FOUR QUESTIONS ON CLIMATE CHANGE

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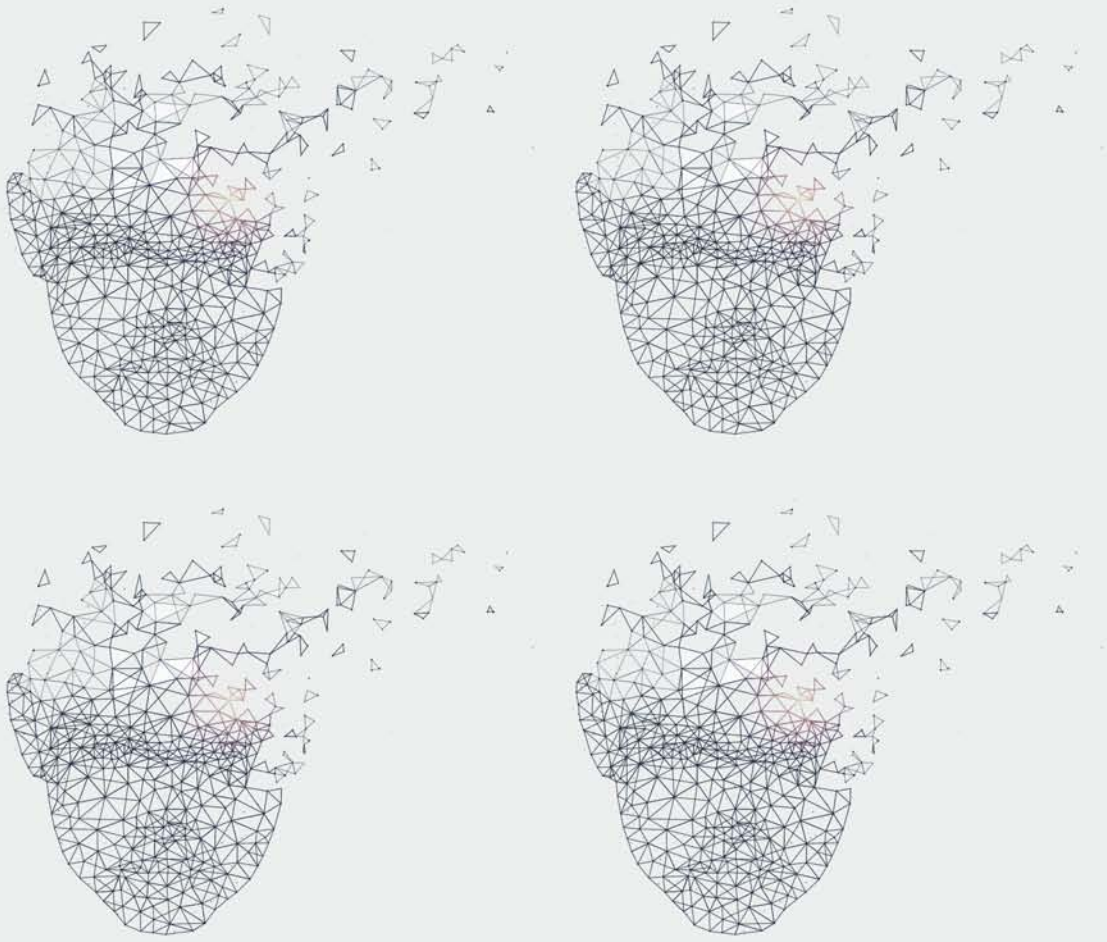

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FOUR QUESTIONS ON CLIMATE CHANGE

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1 Is the science of climate change 'settled'?

The scientific uncertainties associated with climate prediction are the basis of most of the arguments about the significance of climate change,[1] and as well are the basis of much of the polarized public opinion on the political aspects of the matter. Perhaps the most fundamental of the uncertainties can be illustrated by reference to a simple 'thought experiment' as follows.

Imagine a plume of smoke rising from a cigarette into some sort of flue. The stream of smoke is smooth enough for a start, but suddenly breaks into random turbulent eddies whose behaviour is inherently unpredictable.

We can in principle make closely spaced measurements all over the turbulent plume at some particular initial time, and then at regular steps forward in time into the future. We can in principle predict things into the future with a numerical model which uses the initial measurements as a starting point and then makes predictions of the conditions at the end of each time step at all of the so-called 'grid points' corresponding to the positions of the measurements.

After the first time step, the model uses as its starting point the conditions predicted for the end of the previous step. The predictions may match the observations for a while, but very soon random fluctuations smaller than the distance between the measurements (they are called 'sub-grid-scale eddies' in the vernacular of numerical modellers) grow in size and – as far as the model is concerned – appear out of nowhere and swamp the eddies we thought we knew something about. While we can probably say that the overall column of smoke will continue to rise, we can make that rather limited statement only because the eddies are restricted or 'contained' by a boundary (the flue), and cannot grow to a size any bigger than the limit set by the boundary.

Predicting the actual value of the average rate of rise of the overall plume is still difficult. Depending on the shape of the flue, it may require the use of one or more 'tuneable parameters' in the forecasting process. A tuneable parameter is a piece of input information whose actual value is chosen on no basis other than to ensure that theoretical simulation matches observation. Normally it would be used to define something about the average state of the turbulent medium between the grid points of the forecasting model.

The climate system is much like the smoke but is vastly more complicated. The atmosphere and the ocean are two interacting turbulent media with turbulent processes going on inside them, and there are all sorts and shapes of physical boundary (of the ocean in particular) that 'contain' the eddies in a way that may or may not allow prediction of average conditions over areas less than the size of the Earth. In principle, at least, we may be able to make a reasonable forecast of such things as the future global-average temperature and global-average rainfall by using a numerical model and a number of tuneable parameters obtained from observations of present conditions. (The 'in principle' here is based on the fact that the overall size of the Earth sets an upper limit on the scale of possible eddies). Forecasting smaller-scale averages becomes more and more problematic as the scale decreases. As a first guess based on the smoke plume analogy, one might be able to forecast

averages over areas the size of ocean basins (imagine them as 'containers' limiting the maximum possible eddy size) but one cannot really expect to make skilful prediction for areas much smaller than that.

This qualitative conclusion is borne out by the 100-year forecasts of global and regional rainfall produced by the various numerical climate models from around the world.[2] While the predicted global averages are reasonably consistent (not necessarily correct, but at least to some degree consistent with each other), the predictions for continental Australia for instance, where the overall average of measured rainfall is currently about 450 mm per year, range from less than 200 mm per year to greater than 1000 mm per year. From which it would seem that long-term predictions of regional rainfall are probably little better than guesswork.

The World Meteorological Organization of the United Nations took its first steps towards establishing the World Climate Program in the early 1970s. Among other things, it held an international workshop in Stockholm to define the main scientific problems to be solved before reliable climate forecasting would be possible.[3] The workshop defined quite a number, but focused on the two that it regarded as the most important and fundamental.

The first concerned an inability to simulate the amount and character of clouds in the atmosphere. Clouds are important because they govern the balance between solar heating and infrared cooling of the planet, and thereby are a major control of Earth's temperature. The second concerned an inability to forecast the behaviour of oceans. Oceans are important because they are the main reservoirs of heat in the climate system. They have internal, more-or-less random fluctuations on all sorts of time-scales ranging from years through to centuries. These fluctuations cause changes in ocean surface temperature that in turn affect Earth's overall climate.

Many of the problems of simulating the behaviour of clouds and oceans are still there (along with lots of other problems of lesser moment), and for many of the same reasons as were appreciated at the time.[4,5] Perhaps the most significant is that climate models do their calculations at each point of an imaginary grid of points spread evenly around the world at various heights in the atmosphere and depths in the ocean. The calculations are done every hour or so of model time as the model steps forward into its theoretical future. Problems arise because practical constraints on the size of computers ensure that the horizontal distance between model grid-points may be as much as a degree or two of latitude or longitude – that is to say, a distance of many tens of kilometres.

That sort of distance is much larger than the size of a typical piece of cloud. As a consequence, simulation of clouds requires a fair amount of inspired guesswork (for which read 'parameterization', as mentioned above with regard to the smoke plume analogy) as to what might be a suitable average of whatever is going on between the grid-points of the model. Even if experimental observations suggest that the models get the averages roughly right for a short-term forecast, there is no guarantee they will get them right for atmospheric conditions several decades into the future. Among other reasons, small errors in the numerical modelling of complex processes have a nasty habit of accumulating with time.

Apropos of which, NCAR/UCAR has recently assembled a database of 30 individual simulations of the North American climate for the period 1963–2012, using what is known as the Community Earth System Model. Each simulation was subject to an identical scenario of historical 'radiative forcing' (effectively an identical scenario of atmospheric carbon dioxide increase over the period) but each was started from a very slightly different atmospheric state – that is, with an almost infinitesimal difference in the initial value of global tempera-

ture. According to the NCAR/UCAR press release on the subject, the variations in warming and cooling in the 30 simulations illustrate the far-reaching effects of natural variability superimposed on human-induced climate change. The work was discussed by Dr Kip Hansen,[6] who made the point that the results illustrate well the original finding by Edward Lorenz in the 1960s using a weather model on an early computer :

> Two states differing by imperceptible amounts may eventually evolve into two considerably different states…if, then, there is any error whatever in observing the present state…an acceptable prediction of an instantaneous state in the distant future may well be impossible…(the possibility of) precise very-long-range forecasting would seem to be non-existent.

Again because of the grid-point business, oceanic fluctuations and turbulent eddies smaller than the distance between the grid-points of a model are unknown to that model. This would not be a problem except for the point made earlier that eddies in turbulent fluids can grow larger and larger. A small random eddy in the real ocean can grow and appear out of nowhere as far as a forecasting model is concerned, and make something of a dog's breakfast of the forecast from that time on.

All of the above is background to one of the great mysteries of the climate change issue. Virtually all the scientists directly involved in climate prediction are aware of the enormous problems and uncertainties still associated with their product. It is therefore difficult to see how the Intergovernmental Panel on Climate Change (the IPCC) can maintain there is a 95% probability that human emissions of carbon dioxide have caused most of the global warming that has occurred over the last several decades.[7]

Bear in mind that the representation of clouds in climate models (and of the water vapour which is intimately involved with cloud formation) is such as to amplify the forecast global warming from increasing atmospheric carbon dioxide – on average over most of the models – by a factor of about three.[8] In other words, two-thirds of the forecast rise in global average temperature derives from this particular model characteristic. Despite what the models are telling us – and perhaps because it is models that are telling us – very few scientists close to the problem, when asked the specific question, would say that they are 95% sure that the effect of clouds is to amplify rather than to reduce the warming effect of increasing carbon dioxide. If they are not sure that clouds amplify global warming, they cannot be sure that most of that warming is a result of increasing carbon dioxide. (Climate scientists talk in terms of 'feedback'. Positive feedbacks amplify the warming effect, and negative feedbacks reduce it. The various climate models have cloud feedbacks ranging from slightly negative to significantly positive,[8] and there is no guarantee that cloud feedback in the real world lies within even that quite large range.)

Bear in mind too that very few scientists close to the problem, when asked the specific question, would say there is only a very small possibility (for example, less than 5%) that internal ocean behaviour could be a major cause of the warming over the past half-century.[5] They would be particularly careful not to make such a statement now that there has been only a small global warming over the most recent twenty-or-so years. In the scurry to find reasons for this 'pause' (it was first acknowledged as a problem in 2009 or thereabouts[9]), and to find reasons for an obvious failure of the models to predict it, about three or four years ago we began to hear from scientists that (among other theories[10,11]) perhaps the heat of global warming was being hidden in the deep ocean. In other words we were being told that some natural internal oceanic fluctuation may have reduced the upward trend in global temperature. It is therefore a little strange that we were not being told by the IPCC, or at

any rate we were not being told very loudly, that some natural internal fluctuation of the ocean (rather than warming by increasing atmospheric carbon dioxide) may have given rise to much of the earlier upward trend of temperature.

In 2015, a group of scientists within NOAA re-examined the world's long-term measured surface temperature data and found reasons to adjust (to correct?) the data in such a way as to remove the so-called 'pause' from the observational record.[12] There has been much argument about the validity of the adjustments.[13] It has given a considerable impetus to the suggestion that cherry picking of data may be a problem in climate change science.

In light of all this, we have at least to consider the possibility that the scientific establishment behind the global warming issue has been drawn into the trap of seriously overstating the climate problem – or, what is much the same thing, of seriously understating the uncertainties associated with the climate problem. If true, it is a particularly nasty trap in the context of science, because it would risk destroying, perhaps for centuries to come, the unique and hard-won reputation for honesty that is the basis of society's respect for scientific endeavour. It would seem sensible for the climate-science community to back away from any tacit support for the proposition that 'the science is settled'.

2 What is the effect on climate science of public advocacy for the message of disastrous anthropogenic global warming?

The part of the scientific community that has an interest in climate change is highly polarized on the matter.

On one hand there are those within what might be called the climate research establishment. They control or reap the benefit of the vast amount of money that has poured into climate research over the past two or three decades. They are funded almost entirely by government, and they support – at least in public – the thesis of disastrous anthropogenic global warming (AGW). Some of them have become fierce advocates for the proposition that society must drastically limit its use of fossil fuels so as to limit emission of carbon dioxide to the atmosphere.

On the other hand there are the 'climate sceptics' who, for one reason or another, are doubtful that global warming will be a serious problem for the future. Mainly they are from other disciplines, related in some way or other to climate science, or from the various ranks of interested amateur scientists.[14] However they include also a fair number of independent climate scientists – 'independent' here usually (but certainly not always) implying that they are retired. Most climate sceptics do not dispute the actual existence of human-induced global warming. They do suggest that it may be so small as to be insignificant; that if it is significant then it may well be a net benefit to society; or that if it is not a net benefit then the natural processes of human adaption will probably take care of the matter. They are greatly outnumbered by those in the climate establishment, particularly if one considers only those who have actually published their findings and opinions in mainstream media.[15]

The problem for the scientific community as a whole is that this polarization, despite its imbalance towards the establishment, is seriously threatening the public's perception of the professionalism of scientists in general.

Setting aside the issue of who is right in the debate, some of the more vocal of the establishment climate researchers have fallen into a mode of open denigration of climate

sceptics ('deniers' is the offensive popular terminology of the day). They insist that only researchers directly within the climate-change community are capable of giving authoritative advice. They insist that one can find true and reputable science only in peer-reviewed climate literature.[9, 16,17] But most significantly, they seem to have evolved a policy of deliberately excluding sceptics from climate-change forums of one sort or another, and indeed of refusing to take part in any forum where sceptics may share the podium.

The situation is reminiscent in many ways of medieval religion. The priests of that time opposed translation of the written scriptures from Latin into the local languages. They believed that only people fully trained in the theology of the time were capable of interpreting the scriptures correctly. They believed it would be highly dangerous to allow non-trained people to have direct access to the word of God because the chances were high that they would get it wrong. They were not backward in applying their peculiarly nasty forms of denigration on those who thought otherwise about the matter.

The equivalent modern denigration includes quite deliberate and serious calls for the jailing of climate sceptics who dare to question the truths of AGW.[18,19] Despite the strength of the position of medieval priests, they ultimately lost both the battle and much of their public support. The modern equivalent with regard to AGW is that, despite the claim that 95% or more of climate scientists support the AGW establishment position, support for the position among the general public (of the western nations anyway) is only of the order of 50%.[20] The reputation of climate science, and as a consequence the reputation of science in general, seems to have lost a good deal of its public gloss.

Since the climate establishment is the most organized and sophisticated of the polarized sides in the debate – it has by an enormous margin the lion's share of research resources – then it is reasonable to expect the climate establishment would try to organize some sort of bridging of the gap between the sides. In many ways it has much to gain. For instance, it is perhaps more of a rule than an exception that really new ideas in any particular area of research come from outside that area, and many sceptics come from other disciplines. For instance again, some weblog sceptics have access to a quite remarkable store of unpaid and enthusiastic scientific labor. Even within the climate establishment, there are undoubtedly many researchers who worry that their scientific endeavours are guided more by political requirements than by scientific necessity.

3 What are the barriers to public dissemination of results casting doubt on the theory of disastrous AGW?

Scientists – most scientists anyway – may be a bit naïve, but they are not generally wicked, idiotic, or easily suborned, either by money or by the politically correct. So whatever might be the enjoyment factor associated with supporting officially accepted wisdom, and whatever might be the constraints applied by the scientific powers-that-be, it is still surprising that the latest IPCC report has been tabled with almost no murmur of discontent from the lower levels of the research establishment. What has happened to the scepticism that is supposedly the lifeblood of scientific enquiry?

The answer probably gets back to the uncertainty of it all. The chances of proving – 'proving' in the hard scientific sense of requiring both observational support and replication – that the projected change of climate over the next century will be large enough to be disastrous are virtually nil. The same uncertainty ensures that the chances of a climate sceptic, or any-

one else for that matter, proving the disaster theory to be oversold are also virtually nil. To that extent there is a level playing field for the two sides of the argument. The problem is that climate research necessarily involves enormous resources, and is an activity for institutions and organizations. Scepticism is an occupation for individuals. Things being as they are in the climate change arena, scepticism by an individual within the system can be fairly career limiting (see later in this section). In any event, most individual scientists have a conscience, and are reluctant to put their head above the public parapet in order to propound a view of things that is highly uncertain and may indeed be inherently unprovable.

There is a broader context to this issue of uncertainty. To the extent that there is such a thing as normal science, it relies upon accurate observations to verify its theories. Climate research has to rely on spectacularly inaccurate data for information on Earth's climate of more than a century or two ago; it has to rely on proxy information from tree rings and ice cores and corals and so on, and abstracting a coherent story from it all is something of a statistical nightmare. Even for the most recent century, the huge data sets of directly measured surface temperatures have their problems, and the stories that these data tell are revised in one way or another as new ideas about the correct method of analyzing the data appear on the scene. Such revisions make for tremendous arguments and competing claims about whether cherry picking of data has been used to support the predictions of the AGW theoretical models.[21,22]

Climate science is an example of what Funtowicz and Ravetz call 'post-normal science' in which 'the facts are uncertain, values are in dispute, stakes are high and decisions are urgent'. In such circumstances it is virtually impossible to avoid sub-conscious cherrypicking of data to suit the popular theory of the time. Even Isaac Newton and Albert Einstein were not immune from the problem.[23] In their case they were of sufficient genius (and were sufficiently lucky!) for their theories ultimately to trump the inaccuracy of the observations they had selected. Other scientists are rarely so prescient or so lucky. In the modern era of concern about climate, the problem is compounded by the existence of the vastly complex computer forecasting models, which can be tuned, again more or less subconsciously, to yield a desired result. From theory to observation and back again: if we are not very careful, the cherrypicking can go round and round in an endless misleading loop.

But the real worry with climate research is that it is on the very edge of what is called post-modern (as opposed to post-normal) science. Post-modern science is a counterpart of the relativist world of post-modern art and design. It is a much more dangerous beast, where results are valid only in the context of society's beliefs, and where the very existence of scientific truth can be denied.[24] Post-modern science envisages a sort of political nirvana in which scientific theory and results can be consciously and legitimately manipulated to suit either the dictates of political correctness or the policies of the government of the day.

At a more mundane level, there is little doubt that some players in the climate research establishment – not many, but enough to have severely damaged the reputation of climate scientists in general – have stepped across the boundary of what is generally regarded as acceptable scientific behaviour. The Climategate scandal of 2009 for instance,[25] wherein thousands of e-mails were leaked (or perhaps hacked) from the Climate Research Unit of the University of East Anglia, revealed quite a number of such cases. Formal inquiries of one sort or another subsequently cleared the scientists involved of any legal misdemeanours.[26] However the emails[9] showed that some senior members of the climate research community were, for example, quite happy to discuss ways and means of controlling the research journals so as to deny publication of any material that went against the establishment view of

things. The ways and means included the removal of recalcitrant editors who allowed such publication.

For whatever reason, it is indeed vastly more difficult to publish results in climate research journals if they run against the tide of politically correct opinion. Which is why most of the sceptic literature on the subject has been forced onto the web, and particularly onto web-logs devoted to the sceptic view of things. Which in turn is probably why many of the most vocal believers in disastrous AGW subscribe to the view that only peer-reviewed literature should be accepted as an indication of the real state of affairs.[16] They argue that the sceptic web-logs should never be taken seriously by 'real' scientists, and certainly should never be quoted.

This is a pity. Some of the sceptics are extremely productive as far as critical analysis of climate science is concerned. Names like Judith Curry (former chair of the School of Earth and Atmospheric Sciences at the Georgia Institute of Technology), Steve McIntyre (a Canadian geologist-statistician) and blogger Willis Eschenbach come to mind. These three in particular provide a balance and maturity in public discussion that puts many players in the global warming movement to shame, and as a consequence their outreach to the scientifically-inclined general public is highly effective. Their output, together with that of other sceptics on the web, is well on the way to becoming a practical and stringent substitute for peer review.

Before his retirement, Professor Lennart Bengtsson was the director of the European Centre for Medium Range Forecasting, a large numerical modelling facility based in the UK that is perhaps the world's premier institution concerned with global meteorological forecasts up to one year ahead. Modelling on this timescale involves much the same techniques as longer-term climate forecasting. In 2014, only three weeks after his appointment as a member of the Advisory Board to the Global Warming Policy Foundation (GWPF), he was forced to resign.[27] The GWPF is a significant organization, known for its open-minded approach to both sides of the climate change argument. The reasons for his resignation are clear from the following abstracts from his resignation letter to the GWPF.

> I have been put under such an enormous group pressure in recent days from all over the world that it has become almost unbearable to me. If this is to continue I will be unable to conduct my normal work and will even start to worry about my health and safety…I had not expected such an enormous world wide pressure put at me from a community that I have been close to all my life. Colleagues are withdrawing their support, other colleagues are withdrawing from joint authorship etc…It is a situation that reminds me about the time of McCarthy.

In 2015 the University of Western Australia (UWA) entered into a contract with Dr Bjorn Lomborg for the formation of the Australia Consensus Centre, a policy 'think tank' similar in principle to one set up by Dr Lomborg in Copenhagen. The Australian federal government committed $4 million to the proposed new centre. It seems that Dr Lomborg in the past had attracted controversy for suggesting that the dangers of climate change are overstated, and that modern society faces other more pressing challenges such as global poverty. As a consequence, an enormous negative reaction emerged very publically from the academic staff within the UWA (and indeed from the staff of other Australian universities) – so much so that the Vice Chancellor was forced to cancel the contract and return the $4 million to the government.[28] Subsequently, other Australian universities were approached to host the centre, but none of them could be persuaded to take the political risk of upsetting a vocal coterie of their own staff.

Research scientists these days are fully aware that the 'publish or perish' mantra is the dominant, and indeed almost the only, factor determining promotion in the profession – particularly in the early years of a scientific career. And climate research scientists are fully aware that it is difficult to publish results that do not support the thesis of disastrous AGW. Certainly it is extremely difficult to publish them in the more widely quoted journals that are favoured by (and some would say, controlled by) the climate-change establishment. The pressure to publish innocuous rather than controversial results is enormous. Risk aversion in the face of such pressure is even more of an issue now that multiple authorship of research papers has become the norm rather than the exception.

There are many examples where the transition from paid employment in climate research to retirement has been accompanied by a significant change of heart away from acknowledging the seriousness of global warming. It seems that scientists too are conscious of the need to eat, and like everyone else must consider the consequences of public dissent from the views of the powers-that-be. One example was Dr Brian Tucker. He was the Director of the Australian Numerical Meteorology Research Centre, and subsequently became Chief of the CSIRO Division of Atmospheric Research. He was heavily involved in the development of the IPCC. During his time with CSIRO he was the 'go to' man for journalists and radio programmers seeking stories on matters to do with climate change. On retirement he became a writer and speaker for the Institute of Public Affairs, and greatly surprised his former colleagues with his very public change to an openly sceptical view on the subject.

Once upon a time we were led to believe that the road to fame and fortune within science was to produce new ideas that challenged accepted belief. Preferably, those new ideas would lead to tangible benefits for society. But irrespective of the benefit side of things, the practical basis of all research was to be openly sceptical about everything – particularly about one's own theories, and particularly about any new theory that had some vague connection to politically correct ideas of the day. Conscious, deliberate and obvious scepticism was regarded as essential to maintaining some sort of immunity from the human failing of seeing what one wants to see rather than what is real. Good scientific practice demanded at the very least that one should present the evidence against a new theory at the same time as the evidence for it.

It seems that in those parts of science that bear upon the politically correct, sceptics are frowned upon, given nasty names, and ultimately can have their reputations burned at the stake. Certainly in the field of climate change, one could perhaps be forgiven for thinking that 'advocacy for the cause' trumps the need for scepticism on any day of the week.[29] This is no small problem in the grand scheme of things, because the whole issue of climate change has lots to be sceptical about.

4 What are the implications for climate science of public acceptance of the idea that there is a 'consensus among scientists' on AGW?

A statement to the effect that there is a 'consensus among scientists' on AGW is more or less equivalent to saying that 'the science is settled'. While there is certainly a consensus among scientists that increasing carbon dioxide in the atmosphere will increase the average surface temperature of the world above what it would have been otherwise, there is far from a consensus that the rise in temperature will be large enough to be significant. (Bear in mind also

that 'what the temperature would have been otherwise' is also subject to natural variability and is therefore very uncertain). There is even less of a consensus among scientists, environmentalists and economists that any rise of temperature would necessarily be detrimental.

Thus both phrases are highly misleading if they are taken at face value without caveats. It is perhaps no accident that they are most often quoted in the context of outright advocacy for the idea of disastrous AGW.

In any event, if politicians and the general public are finally persuaded of the view that scientists are certain about the onset of disastrous AGW, it is almost certain that climate research will suffer badly.

A prime example was the decision by CSIRO in Australia in 2016 to reduce its current very extensive climate research activity so as to focus more on research relevant to industry. The decision was formally justified on the basis of the 'science is settled' argument,[30] and as a consequence the international climate establishment reacted savagely.[31] Within days of the CSIRO decision, thousands of protesting letters were sent to the chairman of CSIRO from all over the globe. It was an interesting exercise from an outsider's point of view. It was perhaps the very first time that the climate science community itself actively protested loudly in public that the science of AGW is very far from settled.[32] Up to that time, it had let the activists within the environmental movement and within the general public run free with the settled-science proposition.

It should be emphasized that solving (the solvable) problems of climate prediction (or, just as important, making a realistic assessment of the ultimate limits to climate prediction set by the inherent uncertainties within the system) requires the deployment and long-term maintenance of massively expensive observational satellite and oceanographic programs. 'Long term', since we are concerned here with climate time scales, means many decades.

It is doubtful if the maintenance of such programs will continue in a political environment where it is believed that the science is settled. Already there are signs that major oceanographic research efforts – such as NOAA's Tropical Ocean Atmosphere Array (TOAA) for instance – are being downgraded in priority because of maintenance costs.[33] TOAA involves the use of large numbers of specially instrumented ocean buoys, satellite observations and so on, and is concerned with attempts to predict the onset of El Niño and La Niña events in the Pacific ocean. These events are perhaps the most obvious examples (to date anyway) of semi-regular natural oceanic fluctuations that can produce significant medium-term changes in global temperature. TOAA is also relevant to reducing the large errors associated with numerical calculation in climate models of the transfer of heat and moisture between ocean and atmosphere.

It is conceivable in circumstances of reduced funding that overall climate research will revert to a situation where the focus is entirely on the easy option of developing more and bigger numerical models. This would be a sterile activity indeed without the input of experimental observation to guide the development of theoretical prediction methods and to keep the relevant numerical models 'honest'. It would fall foul of a fundamental tenet of scientific endeavour – namely, that a theory without experimental support is little better than guesswork.[34] It could stop climate research dead.

Maintenance of their funding and livelihood requires climate scientists to tread a fine line between emphasizing the uncertainties in climate science and selling the idea of disastrous anthropogenic global warming.

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The Global Warming Policy Foundation is an all-party and non-party think tank and a registered educational charity which, while openminded on the contested science of global warming, is deeply concerned about the costs and other implications of many of the policies currently being advocated.

Our main focus is to analyse global warming policies and their economic and other implications. Our aim is to provide the most robust and reliable economic analysis and advice. Above all we seek to inform the media, politicians and the public, in a newsworthy way, on the subject in general and on the misinformation to which they are all too frequently being subjected at the present time.

The key to the success of the GWPF is the trust and credibility that we have earned in the eyes of a growing number of policy makers, journalists and the interested public. The GWPF is funded overwhelmingly by voluntary donations from a number of private individuals and charitable trusts. In order to make clear its complete independence, it does not accept gifts from either energy companies or anyone with a significant interest in an energy company.

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