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Montreal

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IPCC Lead Author: 2001 TAR
Contributor: 1992 Supplement
Contributor: 1994 Radiative Forcing of Climate Change
Key Contributor: 1995 SAR
Contributing Author: 2007 AR4, WG I and II

NASA Medal for Exceptional Scientific Achievement
American Meteorological Society Special Award for satellite observations
Fellow, American Meteorological Society

Mr. Chairman and members of the IAC panel, thank you for inviting me to offer my views on the IPCC process. Five years ago the *New York Times* quoted me saying that an IPCC-like process, "... is the worst way to generate scientific information, except for all the others." (23 Aug 2005) I now think I was a bit too generous.

A fundamental problem with the entire issue here is that climate science is not a classic, experimental science. As an emerging science of a complex, chaotic climate system, it is plagued by uncertainty and ambiguity in both observations and theory. Lacking classic, laboratory results, it easily becomes hostage to opinion, groupthink, arguments-from-authority, overstatement of confidence, and even Hollywood movies. When climate scientists are placed in the limelight because this issue can generate

compelling disaster scenarios, we simply don't want to say, "We just don't know."

I have been a contributor to the IPCC Assessments since 1992 and a Lead Author in the Third Assessment of 2001. Though I had some good things to say about the IPCC, I did respond in 2001 to the US National Academy of Sciences when they solicited information about certain problems (see Appendix A).

At the time, I was more concerned about the product rather than the process. The first objection I raised regarding the Third Assessment was that the fabled Hockey Stick was oversold as an indicator of past climate change. This was well before the critical work of the Wegman Report, National Academy of Sciences, McIntyre's papers and the East Anglia emails. *Indeed, I urge you in the strongest terms to engage Stephen McIntyre in your deliberations at a high level as he has accurately documented specific failures in the IPCC process, some of which I can attest to, as I was there.*

My second objection to the TAR was its overstatement of confidence in model projections.

My role in the Fourth Assessment of 2007 was limited to that of a Contributing Author. This means I submitted recommendations that were dealt with by the Lead Authors who tended to disagree with my published findings. Thus, their views carried the day in the report. In this process, the final result really boils down the opinions of those selected as Lead Authors, a point I will address below.

In March of last year, 8 months before the email fiasco, about 140 former IPCC Lead Authors gathered in Hawaii for a preview of what the Fifth Assessment might tackle. I was the only one there well-known to be essentially outside the IPCC “consensus.” I had come to the conclusion that the IPCC establishment demonstrated a disturbing homogeneity-of-thought regarding the hypothesized but unproven role that greenhouse gases might impose on the climate system. My short talk (Appendix B) and poster (Appendix C) at that meeting last year dealt with three science issues and offered a recommendation. The three issues were (1) the surface temperature record is flawed in many ways, but is flawed in particular as a metric to detect greenhouse-imposed warming, (2) direct tests of the so-called fingerprint of climate model temperature changes versus observations indicated significant differences, failing simple hypothesis tests, and (3) the critical value of climate sensitivity to greenhouse gases was overstated because it had not been properly calculated. All of these were supported by peer-reviewed publications which even now continue to appear.

In my view, the IPCC process had drifted away from allowing authors to serve as Brokers of climate science, in which various views are given attention, to becoming Gatekeepers of climate science in which one view is elevated and promoted. The IPCC Assessment had become a “consensus of those who agreed with the consensus.” Since “consensus” is a political notion, not a scientific notion, a goal of “consensus” in any forum is at its heart a political goal.

My recommendation last year was to include a chapter written by credentialed climate scientists who would provide evidence concerning these heretofore minimized issues, in particular the low sensitivity of the climate system. My assumption at that time was that the IPCC writing process would be the same, i.e. that the Lead Authors of this chapter, as the others, would be given the sacred right of being their own final reviewers to let a new voice be heard. No one at the meeting thought this was a useful suggestion, I believe, because it would allow the expression of reasonable alternatives to claims too entrenched in the message of looming climate disasters promoted with IPCC indulgence.

Since last March, much has happened to expose some of the scientists who dominated the IPCC, whom I call the establishment, as less than transparent, subject to bias, and who suppress alternative views while using the IPCC's perception as a near-sacred document to promote their own opinions. This establishment dominates not only the IPCC but also the review process of the peer-reviewed literature, making it extremely difficult for alternative evidence to even be published now. This happens when your type of science is rather murky to begin with.

In my view, the three fundamental flaws in the current IPCC process are (1) the two-step political filter by which Lead Authors are selected, (2) the review-authority granted the Lead Authors who write the chapters and synthesis reports, and, (3) the very limited word-count available for each topic, which encourages short and overconfident statements about questions that in truth are plainly nasty to deal with.

In February of this year, *Nature* magazine asked me for a brief discussion about the IPCC and a way forward (Appendix D, last page). My main concern there was to define a process that would let the world know that our ignorance of much of the climate system is simply enormous and we have much to do. Mother Nature has a tremendous number of degrees of freedom up her sleeves, many of which we don't even know about or account for.

So, I suggested a living, carefully-managed, wikipedia-style process. Important questions, most of which are already laid out in the IPCC manifest, would be addressed by teams of Lead Authors who would be far less constrained by the word-count rules, and so would allow fuller expression of uncertainty and disagreement – expressions contributed by the specific people who perform whatever research is being discussed. The Lead Authors main task would be to organize and summarize the information on each question, acting strictly as Brokers, not Gatekeepers. With web-based links to actual text (and data) the Lead Authors would be far less tempted to be biased. Lead Authors need to know they do not have to agree with the findings they report. I believe such transparency would spur the Lead Authors to be fairer and more humble in their summary comments.

Peer-reviewed research of course would dominate the source material, but other documents – whose source is clearly identified – could contribute to the discussion. I know there would be significant issues of managing such a process, but I believe it would be far better than producing big books every six years that are limited, biased and out-of-date when they are printed. We *are* in the 21st Century, and, to the despair of those who find comfort in

absolute answers, there are only continuously evolving levels of understanding (and ignorance) to most of the climate questions being asked. This situation begs for a dynamic assessment process.

The selection of Lead Authors through a two-step political process is a problem too. Presently, national governments nominate to the IPCC those who over the years, they can generally count on to be consistent with national policy. From this pool, the IPCC itself selects those it wants to be Lead Authors. To combat the political influence of governments and the U.N., to a small extent, I would recommend that Lead Authors be nominated by appropriate learned societies, such as yours, and selected for overlapping, rotating terms. I'm not completely comfortable with this as I'm aware that councils of science are deeply involved in political maneuvering which is why I state that to a "small extent" the political influence of governments and the U.N. might be mitigated.

Some Lead Authors could and should be scholars from other disciplines but who have a keen awareness of the hard rules of hypothesis testing, admissible evidence, and the power of language ... physicists, chemists, engineers and yes, even lawyers. As I told a colleague the other day, it is clear to me now that climate science needs some adult supervision.

I realize such a recommendation creates consternation among those who have controlled the process up to now and who believe deeply that the "science is settled" because they find comfort in easy and unimaginative answers to difficult questions. For example, why doesn't the IPCC report on (and funding agencies invest in) major research about the internal

dynamical properties of the climate system? At present these properties are incapably represented in climate models to date, and yet have been shown to be a major source of the variability we've seen. Why must we be so unimaginative that we just give up and claim that nothing else but enhanced greenhouse forcing explains most of the temperature rise in the past 50 years?

Others will complain that such an open process I describe will not generate the definitive statements necessary to drive policy. To those I say, "Welcome to climate science." If a specific policy is desired, climate science is a weak leg on which to stand which means a policy should have multiple, defensible reasons for adoption.

You will hear from those within the IPCC establishment that the IPCC does a terrific job of getting down to the truth about climate science and that the consensus reports are the best documents for policymakers. But as one mostly outside the "consensus", I can not agree, and I am far, far from being alone in that disagreement. I say this as a working-stiff climate scientist who builds datasets from scratch to create understanding and test assertions about the climate system. The process followed in the Fourth Assessment, in my view, simply did not provide to the world the true ambiguities, uncertainties and contentions of our fledgling science.

In summary, to me, the impediments to providing a more honest expression of our science to the world in the current IPCC process are (1) Lead Authors essentially having final review authority, (2) the Lead Author selection process which encourages government-approved, homogeneity-of-thought,

and (3) the limited size, the dead-line character, and the past-expiration-date of printed documents. Thank you.

Appendix A

Response to National Research Council for IPCC TAR Comments John R. Christy

21 May 2001

Vaughan:

I suspect I will have a slightly different view on the SPM, TS and TAR Text of the IPCC than most other participants on the list.

I believe the IPCC effort was a good effort, but not a perfect effort. ~~Attached is the text of an op-ed piece I was asked to write by the Atlanta Journal-Constitution who stated to me they (the paper) felt manipulated by the aggressive media push of certain of the IPCC leaders. The op-ed appeared on 11 March 2001. Note that in general I thought the IPCC body of work (main text) was fine, but that the media reports were not.~~

Here are three issues that specifically concern me regarding your message.

1. 1000-year temperature record

This first concern arises from our chapter (2) for which I must accept as much blame as anyone. We (chapter 2 authors) are guilty of omitting information that indicated the temperature history of the past 1000 years is not as well known as is implied by the prominent figure in the SPM (Fig. 1) and TS (Fig.5). At each of the Lead Authors meetings I pointed out that we should include mention of publications which strongly suggest the medieval warm period was warmer than the current century. In particular I mentioned the Dahl-Jensen et al. 1998 Science paper which I believe presents the most direct measurement of temperature and thus should be highlighted. Broecker (2001, SCIENCE) echoed the very concerns I had put forward in our meetings. In the final version of the text the Dahl-Jensen paper was not even cited in Section 2.3 - a fact I did not realize until last week when I read the report in detail (2.3 is the section on the temperature record of the past 1000 years.) Thus, its information was not carried forward in the TS or SPM. (The paper is only mentioned in passing regarding the warming 8 kypb in the TAR.) I should point out that the final wording concerning the warmth of the 1990's and 1998 as "likely" the warmest of the past millennium (i.e. only 2/3 chance of being correct) tried to account for the lack of certainty in our knowledge of past temperatures. However, the very prominent placement of the time series of the last 1000 years in the TS and SPM overrules what tentativeness some of us actually intended. This is my personal view.

2. Model confidence

Secondly, I view the whole modeling effort with more skepticism than most, perhaps because I do not receive funding to produce model results. Each global modeling group has had 20 years to look at the global surface temperature record and devise clever ways to reproduce what is in the record. This is "a posteriori" science in my view. No one has from first principles actually reproduced the record. The sulfate hypothesis is highly uncertain (as indicated by the IPCC itself) yet has become a critical component of modeling efforts in order to hold down the unrealistic temperature rise most models produce for the past century. Too, models have not reproduced the observed surface-tropospheric differential temperature trends (especially in the tropics), yet now are trying to do so. I'm somewhat confident that a model result will appear soon that announces a reproduction of the differential trend observations - but will it be based on correct physics? Modelers are

working to reproduce observations, and when a match is finally constructed, the insinuation is that the models are successful. In my view, this procedure is not a scientific success as much as an exercise in curve-fitting. Do we know whether the "match" is correct for the right reasons? I generally am comforted by the many references to uncertainty that the TAR contains. The magnitudes of those uncertainties do not convince me that the "science is settled" as several IPCC authors have stated (please define what "science" is settled!) or that we know what policy road to take.

3. SPM representation of surface/troposphere issue

Though I was the Lead Author of the discussion of the upper air temperature data, I was not able to influence a few phrases and statements in the SPM which appeared in the final version. For example, the following is a bullet from the SPM:

The lowest 8 kilometres of the atmosphere and the surface are influenced differently by factors such as stratospheric ozone depletion, atmospheric aerosols, and the El Nino phenomenon. ... In addition, spatial sampling techniques can also explain some of the differences in trends, but these differences are not fully resolved.

I do not believe these explanations have been objectively demonstrated in terms of explaining the trend differences between the surface and troposphere. Nearly all of the discrepancy in trends is found in the tropics. However, in the tropics there is the least amount of ozone depletion (some tropical regions actually show no decrease or a slight increase). And, the stratosphere (16 km and above) is separated by an 8 km layer from the lower troposphere (0 - 8 km), thus little influence would be expected. Too, examination of individual tropical sondes (which have maintained consistent instrumentation) shows the lower troposphere (850-500 hPa) has cooled relative to the upper troposphere. Thus, ozone depletion does not rise to more than speculation as a cause for the trend differences.

The aerosol effect is as yet an unproven hypothesis, and it is unclear that it has much influence at all in the tropics - again speculation. Michaels and Knappenberger (2000) have shown that the El Nino phenomenon has actually influenced the lower troposphere to warm relative to the surface, thanks to the 1997-98 event, not cool as suggested by the SPM above.

The statement that "spatial sampling techniques can also explain some of the differences" is less than fully accurate. The tropospheric data are fully global, thus spatial sampling errors apply to surface temperatures only. However, left as it is in this section the insinuation could be that the tropospheric data are suspect. The most substantive statement in this bullet is the last phrase, "... but these differences are not fully resolved."

In summary, my personal view is that there is a "spin" placed on some of the statements that "leads the witness" toward a conclusion that is not entirely justified. I found this also in many of my discussions with authors from the other chapters. I had a feeling of discomfort in trying to express a view that would diminish the human-related climate paradigm.

Overall, the interactions among the Lead Authors in Chapter 2 were quite open and congenial, and we produced a good document (now outdated a bit) but not a perfect document.

John C.

Vaughan Turekian wrote:

As you may know, the National Academies is conducting a fast-track study to examine a number of key questions about the science of climate change. As part of this study the committee requires information regarding the IPCC WG I report and summary preparation process. Owing your involvement in the IPCC WG I process, you may be able to provide some needed insight. Specifically, do you feel that the WG I SPM and the TS accurately reflected the information in the main body of the WG I report? Were there any instances where the WG I SPM (or the TS) did not accurately convey the information in the WG I report, or do you know of any situation where the body of the WG I report was altered to justify statements in the SPM or the TS?

Please note that any written response to these questions will be included in the study's public access file. If you would prefer to discuss this by phone, please provide contact information.

I thank you in advance for your help on this and look forward to your input. If you have any questions please do not hesitate to contact me.

Vaughan

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Appendix B

Presentation at IPCC Lead Author's Meeting Honolulu Hawaii

Can the IPCC Allow a Section of Alternative Views Authored by Equally Credentialed Climate Scientists?

**John R. Christy
University of Alabama in Huntsville**

I want you all to understand this: No one is holding a gun to my head and no one is paying me money either above or under the table to arrive at the conclusions I (and others) have come to. I propose that the IPCC allow for well-credentialed climate scientists to craft a chapter on an alternative view presenting evidence for low climate sensitivity to greenhouse gases than has been the IPCC's recent message – all based on published information.

In other words, I am proposing that the AR5 be a true Scientific Assessment, not a document designed for uniformity and consensus. In a scientific area as uncertain as climate, the opinions of all are required.

Three quick examples are on the poster.

First, the iconic mean surface temperature is a poor proxy for detecting greenhouse gas influences for reasons shown. And, this metric is not well-observed in any case.

Secondly, many of the so-called metrics of human-induced climate change are not changing at rates policymakers have assumed and the media promotes with the indulgence of the IPCC Leadership. And,

other variables showing change are still within the magnitudes of long-term natural variations.

Thirdly, confidence that the climate system is highly sensitive to greenhouse gases can be shown to be overstated due to assumptions about how the sensitivity is calculated. Latest measurements clearly suggest a strong negative feedback in the short wave – in other words, in warming episodes, clouds respond to cool the climate. Another problem with popular sensitivity estimates is the dependence on essentially one century of an oblique greenhouse-proxy (mean surface temperature) combined with the notion that all of the natural, multi-decadal variability can be defined so accurately that the left-over warming is assumed to be human-induced. The investigation rather should examine all levels of natural variability that have been observed and seek to defensibly eliminate those as possible causes.

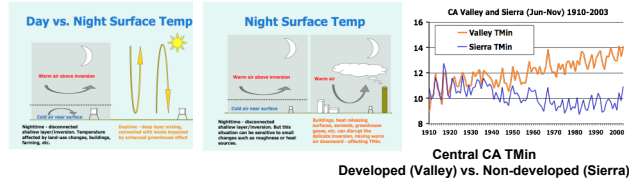
An alternative view is necessary, one that is not censured for the so-called purpose of consensus. This will present to our policymakers an honest picture of scientific discourse and process. I submit this proposal because our level of ignorance of the climate system is still enormous and our policymakers need to know that. We have much work to do.

An Alternative View Proposal for IPCC AR5

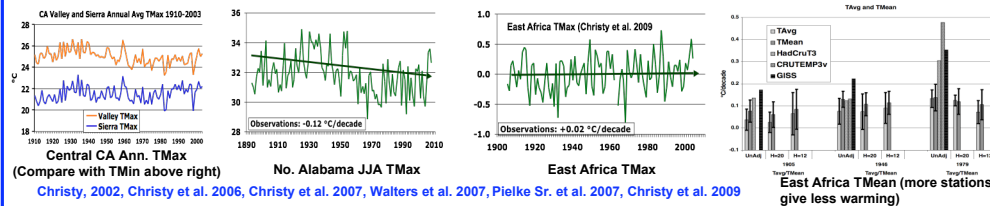
John R. Christy, University of Alabama in Huntsville

Mean Surface Temperature: a Poor Metric for measuring response of climate to enhanced GHGs

$T_{Mean} = (T_{Max} + T_{Min})/2$. T_{Min} is heavily influenced by surface development and changing atmospheric constituents over time. The thermal radiation budget and boundary-layer mixing altered by these changes, introduce higher temperatures. T_{Max} , though not perfect, is better since its spatial mixing scale is much larger.

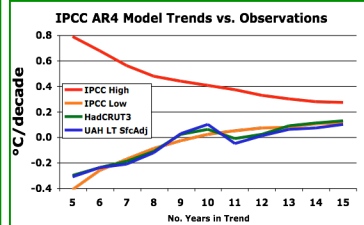
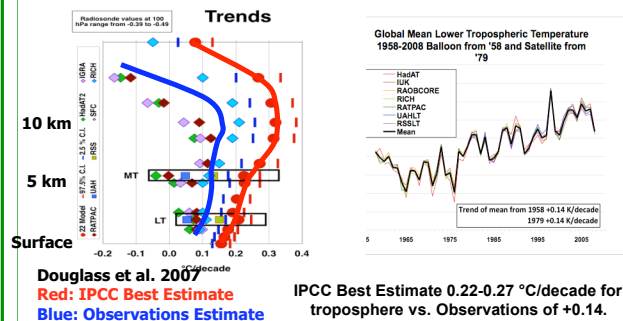


“Super-sampled” regions generate T_{Max} temperature trends near zero while under-sampled methods using T_{Mean} (e.g. GISS, HadCRUT, NCDC) do not. Thus T_{Mean} overstates the warming rate by (1) using T_{Min} and (2) using too few stations.



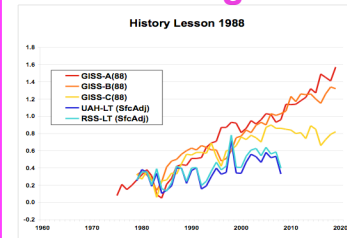
Modeled climate change temperatures inconsistent with observed changes

When climate models generate the same tropical surface trend value as the observed tropical surface temperature trend (below left), their upper air trends are significantly different from observations where GHG signal is largest. Global tropospheric temperature trends of the IPCC mid-range estimate (below right) are significantly higher than the mean of observations from seven sources.



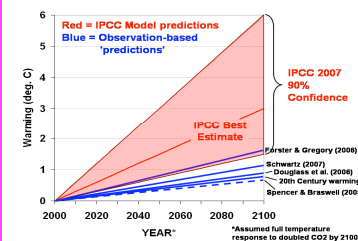
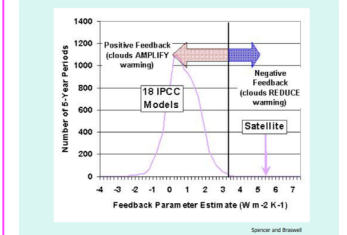
Projections of 21 A1B IPCC Climate models' global trends for segment lengths shown (ending in model year 2020 and observation year 2008, HadCRUT3 and UAH LT - sfcAdj). Models' 95% range bounded by red (high) and orange (low). Results show observations are well below the “best estimate” (+0.20°C/decade) and along the edge of the “significantly different” region. Adapted from P. Michaels.

Climate sensitivity to CO2 Forcing too high in Climate Models



(Left) Hansen projected 3 scenarios in 1988, 2 of which (red, orange) had slightly lower GHG emissions than actually observed over the next 20 years, and one with drastically lower emissions (yellow). The climate sensitivity of the model was so high that all three scenarios, even the one with sharp cuts in emissions, significantly overshoot the observations (lower tropospheric temperatures adjusted for surface comparisons, CCSP 1.1 2006)

(Right) Longwave (LW) and shortwave (SW) feedback parameters ($W/m^2/K$) were calculated for all 5-year periods from 18 IPCC AR4 transient simulations, and also from 5 years of Aqua CERES data. The satellite diagnosis indicated positive LW feedback, right in the middle of the model distribution of similarly computed feedbacks. But the observed reflected solar SW feedback was strongly negative, well outside the range of all 5-year SW feedbacks computed from the models. The total feedback parameter (seen here) is then the sum of both (LW+SW) individual parameters, which is also outside the range of all total feedbacks computed from the models.



(Left) The range of solutions from the IPCC AR4 climate model simulations (pink). Empirically calculated model projections and current observed trend (blue) which by implication factor in the negative feedbacks of cloud responses. The rate of warming in these empirical models is much lower than the full blown coupled models.

Summary: An Alternative View Section written by well-credentialed climate scientists is needed in the IPCC AR5

If not, why not? What is there to fear?

OPINION

IPCC: cherish it, tweak it or scrap it?

As calls for reform intensify following recent furores about e-mails, conflicts of interest, glaciers and extreme weather, five climatologists propose ways forward for the Intergovernmental Panel on Climate Change. Their suggestions range from reaffirming the panel's governing principles to increasing the number and speed of its publications to replacing the volunteer organization with a permanently staffed structure.

Split into three panels

Mike Hulme

Coordinating lead author, lead author, review editor (AR3), University of East Anglia, Norwich, UK

Much has changed since the late 1980s when the Intergovernmental Panel on Climate Change (IPCC) was designed, notably the nature of scientific practice and its relationship with society. How the world's knowledge communities are mobilized to enlighten policy deliberations also needs to be different. The assessments published by the IPCC have firmly elevated anthropogenic climate change to one of the major international political issues of our time. But they have made this impact by drawing in an ever-widening subset of the social, technological, environmental and ethical dimensions of climate change — well beyond the physical sciences.

The IPCC is no longer fit for purpose. It is not feasible for one panel under sole ownership — that of the world's governments, but operating under the delegated management of the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) — to deliver an exhaustive 'integrated' assessment of all relevant climate-change knowledge. As I remarked three years ago in these pages, "The IPCC needs a complete overhaul. The structure and process are past their sell-by dates."

My suggestion for radical reform is to dissolve the IPCC after the Fifth Assessment Report (AR5) in 2014. The work would be split into three types of assessment and evaluation, each rather different to the three existing IPCC working groups.

The first would be a Global Science Panel (GSP). An IPCC-like assessment process should continue to operate for the physical sciences that observe and predict the Earth system. Rather



STR/AFP/GETTY

An IPCC meeting: the panel will publish its Fifth Assessment Report (AR5), in 2014.

than comprehensive reports every six years, this panel would commission, on a rolling basis, a larger number of smaller, sharply focused syntheses of knowledge on fast-moving topics that have great scientific or policy salience. Perhaps two or three would be in production at any one time and each would be no more than 50 pages in length. These would need to be globally coordinated and could be governed either through an intergovernmental process as now, or devolved to a governing council of representative national academies of science.

The second group would be made up of Regional Evaluation Panels (REPs). The cultural, social, economic and development dimensions of climate

change are essentially regional in nature. Each region — five to ten continental or sub-continental regions in all — should conduct its own evaluation of relevant knowledge. This should use the work of the GSP, but also draw in a much more diverse set of expertise, knowledge and scholarship. As well as being structured according to the concerns of

each region, the ownership and governance patterns of these REPs would vary regionally, but should ideally involve a consortium of national governments, civil-society organizations and businesses.

The third group would be the Policy Analysis Panel (PAP) — a standing panel of expertise, global in reach, with interdisciplinary skills and a diverse analytical capacity. Perhaps 50–100 strong, this panel would undertake focused and rapid (6–12 months) analyses of specific proposed policy options and measures that have global significance. These could be subjects such as environmental effectiveness of controlling black carbon, economic implications of carbon border tariffs or new financing options for reducing emissions from deforestation. The policy options to be analysed can be brought forward by UN bodies, non-governmental organizations (NGOs), businesses and groupings of national governments. The PAP could be governed by a council of women and men of international stature and strong cultural significance to represent the breadth of civil society around the world. Such high quality and transparent policy evaluation would broaden the options available

"A new class of short, rapidly prepared, peer-reviewed reports is needed."

for national and international deliberations.

This restructuring would allow clearer distinctions to be made in areas that have been troublesome for the IPCC: assessments of published knowledge versus policy analysis and evaluation; the globalized physical sciences versus more geographically and culturally nuanced knowledge; a one-size, top-down model of ownership and governance versus more inclusive, representative and regionally varying forms of governance. It would better serve the world, and its peoples, in understanding and responding to anthropogenic climate change.

Independent agency needed

Eduardo Zorita

Contributing author (AR4), GKSS Research Center in Geesthacht, Germany

Like the financial sector last year, the IPCC is currently experiencing a failure of trust that reveals flaws in its structure. This presents the climate-change community with the opportunity to address these faults. The IPCC currently performs as a diffuse community of government-nominated academic volunteers occupying a blurred space between science and politics, issuing self-reviewed reports under great stresses and unmanageable deadlines. Its undefined structure puts it at the mercy of pressure from advocates.

The IPCC should be made stronger and independent. We do not need to reinvent the wheel; there are excellent examples of agencies that society has set up when credibility is of the utmost importance. The European Central Bank, the International Atomic Energy Agency (IAEA), the International Energy Agency and the US Congressional Budget Office all independently navigate their way through strong political pressures, delivering valuable assessments, advice, reports and forecasts, tapping academic research when necessary. These agencies are accountable and respected.

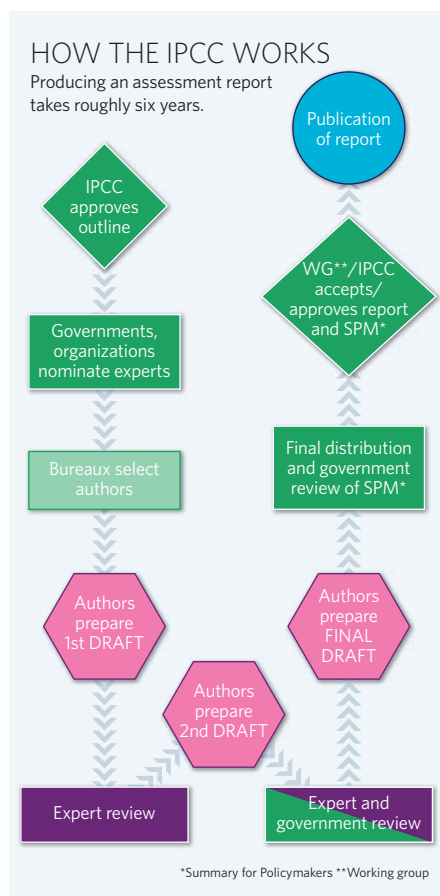
An international climate agency (ICA) along such lines would have a staff of around 200 full-time scientists who would be independent of government, industry and academia. Such an agency should be resourced and empowered to do the following: issue streamlined biennial state-of-the-climate reports; be a repository and quality-controller of observational climate data; advise governments on regional assess-

ments of climate impacts; and coordinate the suite of future-climate simulations by research institutes.

An ICA could be built, for instance, on the IAEA template, encompassing many more countries than the IAEA but with a smaller staff. ICA reports should be independently reviewed in a transparent process, draw only on established, peer-reviewed literature, and highlight research gaps. External reviews would then be incorporated into the reports to form white papers to include possible opposing views in a transparent way.

The process of moving towards such an ICA could start now, alongside the preparation of the next IPCC assessment report, and culminate after its completion. Those climate researchers in the IPCC Bureau who have widely recognized credibility could initiate this transformation, supported by lead authors and review editors more numerous and with a bigger say than presently. These review editors should be elected not by governments but directly by scientific unions, for instance the American Geophysical Union, the European Geosciences Union and similar associations from Asia.

As with finance, climate assessment is too important to be left in the hands of advocates.



Apply best practice rules

Thomas F. Stocker

Co-chair IPCC Working Group I (AR5), coordinating lead author (AR3, AR4), University of Bern, Switzerland

The basis of the IPCC is the voluntary contributions of thousands of dedicated scientists from all over the world. The *Principles Governing IPCC Work* (IPCC, 1998) provide a clear framework for an open, transparent and robust process. This bottom-up endeavour is a unique model of providing scientific information, mainly from the peer-reviewed scientific literature, for decision-making on a challenging problem. It has worked extremely successfully for the past 21 years.

Recent controversies have demonstrated both the value and the limitations of these procedures. The team structure of the chapter authors, the multiple reviews by peers and governments, and the full and public documentation of this process largely eliminate personal views or biases in the science assessment. But procedures are only as strong as their enforcement at all levels of the assessment process. When I served as a coordinating lead author of Working Group I in the Third and Fourth Assessment Reports (AR3 and AR4), I was deeply impressed by the strict adherence to these principles by the co-chairs who ensured that these standards were applied at all levels. The combination of the best scientists and clear procedures constitute the authority of the IPCC.

Calls for reform of the IPCC have been made before. Changes were discussed after the completion of the Fourth Assessment Report in 2007. One possibility mooted was the production of more frequent assessments, more limited in scope. Fast-track assessments in support of the United Nations Framework Convention on Climate Change process were also considered. However, the panel concluded that the production of comprehensive reports roughly every six years is preferable because it ensures the robustness required for a thorough and rigorous assessment. Faster turnover would jeopardize the multi-stage review and thus compromise authority and comprehensiveness. In asking scientists to produce reports and assessments every year, say, we could lose their support rather quickly.

The IPCC has served as an honest broker in the past and will do so, hopefully, in the future. Now that the problem of climate change is on the

SOURCE: IPCC

radar screen of the world, there are many NGOs and other groups, even groups of scientists and institutions, that provide climate-change information in various forms and quality, often lacking comprehensiveness and proper recognition of uncertainties. There is a strong pressure to provide 'just-in-time' scientific updates for policy-makers and stakeholders, as was the case in the preparations for the 2009 climate-change conference in Copenhagen. The IPCC must not yield to this pressure.

In this field of different and divergent forces, confusion may arise. An honest broker therefore is an asset. From my perspective, the IPCC has fulfilled this role with remarkable rigour and integrity. This role is now at risk, as the stakes are higher than ever before. The requirement that assessments are policy relevant but never policy prescriptive, as formulated in the *Principles Governing IPCC Work*, is of paramount importance. Our task is to inform the policy-makers and the public strictly in a 'what if' mode. Any other approach must be left to NGOs, negotiators or individuals. Only with strict adherence to procedures and to scientific rigour at all stages will the IPCC continue to provide the best and most robust information that is needed so much.

Produce more reports faster

Jeff Price

Lead author (AR3, AR4), director, climate-change adaptation, WWF United States

The IPCC is accepting nominations (until 12 March 2010) from governments and participating organizations for authors for its Fifth Assessment Report. One recommendation for the IPCC that could be implemented immediately is in how its coordinating lead authors and review editors are selected.

Currently, authors are selected to represent "a range of views, expertise, gender and geographical representation". However, given the importance placed on these assessments, the most senior positions should be filled by the nominees most expert in their field, regardless of balance. These authors should be the most knowledgeable nominee about the range of topics in their chapter, best able to cooperatively work with a team of international scholars. Preferably, they should have previously been involved in an IPCC assessment and be familiar with IPCC standards and methodologies. Geographic and gender balance should then

be used in selection of lead authors. The level of work required in preparing an assessment is large. Increasing the number of lead authors would provide better balance and give more scientists the ability to participate in the process.

A new class of short, rapidly prepared, peer-reviewed reports is also needed. At present, publication options include supplemental material (no peer review required), technical papers (based on existing assessments) or assessments and special reports that undergo two reviews (expert and government/expert, usually taking more than two years to complete). For topics of emerging importance or uncertainty, we need reports based on expert meetings and literature synthesis that undergo only a single round of extensive peer review with review-editor oversight before publication. The IPCC should also expand the number of specialist task forces, task groups and hold more expert meetings to provide additional scientific review and oversight for the broadening array of models (including model comparisons and validation) and methodologies used in emissions reporting, estimating and monitoring impacts, and in developing assessments and adaptation plans.

Finally, the current period between assessments is too long. One option would be for the IPCC, or another body, to produce an annual review, assessment and synthesis of the literature for policy-makers (for example, three annual review volumes with a synthesis chapter in each volume) prepared by experts in the field. Although the editors of the volumes should ideally be drawn from past IPCC authors and editors, the review articles could be submitted by any author, as they would for a journal, with appropriate peer review and assessment for publication.

Open debate: Wikipedia-style

John R. Christy

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Since 1992 I have served as an IPCC contributor and in 2001, as a lead author. My experience has left me of the firm conviction that the IPCC should be removed from UN oversight.

The IPCC selects lead authors from the pool of those nominated by individual governments. Over time, many governments nominated only authors who were aligned with stated policy. Indeed, the selections for the IPCC Fourth

Assessment Report represented a disturbing homogeneity of thought regarding humans and climate.

Selected lead authors have the last word in the review cycle and so control the message, often ignoring or marginalizing dissenting comments. 'Consensus' and manufactured-confidence ensued. The recent leaking of e-mails from the Climatic Research Unit at the University of East Anglia in Norwich, UK, put on display the unsavoury cycle of marginalizing different viewpoints. Now several errors of overstatement, such as that of the melting rate of the Himalayan glaciers, have been exposed.

Unfortunately, prestigious media, including *Nature*, became cheerleaders for these official reports, followed then by governments trying to enact policies that drastically reduced emissions to 'stop global warming' while increasing energy costs.

I recommended last year that the next IPCC report invites published authors to write about the evidence for low climate sensitivity and other issues. The IPCC then would be a true reflection of the heterogeneity of scientific views, an 'honest broker', rather than an echo chamber. My recommendation assumed a business-as-usual IPCC process.

However, voluminous printed reports, issued every six years by government-nominated authors, cannot accommodate the rapid and chaotic development of scientific information today. An idea we pitched a few years ago that is now worth reviving was to establish a living, 'Wikipedia-IPCC'. Groups of four to eight lead authors, chosen by learned societies, would serve in rotating, overlapping three-year terms to manage sections organized by science and policy questions (similar to the Fourth Assessment Report). The authors would strike a balance between the free-for-all of true science and the need for summary statements.

Controversies would be refereed by the lead authors, but with input from all sides in the text, with links to original documents and data. The result would be more useful than occasional big books and would be a more honest representation of what our fledgling science can offer. Defining and following rules for this idea would be agonizing, but would provide greater openness.

The truth, and this is frustrating for policy-makers, is that scientists' ignorance of the climate system is enormous. There is still much messy, contentious, snail-paced and now, hopefully, transparent work to do. ■

See also Perspectives, page 747.

Have your say on the future of the IPCC at go.nature.com/orzWau.