

Tension between scientific certainty and meaning complicates communication of IPCC reports

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Here we demonstrate that speakers at the press conference for the publication of the IPCC's Fifth Assessment Report (Working Group 1; ref. 1) attempted to make the documented level of certainty of anthropogenic global warming (AGW) more meaningful to the public. Speakers attempted to communicate this through reference to short-term temperature increases. However, when journalists enquired about the similarly short 'pause'² in global temperature increase, the speakers dismissed the relevance of such timescales, thus becoming incoherent as to 'what counts' as scientific evidence for AGW. We call this the 'IPCC's certainty trap'. This incoherence led to confusion within the press conference and subsequent condemnation in the media³. The speakers were well intentioned in their attempts to communicate the public implications of the report, but these attempts threatened to erode their scientific credibility. In this instance, the certainty trap was the result of the speakers' failure to acknowledge the tensions between scientific and public meanings. Avoiding the certainty trap in the future will require a nuanced accommodation of uncertainties and a recognition that rightful demands for scientific credibility need to be balanced with public and political dialogue about the things we value and the actions we take to protect those things⁴⁻⁶.

In this paper, we assess the relationship between two fundamentals of science communication: uncertainty and meaning. Uncertainties are everyday matters of concern for scientists. Most can be called 'local' uncertainties⁷ as they reflect an uncertainty manifest within a single phenomenon. Climate science is replete with such local uncertainties⁸. Here, we focus on temporally local uncertainties that were the subject of a number of questions and answers in the press conference under consideration. Examples of temporally local uncertainties in climate science include the variable effects of volcanoes, solar cycles, climate sensitivity, El Niño, and the impact of the financial crisis on emissions. Some of these phenomena are both spatially huge and temporally local in the sense that they are expected to have short-term effects and require resolution within broader theoretical frameworks^{7,8}. Yet these problematic, temporally local, uncertainties are inevitably encountered by climate scientists seeking to produce broader certainties; namely the concrete, theoretical explanation and detection of AGW.

A second crucial issue, for those concerned with science communication, is that of meaning. Meaning arises from personal experiences embedded in the local contexts within which people create and value their lives^{4,9}. Acknowledging the importance of local contexts highlights how different spheres of meaning become relevant in making science public. For example, a comparison of professional and popular science writing¹⁰ has shown that the characteristics of scientific claims shift as knowledge is translated from scholarly journals into more widely read publications. Journal articles largely

restrict themselves to answering questions of scientific meaning: 'what happened?' and 'what was the reason for the event?' Wider audiences, however, are concerned with questions of public meaning related to their own local contexts: 'what value should be placed on the event?' and 'what action should now be taken?'

Negotiating the boundary between 'scientific meaning' and 'public meaning' is a particular concern for the IPCC for two reasons. First, the IPCC is committed both to providing policy-neutral advice¹¹ and facilitating greater understanding of its work amongst non-specialist audiences¹², and there are calls for such objectives to be achieved not only through an increased supply of scientific knowledge but also through such knowledge being made more publicly meaningful^{4,5}. Second, representatives of the IPCC are requested to give press conferences, events that sit at the boundary between science and the media¹³ wherein officials can make meaning beyond the text and demonstrate authority and still exert a degree of control¹⁴. Here we examine this boundary, building on previous literature on the communication of climate science uncertainties^{15,16} with a qualitative analysis of an original and important data source: the press conference transcript.

We argue here that a relationship exists between certainty and meaning in climate science, that a framework for understanding this relationship can be formed, and that this framework can be explored using the IPCC as a test case. We do not claim that understanding meaning, certainty, or the relationship between them is straightforward. Following others^{5,17,18} we do, however, believe that it is reasonable to treat the two concepts as independent of one another, although further empirical research into the question will be valuable. Investigating the relationship between certainty and meaning is also useful in helping to understand interactions during the press conference under consideration and the activities of the IPCC more broadly.

The degree of certainty regarding AGW has increased since the IPCC's Fourth Assessment Report in 2007 (refs 1,19). Indeed, various calls for action on AGW have been premised on this increasing certainty²⁰. Simultaneously, however, there is a widely held belief, following criticisms⁴, that increased certainty has yet to manifest into public meanings powerful enough to prompt significant personal, political and policy responses (see Fig. 1). That is not to say that no public meanings about climate change have developed during the lifetime of the IPCC (refs 21,22), rather that the certainty of climate change knowledge continues to have greater scientific than public meaning.

During the press conference, the IPCC speakers attempted to make climate knowledge more publicly meaningful by repeated reference to temporally local phenomena such as short-term temperature change. However, as described above, there are more uncertainties around the causes of these phenomena and whether they are indeed attributable to AGW. Furthermore, these phenom-

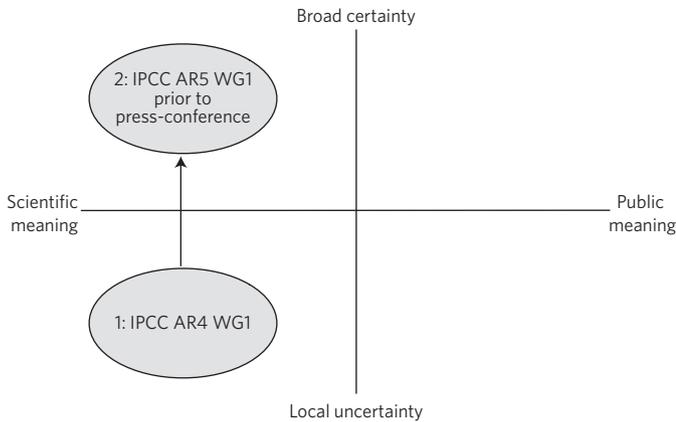


Figure 1 | Increased certainty of AGW. Since the last IPCC report, certainty has increased concerning AGW. Speakers at the press conference stressed this increase: “the evidence for human influence has grown since AR4, it is now deemed extremely likely that human influence has been the dominant cause of the observed warming.” (Steiner L153–155). However, social scientific research has argued⁴ that the issue of AGW is yet to attain enough public meaning to prompt significant personal, political and policy responses. Figure 1 thus shows an upward shift along the y axis, representing increased broad certainty, but no movement on the x axis, representing the continued dominance of scientific meaning.

ena are of a kind with other uncertain, temporally local phenomena such as ‘the pause’² that do not incontrovertibly support the AGW hypothesis. Thus, attempts to increase public meaning through a discussion of temporally local phenomena in this way are coupled with an erosion of certainty. In this press conference, the IPCC speakers failed to acknowledge this diminishing certainty, dismissing journalists’ questions about ‘the pause’ precisely because the phenomenon is uncertain. The simultaneous reliance on some temporally local events to increase public meaning, and dismissal of other similar events because they are uncertain, led to confusion, incoherence and negative press coverage following the press conference. This is the certainty trap that the IPCC must avoid in future.

During the press conference in Stockholm, and in the terms outlined above, there were frequent considerations of ‘the value that should be placed on AGW’ and considerations of ‘what should be done’. In a particularly passionate passage, the World Meteorological Organization’s Michel Jarraud (see Methods for further information on speakers’ organizational roles) argued that “[The] report demonstrates that we must greatly reduce global emissions in order to avoid the worst effects of climate change” (Jarraud L90–92). The information, delivered in WG1’s report, “can be used, that should be used to produce actionable climate information” (L94–96; see Supplementary Information A for full transcript). There are two observations to be made about these extracts. First, there seems little doubt that Jarraud attached a great deal of meaning to AGW and believed particular actions—most notably a significant reduction in global emissions—should be undertaken. What is also clear, in the repeated use of terms such as “our time” (IPCC’s Thomas Stocker, L345–346), “our planet” (United Nations Environment Programme’s Achim Steiner L129), “our only home” (Stocker L507), “our activities” (Jarraud L69), and “we must greatly reduce global emissions” (Jarraud L90–91), is that the speakers believed AGW to be meaningful for a collective that is broader than the scientific community, although ultimately this collective remains unspecified. Second, Jarraud sought to give climate change meaning through certainty. It is ‘the report’ that ‘can be used, should be used’ and that ‘demonstrates’ the need for action. Within the press conference, the speakers attempt to leverage scientific certainty to procure public meaning (Fig. 2).

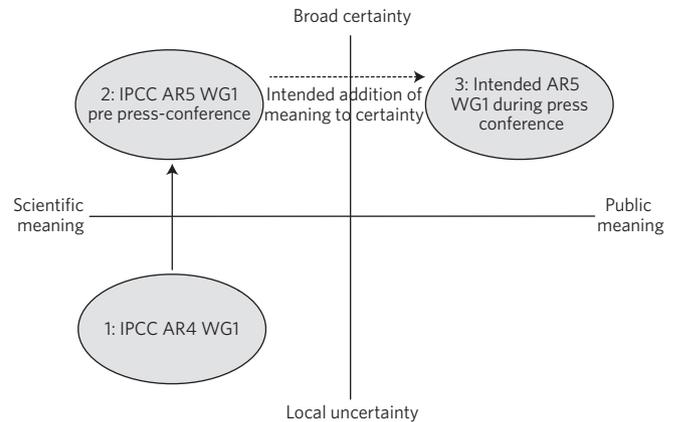


Figure 2 | Intended process of making AGW publicly meaningful. Within the press conference, speakers attempted to leverage the certainty demonstrated in the AR5 report—a report that is explicitly not concerned with public or society—to procure public meaning and policy change: “[The] report demonstrates that we must greatly reduce global emissions to avoid the worst effects of climate change.” (Jarraud L90–92). In Fig. 2 we represent this move with a horizontal shift along the x axis (to position 3); a utilization of certainty to procure public meaning.

The problem for the press conference speakers was that, although they clearly thought that the certainty of AGW demonstrated the need for public action, it is not entirely clear why that argument should have been publicly persuasive given that literature in the social sciences strongly suggests that little public meaning has been successfully attached to this aggregated, abstract notion of climate^{4,5}. Perhaps acknowledging this, speakers attempted to make AGW meaningful by temporally localizing the terms of reference, focusing particularly on recent and short-term climate changes. For example, Jarraud (L84–85), Stocker (L418–420) and the IPCC’s Rajendra Pachauri emphasized that “the decade 2001 onwards having been the hottest, the warmest that we have seen” (Pachauri L261–262). Focusing on these recent decades, we suggest, began to give AGW meaning by situating it within the ‘normal horizons of time’ rather than the epic timescales that are the usual currency of climate science⁴ (for an extended version of this analysis, see Supplementary Information B).

A focus on the decadal scale may have helped to make climate change more meaningful, but it also brought considerable difficulties in large part because press conference speakers asserted that “periods of less than around thirty years... are less relevant” (Stocker, L582–583). Thus, publicly meaningful phenomena were actually incorporated at the expense of certainty (Fig. 3).

What became apparent throughout the press conference is that increasing public meaning at the expense of certainty was particularly problematic, not least because of journalists’ extended focus on the ‘hiatus’ or ‘pause’² in the rate of increase in global mean surface temperature since the late 1990s. The pause was brought into play once time frames of less than 30 years were considered relevant for assessment by the press conference speakers. Thus, by temporally localizing AGW to give the debate meaning, the spotlight also fell on sources of scientific uncertainty. This did not escape the attention of journalists at the press conference, who were particularly interested in this temporally meaningful pause (for an extended version of this analysis, see Supplementary Information C), with 6 out of 18 journalists asking whether the pause undermined the IPCC’s findings. David Rose of the UK’s Mail on Sunday tackled the topic forcefully, asking “how much longer will the so-called pause or hiatus have to continue before you would begin to reflect that there is something fundamentally wrong with the models?” (L772–774).

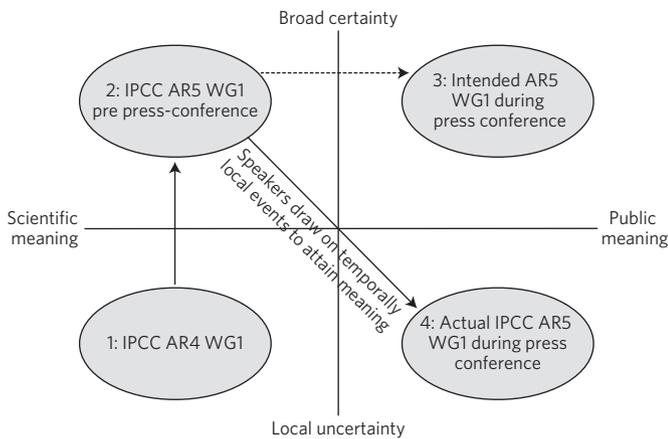


Figure 3 | Public meaning of AGW increased at expense of certainty. The speakers drew on temporally local events to give AGW public meaning during the press conference: “the decade 2001 onwards having been the hottest, the warmest that we have seen” (Pachauri L261–263). The speakers understood these temporally local phenomena to be less certain than the overall theory of AGW: “periods of less than around thirty years... are less relevant” (Stocker, L582–583). Thus, publicly meaningful phenomena were actually incorporated at the expense of certainty. Therefore, the intended move to the top-right quadrant (position three) was not achieved. Instead the move was to the bottom-right quadrant (position four).

Various attempts were made by the IPCC speakers to downplay the importance of the pause. Stocker repeatedly pinpointed a lack of published literature as a problem (L436–437, L568–571) and claimed that temperature trends that last for less than 30 years should be treated as significantly less important than trends that last more than 30 years (L580–584, L793–795). This ‘temporal segmentation’⁷ enabled the pause to be dismissed as scientifically irrelevant, suggesting that journalists’ questions on the matter could be ignored. Jarraud offered just such a dismissal to Rose’s question, which he claimed was “from a scientific point of view... what we would call an ill-posed question” (L827–828), essentially dismissing Rose as scientifically illiterate. The terms of this dismissal, however, seem inconsistent with the temporally localized claims made by speakers during the press conference. The speakers oscillated between two positions: one of broad certainty but little public meaning, the other of public meaning but little broad certainty (Fig. 4). This striking incoherence was noted by Alex Morales of Bloomberg News who asked why 15-year periods are considered by the speakers if they hold no scientific value (L965–969).

When Rose³ published his article the following day, the quote “your question is ill-posed!” was given headline status, and derided as a misjudged response to “a simple question”. We do not wish to claim here that Rose was particularly sympathetic to the IPCC before the press conference^{23,24}, but in this instance his question was well founded. It exposed how attempts during the press conference to increase public meaning undermined the very scientific certainty that representatives were trying to communicate, and then leverage, to procure public meaning.

Climate change is a science/policy arena where consistent attempts are made to communicate the certainty of AGW theory, and the broad level of consensus over certain facets of that theory in the literature^{25,26}. Within this context, a spotlight on scientific uncertainties may be regarded as unwelcome, as the pause proved to be in the press conference. However, we argue that this spotlight is an unavoidable by-product of attempts to make scientific certainty publicly meaningful by emphasizing the temporally local.

This insight implies that seeking to persuade citizens of the case for climate action solely through expositions of the certainty of

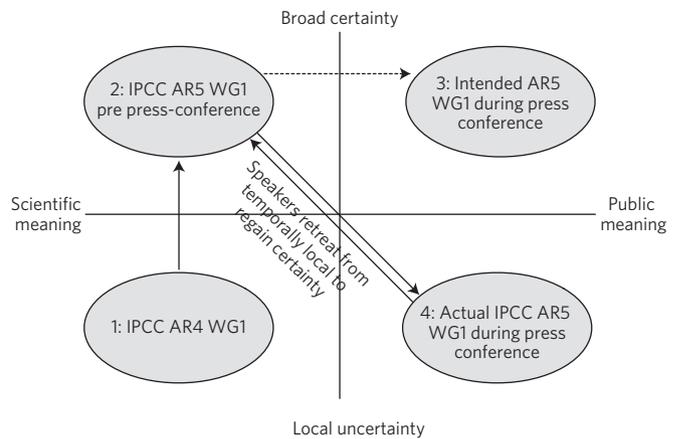


Figure 4 | Incoherent attempt to maintain public meaning and certainty. Drawing on temporally local, publicly meaningful information (‘the hottest decade’) proved problematic, as it lent legitimacy to the discussion of other local uncertainties, such as the 15-year ‘pause’. Speakers were repeatedly challenged on the uncertainties connected to this phenomenon: “Your climate change models did not predict there was a slowdown in the warming. How can we be sure about your predicted projections for future warming?” (Harrabin L560–562). Faced with these challenges, speakers retreated from temporally local, publicly meaningful data (position 4) to reaffirm AGW’s broad certainty (position 2): “we are very clear in our report that it is inappropriate to compare a short-term period of observations with model performance” (Stocker L794–796). This retreat led to confusion, incoherence, and criticism within the press conference.

AGW, and the scientific consensus on the topic, may be a moribund strategy. The IPCC has been able to establish greater certainty around AGW (Fig. 1), but attempts by the IPCC press conference speakers to ground their conclusions with reference to temporally local, publicly meaningful events (Fig. 2) threatened the credibility of the certainty they wished to convey (Fig. 3). This was not lost on the assembled media, whose questions prompted an incoherently oscillating position regarding the appropriate timescales to be considered within climate science (Fig. 4). If IPCC speakers are to avoid this certainty trap in the future, they must be better availed of the competing tensions between scientific certainty and public meaning, and the particular difficulties faced by scientists when trying to communicate their findings in a meaningful fashion. In particular, public dialogue has a key role to play in making climate science knowledge meaningful. We should strive for an approach to climate change that breaks free of the certainty trap to better include public dialogue, values, visions and beliefs^{4,6,17,21,27,28}.

Methods

Methods and any associated references are available in the [online version of the paper](#).

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Author contributions

Both G.J.S.H. and W.P. contributed fully to all aspects of this submission and acknowledge joint first authorship.

Additional information

Supplementary information is available in the online version of the paper. Reprints and permissions information is available online at www.nature.com/reprints. Correspondence and requests for materials should be addressed to W.P.

Competing financial interests

The authors declare no competing financial interests.

Methods

Publication in journals cannot be relied on as a means of communicating research outputs beyond the scientific community; less than 0.005% of scientific papers outside health and medicine were reported in the mass media between 1990 and 2001 (ref. 29). Press conferences, therefore, are a means for scientists to reach non-specialist audiences and provide an important location for the study of science communication. Where the issue under consideration is of political importance, such as climate change, press conferences take on greater significance as they offer a demarcation line between the relatively closed processes of scientific assessment, during which the publication of provisional findings are likely to be discouraged, and the point at which a peer-reviewed scientific publication can be made public through the media¹³. Thus, the press conference represents a 'constitutional stage' on which officials can impart meaning beyond the text, demonstrate authority and still exert a degree of control over proceedings¹⁴. The press conference also, however, marks the point at which the authors of a report begin to lose control of meaning, the inescapable moment at which the report begins to take on a life of its own following publication.

Despite the importance and unique features of a scientific press conference, there are no detailed analyses of these events in the literature, although they are acknowledged as a part of the difficult boundary between science and the media^{13,30,31}. This paper begins to address this empirical gap by examining the IPCC press conference held in Stockholm, Sweden on 27 September 2013 to present the Summary for Policymakers for Working Group 1 of the Fifth Assessment Report¹.

The press conference began with a sequence of presentations by six speakers: Ban Ki-Moon (United Nations), Michel Jarraud (Secretary General, World Meteorological Organization), Achim Steiner (Executive Director, United Nations Environment Programme), Rajendra K. Pachauri (Chair, IPCC), Qin Dahe (Co-Chair, IPCC WG1) and Thomas Stocker (Co-Chair, IPCC WG1).

The presentations were followed by questions from a total of 18 journalists, all but one of which were answered by Jarraud, Pachauri or Stocker. We viewed the press conference as it was aired live on BBC News 24 and subsequently transcribed a recording. The transcript is 12,400 words in length and is presented in full in Supplementary Information A. The transcript is produced verbatim from the words uttered during the press conference and apparent errors of speech have not been corrected. Quotes taken from the transcript are supplied with line numbers, to ease cross-referencing with the full transcript.

The transcript was coded for language related to the two categories being studied: meaning and certainty. Our understanding of meaning arises from a simple taxonomy of four questions that account for the development of issues in the public sphere; 'what happened?', 'what is the reason for the event?', 'what value should be placed on the event?', and 'what action should be taken now?'¹⁰. In a comparison of professional and popular science writing, it has been shown that the characteristics of claims shift as knowledge is translated from scholarly journals into more widely read publications. In particular, journal articles largely restrict

themselves to answering the question 'what happened?', allocating considerable space to validating the answer to the question through a description of research methods. Wider audiences, however, are concerned with larger public issues than the deliberately restricted claims served up for a narrow audience of specialist scientists. Such concerns lead on to questions concerned with the causality, value and implications of an event. We were, therefore, able to code statements relating to meaning into one of four categories and determine whether utterances had more in common with the statements most frequently found in scientific publications ('scientific meaning') or the public sphere ('public meaning').

Similarly, we searched for utterances concerned with the certainty of scientific findings. We used an existing division^{7,32} between 'local' and 'global' (here renamed local and broad), as well as specific literature relating to climate change^{4,8,9} to determine whether certainty-statements referred to large or small scale (temporally and spatially) events. When explanations for uncertainty were proffered, we again referred to literature from sociology and science and technology studies, which has considered this question in depth, to classify the nature of those responses^{7,15,16,32–36}.

Finally, we identified patterns in the data that were suggestive of a relationship between these two categories of certainty and meaning, and employed principles of narrative analysis to ensure, first, the veracity and faithfulness of our data interpretation³⁷ and, second, that the data presented provide a robust representation of how the IPCC speakers communicated during the press conference.

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