Deconstructing climate change: facilitating network analysis of scientific influence

Building a customized database of bibliographic and citation data to significantly shorten the research timeline of a study examining the growth and expansion of knowledge on climate change.

This research project brings together three leading academic institutions: the University of Melbourne, La Trobe University and INSEAD.

The Faculty of Business and Economics at the University of Melbourne is a leading centre of teaching and research in accounting, actuarial studies, economics, finance and management and marketing. The Management department focuses on how organisations operate – what they do, their employment practices, their ways of managing and their strategies. Simply put, management is about the processes required to achieve organisational goals. It demands an understanding of the economic, social and environmental context.

As part of its work on The ontological politics of climate change, a team at the University of Melbourne is undertaking an analysis of climate change articles published in Science and Nature since 1980.
Clarivate Analytics is providing custom datasets extracted from Web of Science for the targeted papers in Science and Nature as well as details of cited articles and citing articles. This will enable the team to analyse the climate change debates in the scientific community to better understand how climate science diffuses across disciplines.

Our paper seeks to examine how the metrification of the sciences facilitates ‘evaluative tournaments’ that will act as de facto ‘arbiters of truth’ in the realm of climate change. We examine how evaluative tournaments — represented by practices such as rankings, impact factors and citation scores — accord greater value to one understanding of climate change over another.

What challenges was the University of Melbourne facing?

Finding the relevant climate change papers from 1980 onwards

- The University of Melbourne was looking to analyze all articles published in Nature and Science from 1980 to today — more than 3,533 papers in total.
- The research team needed to reliably identify articles that referenced specific keywords and variations of those keywords.
- Pulling together the necessary data using internal resources and available bibliographic tools would have added years to the research timeline.

Accessing citation data for the climate change group of papers

- The research team needed citation data to see how climate science diffuses across disciplines.
- It was important to understand the influence of individual papers in terms of citation counts and other article-level metrics.
- Critically, the team wanted to look at where papers were influencing research in other disciplines (e.g. biology, geography, economics).
- This meant pulling together bibliographic and category data for both citing and cited papers.

A key question is the politics of how we are framing the problem. For example, we have seen the adoption of the more neutral term climate change as opposed to global warming. So how are we going to address these problems and provide input to policymakers if we can’t define them consistently to begin with. And that’s where our citation analysis fits in – to help us understand how institutional context shapes scientific processes.

Dr. Angela McCabe, Lecturer in Management
La Trobe University

We are analyzing publications related to climate change from 1980 until now from Science and Nature, tracking citations of those publications to understand their influence in different scientific disciplines and across time. We are also looking at the literatures those articles are drawing upon to provide a full picture.

Dr. Joeri Mol, Lecturer in Organisation Studies & Co-Director of Cluster for the Study of Organisation Society and Markets (COSM), University of Melbourne

1 The ontological politics of climate change: Evaluative tournaments as arbiters of truth (McCabe, Mol & Osegowitsch, 2017)
Solution

The University of Melbourne team used Custom Data extracted from Web of Science to quickly and accurately identify relevant Science and Nature papers and related citation data. This data is needed to test hypotheses around the influence of climate science within a single discipline and across multiple disciplines.

Custom Data sets are based on Clarivate's Web of Science Core Collection – the world’s leading bibliographic and citation database. The Core Collection provides 100% coverage of the world’s highest impact research journals – approximately 12,700 in total.

Custom Data Specification

- Papers published in Nature and Science from 1980 onwards based on a search for keywords and common variations
- Keywords included “climate change”, “climate warming”, “global temperature”, “global warming”, “greenhouse gas”, “greenhouse effect”, and “greenhouse warming”
- Data included bibliographic data, Web of Science categories and article-level metrics (e.g. cites, CNCI, JNCI, percentiles)
- Bibliographic and category data for both citing papers and cited papers
- Data delivered in Microsoft Access Database format

Value Delivered

Research timeline significantly shortened

- Having a Custom Data set created by Clarivate, that exactly met the University’s research criteria, eliminated the internal effort that would otherwise have been required and hence significantly cut the project timeline.
- Working with Clarivate gave the team access to bibliographic and citation data for papers going back to the start of the climate debate, many decades ago.

One of the main attractions for working together with Clarivate is that they provided us with a ready-made dataset. It would be very time consuming for us to look for the individual articles and extract the data.

Dr. Joeri Mol, Lecturer in Organisation Studies & Co-Director of Cluster for the Study of Organisation Society and Markets (COSM), University of Melbourne

If you think about publication as an input / output model, the input would be the references cited and the output would be the people who refer to this article. So you can quantify the disciplines that are informing the science over time, and thus how the climate change debate itself is changing over time.

Dr. Joeri Mol, Lecturer in Organisation Studies & Co-Director of Cluster for the Study of Organisation Society and Markets (COSM), University of Melbourne

Facilitated the understanding of the network of influence that exists across disciplines

- Provided bibliographic and category data for cited (input) and citing (output) papers to identify the network of connections.
- Supported the analysis of multidisciplinary research in climate science by providing a view of the level of influence from a single discipline versus a range of disciplines (e.g. biology, geography, economics, etc).
- Enabled a deep understanding of collaboration at the author-, institutional- and country-level and made it possible to track where the locus of the debate has shifted over time.
Our Customer

The University of Melbourne is an internationally recognized, research-intensive university with a strong tradition of excellence in teaching, research and community engagement spanning more than 160 years. Its outstanding performance in international rankings puts the University of Melbourne at the forefront of higher education globally.

La Trobe University is ranked in the QS Top 50 under 50 of the world’s best recently-formed institutions and has been rated among the top ten in Australia by the Excellence in Research for Australia (ERA). La Trobe University has a commitment to excellence, creativity and innovation in relation to global problems and to improving the welfare of human societies.

Located south of Paris, INSEAD is one of the largest graduate business schools in the world and has recently been voted the number one business school in the world by the Financial Times for the second year in a row. INSEAD has a commitment to investigating global challenges and contemporary social issues.

Who We Are

Clarivate Analytics is a leading provider of intellectual property and scientific information, decision support tools and services that drive the Lifecycle of Innovation for governments, academia, publishers, corporations and law firms as they discover, protect and commercialize new ideas and brands.

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