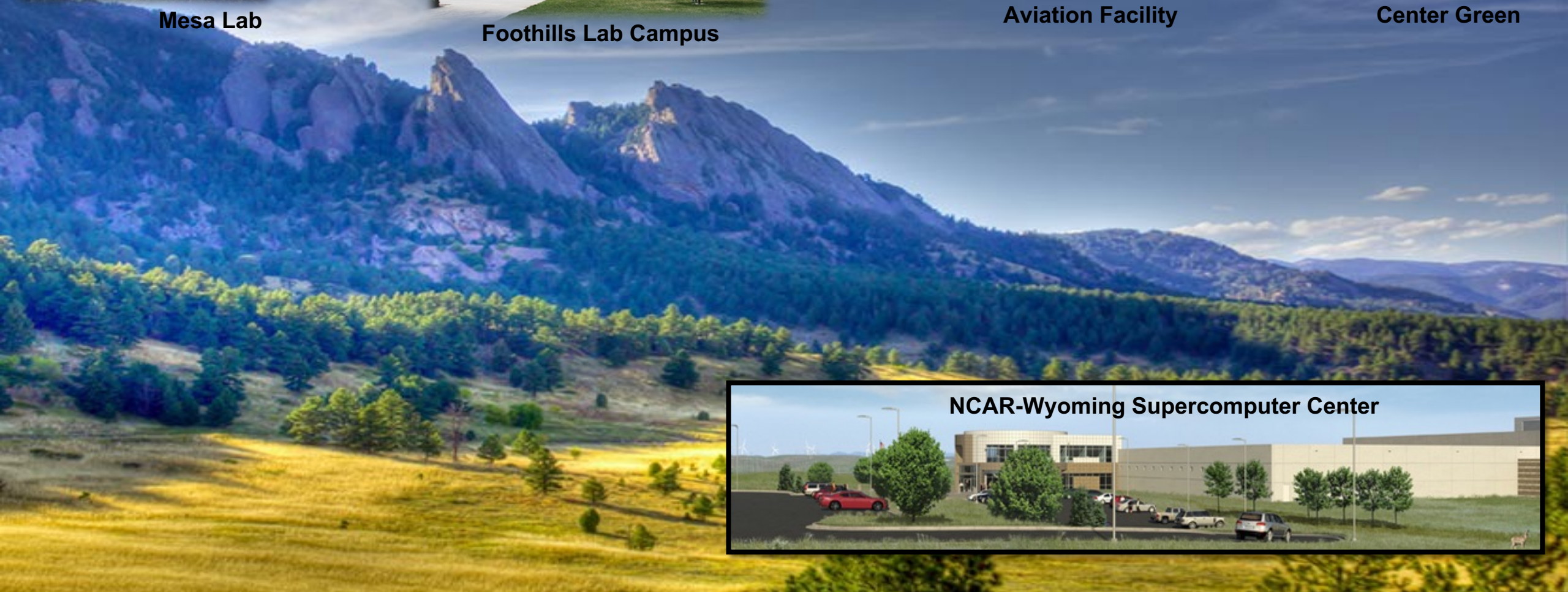
Foothills Lab Campus



Aviation Facility



Center Green



NCAR-Wyoming Supercomputer Center

National Center for Atmospheric Research



Vision

A world-class research center leading, promoting and facilitating innovation in the atmospheric and related Earth and Sun systems sciences.

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



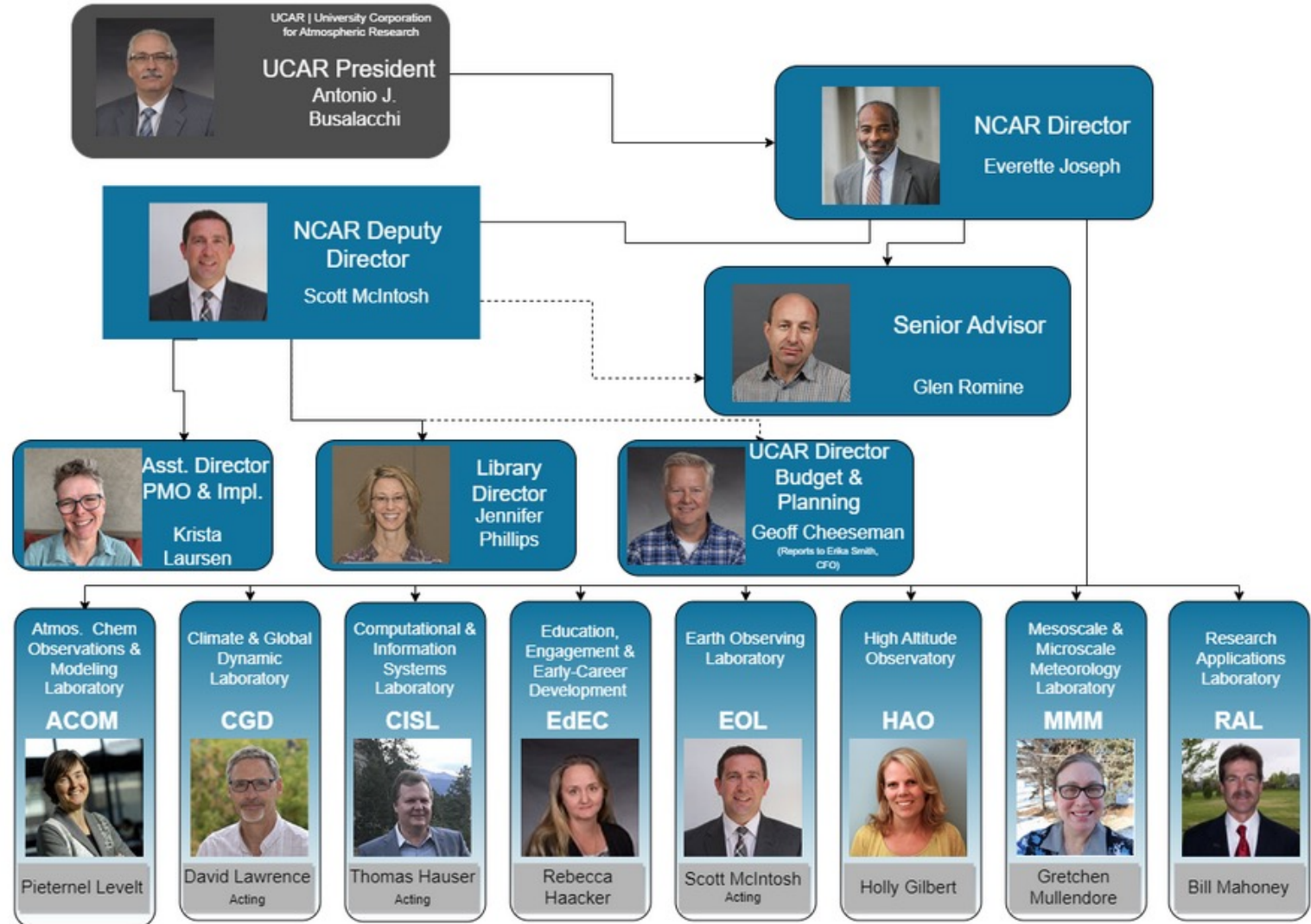
National Center for Atmospheric Research



- **NCAR** is a Federally Funded Research & Development Center
- Administered by consortium of 122 North American universities through the **University Corporation for Atmospheric Research (UCAR)**, a not-for-profit 501(c)(3) organization.
- UCAR International Affiliates: A group of 59 international institutions with strong connections to UCAR/NCAR



Organization and Leadership



Research Applications Laboratory

- One of seven NCAR laboratories
- About 190 people, with a mix of atmospheric and social scientists, physicists, mathematicians, software engineers, administration, and others...
- 92% soft funded (non-National Science Foundation)

Mission

To conduct fundamental and use-inspired research that contributes to the understanding of the Earth system; extend the capabilities of the scientific community; and transfer knowledge and technology for the betterment of society



Research Applications Laboratory

*William Mahoney, Director Elizabeth Hoswell, Lab Administrator
Sue Ellen Haupt, Deputy Director*

Administration

Systems Admin
Mohling

Multi-media
Ziady

December 2022

Aviation Appl. Prog.
Steiner
Dumont/Pinto

Hydromet Appl. Prog.
Rasmussen
TBD/Chen

Wx Sys. & Assessment Prog.
Kosovic
Alessandrini/Cowie

Nat'l DTC Director
Nance

GIS Program
Wilhelmi

Regional Integrated
Sciences Collective
Mearns

Nat'l Security Appl. Prog.
Swerdlin
Knievel/Sheu

Joint Numerical Testbed
Ek
K. Newman/Halley Gotway

Icing
Ceiling and visibility
Storm prediction
Turbulence
Wind shear
Weather integration into
decision making
Oceanic hazards
Winter weather
International
aviation weather
UAS weather

Forecasting urban
atmospheres
Hazardous plumes
Mesoscale current-
climate
downscaling
Operational NWP,
improved data
assimilation
Weather, climate, and
health
Air Quality

Hydrometeorological
modeling
Land-surface modeling
Precipitation and
aerosols
Water and climate
change
Water-energy nexus
Short-term storm
forecasting
Winter precipitation
and snowpack
Regional climate
Climate Change
Knowledge Portal

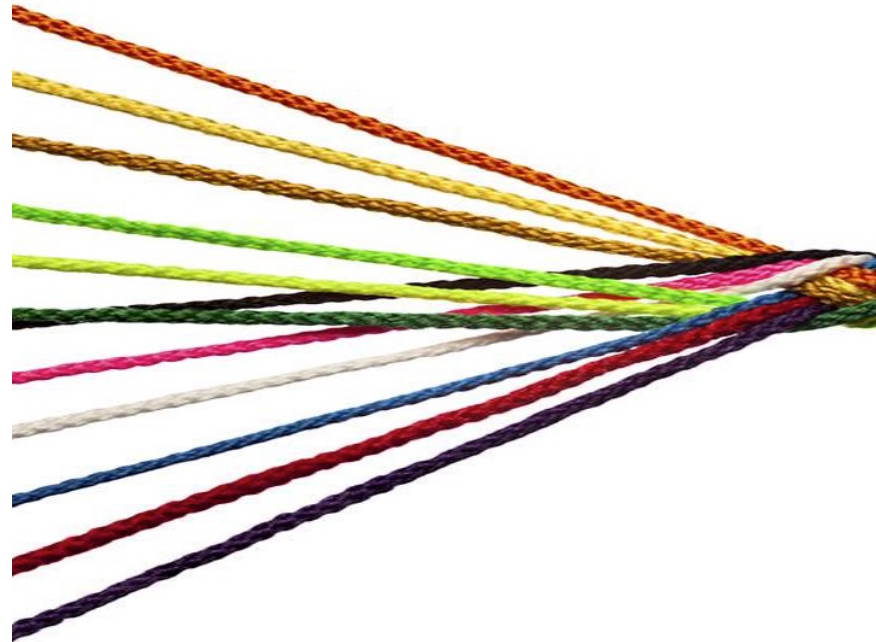
Wind energy
Solar energy
Statistical prediction
systems (ML)
Surface transportation
weather
Boundary layer and
complex flow
Fire behavior prediction
Meso-to-microscale

NWP testing & evaluation
Advanced forecast
evaluation methods
NWP testing and
evaluation
Tropical Cyclone
Testbed
Global Model Testbed
NWP Community code
support
NWP system capacity
development
METplus

Projects

RAL Capabilities

- Data assimilation
- Process understanding
- Model physics development
- Convective-scale modeling
- Boundary layer characterization
- Land surface modeling
- Wildland fire modeling
- Cloud microphysics
- Short-term prediction
- Hydro-meteorology
- Machine learning
- Meso-to-microscale modeling
- Human Dimensions
- Regional climate analysis/impact
- Turbulence
- Air quality (chemistry, aerosols)
- GIS Program, education & outreach
- Software engineering
- Model acceleration (e.g., GPU)

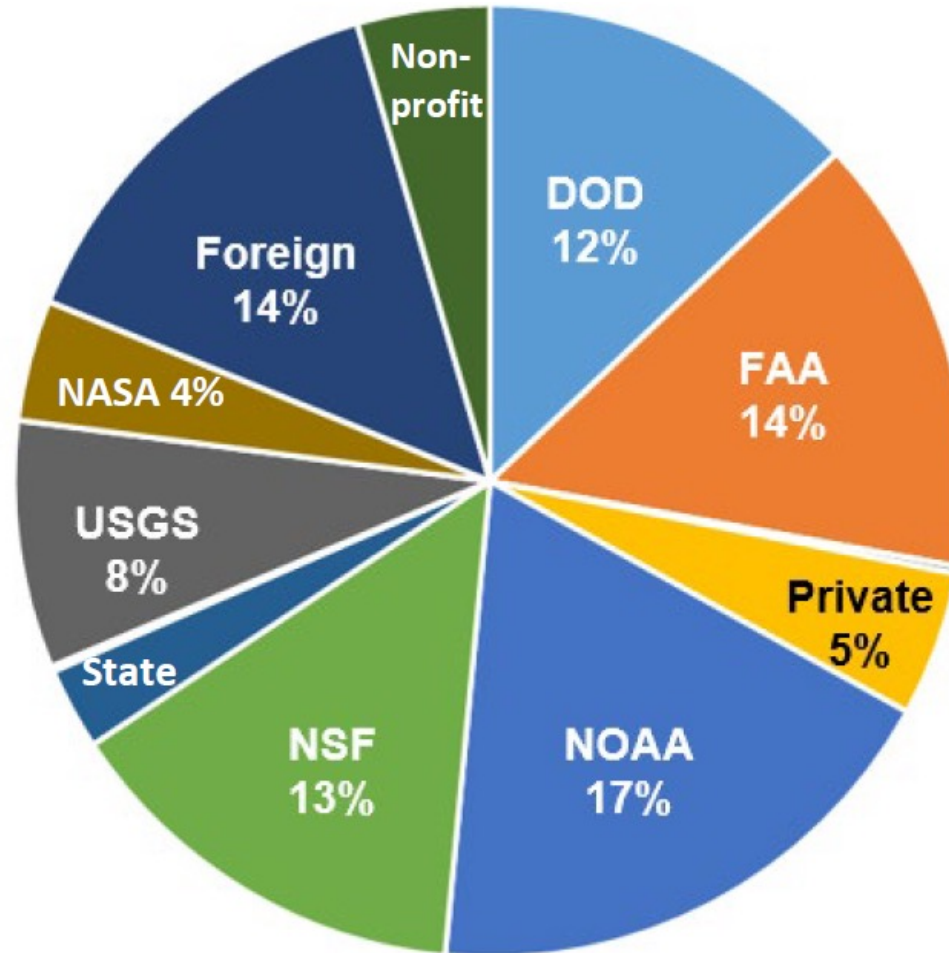


RAL FY22 Spending by Sponsor Categories

FY22 Spending

\$32.3M

RAL has a diverse sponsor base with approximately **90 sponsors**. There were **192 active contracts** during FY22



International

Kuwait, Italy, India, Israel, China, UK, Iceland, China, Canada, Taiwan, Saudi Arabia, UAE, Australia, Germany, Japan, and others

Significant Funding Diversity

Technology Transfer Methods

- Publications
- Public domain IP
- Licensed IP
- Technical specifications
- Documentation
- Software/hardware systems
- Turn-key solutions
- Education & outreach
- Technical Advice
- Visitorships
- Training programs



RAL Growth Areas

- **Hydrometeorological Decision Support**
 - Flood prediction, water resource management, etc.
- **Fire Behavior Prediction**
 - Decision support for planning, tactical support, training
- **Urban Meteorology**
 - Hazardous plume, energy, heat, impacts on climate change
- **Air Quality**
 - Aerosol tracking, data assimilation, modeling, early warning
- **Renewable Energy**
 - Wind and solar energy prediction
- **Machine Learning**
 - Many application areas

