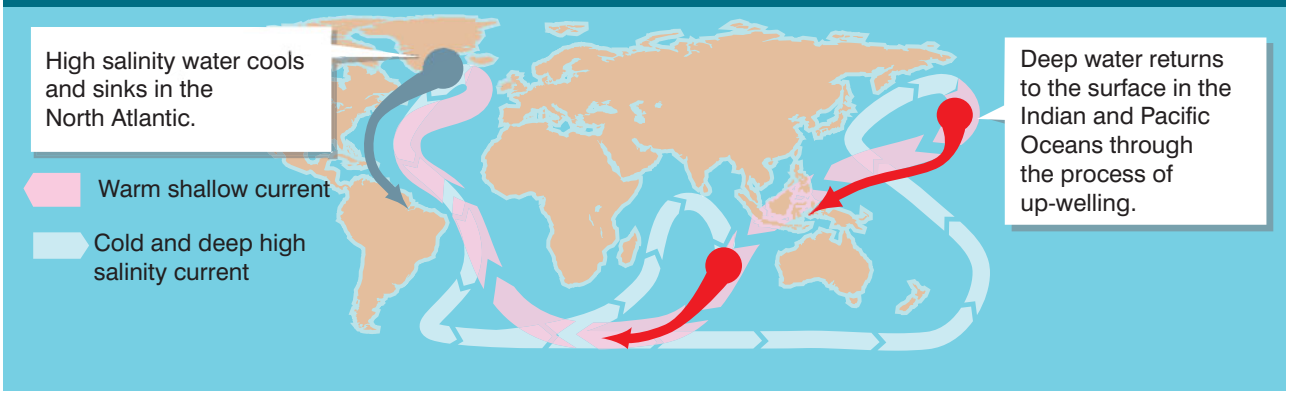
CAN YOU

Believe it?

WITH ASSOCIATE PROFESSOR DEREK LEINWEBER

Feelin' hot hot hot

Heat pump: Ocean current circulation



There's no doubt about it. It's getting hot in here.

SHORT memory spans can often be blamed for the common refrain: ''gee, it's hotter than usual this year, ain't it?''. But, if you recited this line in 1998, 2002, 2003, 2004 or 2005 – you'd be right. These were the top five warmest years worldwide since the late 1800s. In fact, the 10 warmest years of the 20th century all occurred in the past 15 years.

Using indirect measurements that go back even farther, it's argued that 2005 was the warmest year in the past several thousand years.

And if you've commented the weather's been getting worse, you'd be right, too.

It is an undisputed fact that humans have altered the chemical composition of the atmosphere. Most of the warming over the past 50 years is attributable to these changes.

Humans have upset nature's fine balance, established over centuries before the onset of the industrial revolution of the 1750s.

Energy from the sun drives the Earth's weather and climate. It heats the Earth's surface. In turn, the Earth radiates energy back into space. But atmospheric greenhouse gases (water vapour, carbon dioxide, methane and other gases) trap some of the outgoing energy, retaining the heat as though it were a blanket.

Scientists estimate that the average global surface temperature will rise 0.6 to 2.5C in the next 50 years. The 21st century could see global temperature increases of 3C to 5C. That will bring us up to the warmest temperatures the world has experienced in the past million years.

Some effects are easy to predict.

Evaporation will increase as the climate warms, and this will increase average global rainfall. Intense storms will become more frequent. In fact, the ferocity of last year's devastating hurricane season is attributed to the higher than average water temperatures in the Gulf of Mexico. This will not be an isolated event.

As land and continental-shelf based glaciers melt, sea levels are rising. Measurements in Amsterdam, Stockholm and Liverpool show a significant trend of rising sea levels over the past 150 years. Sea level rises exceeding 50cm are predicted. Many in-land suburbs will produce beach-front properties in the next few decades.

Somewhat harder to predict is the effect of global warming on thermohaline circulation – better known as the great ocean conveyor belt.

This ocean current circles the Pacific Ocean, passes north of Australia, dips around the horn of Africa, and is best known for carrying warm tropical water up the east coast of the U.S. in the Gulf Stream.

As the warm water releases its heat in the North Atlantic, it warms most of Europe – delivering the equivalent of a million power stations. As the water cools and becomes more saline via evaporation, it becomes more dense and sinks. And it is this sinking of the water that drives the ocean conveyor belt.

There is concern that the mixing of fresh glacial melt water with the warm salt water will act to reduce the salinity and density of the water – preventing it from sinking at all.

With a key motor of the ocean conveyor belt out of operation, there is a possibility that the conveyor belt will stop. In this case, northern Europe would experience severely cold winters and the rest of the world will be hotter without the transference of heat to the arctic region.

And it's happening already.

Researchers have recently measured the strength of the current between Africa and the U.S. and find that the circulation has slowed 30 per cent since it was measured 12 years ago.

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