

Our research

Walker Institute for Climate System Research

Improving predictions of climate and its impacts— over seasons, decades and beyond

Research at the Walker Institute is aimed at understanding and improving predictions of climate, and its implications for society and the environment.

Our strength lies in the breadth and depth of our science and our ability to bring together the science of climate prediction with the science of climate impacts.

Our research focuses on understanding and predicting:

- Regional and local climate.
- Changes in climate extremes and hazardous weather.
- Changes over the next 5 to 20 years and beyond.
- Impacts on society and the environment.

Understanding the climate system

The Institute encompasses a broad range of fundamental research crucial to understanding climate system processes:

- We are looking at how greenhouse gases, including aircraft emissions, affect climate.
- We carry out extensive research on climate variability, the processes of weather and the interface between

climate and weather—all crucial for understanding the impacts of climate.

- The breadth of our research includes studies of the atmosphere, ocean, ice, the land surface and aquatic systems, and how these components interact.
- We also have world leading groups utilising earth observations to understand climate and weather processes.

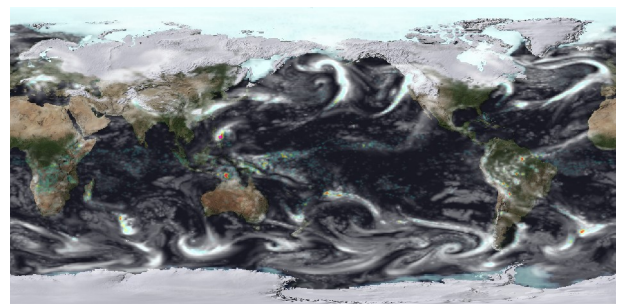
Building the next-generation of climate models

The effects of climate and extreme weather are typically felt at the local and regional scale, through, for example, floods or tropical storms. However, predicting regional climate and local weather systems is something that stretches the capability of current global climate models—the tools we use to predict climate.

At the Walker Institute we are undertaking pioneering research to develop climate models with higher resolution and improved physical processes.

Our research shows that higher resolution models are better at simulating regional climate and weather systems such as mid-latitude storms and hurricanes.

Over the next few years, the increased skill of our models will help to improve predictions of changes in weather and climate.



Our high resolution climate models are simulating climate with unprecedented detail.

The next 5 to 20 years

For governments and businesses to be able to assess the risks of climate change, they need much more detailed advice about local and regional changes over the next 5 to 20 years.

When looking 5 to 20 years ahead, it is vital to take into account both natural variations and the effect that people are having on climate.

The Walker Institute has world-leading

groups looking at natural climate variability, like the El Niño warming in the tropical Pacific and the variability in European climate due to the Atlantic Ocean.

Our research is helping us understand how these natural variations will affect and be affected by man-made climate change. This knowledge is essential for improving climate predictions on all time-scales from seasonal to multi-decadal.

Water—too much or too little

Many of the most significant impacts of climate and climate change are mediated through water. Predicting how rainfall may change in the future, both mean and extremes, remains difficult and constitutes a major challenge for climate scientists.

At the Walker Institute we carry out fundamental research to better understand, model and predict the processes that

bring rain, such as mid-latitude storms, the Indian monsoon and other tropical weather systems.

Hydrologists in the Institute are developing models which simulate the integrated effects of climate and land-use changes on rivers and lakes, water availability and water quality.

Food and biodiversity

Agriculture is highly dependent on climate. As well as the effects of changes in mean climate, it is important to consider the impact of thresholds: for example, a few days of very high temperatures can devastate crop yields.

In the Walker Institute we have developed a crop model which is fully integrated within our climate model. This enables us to assess the impact of both changes in

mean climate and climate variability on crop yields, and to assess feedbacks between crops and climate.

Working with hydrologists in the Institute, we can look at the interaction between agriculture and water use.

We are also assessing the risks to biodiversity posed by a combination of climate and land-use changes.

International dimension

The research groups within the Walker Institute collaborate extensively within the UK and internationally. Our scientists have built up strong relationships with the wider scientific community, especially the Met Office Hadley Centre and the National Centre for Atmospheric Science.

Internationally, we have partners as far as the state of Queensland in Australia, where a strategic alliance has just started.

We also have a strong programme on climate and its impacts in the developing world, especially China and India.

We have experts in:

- agriculture
- geography
- hydrology
- meteorology, oceanography and climate
- biodiversity and land-use
- soil science
- computer science



www.walker-institute.ac.uk

Tel: +44 (0)118 378 7380

Email: walker_info@reading.ac.uk

Director: Prof Nigel Arnell