CAN YOU

Believe it?

WITH ASSOCIATE PROFESSOR DEREK LEINWEBER

Food for thought

Is Earth being changed from a pressure-cooker into a microwave?

AUSTRALIA'S multibillion-dollar fishing and wine industries may be in for troubled times. And it may all be due to what is happening to a chain of tiny atoms 15km above the Earth's surface. Just as greenhouse gases are good at radiating heat back down to us on the Earth's surface, they are also good at radiating heat in the upper atmosphere back out into space.

And while it's getting hotter down here, it's getting cold up there.

Greenhouse gases are cooling the stratosphere, 15km above the Earth's surface, where ozone is produced.

In this new ultra-cold environment created by the greenhouse gases, polar stratospheric clouds of ice particles are forming in abundance. These harbour polluting, chlorine-based molecules which act as a catalyst in chemical reactions destroying ozone.

It is estimated that a single chlorine atom can destroy more than 100,000 ozone molecules before it is removed from the stratosphere.

Ozone plays a vital role in life on Earth in stopping harmful UVB ultraviolet rays from the sun. UVB radiation is linked to skin cancer, cataracts, suppression of the body's immune system, damage to materials such as plastics and harm to certain crops and marine organisms.

The University of Adelaide's Atmospheric Physics Research Group, led by Professor Robert Vincent, is providing information vital to the development of accurate models of the upper atmosphere so that the ultimate impact of this change may be anticipated.

Of particular interest is the effect of UV radiation on the Southern Ocean's krill population. Krill is a small crustacean about the size of your little finger that feeds many of the ocean's animals including whales, seals, fish and penguins. There is concern that the significant decline in krill population over the past 20 years is attributable to the Antarctic ozone hole and global warming. In turn, this decline threatens to destabilise our oceans' ecosystems - effectively starving large sections of the food chain, including commercial fish stocks.

But there will be even further implications for Australia. Scientists estimate that the average global surface temperature will rise 0.6C to 2.5C in the next 50 years. This will have a serious impact on Australia's agriculture.

A recent study into Australia's $5 billion wine industry reveals disturbing compromises to grape quality over the next 20 years. In most cases, the budburst is earlier, leading to earlier harvest times. The warmer climate combined with harvesting at a warm time of year delivers a double-warming wammy on grape quality.

Coonawarra harvests may be 46 days earlier in the year 2050. Historical data correlating cabernet sauvignon grape prices with mean January temperatures reveal that this grape variety is particularly susceptible to global warming spoilage. Quality may be reduced by as much as 50 per cent by 2050.

And the evidence for this impending change is clear. The intimate relationship between temperature and greenhouse gases in the atmosphere is exposed in data obtained from ice cores drilled in Greenland and the Antarctic. Bubbles trapped in the ice provide atmospheric samples. It is the concentration of oxygen-18 atoms in these bubbles that reveal ancient temperatures, and the cores track the concentration of atmospheric methane and carbon dioxide beautifully over a period of 420 thousand years. The record reveals that we are living in what is already a relatively warm period in the earth's history. And it's going to get hotter.

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