The famous 97.1%-climate consensus ("Cook-consensus") is unsubstantiated and misleading

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Abstract

The notion of a scientific "consensus" on the question of anthropogenic global warming (AGW) is very prominent and has influenced political and scientific debate. We re-examined this notion by analysing a key consensus paper conducted by the Cook team which reports a 97.1% consensus on AGW. While employing a methodology which is in principle sound, the analysis done by this consensus study contains a fundamental weakness. The Cook consensus is primarily based on the abstract language, they retrieved and separated 11,944 abstracts into categories, i.e. abstracts "expressing position on AGW" or "no position/neutral on AGW", rather than "relevant to AGW controversy", (i.e. any data on global climate change mechanisms) vs. "non-relevant to AGW controversy", (i.e. impact modelling, geoengineering proposals, etc.). We demonstrate that the categories and the resulting analysis of the Cook consensus are very likely deeply flawed. In our assessment, the Cook consensus do not present data which can credibly claim to document a "scientific consensus" regarding AGW. The critical re-assessment approach can be transferred to other "consensus" publications. The true extent of the actual support of published data regarding the AGW-question needs to be evaluated in a separate data analysis project.

Keywords: critical analysis, scientific consensus, anthropogenic global warming, global climate change, peer-review

1. Introduction

The publication by Cook et al. (2013, henceforth referred to as C13) „Quantifying the consensus on anthropogenic global warming in the scientific literature“ has firmly established the so-called climate consensus notion in the scientific literature on climate change. Note that already the title specifies that the consensus in question relates to the notion of anthropogenic global warming (AGW), with the full context of the paper specifically the green-house gas driven anthropogenic global warming (GHG-AGW).

This publication has been key in many dimensions: C13 and Cook et al. (2016, henceforth referred to as C16) are still in position 2 and 3 of most read papers of the originator journal Environmental Research Letters as of January 2021. It has triggered follow up research (e.g. Verheggen et al. 2014; Stenhouse et al. 2014; Carlton et al. 2015), and has been used for pleas for active political communication (e.g. Maibach and Leiserowitz 2014).The political perception often by far extends the original claims – pars pro toto one can take the description of the study and its results by one of its co-authors, Dana Nuccitelli, in March 2013 in a piece for the newspaper “The Guardian“: „Survey finds 97% of climate science papers agree warming is man-made” [7]. The 97%-consensus notion has been a very powerful message in the climate debate, especially in the public realm, and can be considered a household-notion. The notion of a consensus of science (rather than a consensus of scientists) is very powerful, both scientifically (which scientist dares to challenge a science which is in “consensus”?) and politically. The rally cry “unite behind the science” is so strong because it is based on the premise that the science itself is united, i.e. in consensus.

Despite the above considerations it seems a scientifically worthwhile exercise to actually quantify the level of support for a certain scientific concept, in this case GHG AGW. In fact,

this is what C13 have claimed to set out to do. The aim of this work is to put this key investigation, and its key result, which we term the “Cook-consensus”, to the test. This re-analysis goes well beyond some original criticism by Tol (2016), which was elaborately answered and addressed by C16. Two Feynman quotes shall be the Leitstern for this re-analysis: “I would rather have questions that can't be answered than answers that can't be questioned.”, and “Science is a culture of doubt.”

The following questions will be addressed in this hypothesis work in detail: Has C13 really documented a scientific consensus on the notion of GHG AGW? And if the 97.1% claim does not stand up for scrutiny what can we estimate to be the true level of scientific support for the GHG AGW notion? This hypothesis work will demonstrate the following:

- That the “Cook-consensus” is not real.
- That it has been generated by the chosen methodology, assumptions, and its inherent flaws.
- That the suggestive 97% number is grossly misleading and fully unsubstantiated as the true level of data-based support of the science regarding GHG AWG is most likely well below a generously estimated upper limit of 35%.

2. Methodology of checking the Cook-consensus

The methodology for this work is simple and an established technique in the realm of technology assessment, as it has been practiced e.g. by the US Congress Office of Technology Assessment during its time of operation or is being practiced to this day by the Office of Technology Assessment at the German Bundestag (www.tab-beim-bundestag.de). It basically scrutinizes published literature in view of a specific question, occasionally doing small analysis or recalculations of the published data, and thus coming to an independent judgement on the presented material and the spins set upon the data. The only prerequisite

is that the reanalysis is done following rigorous scientific principles, preferably by trained scientists and the results and new conclusions are put to the scientific community and public for scrutiny by transparently publishing. The authors of this work followed exactly these principles.

3. Re-analysis of C13

The authors

Although this may intuitively not look like a strictly scientific argument, this critical analysis shall start with the authors of C13. The main author is John Cook, a trained physicist who later distinguished himself scientifically in the field of cognitive psychology and received his doctorate in this field. At the same time, John Cook is also an activist, founder and entrepreneur. John Cook is the spiritus rector behind the initiative and website 'Skeptical Science' (www.skepticalscience.com). Co-activists from Skeptical Science helped in the research effort and are co-authors of the manuscript: Dana Nuccitelli, Bärbel Winkler, Rob Painting and Andrew Skuce. This is not a problem per se and is clearly described in the author list and disclosures, nevertheless the dual role of John Cook and his co-authors of Skeptical Science in C13 must be clearly understood. This dual role is problematic despite documentation in the publication: C13 and C16 not only create the evidence for the so-called scientific consensus on climate change, but act also in their activist role as gatekeepers (e.g. by means of the sophisticated and highly professional skepticalscience.com machinery), to ensure that not only everyone knows about this ’consensus’, but also by strongly lobbying towards the end that the 'consensus' is adhered to. This is by no means limited to the website, but also expresses itself, for example, in aggressive social media activities. Thus, C13 and C16 claim to have found and strengthened a ‘consensus’, which they are actually actively working to create, nourish and control – in any science or industry field this would actually be called a conflict of interest and likely considered incompliant behaviour.

The methodology of the critical analysis of the Cook-consensus

The core weakness of the Cook consensus will be analyzed in detail below - in his critical comment Richard Tol (2016) already touched upon it, but did not rigorously follow through.

It is not a methodological limitation - Tol (2016) discusses some points to that effect, which C16 addresses extensively and adequately. C13 used a 'citizen science' approach with volunteers recruited via the 'Skepticalscience.com' website project. With these volunteers, all abstracts from the scientific literature from 1991-2011 on climate change research (identified with the search string 'global warming', 'global climate change') were collected. The abstracts were then reviewed and evaluated, and put into categories. Finally, C13 cross-checked results by writing to the first or corresponding authors. All in all, this methodological approach appears sound and thus, this critical review does not focus on the second tier aspects of the methodology, but rather on the key assumptions, the categorization, and the results and their interpretation.

Key issues (I): Basis of the analysis is the abstract communication not the scientific data

The key ploy used by C13 is the basis of the "consensus" analysis: C13 did not base their analysis on the scientific data of actual peer-reviewed publications, but on the abstracts only. Basing the analysis on the abstracts, C13 evaluated the communication position taken by the authors in those abstracts.

In fact, C13 detailed the approach originally pursued and established by Oreskes (2004). In their much more elaborate work, they categorized the abstracts according to the position expressed on AGW: Endorsement, Undecided, Rejection, or No position. From these

categories, two types of results were calculated: Abstract-based results (basis number of investigations/papers) and author based (basis number of authors on the respective papers). Categories and results from C13 are redisplayed here (Table 1).

Positioning a consensus analysis solely on the position stated by the authors in the scientific abstracts of their work probably gives some indication on the scientific convictions (or assumptions) of the authors in the author-based analysis, but it is a questionable means for the key publication-based analysis. While the Cook-approach seems to aim at reflecting the actual science in their analysis, we claim that the chosen path via the abstract categorization does not, in fact, serve that purpose. We claim that the categorizing of AGW positioning of the authors in the abstract is not a valid representation of the scientific content of the underlying data, not even as a surrogate. Thus, the publication based-analysis presented in Table 1 including the famous 97.1% claim seems not to be justified.

C13 does in fact claim to have tried to reconcile the two worlds (position stated by authors in the abstract vs. what the data actually say). However, we would again state that the chosen path has not been correct. The elaborate cross-check performed and documented in C13 revolved around the confirmation of the proper categorization of the AGW statement in the abstracts. According to the manuscript, no attempt was made to actually ask whether the lead authors consider their data to be supportive of GHG-AGW. Asking lead authors whether the categorization of their AGW positioning in the abstract is correct does not serve as an independent test of what the actual data express. Incidentally, it unearthed a gross mismatch which we will discuss further down, actually strengthening our suspicion.

Key issues (II): Constructing the 97.1% “consensus” via the abstract based positioning analysis by eliminating the large portion of ‘no position’ abstracts

How did C13 arrive at the 97.1% abstract based result (second column in Table 1)? Using the author-abstract-positioning approach, C13 eliminated the large no-position group to arrive at a 97.1% abstract-based endorsement. This result suggests that 97.1% of the scientific work published on climate change supports AGW, resulting in the birth of a climate “scientific consensus”.

With this elimination of the ‘no position’ works, C13 turned a not so impressive 32,6% endorsement of AGW categorization in the climate research abstract analysis into a 97,1% “consensus on AGW”. Is the elimination of “no position” justified? It would have been, and this is our first key hypothesis on the Cook’s “scientific consensus” if the “no position” abstracts are in fact those works which do not contribute to the underlying question on GHG-AGW. We term such work “non-relevant” (to the GHG-AGW).

However, we consider the approach taken by C13 to be deeply flawed. The reason is simple: There is a very likely strong mismatch between the categories chosen by C13 regarding the abstracts and the actual content of the data and investigations. The “no position” abstracts are likely not a good representation of the “non-relevant” works. This will be described in detail below.

Key issues (IIIA): Mismatch of authors positioning and the underlying data – the no position portion (III).

C13 identified 11,944 studies/investigations in their search. Out of these, representing a sizable body of evidence, the authors of 66.4% (7930) cases expressed no position on AGW in the abstract and were thus eliminated from the final analysis.

As described above, it is justified and even necessary to eliminate investigations from a “consensus” analysis in cases where the data are actually not relevant to the question at hand.

If a publication is not dealing with a specific scientific problem, it is not only justified, but necessary to exclude such a work from such an analysis. For example, an analysis on the usefulness of vaccinations to fight a specific disease - a paper that deals with the characteristics of a test for that disease would not be considered directly related to the topic in question. Such a work would be 'non-relevant' for the question explored and thus should not be counted in a "consensus" analysis on the topic.

Does the elimination of "no position" abstracts serve the purpose of excluding non-relevant work from the climate consensus analysis, while keeping all relevant publications? Our challenge to the C13 work is that this is clearly not the case. Fig 1. displays the reasoning in detail. The no-position/neutral ("N") category of C13 are subdivided in 4 subcategories, according to what the data actually support. With these subcategories, however, only N4 can be considered to be a correct classification, i.e. neutral/no position according to C13 and indeed non-relevant data to be eliminated from a consensus analysis. N1, N2, and N3 as relevant data to the question at hand would be incorrect classifications by C13.

The key question relates to the size of these groups: How many of the 7930 N-abstracts actually do contain data relevant to the AGW-question (N1-N3)? It is not clear, but it is likely substantial, especially in view of the N2 category. N2 depicts studies which actually deal with science relevant to the AGW question, i.e. modelling, temperature curves, temperature-CO2-mechanisms etc., which however, are not discussing or gauging AGW, or have produced inconclusive data on the GHG-AGW-question. It can be clearly argued why scientific best practice would command that non-relevant work have a "no position" abstract (for critical appraisal see below) the same holds true for relevant work which is not directly dealing with GHG AGW or is generally inconclusive. Also, scientific best practice would actually mandate a 'no position/neutral' stance in the scientific abstract.

To detail this point, we gauged the scientific literature covered by C13, employing the same search strategy. We also present two examples from the C13 timeframe, one we classify as

N4 and one N2. The full evaluation is supplied as supplementary material (see supplementary material).

Discussion of examples – “no position” portion

The work by Engstrom and Linden (2009) very likely represents in our view a correct classification by C13 in the ‘no position’ portion of the data. The author states no position on GHG-AGW in the abstract (not even indirectly) and the work deals with soil nitrogen mineralization – its scientific content is indeed non-relevant to the AGW-question. We thus qualify this as N4. However, two other examples, Vither et al. (2009) and Wang et al. (2009) are clearly to be categorized differently. Also, both abstract do not state a position on AGW, but in both cases, the data and investigations are clearly relevant (Greenland Ice sheet in the holocene and regional periodic natural climate drivers). Both papers certainly do not strengthen or support GHG-AGW, and thus would weaken the consensus figure, irrespective of the question, if Vither et al. (2009) might in fact have been classified as Cook ‘endorse’, which cannot be fully excluded.

Based only on these first tests, it seems very plausible that at least 10% of the N-abstracts actually fall in the N1-3 category (presumably mainly N2). These misclassifications alone already fully delegitimize the 97.1% notion presented by C13.

Key issues (IIIB): Mismatch of authors positioning and the underlying data – the endorse position portion.

Using their classification, C13 found 3896 investigations (32.6% of all abstracts retrieved) that were classified as endorsing the AGW. It should be noted that C13 were relatively generous with this classification (see Table 2). C13 also categorizes “implicit endorsement”, i.e. basically mentioning AGW as an “endorse” position, thus opening the door for basically all types of

impact and mitigation modelling or intervention paper, which are all based on AGW, and likely to mention this in the abstract.

As previously stated, the key scientific question is “what does the actual data say?”. Once again we created four subcategories (Fig. 2). Most critical for the C13 conclusions are the categories E1, E2, and E4 (we consider E3 to be negligible). How many investigations actually clearly support GHG-AWG based on what the data says rather than just a declamatory statement in the abstract? We would argue that E1 is substantially smaller than Cook's E-portion. We also have a strong indication that E2 and E4 are much bigger than what can be considered a margin of error. Given the generous interpretation of the endorse category by C13, we are certain that a number of impact studies, i.e. non-relevant work as well as data which are in fact not directly related to or inconclusive on AGW contain explicit or at least implicit AGW-endorsing statements in the abstract.

Discussion of examples – “endorse” portion

We provided samples for both subcategories (full detail in supplement). Vaughan et al. (2009) is a classical E4 paper. While the abstract explicitly endorses GHG-AGW, the actual mitigation effort work does not provide data to strengthen the hypothesis, but simply builds on it. While again the C13 ‘endorse’ classification may or may not be an accurate reflection of the beliefs or assumptions of the authors, it is not a reflection of what the data and work actually contributes to science.

In this context, it should also be noted that the quality assurance measure taken by C13, i.e. the confirmation of the abstract positioning by the lead authors returned a considerable mismatch between the two datasets. While in the C13 data, about 37% abstracts were rated “endorse” and 63% “no position”, the lead authors turned this into a 63% “endorse” 36% “no position” – a gross mismatch. Interestingly, the thus obtained self-rating “consensus” did not only increase - next to the strong increase in “endorse” positions there was a notable increase

in “reject” as well, offsetting the effect (we will also see this pattern in our mini analysis, see below).

Key issues (V): The calculation of the study-based consensus.

We postulate that the classification and evaluation by C13 as taken, i.e. E/E+R,U while excluding N is wrong and absolutely not justified even as a surrogate for what the data actually represent. This issue is explicitly not the exclusion of the N-abstract but the fact that non-relevant investigations need to be excluded, and the Cook-categories are likely a significant mismatch in this respect. Sticking to abstract analysing approach, a true data considering support estimation would need to be (E1+N1)/(E-E4+N-N4+R,U), i.e. all relevant data as a basis, while excluding all non-relevant (E4+N4). For sake of convenience, we assume that R, U given the very small number of works identified do not contain a substructure. An estimation based on some preliminary overview analysis leads us to the ballpark estimation of probably true or truer numbers presented in Table 3 with an upper boundary of GHG-AGW support of about 35%.

The new hypothesis

To arrive at reliable data-based conclusions one needs to concentrate on the actual content of the investigation. The categorization process needs (in the first steps) to put the works into two main categories according to relevance to the GHG-AGW hypothesis: relevant vs. non-relevant. Non-relevant data can and need to be ignored.

Gauging the level of support for GHG-AGW need a further differentiation of the relevant data into: RS (relevant supporting) covering data which clearly support or strengthen the GHG-

AGW, RN (relevant neutral) covering all relevant, but not directly related to or inconclusive on AGW investigations, as well as RR (relevant reject) covering relevant work which contradicts or clearly weakens GHG-AGW. This cannot be done based on the abstract, but only on the data. The abstract might help as a direction, but in case of contradictions the main body of evidence is what any categorization will need to be based on – contradictions to the Cook-author-positioning approach are not only likely but almost inevitable. The newly proposed categories are summarized in Table 4.

To calculate a support level one would take the following ratio: RS/R, excluding NR. If that RS-level exceeds 90% it could then be termed a “consensus”.

Would we dare to predict the outcome of a revised abstract starting analysis?

Taking all points together, it can be safely forecasted that the Cook-consensus of 97,1% does not hold even remotely. Arriving at a consensus threshold level of more than 90% (or even 80%) seems out of the question. Even the original number by hypothesis-generating Oreskes (2004) analysis of 75% is unrealistic, given by what we already know. Based on our work on reanalysing C13, drafting the hypothesis testing work of a mini-analysis as well as working on the concept for the full project, we have a feel of the actual situation. This is summarized in Table 3. The key assumption is that at least a third of the ‘no position’ abstract are actually relevant, and most of them are at least relevant neutral. We would also assume that the ‘endorse’ abstract contains at least 50% non-relevant works. These facts together bring us to an estimation of an upper boundary of actually published data which support the GHG-AGW of 35% as a very optimistic estimation. It should be noted that the results of our 1999 mini-analysis and the ongoing work of our group point to even a much lower number of truly supporting work for GHG-AGW (<10% of published relevant studies). We still concede that

this is currently a hypothesis, albeit a very strong one: The scientific truth, of course, lies in the data.

Testing the Hypothesis (I) – a mini analysis with 1999 data

Given the reasoning above, the path ahead is quite easy to sketch. Simply doing another more thorough abstract analysis along the lines of C13 could be done, but in itself would not produce new results or insights. However, given the dimension of our claim, and the fact that a reproduction of a subset of the C13 analysis is indeed feasible, we (re:look climate) have undertaken the effort to conduct a mini-analysis. For the sake of this “hypothesis” paper we believe that presenting the 1999 data of that mini-analysis is sufficient to support our argument.

We created a data set according to the C13 methodology but restricted the data to one month of a publication year, September 1999 (we chose that year and month pragmatically, being in the middle of the timeframe investigated by C13, but slightly before the number of publications on the subject dramatically increased. We created categories based on what the data and investigation actually say. The initial separation was conducted by apportioning the publications into “relevant” or “non-relevant” (to the question of GHG-AGW climate change) categories. Afterwards, If a work is considered relevant, the abstract and (in case of any doubt) the whole paper would then be evaluated on whether or not its analysis, data, conclusions, etc is “relevant support, RS”, “relevant reject or weaken, RR”, or do not obviously contribute to the actual hypothesis, “relevant neutral, RN” (including all work which is inconclusive or contributes data to the understanding of climate, climate change mechanisms without really dealing with the GHG-AGW-hypothesis directly).

The results are the following: Of all the 100 papers, we had 83 viable results. Some hits needed to be removed as there were, in fact, not representing a scientific work. We did,

however, keep congress abstracts published in scientific journals in the analysis, as these do represent actual scientific work.

Taking the C13 categories, we classified 68 as “No position”, 12 “Endorsing”, and 3 “Rejecting/Undecided”, these results are shown in Figure 3. From these results, we calculated the “Cook -Consensus” yielding a “Consensus” of 80.0%. Using the categories and approach from re:look climate, the 83 viable studies were categorized as 25 “relevant” and 58 “non-relevant” to GHG-AGW. Within the relevant results, we classified 22 as “relevant neutral” and 3 as “relevant supporting” (Figure 4). Calculating the “support” (“consensus”) value, yielded a result of <10%.

The results of our mini analysis are striking. While the C13 analysis is nicely reproduced in this subset (“consensus” level about: 80% for an arbitrarily chosen small subset of the C13 timeframe), the discrepancies to the re:look climate categories are dramatic. While the distribution between “position vs. no position” and “relevant vs. non-relevant” looks similar, the actual works in the groups are strikingly different. The misclassification assumptions outlined above are nicely confirmed. In the relevant group according to re:look climate assessment, the “relevant neutral” are dominating, as one would expect. We have found a few “relevant rejecting” (we have been very conservative with this assignment, leaving a number of borderline cases in the relevant neutral group), but no real “relevant supporting”. This turns a >80% into a <10% scientific support for GHG-AGW hypothesis.

Fully utilizing published literature regarding climate research and GHG-AGW hypothesis

The positive contribution of Oreskes (2004) and C13 is the more holistic view on the published literature on climate change. While one could argue that this is the task of the scientific summary of the IPCC, the counterargument is that a purely scientific analysis should be performed by scientists on scientific principles only, not being touched by political or funding

influence (Livingston and Rummukainen, 2020). In fact, it is postulated that the IPCC process is under considerable political influence rather than a pure scientific exercise (Livingston and Rummukainen, 2020).

What would we propose to best explore the richness of the published science, and still generate an answer to the question of C13 and Oreskes (2004) as to how certain science is on GHG-AGW? We propose that the focus of the efforts should be shifted: Let the data speak, use abstract language only as a guiding light to arrive at relevant work faster. Gauging abstracts positions according to C13 does not yield a true scientific value and should be discontinued. We consider our re:look climate categories to be a very useful and robust first approach i.e. segmenting the literature according to how “relevant” or “non-relevant” they are to the question of interest, in this case GHG-AGW, and then deep-drilling the two datasets. The “support” (is a “consensus” really needed?) answer regarding any scientific problem including but certainly not limited to GHG-AGW lies, of course, in the relevant data only. We would assume that analysing one year of scientific publications, i.e. taking a recent year’s sample size of over 15,000 works would be a sufficiently broad basis. The search criteria to really capture all relevant works need to be broadened beyond those used by C13.

This full analysis project requires fully trained scientists to ensure rigorous scientific conduct, but still seems feasible using modern methods of open-source, participative, interactive, responsive science. To the best of the authors knowledge, no such analysis has been performed to date. re:look climate is committed to achieving that goal, however as any endeavour in science this is an open race.

What is our judgment on C13?

The suggestive number of 97.1% was arrived at with a sly combination of a wrong assumption (abstract based analysis), taking a wrong surrogate (authors abstract positioning in the

abstract), allowing for considerable mismatch of abstract positioning categories and underlying data, and boldly mixing of these components to arrive at what we assume was the desired result.

While the true extent of level of support will need to be confirmed in a larger-scale project, one can already conclude that the Oreskes-Cook-Consensus has been generated, is unsubstantiated and grossly misleading.

4. Outlook and Considerations

The presented and aggressively promoted conclusion (97.1% “consensus”) is clearly not substantiated. It has been generated with a wrong assumption (abstract positioning as surrogate for data content), a flawed categorization (mismatch between abstract positioning and data) and thus a flawed evaluation. While the true level of relevant data based AGW-support is unknown, it in all likelihood not only misses a consensus margin of 90% by a very wide margin, but is actually in a totally different ballpark, potentially as low as 10%. This is the hypothesis of this paper: We have outlined approaches to truly quantify the current level of scientific support for GHG-AGW in the peer-reviewed literature. We have additionally created the reverse hypothesis, i.e. that GHG-AGW hypothesis is likely scientifically much weaker than currently assumed in the wider science, political and public space.

Disclaimer:

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Table 1 Key data by Cook *et al.*[1] (2013)

Data as published by Cook *et al.* (2013) (Table 3 in original) "Abstract ratings for each level of endorsement, shown as percentage and total number of papers" (abstract analysis, n = 11,944, author analysis: 29 083 authors) (shading, bolding of key data row performed by authors of this work, not present in the original)				
Positions	%	% of Abstracts with Position on AGW	% of all authors	% among authors with AGW position (%)
Endorse AGW	**32.6% (3896)**	**97,1%**	34.8% (10.188)	98.4
No AGW Position	66,4% (7930)	-	64.6% (18.930)	—
Reject AGW	0,7% (78)	1,9%	0.4% (124)	1.2
Uncertain about AGW	0,3% (40)	1,0%	0.2% (44)	0.4

Table 2 Classification according to Cook *et al.*[1] (2013) ("Definitions of each level of endorsement of AGW." Table 2 of original publication)

Level of endorsement	**Description**	**Example**
Explicit endorsement with quantification	Explicit endorsement with quantification	'The global warming during the 20th century is caused mainly by increasing greenhouse gas concentration especially since the late 1980s'ement
Explicit endorsement without quantification	Explicitly states humans are causing global warming or refers to anthropogenic global warming/climate change as a known fact	'Emissions of a broad range of greenhouse gases of varying lifetimes contribute to global climate change'
Implicit endorsement	Implies humans are causing global warming. E.g., research assumes greenhouse gas emissions cause warming without explicitly stating humans are the cause	'. . . carbon sequestration in soil is important for mitigating global climate change'
No position	Does not address or mention the cause of global warming	
Uncertain	Expresses position that human's role on recent global warming is uncertain/undefined	'While the extent of human-induced global warming is inconclusive. . . '
Implicit rejection	Implies humans have had a minimal impact on global warming without saying so explicitly E.g., proposing a natural mechanism is the main cause of global warming	'. . . anywhere from a major portion to all of the warming of the 20th century could plausibly result from natural causes according to these results'

Explicit rejection without quantification	Explicitly minimizes or rejects that humans are causing global warming	'. . . the global temperature record provides little support for the catastrophic view of the greenhouse effect'
Explicit rejection with quantification	Explicitly states that humans are causing less than half of global warming	'The human contribution to the CO2 content in the atmosphere and the increase in temperature is negligible in comparison with other sources of carbon dioxide emission'

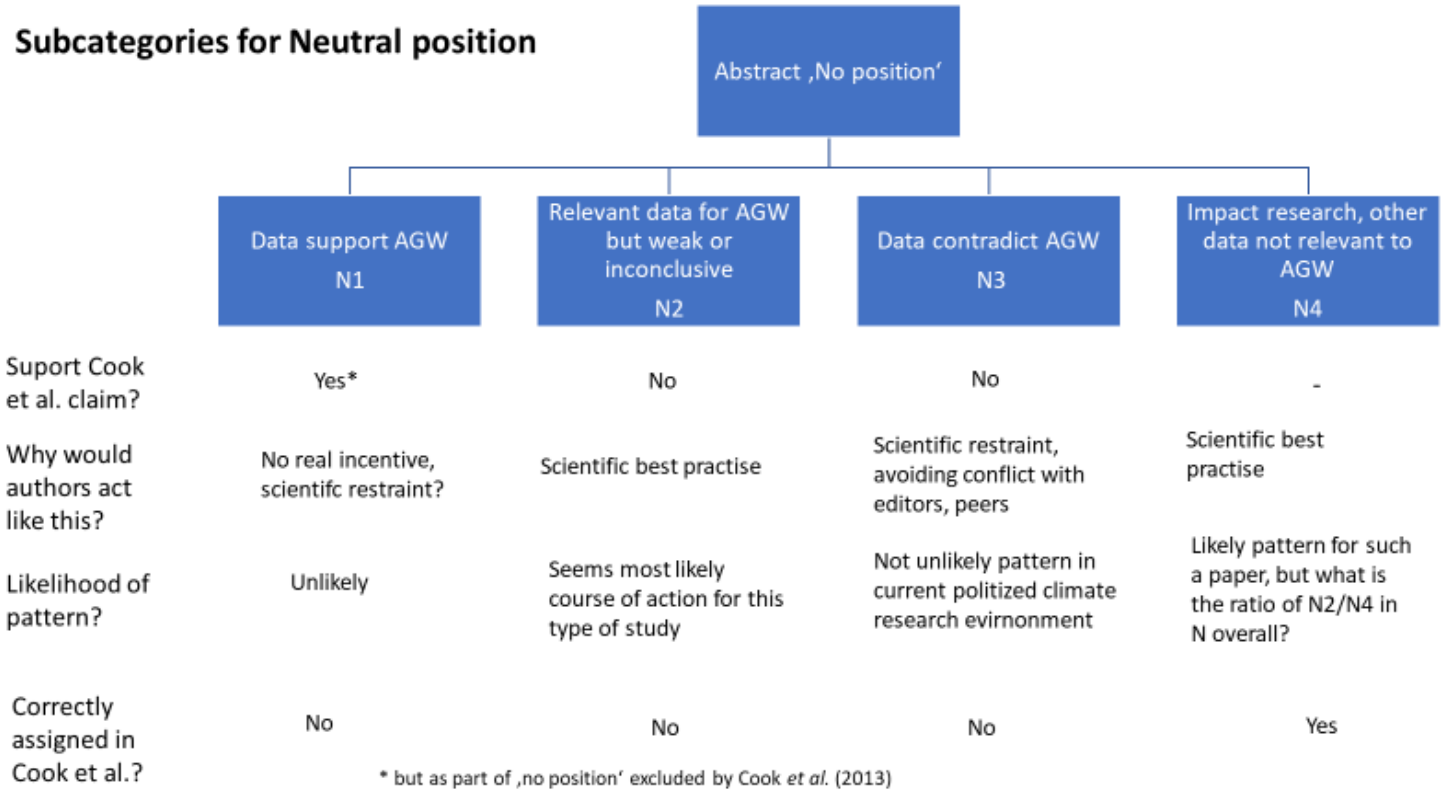
Table 3 Hypothesis about the true level of data-based support on GHG AGW based roughly Cook et al. data (n=12.000 abstracts) – ballpark to be tested in mini-analysis

"Cook-consensus" (abstract based)			Mini-Analysis with new categories (estimation)		New support level	
Endorse	33%	97%	E1 20%, E2 30% E3 0%	E4 50%	(E1 + N1)/ (E-E4+N- N4+R,U)	35%
No position	66%	-	N1 10% N2 20% N3 0%	N4 70%	N4, E4	-
Reject/Uncertain	1%	3%	R, U 1%		R,U+ E2+E3+N2+N3	65%

Table 4 New categories for data-based support evaluation, and estimation of true numbers of a recent publication year (assumption about 18.000 more recent works).

Data-based analysis categories			
Main categories	Estimation	Sub categories	Estimation
Non-relevant (NR)	70%		
Relevant (R)	30%	Supporting (RS)	10%
		Weak/inconclusive ‘neutral’ (RN)	80%
		Contradicting/weakening ‘reject’ (RR)	10%

Figure 1. Subcategories for ‚No position/neutral'. Only N4 is correctly assigned in Cook *et al.*[1] (2013), i.e. matching the underlying data. N2 likely comprises a substantial number of publications.



1. Cook, J., Nuccitelli, D., Green, S. A., Richardson, M., Winkler, B., Painting, R., Way R, Jacobs P., and Skuce, A. , *Quantifying the consensus on anthropogenic global warming in the scientific literature.* Environmental Research Letters, 2013. **8**: p. 024024.

Figure 2. Subcategories for ‚Endorse' position. Only in E1 data truly support AGW-hypotheses.

E2 and E4 likely comprises a substantial number of publications.

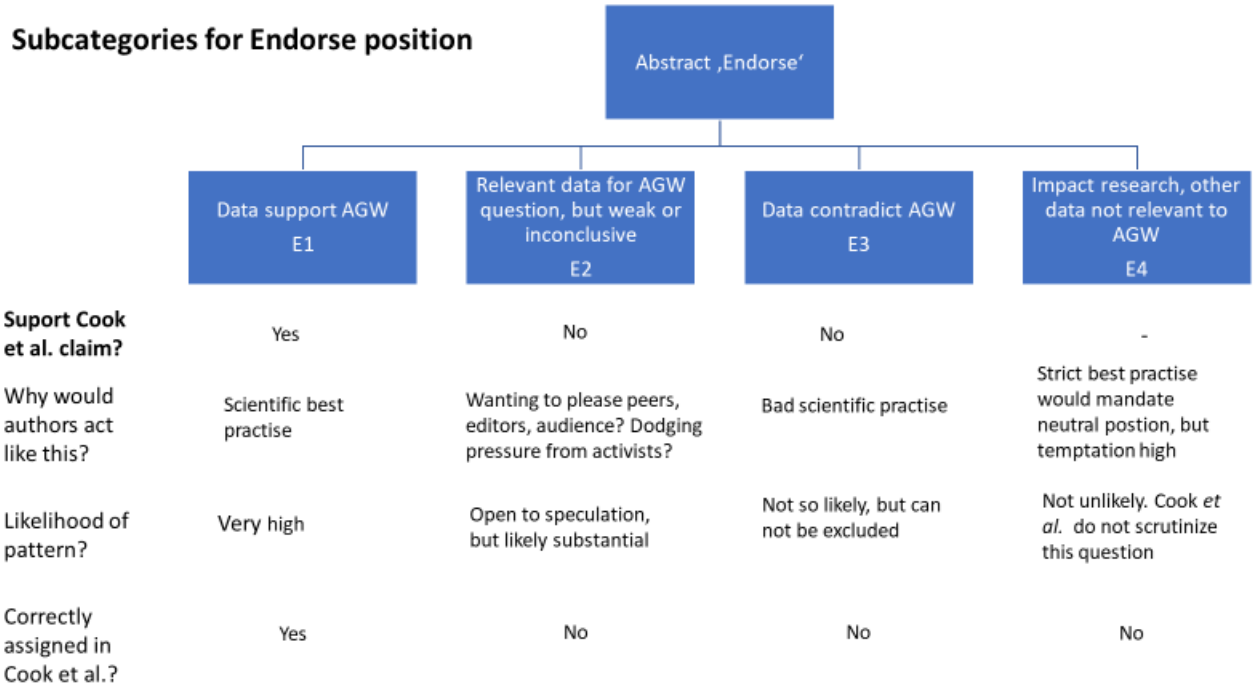


Figure 3: Graphical Representation of the Results from the 1999 Analysis, using the Cook et al Methodology.

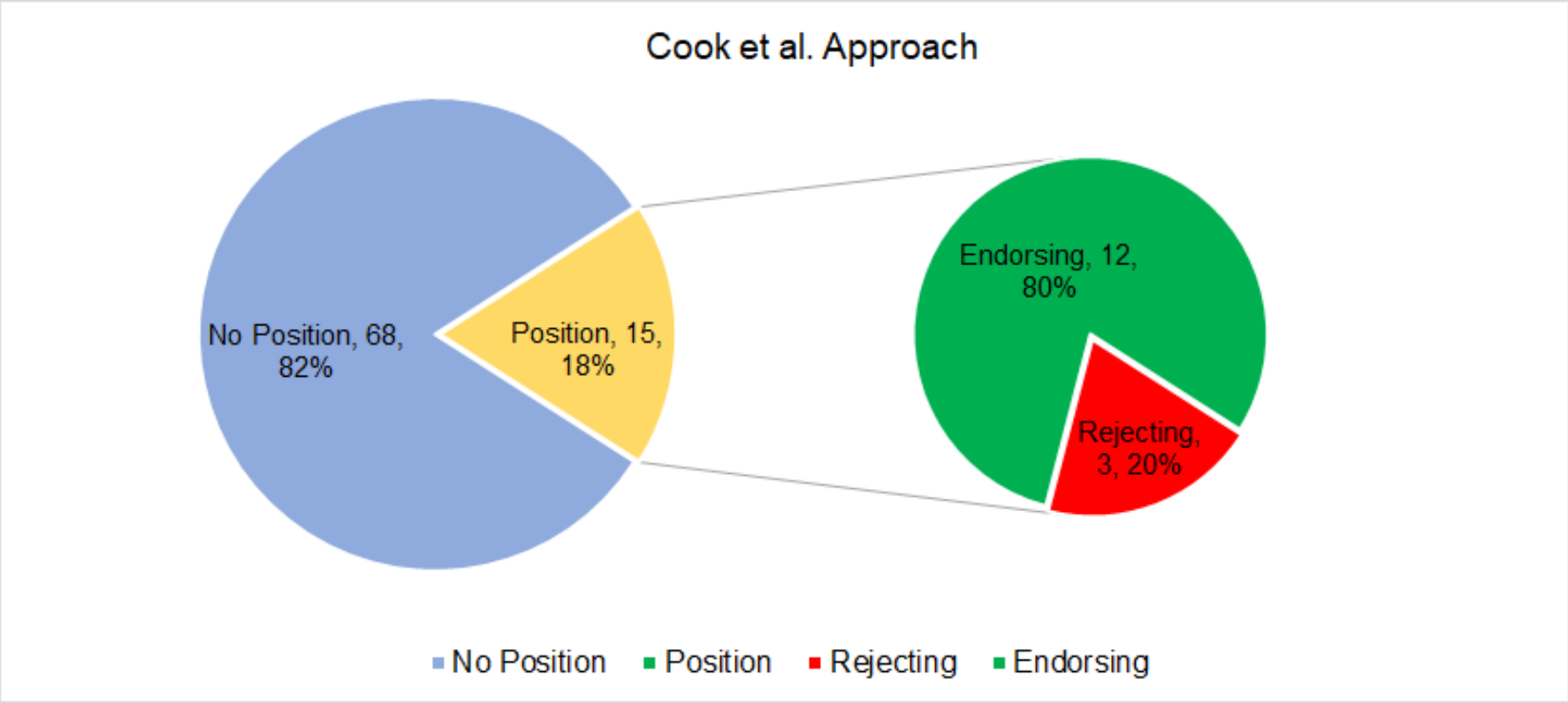
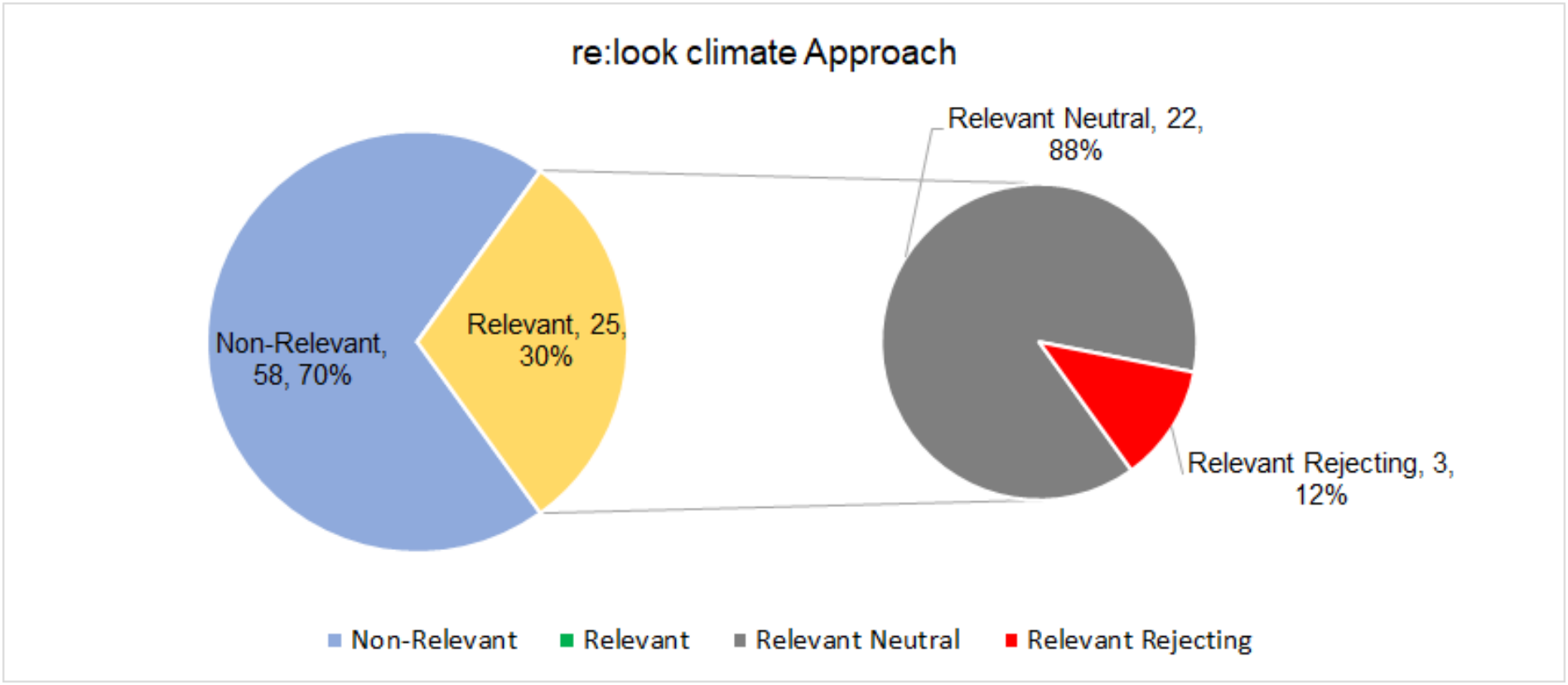


Figure 4: Graphical Representation of the Results from the 1999 Analysis, using the re:look climate Methodology.


re:look climate Approach
Relevant Neutral, 22, 88%
Non-Relevant, 58, 70%
Relevant, 25, 30%
Relevant Rejecting, 3, 12%
Non-Relevant
Relevant
Relevant Neutral
Relevant Rejecting