Simulating planet Earth

Walker Institute research

The benefits of higher-resolution climate models

The Walker Institute aims to increase stakeholder's understanding of the climate system, extreme weather events and projected climate change, through scientifically sound, client tailored information and advice.

Improved understanding can act to reduce a business's vulnerability to the impacts of climate-related shocks. Extreme weather events, for example, can have a significant impact on numerous business sectors.

But the Walker Institute can go one step further when informing businesses.

At the Walker Institute, high-resolution climate simulations and observational studies are leading to improved seasonal forecasts and climate change projections both of the mean climate and climate extremes.

Building better models with higher resolution and with better use of observations will allow climate prediction to be improved on all time scales.

These improvements in modelling technique are heavily reliant on the computing power provided by supercomputers, such as the Earth Simulator.

World-leading simulations of climate using supercomputing power

The Earth Simulator, based in Japan, is one of the world's most powerful supercomputers. It is a highly parallel vector supercomputer system with a peak performance of 40 Teraflops—40,000,000,000,000 numerical operations per second!

The UK-Japan Climate Collaboration is an exciting research partnership which aims to harnesses the power of the Earth Simulator supercomputer and our expertise in climate modelling to produce world-leading climate simulations.

This collaboration joins teams from the Climate division of the National Centre for Atmospheric Science - a key component of the Walker Institute, and the UK Met Office with Japanese modelling groups at the Earth Simulator Centre and the University of Tokyo.

Our scientists also use the UK Research Council high performance computer, the power of which is expected soon to overtake that of the Earth Simulator.

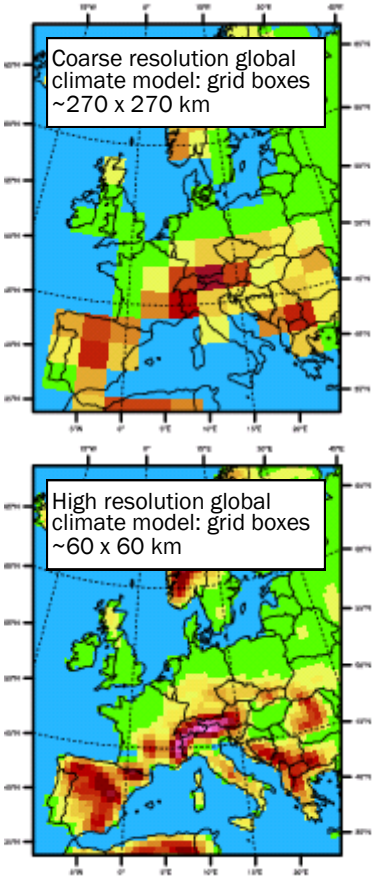
Improving climate prediction on all time and space scales

Climate models divide the atmosphere, ocean and other components into a grid of boxes. The smaller the box, the more spatial detail is represented, but the more computing power is required.

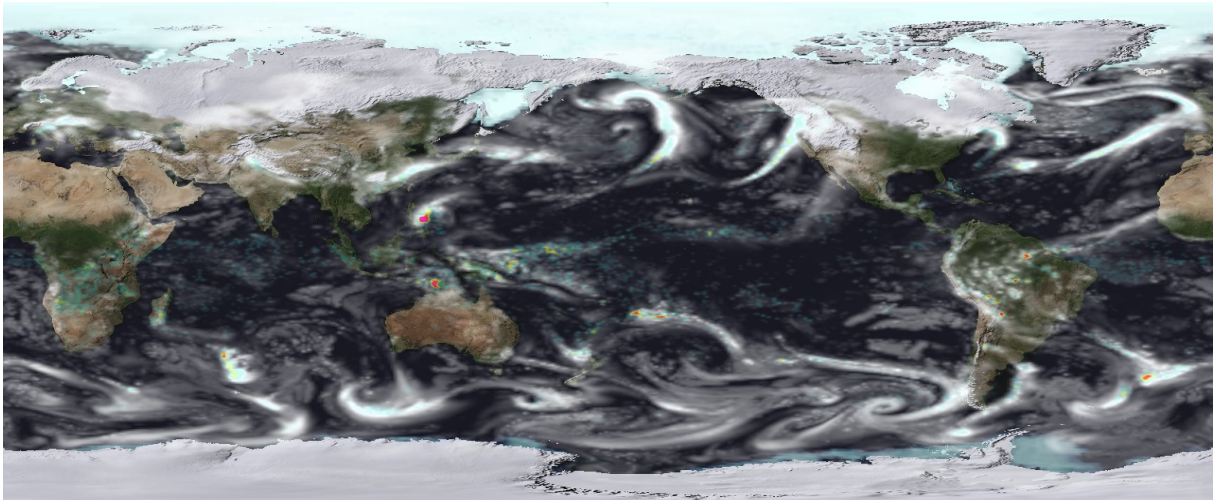
Our access to greater computer power means that we can run global climate simulations with much finer resolution than ever before. As a consequence, we are now able to the study weather systems and extreme weather events, such as tropical cyclones, wind storms, droughts and heatwaves, in global climate models—a major step for climate science.

Weather systems are the building blocks of climate. So, improving the representation of weather in global climate models will lead to improved climate prediction on all time and space scales.

Using these high-resolution simulations, climate scientists at the Walker Institute are addressing important questions, such as the impact of climate change on the location, frequency and severity of potentially catastrophic weather events. This research will allow the Walker institute to provide our stakeholders with more relevant climate information.



Greater computing power allows much higher model resolution and vastly improved spatial detail.



A snapshot of the detailed weather systems that can be captured by a high resolution climate model running on the Earth Simulator supercomputer.

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