Guilt trip

As the evidence for a tight link between greenhouse-gas emissions and climate change accrues, scientists — and editors — should moderate their use of international air travel.

Climate sceptics often point gleefully at evidence from Antarctic ice cores that shows the rise in global temperature that brought to an end the last ice age ran ahead of the increase in atmospheric carbon dioxide, which they say proves that the latter did not drive the former. However, a study published last month (*Nature* **484,** 49–54; 2012) comes to a different conclusion.

A team led by Harvard researcher Jeremy Shakun used 80 proxy records from dozens of locations around the world to reconstruct global surface temperature during the most recent deglaciation — a critical period of Earth's history, roughly 20,000 to 10,000 years ago. The study provides compelling evidence that the rise in temperature during this deglaciation in fact correlated with and generally lagged behind the increase in carbon dioxide — consistent with our present understanding of the link between carbon dioxide and climate. By implication, the findings clearly strengthen the present consensus about the causes of contemporary global warming and the near certainty of continued warming if we fail to curtail greenhouse-gas emissions.

It will be interesting to see what negative spin the climate change sceptics and outright deniers will put on these findings, as no doubt they will. At the very least we can expect claims of scientific 'U turns' and 'contradictory results' — talk designed to distract from the growing body of evidence that anthropogenic climate warming is real and here to stay unless we do something about it.

How such evidence is portrayed in our schools and colleges is particularly important. On page 303, Mason Inman takes a close look at how the teaching of climate change science has become a political hot potato in the United States, and what educationalists are doing to counter the claims of denialists that human-induced climate change is just a myth promulgated by liberals and tree huggers. Inman highlights polls run by the Pew Research Center suggesting that the percentage of the US population accepting climate change has actually fallen over recent years — a disturbing trend indeed — and that denialism, according to polls conducted by the Yale Project on Climate Change Communication, is far from being confined, as some suppose, to white, middle class and well-healed Christian conservatives. As described by Inman, such polls also reveal a remarkable degree of ignorance among US adults and teenagers alike about the causes of climate change, even when they accept it as a real phenomenon. Part of the reason no doubt is the inadequacy or absence of classroom teaching of Earth sciences in many schools.

But that is not the whole story. Teachers are placed under considerable pressure from some parents to not even broach the subject of global warming or to portray it as an unsubstantiated 'theory' disputed by many scientists — which is far from the case. Furthermore, powerful and vocal lobbyists often have a disproportionate influence on science curricular, with some states actually having passed bills constraining the way that climate change science is taught in schools, if at all. However, as Inman says, advocates of scientific literacy are now identifying and implementing innovative strategies for countering the denialists' agenda in US schools. Power to their elbows we say.

Sadly, as the article notes, children can be made to feel afraid, ashamed or guilty as a result of learning about human impacts on the climate and environment. And indeed, global warming is a deeply ethical issue: actions that we take today are likely to affect the well-being of others in the future, and not just that of our own kith and kin. Modifying our own behaviour to limit the impact of climate change can be seen as being truly altruistic if it means making individual sacrifices now to benefit future generations or people in those parts of the world already being affected by climate change. Of course, some live only for the present, caring little about what will happen to our planet once they are dead and gone. However, many of us do want to make a difference and do feel guilty when our actions are not in kilter with our lofty ideals.

This is a fraught area where it is difficult not to sound sanctimonious or even open to the charge of hypocrisy — and scientific editors are not immune. Take air travel. Editors are expected to attend conferences around the world, which inevitably often involves long-haul flights. And yet it has been estimated that international air travel accounts for around 5% of global warming; moreover, carbon dioxide emissions from the sector are rising rapidly (page 308). Airlines can buy international carbon offsets under the European Union's Emissions Trading Scheme, but that does not in itself stop or necessarily even reduce global emissions in the longer term.

Scientists, as well as editors, naturally feel torn by the dilemma, and many have started seriously to question whether the extent of travel to international conferences is defensible. Kevin Anderson, who leads the UK Tyndall Centre's energy and emissions-related research, took the train last year to and from Shanghai to avoid flying (he was helping with the opening of a Shanghai centre of Tyndall). In April, Anderson withdrew from the Planet Under Pressure conference in London because of its use of carbon offsetting. In an Interview on page 307, he explains his objections to this practice.

More generally, carbon trading has become big business, with the European Union's Emissions Trading Scheme accounting for a large proportion of transactions. As discussed by Mark Maslin and Martyn Poessinouw (page 300), this has led to the rapid growth of the carbon-market intelligence 'industry', which provides information to help organizations buy or sell carbon credits. They note that "the global business community has shown that it is taking carbon accounting and carbon trading very seriously by investing over £35 billion in information last year." Indeed, the carbon market is so large that taking the odd flight to attend a conference — or to go on holiday — seems a drop in the ocean. But of course this is exactly what airlines and other carbon-expensive industries would have us believe. It is collective action that matters. If we were all to change our behaviour, the results would be significant. ❐