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## A climate of alarm

News &amp; Analysis: February 2007

**The conventional view among scientists is that man-made global warming is real and potentially devastating. Climate physicist Richard Lindzen tells Edwin Cartlidge why he disagrees**

These days it seems hard to get away from talk about global warming. Dramatic stories about potential climate catastrophes fill the front pages of newspapers and receive hours of airtime on TV and radio, while politicians take every opportunity to boost their green credentials. The chief scientific advisor to the UK government Sir David King has described climate change as "the most severe problem we are facing today", while former US Vice-President Al Gore claims that "at stake is nothing less the survival of human civilization".

But for Richard Lindzen, a climate physicist at the Massachusetts Institute of Technology, this explosion of interest amounts to "baseless alarmism". Lindzen, who has studied meteorology and the climate for more than 40 years, believes the evidence that man is dangerously overheating the planet simply does not stack up. And he thinks that the predicted widespread sea-level rises, droughts and floods will not materialize. Even if these effects were on the cards, he says, attempts to reduce emissions of carbon dioxide and other greenhouse gases would do almost nothing to hold such disasters back.

Lindzen, 66, is unusual in being an established climate researcher who publicly argues the case against anthropogenic climate change. Any large meeting related to environmental science is likely to have very few talks or posters that would dispute the basic thesis of man-made global warming. However, Lindzen believes there are plenty of other scientists who broadly share his views but do not air them for fear of losing credibility or funding. Indeed, he says he has experienced a lot of what he sees as the bias operating within climate research. "Many programme managers have told me that funding depends on concern for global warming," he says. "But if that is true, how can you objectively study the way climate works?"

[Alarmism opponent](#)

### From whence the warming?

Lindzen has no issue with the notion that the Earth has warmed. The body that was set up by the United Nations to investigate the phenomenon of global warming, the Intergovernmental Panel on Climate Change (IPCC), which draws on the expertise of hundreds of climate scientists, engineers, economists, social scientists and others around the world, stated in 2001 that the global mean temperature has increased by about 0.6 °C during the 20th century, a figure that Lindzen thinks is probably about right. He also agrees that the concentration of greenhouse gases in the atmosphere has gone up (with carbon dioxide increasing from about 280 parts per million in about 1700 to over 370 parts per million today), much of which has been caused by human activities. But where he parts company with the IPCC is the extent to which this increasing concentration can cause warming, or in other words, how much man is influencing the climate.

The now famous "hockey-stick" graph published in 1999 by Michael

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Mann, then at the University of Virginia, and colleagues shows that temperatures in the northern hemisphere were higher in the last few decades of the 20th century than during any comparable period in the previous four centuries and possibly even over the last millennium. Meanwhile, researchers at the Hadley Centre in the UK have produced a climate model that closely reproduces the temperature data from the last 150 years if it includes both natural and human-induced temperature fluctuations. These and other studies led the IPCC to conclude in 2001 (in its "summary for policy makers") that "taking into account the remaining uncertainties, most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations", a conclusion that is likely to be strengthened in the panel's latest report on the science of climate change, which is released this month.

For Lindzen, however, the comparison between modelled and observed temperature data is basically an exercise in "curve fitting", since, he says, the properties of a number of the natural and human-induced mechanisms that could heat or cool the Earth are poorly understood. Indeed, he believes that the claimed anthropogenic heating "signal" is obscured by the "noise" of the uncertainty in the temperature measurements and, more importantly, the internal variation of the climate. By internal variation he simply means the internal dynamics of the atmosphere and the ocean, rather than external natural factors, such as variations in the Sun's output or sudden changes in levels of atmospheric aerosols due to volcanic eruptions. "The most plausible null hypothesis for the variation in temperatures we have seen is that it is natural," Lindzen says. "So we are faced with the question: is there anything here that calls for an extraordinary explanation? I think the answer is no."

But he goes further. Lindzen believes that even if man were indeed responsible for the vast majority of the warming observed in the last 100 years, he thinks there is still no cause for alarm. In its 2001 report, the IPCC concluded that between 1990 and 2100 the Earth would heat up by between 1.4 °C and 5.8 °C, with the exact amount depending on future trends in greenhouse-gas emissions, as well as on the specific model used to carry out the projection. For Lindzen, these figures are way off the mark. He claims the climate models used by the IPCC are far too sensitive to changes in the concentration of atmospheric carbon dioxide, and estimates that the Earth will in fact warm up by perhaps just a few tenths of a degree over the next century. Needless to say, this is a conclusion that other climate researchers strongly disagree with (see "How sensitive is the climate?").

#### **No action required**

Lindzen himself wrote part of one of the chapters of the IPCC's 2001 scientific assessment. Although he was not involved in drawing together the different chapters into an executive summary, he does believe that this was well carried out and resulted in statements that were couched in suitably uncertain terms. However, he objects to the way that this document was then used to prepare the summary for policy makers, a process that involved people from government, industry and environmental organizations as well as scientists. If that was not bad enough, he says, the summary for policy makers was then further stripped down by the press, eager for a good story, and politicians, keen to play up the significance of the report as much as possible in order, as he says, to "co-opt the authority of scientists".

Lindzen, however, reserves his greatest wrath for scientists who are not climate-research specialists but who, as he sees it, try to exploit their authority in the climate-change debate. For these people, he says, there is a "special place in hell". Among these he counts Lord (Robert) May, former UK chief scientific advisor and past president of the Royal Society, and Sir David King. "For whatever reason, be it an agenda or a bias or an emotion, I have no idea what, but the statements they make bear no relation to the science," he says.

But is it not possible that increasingly powerful models could ultimately confirm once and for all that significant man-made global warming is taking place? Would it not be sensible to start limiting carbon-dioxide emissions just in case? No, says Lindzen. He believes that the Kyoto treaty will have a tiny impact, delaying any particular



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level of warming by just a year or two, and that it is completely unrealistic to see it as just a first step in a whole series of ever more ambitious emissions treaties.

For Lindzen, there is not a lot we can do, beyond ensuring that nations become rich enough to build flood defences or whatever might be necessary if the climate does start to go awry. To some, this might seem complacent, but he rejects this allegation. "That would be like saying you have a child that has a rare illness and nobody knows how to deal with it, and then a faith healer comes along and says that because you have no alternative you might as well follow me."

Certainly in public, Richard Lindzen is in the minority when it comes to his belief that man is not seriously heating up the Earth. NASA's Gavin Schmidt believes that Lindzen is "fighting yesterday's battles" and that the issues he is arguing about "were once key uncertainties but are now ready for the textbooks". There are also likely to be many who believe he is getting in the way of saving the planet. But there will doubtless be others who see him as a necessary dissenting voice in a scientific issue that is often portrayed as being done and dusted.

### In Person

**Born:** Webster, Massachusetts, 1940

**Education:** degree in physics and PhD in applied mathematics, both from Harvard

**Career:** Chicago (1967–1972), Harvard (1972–1983), MIT (1983 onwards)

**Outside interests:** photography, amateur radio, oriental rugs

**Family:** married, two sons

### How sensitive is the climate?

The benchmark figure usually used to illustrate the climate's sensitivity is the temperature change caused by a doubling of carbon dioxide (CO<sub>2</sub>) in the atmosphere. In 2001 the IPCC's best estimate for this was 2.5 °C. But Lindzen believes this is a huge overestimate. He maintains that although levels of CO<sub>2</sub> have only risen by around a third since the industrial revolution, some three-quarters of the heating associated with a doubling of the concentration of the gas has already taken place. He says that this is because the warming effect of each additional carbon-dioxide molecule decreases as more and more carbon is added to the atmosphere, and because the concentration of other greenhouse gases such as methane and freons is not likely to increase significantly in the future. He believes that even if man were responsible for the entire 0.6 °C rise seen in the last century, we can expect only another 0.3–0.4 °C when carbon-dioxide levels reach 560 ppm (on current trends this is expected to occur sometime between 2040 and 2070).



[Clouding the issue](#)

Lindzen maintains that the models go wrong because they completely fail to replicate the "feedback" mechanisms in the climate system. Everyone agrees that, according to simple physical calculations, if greenhouse gases were acting alone, their doubling would lead to a rise of about 1 °C in global temperatures. But the models used by the IPCC have strong positive feedbacks from water vapour, which is a powerful

greenhouse gas. In other words, greater evaporation in a warmer world leads to larger concentrations of water vapour in the atmosphere, which in turn leads to higher surface temperatures.

But Lindzen believes that the difficulty of modelling individual clouds – one of the thorniest problems faced by climate scientists (see "[A model approach to climate change](#)") – means that researchers have no way of knowing how much of the water vapour in the atmosphere will condense into clouds and then fall to Earth as rain and how much of the rain will evaporate. He also points out that clouds themselves provide strong feedback mechanisms – with lower clouds tending to reflect incoming solar radiation back out into space, thereby reducing warming, and higher clouds tending to reduce the amount of the Earth's thermal radiation that is lost to space, so increasing warming.

In fact, Lindzen believes that, if anything, clouds and water vapour actually provide a strong negative feedback within the climate system, roughly halving the heating effect of greenhouse gases. He claims that ground- and space-based observations show that upper-level cirrus clouds in the tropics contract strongly when surface temperatures are higher and expand when these temperatures are lower, so opposing the trend on the surface. He calls this the "infrared iris effect", by analogy with the eye's iris that opens and closes in response to visible light.

However, Gavin Schmidt of NASA's Goddard Institute for Space Studies in New York believes that Lindzen's estimate of the climate's sensitivity is wrong. According to Schmidt, Lindzen has not properly taken into account the thermal inertia of the oceans, which means that much of the temperature rise associated with the carbon in the atmosphere today will not appear for about 20 years. He adds that Lindzen has also not accounted for the possible cooling effects of aerosols, which, if ignored, also lead to an underestimate of climate sensitivity. As regards the role of clouds and water vapour, Schmidt claims that Lindzen is unique in his belief that they act as a negative feedback, adding that there are now strong observational data to the contrary.

#### About the author

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