

# Our leading research centres

## Data Assimilation Research Centre

**DARC is a NERC Earth Observation Centre of Excellence.**

Its objectives are the assessment, combination and synthesis of Earth Observation data with numerical models using state-of-the-art data assimilation techniques in order to reproduce the evolution of the earth system and to forecast its behaviour. The directorship of DARC is based in the Department, but DARC includes partners in the Rutherford Appleton Laboratory and the Universities of Oxford, Cambridge and Edinburgh. The Reading group is particularly involved in exploiting the exciting new data from the ESA Envisat satellite.

<http://darc.nerc.ac.uk>

## Universities Weather Research Network

**UWERN is an NERC centre which consists of UK university departments working in close collaboration with each other and with providers and users of regional and local weather services.**

It aims to advance the knowledge, understanding and prediction of atmospheric behaviour on regional and smaller scales. Its principal research areas are boundary-layer meteorology, convective clouds, cyclonic storms, orographic processes, regional atmospheric transport, quantitative precipitation forecasting and urban meteorology.

<http://uwern.nerc.ac.uk>

## Centre for Global Atmospheric Modelling

**CGAM is a leading NERC centre in climate science. It collaborates widely to achieve the following objectives:**

- To increase knowledge of climate variability and change on timescales of weeks to millennia,
- To develop the capability to perform comprehensive simulations of the earth system on these timescales,
- To establish the usefulness and accuracy of climate predictions at the regional scale,
- To support the climate science community in high performance computing, and to provide tools for modelling, analysing and visualising the climate system.

CGAM enables NERC and the wider UK academic community to contribute to key questions about the sustainability of the global environment and to develop strategies to adapt to or mitigate climate change.

[www.cgam.nerc.ac.uk](http://www.cgam.nerc.ac.uk)

## Met Office Research Groups

The Department has excellent collaboration with the Met Office and hosts three collaborative research groups:

### Joint Centre for Mesoscale Meteorology

A collaborative joint University and Met Office research centre established in 1988. The Mesoscale Modelling Group is primarily responsible for the development and verification of the new high-resolution mesoscale model (1 km) used for national weather forecasts over the UK. They work closely with the Mesoscale Data Assimilation Group, who develop the ability of the mesoscale model to assimilate high-resolution data from a wide range of sources.

### Satellite Applications Group

This group aims to improve the assimilation of new satellite data into the global forecast model. They collaborate closely with the Data Assimilation Research Centre.

### The Hadley Centre at Reading

This group studies numerous aspects of climate science, including monitoring, attribution and prediction, and collaborates with the Centre for Global Atmospheric Modelling and other Departmental staff.

[www.metoffice.com](http://www.metoffice.com)

## Department of Meteorology Research summary

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Department of Meteorology



# Research Summary

Excellence in weather and climate research since 1965

# Research in the Department of Meteorology

## The Department

**We are one of the largest and most renowned university departments of meteorology in the world.**

In addition to receiving the highest national grades for our unique and comprehensive range of undergraduate and postgraduate teaching programmes, we are also recognised both nationally (having received the highest possible rating in all UK Research Assessment Exercises) and internationally for the excellent quality of our research. The Department received a 2005 Queen's Anniversary Prize for Higher and Further Education for 'Weather and Climate Science: Research, Training and Informing Environmental Policy'.

With more than 20 academic teaching staff (see enclosed sheet), 60 postdoctoral research scientists and 50 PhD research students we are able to pursue exciting research in many areas of atmospheric, oceanic and climate science. All activity takes place in the Meteorology building, an attractive, purpose-built, modern facility.

Many of our academic faculty lead thriving research teams in their areas of expertise. In addition, the Department also hosts and works closely with several Met Office research units and two research centres funded by the Natural Environment Research Council (NERC). These are described in more detail on the back cover of this pamphlet. We play a central role in coordinating and collaborating with atmospheric and climate research activities in other UK universities.

## What we aim to do in our research

Our research is aimed at improving understanding and modelling of the fundamental atmospheric and oceanic processes. Our research helps to improve socio-economically valuable weather and climate forecasts over a wide range of lead times, for example, short-lead urban air quality forecasts, satellite-based rainfall monitoring and forecasts of flood-producing rains several hours ahead, the development of mid-latitude depressions over several days, seasonal climate forecasts used for agriculture, and climate-change projections of temperature and precipitation for the 21st century.

## Research Collaboration

We have an exceptionally broad range of well-established research collaborations. For example, we participate in and provide expert advice for international programmes within the International Council of Scientific Unions, the World Meteorological Organization and the Intergovernmental Panel on Climate Change. Our research staff lead and collaborate in many diverse European Union funded research projects. In addition, we have excellent working collaborations with scientists in the Met Office, the European Centre for Medium-Range Weather Forecasts (ECMWF) based nearby in Reading, and many other national weather and hydrological services around the world. The Department also collaborates with other departments and units in the School of Mathematics, Meteorology and Physics, including the NERC Environmental Systems Science Centre, as well as with other Schools in the University including Agriculture, Chemistry, and Human and Environmental Sciences.

## Funding

The gross research contract income of the Department and research centres has averaged over £4 million per year in the last four years. This is obtained mainly through our successful bidding and participation in both national and international research projects and programmes. National support comes from governmental agencies such as NERC and the Met Office. International support comes from agencies such as the European Union and the European Space Agency. In addition we provide consultancy for industry, such as the agriculture, insurance, reinsurance, space, defence and transport industries.

**'With more than 20 academic teaching staff, 60 postdoctoral research scientists and 50 PhD research students we are able to pursue exciting research in many areas of atmospheric, oceanic and climate science.'**

## Research Methods and Facilities

All our research is firmly based on our deep understanding of the fundamental physical and mathematical principles that govern the dynamics of the Earth's atmosphere and oceans.

We use a hierarchy of models to understand key processes in the physical climate system. These include advanced state-of-the-art weather and climate prediction models, simpler numerical process models and powerful conceptual models. Our staff have access to the latest versions of the Met Office Unified Model used for operational weather and climate change forecasts. In addition, we use the Met Office Large Eddy Model to perform more detailed high-resolution simulations of boundary-layer processes, clouds and convection. The large amount of supercomputer time needed to run these models is provided by access to national high performance computing facilities.

Our modern laboratory facilities include a wind tunnel which is used to study pollution dispersion and airflow over urban areas, an atmospheric observatory and extensive micrometeorological equipment for use in field campaigns.

We make extensive use of measurements from specialized ground-based and satellite-based observing systems, in particular the Chilbolton radar remote-sensing facility in southern England and the European Space Agency's multi-instrument Envisat satellite. In addition, we have access to global observation and analysis products from weather forecasting centres such as the Met Office and ECMWF. Our strong expertise in advanced data analysis and assimilation allows us to get maximum information from all these data.

**World-leaders in:**  
**Atmospheric processes and measurements**  
**Regional weather**  
**Climate variability and predictability**

We look at the weather from every angle, from cause through to consequence

