

Weather and climate

Last summer's weather — the hottest June on record, followed by a very wet July — certainly raised our awareness of climate change. However, the inaccuracies of day-by-day weather forecasting have led some to suggest — wrongly — that we should not believe the predictions of long-term climate models.

Weather stations around the world (1) gather data on atmospheric conditions. Weather forecasts require knowledge of current atmospheric conditions across the world in order to predict what will happen in the future. For this they use huge supercomputers, such as the IBM Blue Gene/Q Sequoia supercomputer at Lawrence Livermore National Laboratory (2), which can carry out 504 billion computing events per second.

Recordings of temperature, air pressure, wind speed and direction, rainfall and so on are combined with weather satellite data (3) in order to make forecasts. Complex equations, including the Navier–Stokes equations that describe fluid flow, are used to model the weather. The computer models are run several times every day and are constantly compared with actual weather changes. Sometimes, when atmospheric conditions are particularly unstable, weather forecasts can be somewhat unreliable (4).

When climate scientists — including physicists and applied mathematicians — talk about 'weather', they mean the minute-by-minute, hour-by-hour and day-by-day changes in atmospheric conditions. Climate, on the other hand, refers to the behaviour of the atmosphere over years, decades and centuries. Because it is an average over longer time periods, climate is more predictable than weather because it is concerned with trends, and the short-term vagaries of the weather are averaged out.

Weather forecasts may be unreliable at times, but we ignore the predictions of long-term climate models at our peril. The fact is, our climate is changing (5), and we all need to be aware of the potential consequences, and of the contribution we can all make to reducing the impact of global warming.

To find out more about climate change and its likely consequences for the UK, a good place to start is the Met Office website:

<http://tinyurl.com/metoffice-climate-change>

1 Weather station on a Finnish mountain



2 The IBM Blue Gene/Q Sequoia supercomputer



3 Hurricane Laura over the Gulf of Mexico in 2020

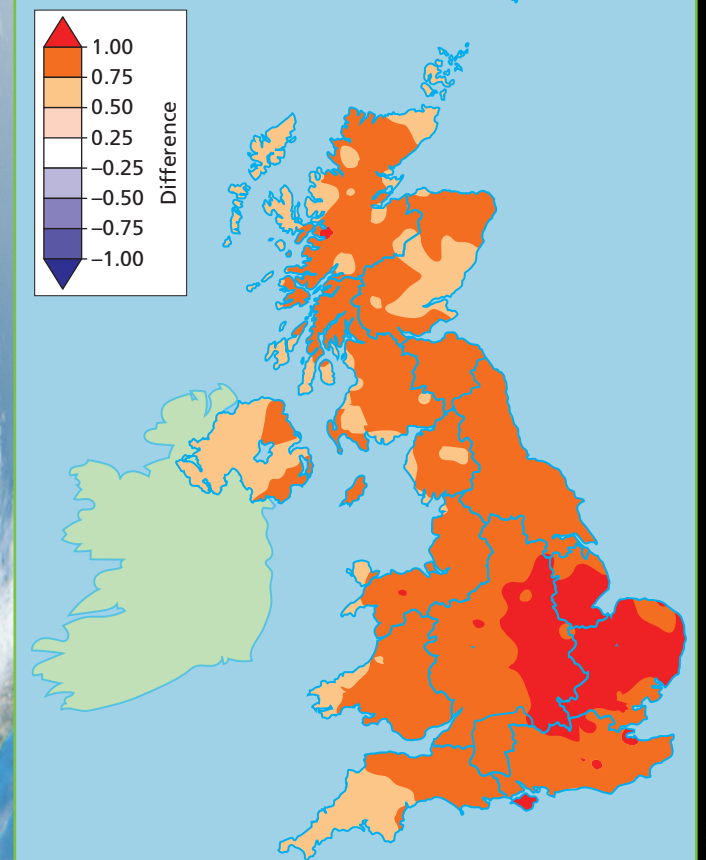


4 Blizzard conditions on Lyme Regis seafront in March 2018



5 The annual average temperature change in the UK is changing

Difference in mean annual average temperature (1991–2020 compared with 1961–1990)



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