

**The NCAR Research Applications Laboratory.** *RAL conducts directed research that contributes to fundamental understanding of the atmosphere and related physical, biological, and social systems; supports, enhances, and extends the capabilities of the scientific community; and develops and transfers knowledge and technology for the betterment of life on Earth. RAL strives to be a world-class leader in performing collaborative end-to-end research, development, and technology transfer.*

## Developing innovative solutions to address societal problems



### OPPORTUNITIES

**Collaborative Research.** RAL scientists and engineers actively seek opportunities to collaborate with university investigators in developing proposals in a wide range of application areas, including: specialized numerical weather prediction, nowcasting, hydrology, water cycle, renewable energy, aviation, surface transportation including connected vehicles, dispersion modeling, weather decision support systems, economic evaluation of weather information, communication of weather risk, weather data analytics, climate and health, GIS, climate services, community support for numerical weather prediction, data assimilation, urban meteorology and modeling, agriculture, and wildland fire. Visit: [www.ral.ucar.edu](http://www.ral.ucar.edu)

**RAL Visitor Program.** RAL encourages and supports collaboration with colleagues within the U.S. and abroad. To further those interactions we offer a variety of opportunities to visit RAL and work with our staff, providing administrative and computing support as well as travel and per diem support for selected visitors. Visit: [ral.ucar.edu/general/about/visitor\\_program.php](http://ral.ucar.edu/general/about/visitor_program.php)

**Developmental Testbed Center (DTC) Visitor Program.** Through an on-going announcement of opportunity, the DTC solicits research proposals to test new forecasting and verification techniques, models, and model components for numerical weather prediction (NWP). This program offers opportunities for both established researchers and graduate students. Selected visitors can receive salary support as well as travel and per diem or, in the case of graduate students, travel support and temporary living per diem. Visit: [www.dtcenter.org/visitors](http://www.dtcenter.org/visitors)

**Graduate Student/Postdoctoral Opportunities.** RAL provides support for graduate research assistants and postdoctoral scientists in partnership with NCAR's Advanced Study Program (ASP) and other sponsors such as NOAA, the Bureau of Reclamation, Army Corps of Engineers, and Centers for Disease Control. The DTC also offers opportunities for graduate student visitors. Visit: [ral.ucar.edu/general/about/visitor\\_program.php](http://ral.ucar.edu/general/about/visitor_program.php)

**Warner Internship for Scientific Enrichment (WISE) Fellowship.** In conjunction with ASP, RAL offers a graduate student visitor opportunity in memory of Professor Tom Warner and his commitment to the role of science in service to society. Students receive travel funds and a monthly stipend to support their visit to NCAR and enhance work on their PhD theses. Visit: [www.asp.ucar.edu/graduate/graduate\\_visitor.php](http://www.asp.ucar.edu/graduate/graduate_visitor.php)

**Workshops and Tutorials.** Regularly scheduled events to which members of the community are invited focus on the Weather Research and Forecasting (WRF) model, Hurricane WRF (HWRF), Model Evaluation Tools (MET), Gridpoint Statistical Interpolation (GSI) and Ensemble Kalman Filter (EnKF) data assimilation systems, and Climate and Health. A number of workshops focused on specific topics are also held each year and advertised on the RAL website. Visit: [ral.ucar.edu/general/events](http://ral.ucar.edu/general/events)

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## COMMUNITY RESOURCES

**GIS Program.** The GIS program fosters interdisciplinary science, spatial data interoperability, and knowledge sharing using Geographic Information Systems. The goal of the GIS program is to promote and support the use of GIS as both an analytical and infrastructure tool in atmospheric research, as well as using the discipline to address broader issues of spatial data management, interoperability, and geoinformatics within the geosciences. Visit: [gis.ucar.edu](http://gis.ucar.edu)

**Model Evaluation Tools.** MET is a community toolkit developed in RAL to help the numerical weather prediction community assess and evaluate model performance. It includes a variety of advanced verification methods that have been developed by the international community and that are particularly relevant for mesoscale models. MET version 5.0 is the current release (Sep. 2014). Visit: [www.dtcenter.org/met/users](http://www.dtcenter.org/met/users)

**Community Models & Frameworks.** RAL scientists and engineers continually develop and refine a variety of specialized modeling systems. These include [WRF-Hydro](#), [WRF-Solar](#), [WRF-Urban](#), [WRF-Crop](#), and [FINECAST](#)<sup>®</sup>. In addition, RAL develops and refines community land surface modeling and data assimilation capabilities such as [Noah-MP](#) and [HRLDAS](#), respectively. RAL developed the Structure for Unifying Multiple Modeling Alternatives ([SUMMA](#)), a hydrologic modeling approach built on a common set of conservation equations and numerical solver, which together constitute the structural core of the model. Emerging community capabilities include the GRidded Atmospheric Forecasting System ([GRAFS](#)) and the Intermediate Complexity Atmospheric Research model ([ICAR](#)), which is capable of running hundreds to thousands of times faster than state-of-the-art regional climate models while still providing ~90% of the information about precipitation and temperature patterns.

**Data Sets.** RAL generates a variety of datasets as part of its sponsored research. For example, future climate model datasets are provided via the [GIS Climate Data Portal](#). Through the next generation portal, users can access climate change analysis products such as seasonal and annual averages and climate anomalies. The Global Climate Four-Dimensional Data Assimilation ([CFDDA](#)) reanalysis is a dynamically downscaled data set with high temporal and spatial resolution. The data contain three-dimensional hourly analyses in netCDF format for the global atmospheric state on a 40 km horizontal grid (0.4 degree grid increment) with 28 vertical levels.

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## WORK WITH US

Tapping into the scientific expertise at NCAR and UCAR's university partners, RAL conducts directed research and development focused on tailored solutions to specific weather and climate. RAL scientists and engineers work broadly across disciplines, collaborating with colleagues in the research and operational science communities. We participate in all phases of the R&D cycle, with careful assessment of the science and its readiness for application.

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## CONTACT

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