

Max W. Callaghan

PhD Candidate
Applied Sustainability Science
Torgauer Str. 12-15
10829 Berlin | Germany
tel +49 (0) 30 338 55 27 - 245
fax +49 (0) 30 338 55 37 - 102
mail callaghan@mcc-berlin.net
web www.mcc-berlin.net

Bronwyn Wake
Chief Editor
Nature Climate Change

July 12, 2019

Dear Bronwyn Wake,

I herewith submit on behalf of my co-authors the manuscript “A Topography of Climate Change Literature” for consideration as a letter in *Nature Climate Change*.

“Big literature” - the vast and rapidly expanding body of publications - poses new, and largely neglected challenges for climate change assessments and how we understand them. For example, we estimate a total of 350,000 new publications on climate change to emerge (only) in the Web of Science during the Sixth Assessment Cycle of the Intergovernmental Panel on Climate Change spanning from 2015 to 2022. Big data and machine learning methods need to be applied to maintain an overview of developments in the scientific landscape and to analyse how past IPCC assessments have engaged with the available literature. So far, attempts [1, 2, 3, 4] have often been based on qualitative perceptions, or incomplete data with insufficient methodological sophistication.

In this study we use machine-learning to provide a comprehensive, thematic map of the more than 400,000 articles on climate change published in the Web of Science to date. We perceive two innovations that allow us advance the current state of knowledge on the IPCC and the field it is tasked with assessing. First, our thematic map allows us to situate a complete set of IPCC citations into the context of the wider literature and analyse disciplinary representation adequately. We find that contrary to previous claims, the social sciences are over-represented in IPCC reports. Second, the use of machine learning methods in creating the map allows us to analyse the content of publications more or less represented in the IPCC. We find that literature on technical solutions (such as negative emissions, buildings or cities) is growing fast and, even compared to other fast-growing literatures, has been under-represented in IPCC reports. We point towards a variety of other applications of such a comprehensive, thematic literature map within global environmental assessments as well as the broad field of research synthesis. Our findings have direct implications for addressing growing demands for more solution-oriented climate change assessments that are also more firmly rooted in the social sciences.

Yours Sincerely,

Max Callaghan

Director
Prof. Dr. Ottmar Edenhofer

Bank Account
Sparkasse Berlin
iban DE58 1005 0000 0190 1246 36
bic BELADEBEXXX

Amtsgericht Charlottenburg
HRB 142902 B

MCC was founded jointly by the
Stiftung Mercator and the Pots-
dam Institute for Climate Impact
Research

References

- [1] Andreas Bjurström and Merritt Polk. Physical and economic bias in climate change research: A scientometric study of IPCC Third Assessment Report. *Climatic Change*, 108(1):1–22, 2011.
- [2] Mike Hulme and Martin Mahony. Climate change: What do we know about the IPCC? *Progress in Physical Geography*, 34(5):705–718, 2010.
- [3] David G. Victor. Embed the social sciences in climate policy - David Victor. *Nature*, 520:7–9, 2015.
- [4] Martin Kowarsch, Jason Jabbour, Christian Flachsland, Marcel T. J. Kok, Robert Watson, Peter M. Haas, Jan C. Minx, Joseph Alcamo, Jennifer Garard, Pauline RiOUSset, László Pintér, Cameron Langford, Yulia Yamineva, Christoph von Stechow, Jessica O'Reilly, and Ottmar Edenhofer. A road map for global environmental assessments. *Nature Climate Change*, 7(6):379–382, 2017.