**Reviewing the “Powell Consensus”: James Powell’s “climate consensus” is unsubstantiated.**

**Abstract**

Public call to unite behind science is on the rise fueled also by the notion of a scientific “consensus” on the question of anthropogenic global warming (AGW). This paper reexamines this notion by reviewing the works of James Powell (2015, 2016, 2019) which reports an above 99.99% (100% in latest publication) consensus on AGW. The so called consensus was achieved primarily by title and abstract analysis similar to Cook et al (2013) (i.e. separating abstracts supporting, rejecting, or expressing a neutral or no position on AGW), but with a different turn. By carefully evaluating the three published Powell works, we highlight the deep flaws in the study conduct and methodology employed by Powell. In our assessment, Powell barely skimmed through publication titles and abstracts to determine which articles question the AGW hypothesis. We find this questionable, strongly opinion based and unfit according to scientific standards. In addition, the Powell methodology approach assumes that all articles without an explicit rejection are AGW endorsing (including those with “no position”). This assumption is flawed and unfit to be deemed evidence for a “scientific consensus”. The above 99.99% consensus figure is therefore unsubstantiated.

**Key Words**

Climate Change, Consensus, Peer Review, Anthropogenic Global warming

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**Introduction**

The call from the public to unite behind science has increasingly grown in recent times. This is implicitly linked to the assumption that there is a consensus among the scientific community concerning the key driver of climate change. The political demand is geared towards uniting behind the notion of slowing or stopping greenhouse gas (GHG) driven anthropogenic global warming (AGW) endorsed by IPCC – positioning anthropogenic greenhouse gas (GHG) emissions, especially CO2 as the main key driver for post-industrialization climate change. This GHG-AGW-hypothesis is also at the fore and center of most political mitigation measures, as e.g. laid down in the Paris climate accord. There is supposedly a scientific consensus on the question that GHG AGW is the key climate change force for the industrial era.

The so-called climate consensus has been claimed in several peer reviewed studies like the most cited 97% climate consensus notion created by Cook et al. (2013). Riding this consensus notion wave are consensus claim publications work of James Powell – all published in the *Bulletin of Science, Technology & Society (BSTS)*. James Powell claims to have found a consensus exceeding Cook et al. (2013) with agreement rates of above 99.9% (Powell 2015, 2016, 2019).

Powell in his work explicitly disagrees with the 97% agreement notion created by Cook et al. (2013) and the underlying fine detail of the methodology, claims to have found not only a consensus but virtual unanimity, and in his last piece even unity (100% agreement rate) (Powell 2019). The Cook et al. team published a rebuttal also in BSTS, emphasizing that their methodology which does not include abstracts rated as “no position” resulting in a 97.1% consensus is logical and correct (Skuce et al., 2017). Also, they deemed the ‘consensus’ figure discrepancy to be of a rather political nature and thus resolving the discrepancy to be unnecessary since the vast majority of scientists are already united, according to their results (Skuce et al., 2017). However, Powell maintained his position by stating that “the consensus cannot be both 97% and virtual unanimity” (Powell, 2016 – key sentence in beginning of Introduction section). Further: “In science, when confronted with differing results for the same quantity, we do not shrug our shoulders and say that one is as good as the other: We try to determine which is correct.” (Powell, 2016 – Introduction, the subsequent paragraph). Hence, this work aims to follow this scientific principle by having a careful review of the Powell work.

**Our review of the Powell works**

To scrutinize the works of James Powell published in the Bulletin of Science, Technology & Society (BSTS) we:

* Carefully evaluated of the three Powell works (also taking into account the counterplea by Skuce et al., 2017).
* Analyzed and displayed the published data and key results (with calculations and added comments).
* Reviewed the claimed methodology and the drawn conclusions.

**General aspects**

In his work, Powell (2015, 2016, 2019) objects to the details of the methodology chosen by Cook et al. (2013). While Powell accepts the key premise, i.e. a “climate consensus” evaluation based on the positioning on AGW expressed by the authors of the respective investigations in the abstract, James Powell strongly argues against another key assumption of the Cook et al. (2013) analysis, i.e. the elimination of the “no position” category for the calculation of the “consensus” level. With roughly 60% of the over 11.000 works evaluated by Cook et al. (2013) being categorized as expressing no position on AGW in the abstract, and thus being taking out of the consensus calculation, the Powell critic thus still touches a key pillar of the Cook et al. (2013) analysis. James Powell postulates that the abstract based analysis should concentrate on explicit rejections of the GHG-AGW-hypothesis. Only such works should be excluded from the “consensus” analysis. All other work would be counted as supporting the “climate consensus”. Using this revised abstract analysis approach Powell claims to have found a higher consensus level exceeding the 97.1% “consensus” published by Cook et al. (2013).

Putting his assumption to action Powell (2015) claimed to have evaluated all published abstracts of single publication years using the same search strings as Cook et al. (2013). This resulted in a postulated analysis of 24,210 abstracts of original publications on climate change and global warming of the publication years 2013 and 2014 (Powell 2015), and was supplemented by 3,517 abstracts/original works from 2012 and 14,524 abstracts/original works from 2015 (Powell 2016) in a paper where James Powell also counters the response from the Cook group (Skuce et al., 2016). Powell derived a “consensus” of >99,9%. In a third publication of this series, he claimed to have assessed additional 11,602 articles (published from Jan – Aug 2019), now finding a 100% consensus (Powell, 2019). James Powell even wrote this conclusion in the title of his BSTS publication: “Scientists Reach 100% Consensus on Anthropogenic Global Warming” (Powell 2019). We summarized the data presented by Powell in his first publication (see Table 1).

The aim of this work is put the “Powell consensus” works to a critical test., both regarding the chosen methodology and the conduct. We will start with the latter and then review the former, and will present a clear conclusion, i.e. that the “Powell consensus” is unsubstantiated.

**Powell's Study Conduct**

It is relatively obvious that Powell's study conduct is questionable and highly critical regarding scientific robustness. It is a one-man methodology without any quality assurance, but claiming a sizeable amount of scientific work.

James Lawrence Powell is certainly a highly qualified and distinguished scientist, author, science manager, science politician, and science activist. Powell, who turns 85 in 2021, a geologist by training, looks back at a career with high responsibility in science and politics, serving amongst others as the president of the Franklin and Marshall College, then the Reed College, the Franklin Institute Science Museum in Philadelphia, and the Natural History Museum of Los Angeles. James Powell served for 12 years on the US National Science Board. James Powell has a long and respectful publication track record, although notably responsibilities for a scientific journal as an Editor-in-Chief seem not to have been part of his scientific career (key data from <http://www.jamespowell.org/bio>).

Still, are the scientific qualifications of James Powell a justification for the chosen study conduct? We do not think so. Powell’s methodology execution as a one-man project is deeply flawed: One person skimming through thousands of publication abstracts to determine which articles question the AGW hypothesis within the given timeframe is strongly opinion based and thus, cannot be replicated according to scientific standards (Pare et al., 2015; Siddaway et al., 2019; Mengist et al., 2020). Validity, reliability, and repeatability are the core ingredients of sound scientific inquiries and literature reviews (Xiao and Watson, 2019). This is obviously lacking in the Powellian one-man methodology; hence, it cannot be considered as a reliable nor sufficient evidence for a consensus claim.

While James Powell is undoubtably qualified to evaluate a climate change publication abstract, is it plausible that he actually performed the evaluations as claimed, even if we are convinced that an one-person approach is not justifiable? To test this, we estimated the total time required to read and classify the thousands of abstracts (see Table 2) for the key first work, i.e. the evaluation of the two publication years (2013, 2014) detailed in the first “Powell-consensus”-paper (Powell 2015). We also summarized the work load estimation based on very simple calculations (time per abstract as input plus some working time assumptions listed in the table) (Table 2).

James Powell had a maximum of one year for his analysis, including the preparation of the manuscript and submission, according to the timelines communicated in the manuscript. Based solely on the estimate documented in Table 2, which is based on the assumption that Powell has fully concentrated in core working hours exclusively (without vacation or other interruptions) on the analyses, it is imperative to note that Powell could only have invested significantly less than 5 min per abstract/work (shaded lines).

Since it seems highly unlikely that James Powell actually spent all his time on the core analysis of this project, a still sporting assumption of 70% of his time results in a necessary period of 7-8 months at a time of 2-2.5 minutes per abstract/publication. Presumably, the time actually invested was well below this value. In addition, it is worth noting that Powell has reportedly seen a total of more than 42,000 abstracts up to the second publication published in May 2017 (Powell, 2016). We regard this as being utterly inconceivable. The studies Powell 2015, 2016 cannot have been conducted as claimed.

Given these facts, it seems highly unlikely that Powell's findings would persist regardless on whether the chosen methodology is seen as correct or not.

Powell gives credence to our argument in his third work. The 2019 Powell paper is directly linked to the two previous Powell works (Powell 2015, 2016). Powell searches the 2019 publications from January to early August and finds 11,602 publications on climate change/global warming. Interestingly, however, Powell is now officially changing the approach to this work. Instead of claiming that he actually read all the abstracts, as he did in the two previous publications (Powell 2015, 2016), and in what we identified as a central weakness of the claim as stated above, Powell now writes quite openly (second last paragraph of the main text): "To read even the abstracts would be a daunting and time-consuming task” and “the conclusions drawn from this are “subject to fatigue and error” (Powell 2019).

**Powell’s Methodology Weakness**

As a first conclusion, the conduct of the investigations published by Powell clearly do not stand up to scientific scrutiny, but what about the chosen methodology assumptions?

We are also convinced that the methodological approach is flawed. Assuming the abstract analysis based approach taken by Cook et al. (2013) to be valid, the Powell-assumption that anything shy of an explicit rejection of GHG AGW in the abstract equates to an AGW endorsement is in our view plain wrong. The Cook team in their rebuttal publication addressed this point by providing evidence from Cook et al. (2013) which contradicts the Powell assumption (Skuce et al., 2017). According to the evidence from Cook et al. (2013): “Spencer, Braswell, Christy, and Hnilo (2007) was rated as rejection, but five other papers by the same lead author were rated as “no position”. It is illogical to assume, as Powell does, that those papers represent endorsements. This counterexample shows that “no position” is not synonymous with endorsement”. Hence, Cook et al. (2013) is right in the assumption that it is not correct to assume that a lack of explicit doubt or rejection in a scientific abstract equates to anything which can be termed supporting a “consensus”. Silentium est consensu is a concept from politics, and often misused in power struggles or dictatorships in order to ensure complicity – as reject it as a meaningful scientific assumption in complex scientific debate.

Just for completeness: Stretching the wrong Powell assumption regarding the abstract analysis (everybody who does not explicitly state uncertainness or rejection supports the AGW “consensus”) to a publication title analysis (as done in his third work, Powell 2019), i.e. claiming that the title unless suggesting an explicit rebuttal of GHG-AWG is a proof for a meaningful scientific consensus on the topic of GHG AGW is not only questionable and in our view plain wrong, but raises for us a number of red flags regarding the scientific publishing process in general. Scientific publishing should not actually force authors to put flashy claims into the title of their publications, and scientific editing should safeguard the scientific community for this type of social media style click baiting-approach.

Thus, in a second conclusion, we clearly conclude that within the Powell-Cook-abstract-analysis-controversy we do not side with Powell. The actual analysis of the “Cook consensus” is beyond the scope of this work and presented elsewhere.

In summary of these arguments, the so called 99.99% figure by Powell (2015) can only be classified as frivolous. As evidence of a scientific “climate consensus” is clearly unfit.

**Abstract Analysis vs Data-Centered Analysis**

We take the argument even further: In our conclusion, both the “Cook-consensus” and the “Powell-consensus” are not substantiated. We claim that the idea of an abstract analysis in itself is the key limitation, as in fact the analysis (proper or flawed) only generates knowledge on the abstracts or as we term the manuscripts – scientific media statements (Grabert et al., n.d.). While it is certainly interesting to analyze the scientific abstract of groups and their studies, it still is only an analysis of the communication spin set on the data. It is additionally likely some sort of reflection of the values and potentially the beliefs of the authors as well as the editors of the respective journals - however, science is not a democracy, the question of whether the GHG AGW hypothesis holds true, just as any other scientific question, is not being answered by a community ballot cast.

The GHG AGW hypothesis just as any other claim in science needs to be tested, supported, strengthened, weakened or disproven on data, not on state beliefs. The actual investigations, if they are relevant to the question at hand, make the ruling. And again, we would argue that science is not a democratic process, where you simply count the number of supporting works and if they supersede the number of opposing works your controversy is settled. It is more complex than that.

As opposed to the data which harbors the scientific truth of a study, an abstract is the attempt to condense the study finding into a short readable overview. While if done properly it does help the reader to get an idea on the investigations it cannot be expected to convey the shades of grey present in the investigation. The data and findings are in the main text, the abstract in best case is just reflection of the key findings and its interpretation. The abstract provides very limited information, while the actual message of the data, i.e. the contribution of the data to the scientific understanding, lies in the work. If push comes to shove the abstract is not the witness, but the underlying data as presented in the main text. For an evaluation of the actual work the abstract can be fully ignored, while an abstract claim is not more than a mistake or worse if it does not properly reflected the actual content of the work. The abstract is also the crown piece in the already highly complex and sophisticated scientific publishing process, with mechanics of its own not untouched by commercial, political and other non-scientific factors (Siler 2019).

In order to improve knowledge on how strong the published research regarding the GHG AGW-hypothesis actually is, we postulate that there needs to be a change in approach. The focus needs to shift from semantically categorizing the abstracts to a look at what the vast amount of published data actually substantiates. After all, physics, chemistry, geology, meteorology, mathematics, informatics, and all other key sciences related to the understanding of climate change are not social or political sciences, revolving around the interpretation of words, intentions, beliefs, convictions or political pleas for actions etc.

If the question of “consensus” is seen as important than the question the climate science community should be asking is this: In which direction does the relevant data point? This would be a much more meaningful indicator on the level of certainty on the GHG AGW-controversy in the scientific literature. And it would in the example at hand, i.e. GHG-AGW move away from a potentially false dichotomy of natural vs. anthropogenic factors towards the question, which factor plays what role, and how to the complex mechanisms work in detail? Here an in-depth cross-functional, cross-working group approach by means of analyzing the published literature might actually contribute to advancement of understanding. We therefore posit that a proper data-based investigation, evaluation, and categorization would give a true, or at least much more robust insight into the state of scientific affairs on the GHG AWG-hypothesis and the questions relevant for climate research.

We can take out some positives from the works of James Powell in that they elicit the continuation of the scientific debate and therefore potentially give rise to more interesting studies.

**Conclusion**

The presented >99.99% Powell consensus is clearly unsubstantiated. Not only has it has been generated with a flawed study approach (lack of quality assurance) which does not match scientific standards, the methodology assumptions of the abstract analysis (including all papers in consensus calculation except for explicit rejections) are also wrong. In addition, abstract analysis per se is not a sufficient method of quantifying a scientific consensus due to its limitations, as opposed to assessing both the abstracts and the corresponding data which provides full insights to the question of the AGW hypothesis. Hence, a consensus assessment from a data-centered approach will be a much better indicator of the true level of scientific support for the GHG-AGW hypothesis.

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| Methodology | Detail | Comments (from this group) |
| Source | Web of Science Core Collection, Enhanced Science Index |  |
| Publication years | 2013, 2014 | Follow-up on Cook et al. (2013) which covered 1991-May 2012 |
| Search terms | ‘global warming’, ’global climate change’ or ‘climate change’ | Search terms used in Cook et al. (2013) |
| Powell’s assessment criterion (primary variable) | Clear rejection of AGW-consensus in the abstract  | Personal judgement by JL Powell |

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| --- | --- |
| Results | Comments (from this group) |
| No of Abstracts found after search | 24.210 | Powell applied the Cook et al. search strategy correctly. |
| No of Authors | 69.406 |  |
| No of Abstracts rejecting AGW | 5 | The works identified by Powell are listed in the references of the respective Powell publication.Note that also Cook et al. (2013) contains an abstract- and an author-based analysis. |
| % Abstracts (Rejecting AGW) | 5/24.210 = 0.02% |
| “Powell-Consensus” Abstracts (Authors) | 99.98%(99.99%) |

Table 1. Results of Powell (2015) (own presentation, comments from this group).

Table 2. Time estimate needed for the Powell evaluation as claimed (the shaded lines refer to time theoretically possible in the timeframe between publication year and submission of manuscript).

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| --- | --- |
| Data and Assumptions | 24.210 Abstracts, 10h per day, 5 days per week, Year = 52 weeks, half year 26 weeks (= de facto exclusive work on the analysis) |
| Results |  |  |  |
| Input | **Output** |
| Time per Abstract | **Required time in hours** | **Required time in weeks** | **Required time in years** |
| 20 min | ~8000h | ~160w | ~3y |
| 10 min | ~4000h | ~80w | ~1.5y |
| 5 min | ~2000h | ~40w | ~0.75y (9 months) |
| 2.5 min | ~1000h | ~20w | ~0.375y (4.5 months) |