



Climate and Global Dynamics Laboratory

The NSF NCAR Climate and Global Dynamics (CGD) Laboratory: A world leader in Earth system science addressing the risks a changing climate poses to our planet and humankind. To achieve this, CGD provides scientific and software leadership and capabilities to the Earth system science community.

Fundamental and applied research

- Co-designing Earth system science research across NSF NCAR, universities, and stakeholders throughout the world;
- Delivering leading scientific output underpinned by the development and use of models and observations;
- Understanding the components of the climate system, their interactions, and how to represent them in models;
- Engaging in multi-disciplinary research to ensure the greatest impact of Earth system science on society.

Capability delivery

- Leading the development and support of the Community Earth System Model (CESM), a world-renowned, multi-capability open-source Earth system model for the global research community;
- Providing training and support for the broad community of CESM users;
- Carrying out simulations of prediction and projections with CESM and providing CESM data to support community science;
- Providing trusted, innovative data analysis, tools, and methods to enable new scientific discoveries.

Workforce Investment

- Fostering the next generation of Earth system scientists through engagement, mentorship, collaboration, and training;
- Developing the next generation of collaborative data scientists and software engineers through training, mentoring and applying best practices in models, methods, tools and infrastructure.
- Providing an innovative, collaborative, and inclusive environment for all our staff and visitors, nurturing their personal development and productivity, and helping them achieve their goals.



COMMUNITY RESOURCES

CESM | Community Earth System Model - An open-source global Earth system model developed in collaboration with the community. It enables state-of-the-art realizations of Earth's past, present, and future climate states. Vital elements of CESM development include key process representations, software engineering, and evaluations against observational datasets. CESM provides the community with a single framework that enables a portable and flexible out-of-the-box hierarchy of capabilities for Earth system-related research.

CESM is a collection of component models that include: CAM: Community Atmosphere Model; CICE: DOE Los Alamos Sea Ice Model; CISM: Community Ice Sheet Model; CTSM: Community Terrestrial System Model; POP: DOE Los Alamos Parallel Ocean Program; and MOM: NOAA Geophysical Fluid Dynamics Laboratory Modular Ocean Model. These and other component models can be used in multiple configurations, including stand-alone and idealized, to address a wide range of scientific topics. See www.cesm.ucar.edu

Community Datasets - Freely available data from Earth system model experiments. These include ensembles of simulations to explore past, present, and future using predictions and projections. They are extensively used by CGD scientists, university collaborators, and other research partners. See [Community Projects](#) and the webpages of individual CESM working groups: [Working Groups | Community Earth System Model](#). In addition, where relevant, data are submitted as part of the Coupled Model Intercomparison Project (CMIP) activity.

Climate Data Guide - A high-traffic data discovery and knowledge portal featuring community-written expert guidance on the strengths and limitations of the data and methods that are used for observing climate variability, evaluating models, and predicting climate risks (climatedataguide.ucar.edu).

OPPORTUNITIES

CGD Scientific Visitor Program - A robust and long-standing program that brings visitors to NCAR's Mesa Laboratory each year for collaborative research. Graduate students and postdocs are eligible to participate through the likes of internships (<https://www.cgd.ucar.edu/visitors>).

CESM Tutorial - A week-long tutorial during summer geared towards graduate students and early-career scientists. The tutorial consists of lectures on simulating the Earth system and practical sessions on running CESM, modifying its components, and analyzing simulations. The selection process emphasizes advancing research capacity for a broad array of university and other collaborators, with a focus on early-career researchers and graduate students (www.cesm.ucar.edu/events/tutorials).

CESM Workshops and Meetings - Summer workshop and winter Working Group meetings for the scientific community engaged in the CESM activities. These consist of a combination of plenary and poster presentations along with CESM Working Group and cross working group sessions. The workshop and meetings are key activities in the planning of future priorities for model development and simulations. It is also a time to enhance collaborations and communicate CESM science to users and researchers. Presentations are made available to the community via the web (<https://www.cesm.ucar.edu/events>).

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