



Discussion of risk policy and the integrity of science: Using IPCC to stress test the corpus model

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The Intergovernmental Panel on Climate Change



GROUPE D'EXPERTS INTERGOUVERNEMENTAL SUR L'ÉVOLUTION DU CLIMAT



- ▶ Sets accounting standards for greenhouse gases emissions
- ▶ Five Assessment Reports: 1990, 1996, 2001, 2007, 2013
- ▶ Many Special Reports: Extreme events, Scenarios...

IPCC's writings and the corpus model

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- ▶ High entry requirement: peer review only
- ▶ Social cooperation: Reports to UNFCCC
- ▶ Individual cognitive economy: Key findings, summaries, synthesis

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- ▶ Not all purpose
- ▶ Only practical rationality: Policy relevant but not policy prescriptive
- ▶ Fragmented: Assessment reports by 3 working groups, Special reports by ad hoc panels

The + are essential, the - are contingent. Model good !

Key findings = statements of facts = corpus items

- ▶ Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.
- ▶ Global GHG emissions due to human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004
- ▶ Adaptive capacity is intimately connected to social and economic development but is unevenly distributed across and within societies.

Source: Summary for policymakers of AR4's synthesis report

Where the corpus model breaks down

- ▶ It is *very likely* that over the past 50 years: cold days, cold nights and frosts have become less frequent over most land areas, and hot days and hot nights have become more frequent.
- ▶ There is *very high confidence* that the net effect of human activities since 1750 has been one of warming.
- ▶ There is *high agreement and much evidence* that with current climate change mitigation policies and related sustainable development practices, global GHG emissions will continue to grow over the next few decades.

Is that Bayesianism ? Which kind ? How did we get there ?

First report (1992): starting up

Question 1: Is Climate Change a real problem ? → ++Working Group I (climatology)

- ▶ Political pressure on WG I to address uncertainties rigorously, with peer review.
- ▶ Subjective perspective: certainties, degrees of confidence. Predictions (!).
- ▶ No central inter-WG coordination
- ▶ Review and formulation of uncertainties less systematic in WG II (impacts) and III (economy).

Second Report

- ▶ WG I: No specific vocabulary. An “uncertainties“ section. Projection instead of prediction.
- ▶ WG II: Vocabulary for degrees of confidence.
- ▶ WG III: Reports intervalls, conditional cost scenarios

Need for coordination is recognized

Reports 3, 4 and 5

- ▶ Common guidance across all IPCC working group
- ▶ Offers a common approach and vocabulary
- ▶ Pragmatic (practical limits)
- ▶ Formally revised and improved

Enforcement: WG III harmonizes at AR4

Guidance Note for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties

IPCC Cross-Working Group Meeting on Consistent Treatment of Uncertainties
Jasper Ridge, CA, USA
6-7 July 2010

Core Writing Team:

Michael D. Mastrandrea, Christopher B. Field, Thomas F. Stocker,
Ottmar Edenhofer, Kristie L. Ebi, David J. Frame, Hermann Held, Elmar Kriegler,
Katharine J. Mach, Patrick R. Matschoss, Gian-Kasper Plattner, Gary W. Yohe,
and Francis W. Zwiers

The corpus model is used ... only in some cases

- 5) Consider that, in some cases, it may be appropriate to describe findings for which evidence and understanding are overwhelming as statements of fact without using uncertainty qualifiers.

- 9) A level of *confidence* is expressed using five qualifiers: "very low," "low," "medium," "high," and "very high." It synthesizes the author teams' judgments about the validity of findings as determined through evaluation of evidence and agreement. Figure 1 depicts summary statements for evidence and agreement and their relationship to confidence.

Basis for the qualitative confidence expression

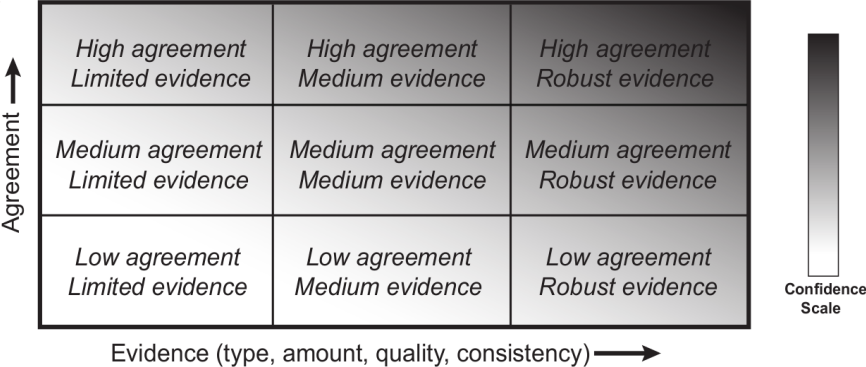


Figure 1: A depiction of evidence and agreement statements and their relationship to confidence. Confidence increases towards the top-right corner as suggested by the increasing strength of shading. Generally, evidence is most robust when there are multiple, consistent independent lines of high-quality evidence.

If confidence is high, certainty can be quantified further

The AR5 will rely on two metrics for communicating the degree of certainty in key findings:

- Confidence in the validity of a finding, based on the type, amount, quality, and consistency of evidence (e.g., mechanistic understanding, theory, data, models, expert judgment) and the degree of agreement. Confidence is expressed qualitatively.
- Quantified measures of uncertainty in a finding expressed probabilistically (based on statistical analysis of observations or model results, or expert judgment).

In order to develop their key findings, author teams should evaluate the associated evidence and agreement. Depending on the nature of the evidence evaluated, teams have the option to quantify the uncertainty in the finding probabilistically. In most cases, author teams will present either a quantified measure of uncertainty or an assigned level of confidence.

Quantitative uncertainty vocabulary

Table 1. Likelihood Scale

Term*	Likelihood of the Outcome
<i>Virtually certain</i>	99-100% probability
<i>Very likely</i>	90-100% probability
<i>Likely</i>	66-100% probability
<i>About as likely as not</i>	33 to 66% probability
<i>Unlikely</i>	0-33% probability
<i>Very unlikely</i>	0-10% probability
<i>Exceptionally unlikely</i>	0-1% probability

* Additional terms that were used in limited circumstances in the AR4 (*extremely likely* – 95-100% probability, *more likely than not* – >50-100% probability, and *extremely unlikely* – 0-5% probability) may also be used in the AR5 when appropriate.

Conclusions

IPCC has evolved a "Guidance on uncertainty management" system to preserve the integrity of science.

Challenges: High practical values, media attention, diversity of disciplinary traditions.

Embraces and extends both the corpus model and the Bayesian model.