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Focus: So, are we going to freeze or fry?

Scientists say that global warming is slowing the Gulf Stream and that Britain may face a new ice age as a result. Confused? Jonathan Leake explains the oddities of climate change

For two dozen climate change scientists with a theory to prove, the results were startling. The end of the world as we know it had come a little closer — and they had the data to show it.

For weeks their research vessel, the Discovery, had ploughed across the Atlantic gathering information on how water circulates in the oceans. Among ocean scientists, such voyages are routine and several weeks at sea can provide enough data for two years of worthy but obscure research.

This one, however, was different. The researchers, all British, were seeking evidence for or against a hypothesis so apocalyptic that, if proven, it could mean the freezing of Europe within a few decades. And, as the Discovery steamed from the Bahamas towards Africa, they were getting the first hints that the hypothesis could be right.

Two or three times a day, the boat would stop in mid-ocean and drop a package of instruments over the side. Then they would wind out nearly three miles of wire and log the temperature, salinity and other features of the water deep beneath their ship.

As the ship steamed on to the next sampling point, the researchers would add new data to the mass of figures collected. In time patterns began to emerge. Some instruments were showing that the deep ocean currents were smaller and slower than ever before. Others were showing how the same water was less salty than normal — and a bit warmer.

For ocean scientists, such findings were shocking. The deep waters of the oceans had hardly varied at all over decades of measurement. What was going on?

“What we were getting were the first inklings that the structure of the ocean could be changing,” said Dr Richard Sanders, a chemical oceanographer

from the National Oceanography Centre at the University of Southampton, who was monitoring the instruments on the voyage.

“It was very interesting, but it was just a hint. We knew we needed to analyse the data much better.”

In a way, the findings were just what the researchers had hoped for. The data appeared to be the first real evidence that greenhouse gases might be affecting the circulation of the oceans. If true, it could make their reputations.

But it was also frightening. It could mean that the temperate climate in which northern Europe had flourished for thousands of years was going to be plunged into icy winter.

The real analysis began when the scientists returned to Southampton. Six months later, in September last year, Harry Bryden, Southampton’s professor of physical oceanography, called colleagues Stuart Cunningham and Hannah Longworth to his office to see what they had found.

“As soon as we compared our figures,” he said, “we knew it was serious. What we were seeing was a 30% reduction in Atlantic ocean circulation, with some currents diminishing by as much as 50%.”

“These currents are what give Europe its temperate climate,” added Bryden. “If the Gulf Stream were to continue to weaken it could give Britain a much colder climate, similar to that of Alaska.”

For the layman, such assertions can seem confusing. For years we have been told the threat is from the big heat, not the big chill.

This week 10,000 diplomats and politicians are gathered in Montreal in Canada seeking ways to cut down the greenhouse gases that, say the scientists, will warm the world by up to 5C by 2100.

Now we find that while the rest of the world might be baking, Britain and Europe will freeze. How can both be true?

BRITAIN has frozen before. About 450,000 years ago, a giant ice-sheet came close to what is now London.

It lasted for millennia — but shrank back so that 125,000 years ago, hippos, lions and elephants would have been a common sight in what is

now central London.

Then, about 80,000 years ago, the earth entered a new glacial period whose peak 20,000 years ago saw an ice sheet covering much of Scotland and England as far south as Birmingham. The end of that ice age, 11,500 years ago, allowed humans to colonise northern Europe.

However, those glaciations and warmings each took place over thousands of years — and were probably caused by small rhythmic changes in the earth's orbit around the sun.

This time, say scientists, it's different. The climate seems to be changing much faster and the suspected cause of the warming is greenhouse gases. But if global temperatures are rising, how can a freeze threaten Britain? The answer lies in the ocean currents, especially the Gulf Stream, a huge warm surface current that travels from the hot Caribbean towards northern Europe.

As it flows, it releases heat equivalent to the annual output of 1m power stations into the overlying air — creating the warm winds that keep Europe's climate so mild.

Without them, Europe would be a much more hostile place. Britain is on the same latitude as Labrador in Canada and would probably be covered in tundra with winter temperatures dipping to –30C.

So why is the Gulf Stream under threat? Scientists point the finger at the north Atlantic and the seas around Greenland, where they have been studying one of the "engines" that drives the system: the sinking of dense supercooled water from ice shelves.