

Max Callaghan

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Education

- 2018–2022 **PhD**, *University of Leeds*, School of Earth and Environment.
Machine Reading the Science of Climate Change: Computational Tools to Support Evidence-Based Decision-Making in the Age of Big Literature
Supervisors: Professor Jan Minx, Professor Piers Forster
- 2013–2016 **Master of Public Policy**, *Hertie School of Governance*, Berlin, 91/100.
- 2007–2011 **BA - English and Related Literature**, *University of York*, First-class honours.

Employment History

- 2016– **Researcher**, *Mercator Research on Global Commons and Climate Change (MCC)*, Berlin.
- 2015–2016 **Research Assistant**, *Mercator Research on Global Commons and Climate Change (MCC)*, Berlin.
- 2016–2016 **Teaching Assistant – Stats II**, *Hertie School of Governance*, Berlin.
- 2015–2015 **Teaching Assistant – Applied Economic Analysis**, *Hertie School of Governance*.
- 2014–2015 **Junior Research Fellow – Development, Gender and Human Rights**, *United Nations System Staff College (UNSSC)*, Turin.
- 2014–2014 **Research Assistant – The Governance Report**, *Hertie School of Governance*, Berlin.
- 2013–2014 **Research Analyst**, *Market Logic Software*, Berlin.
- 2013–2013 **Junior Consultant**, *Cadence Partnership*, London.
- 2012–2013 **Communications Intern**, *Release*, London.
- 2011–2012 **Teacher**, *The English School of Mongolia*, Ulaanbaator.

Honors and Scholarships

- 2017 PhD Scholarship, Heinrich Böll Stiftung
- 2016 Dean's List, Hertie School of Governance

Funding

- 2021–2022 **Climate Vulnerability Monitor**, *Design and lead of Work Package 1 - Observed climate change*, 85,000 EUR out of 669,390 USD - funded by Climate Vulnerable Forum.

Teaching Experience

Autumn 2022 **Text as Data**, *Hertie School of Governance*, Berlin, Adjunct Lecturer.
Summer 2022 **NLP for evidence synthesis in climate change research**, *Climate Change AI Summer School*, Online, Tutorial.

Mentoring Experience

2021 **Co-supervision of Master Thesis**, *The dynamics of hate speech against Greta Thunberg: An analysis of Tweets*, Nina Locher, Hertie School of Governance.

Research Service

Peer Review I have provided reviews for Nature Climate Change, Nature Sustainability, Energy Research & Social Science, Environmental Research Letters, Climatic Change, Regional Environmental Change, Research Synthesis Methods, The Journal of Hydrology, and the Journal of the American Medical Informatic Association

Assessments I was a contributing author in Chapter 9 of Working Group II's contribution to the sixth assessment report of the Intergovernmental Panel on Climate Change. I was a contributing author in Chapter 3 of the Austrian Panel on Climate Change's special report "Strukturen für ein klimafreundliches Leben"

Media echo

My work has recently been covered by the Washington Post, CBC, CNN, Al Jazeera, ABC News, and the Frankfurter Allgemeine Zeitung.

Work in Progress

Climate policy What is the evidence on climate mitigation policies, and to what extent can it be identified and classified using Machine Learning?

Climate and Health Attributing the impacts of climate change on health to human influence on the climate

ML-assisted review Why validation needs to simulate real-world conditions: a response to "An open source machine learning framework for efficient and transparent systematic reviews"

Peer reviewed publications

Up-to-date publication statistics are available at <https://scholar.google.com/citations?user=B6mNFrAAAAAJ&hl=en>).

- [1] Marina Romanello, Claudia Di Napoli, Paul Drummond, Carole Green, Harry Kennard, Pete Lampard, Daniel Scamman, Nigel Arnell, Sonja Ayebe-Karlsson, Lea Berrang Ford, Kristine Bellesova, Kathryn Bowen, Wenjia Cai, **Max Callaghan**, Diarmid Campbell-Lendrum, Jonathan Chambers, Kim R. van Daalen, Carole Dalin, Niheer Dasandi, Shouro Dasgupta, Michael Davies, Paula Dominguez-Salas, Robert Dubrow, Kristie L. Ebi, Matthew Eckelman, Paul Ekins, Luis E. Escobar, Lucien Georgeson, Hilary Graham, Samuel H. Gunther, Ian Hamilton, Yun Hang, Risto Hänninen, Stella Hartinger, Kehan He, Jeremy J. Hess, Shih-Che Hsu, Slava Jankin, Louis Jamart, Ollie Jay, Ilan Kelman, Gregor Kiesewetter, Patrick Kinney, Tord Kjellstrom, Dominic Kniveton, Jason K. W. Lee, Bruno Lemke, Yang Liu, Zhao Liu, Melissa Lott, Martin Lotto Batista, Rachel Lowe, Frances MacGuire, Maquins Odhiambo Sewe, Jaime

Martinez-Urtaza, Mark Maslin, Lucy McAllister, Alice McGushin, Celia McMichael, Zhifu Mi, James Milner, Kelton Minor, Jan C. Minx, Nahid Mohajeri, Maziar Moradi-Lakeh, Karyn Morrissey, Simon Munzert, Kris A. Murray, Tara Neville, Maria Nilsson, Nick Obradovich, Megan B. O'Hare, Tadj Oreszczyn, Matthias Otto, Fereidoon Owfi, Olivia Pearman, Mahnaz Rabbaniha, Elizabeth J. Z. Robinson, Joacim Rocklöv, Renee N. Salas, Jan C. Semenza, Jodi D. Sherman, Liuhua Shi, Joy Shumake-Guillemot, Grant Silbert, Mikhail Sofiev, Marco Springmann, Jennifer Stowell, Meisam Tabatabaei, Jonathon Taylor, Joaquin Triñanes, Fabian Wagner, Paul Wilkinson, Matthew Winning, Marisol Yglesias-González, Shihui Zhang, Peng Gong, Hugh Montgomery, and Anthony Costello. The 2022 report of the Lancet Countdown on health and climate change: Health at the mercy of fossil fuels. *The Lancet*, 400(10363):1619–1654, November 2022.

- [2] Kim R. van Daalen, Marina Romanello, Joacim Rocklöv, Jan C. Semenza, Cathryn Tonne, Anil Markandya, Niheer Dasandi, Slava Jankin, Hicham Achebak, Joan Ballester, Hannah Bechara, **Max W. Callaghan**, Jonathan Chambers, Shouro Dasgupta, Paul Drummond, Zia Farooq, Olga Gasparyan, Nube Gonzalez-Reviriego, Ian Hamilton, Risto Hänninen, Aleksandra Kazmierczak, Vladimir Kendrovski, Harry Kennard, Gregor Kieseewetter, Simon J. Lloyd, Martin Lotto Batista, Jaime Martinez-Urtaza, Carles Milà, Jan C. Minx, Mark Nieuwenhuijsen, Julia Palamarchuk, Marcos Quijal-Zamorano, Elizabeth J. Z. Robinson, Daniel Scamman, Oliver Schmoll, Maquins Odhiambo Sewe, Henrik Sjödin, Mikhail Sofiev, Balakrishnan Solaraju-Murali, Marco Springmann, Joaquin Triñanes, Josep M. Anto, Maria Nilsson, and Rachel Lowe. The 2022 Europe report of the Lancet Countdown on health and climate change: Towards a climate resilient future. *The Lancet Public Health*, 7(11):e942–e965, November 2022.
- [3] Wenjia Cai, Chi Zhang, Shihui Zhang, Yuqi Bai, **Max Callaghan**, Nan Chang, Bin Chen, Huiqi Chen, Liangliang Cheng, Xueqin Cui, Hancheng Dai, Bawuerjiang Danna, Wenxuan Dong, Weicheng Fan, Xiaoyi Fang, Tong Gao, Yang Geng, Dabo Guan, Yixin Hu, Junyi Hua, Cunrui Huang, Hong Huang, Jianbin Huang, Linlang Jiang, Qiaolei Jiang, Xiaopeng Jiang, Hu Jin, Gregor Kieseewetter, Lu Liang, Borong Lin, Hualiang Lin, Huan Liu, Qiyong Liu, Tao Liu, Xiaobo Liu, Xinyuan Liu, Zhao Liu, Zhu Liu, Shuhan Lou, Chenxi Lu, Zhenyu Luo, Wenjun Meng, Hui Miao, Chao Ren, Marina Romanello, Wolfgang Schöpp, Jing Su, Xu Tang, Can Wang, Qiong Wang, Laura Warnecke, Sanmei Wen, Wilfried Winiwarter, Yang Xie, Bing Xu, Yu Yan, Xiu Yang, Fanghong Yao, Le Yu, Jiacan Yuan, Yiping Zeng, Jing Zhang, Lu Zhang, Rui Zhang, Shangchen Zhang, Shaohui Zhang, Qi Zhao, Dashan Zheng, Hao Zhou, Jingbo Zhou, Margaret Fu-Chun Chan Fung, Yong Luo, and Peng Gong. The 2022 China report of the Lancet Countdown on health and climate change: Leveraging climate actions for healthy ageing. *The Lancet Public Health*, 0(0), October 2022.
- [4] Finn Müller-Hansen, Yuan Ting Lee, **Max Callaghan**, Slava Jankin, and Jan C. Minx. The German coal debate on Twitter: Reactions to a corporate policy process. *Energy Policy*, 169:113178, October 2022.
- [5] Felix Creutzig, Leila Niamir, Xuemei Bai, **Max Callaghan**, Jonathan Cullen, Julio Díaz-José, Maria Figueroa, Arnulf Grubler, William F. Lamb, Adrian Leip, Eric Masanet, Érika Mata, Linus Mattauch, Jan C. Minx, Sebastian Mirasgedis, Yacob Mulugetta, Sudarmanto Budi Nugroho, Minal Pathak, Patricia Perkins, Joyashree Roy, Stephane de la Rue du Can, Yamina Saheb, Shreya Some, Linda Steg, Julia Steinberger, and Diana Ürge-Vorsatz. Demand-side

solutions to climate change mitigation consistent with high levels of well-being. *Nature Climate Change*, 12(1):36–46, January 2022.

- [6] **Max Callaghan**, Carl-Friedrich Schleussner, Shruti Nath, Quentin Lejeune, Thomas R. Knutson, Markus Reichstein, Gerrit Hansen, Emily Theokritoff, Marina Andrijevic, Robert J. Brecha, Michael Hegarty, Chelsea Jones, Kaylin Lee, Agathe Lucas, Nicole van Maanen, Inga Menke, Peter Pfleiderer, Burcu Yesil, and Jan C. Minx. Machine-learning-based evidence and attribution mapping of 100,000 climate impact studies. *Nature Climate Change*, 11(11):966–972, November 2021.
- [7] Lea Berrang-Ford, A. R. Siders, Alexandra Lesnikowski, Alexandra Paige Fischer, **Max W. Callaghan**, Neal R. Haddaway, Katharine J. Mach, Malcolm Araos, Mohammad Aminur Rahman Shah, Mia Wannewitz, Deepal Doshi, Timo Leiter, Custodio Matavel, Justice Issah Musah-Surugu, Gabrielle Wong-Parodi, Philip Antwi-Agyei, Idowu Ajibade, Neha Chauhan, William Kakenmaster, Caitlin Grady, Vasiliki I. Chalastani, Kripa Jagannathan, Eranga K. Galappaththi, Asha Sitati, Giulia Scarpa, Edmond Totin, Katy Davis, Nikita Charles Hamilton, Christine J. Kirchhoff, Praveen Kumar, Brian Pentz, Nicholas P. Simpson, Emily Theokritoff, Delphine Deryng, Diana Reckien, Carol Zavaleta-Cortijo, Nicola Ulibarri, Alcade C. Segnon, Vhalinavho Khavhagali, Yuanyuan Shang, Luckson Zvobgo, Zinta Zommers, Jiren Xu, Portia Adade Williams, Ivan Villaverde Canosa, Nicole van Maanen, Bianca van Bavel, Maarten van Aalst, Lynée L. Turek-Hankins, Hasti Trivedi, Christopher H. Trisos, Adelle Thomas, Shinny Thakur, Sienna Templeman, Lindsay C. Stringer, Garry Sotnik, Kathryn Dana Sjostrom, Chandni Singh, Mariella Z. Siña, Roopam Shukla, Jordi Sardans, Eunice A. Salubi, Lolita Shaila Safaee Chalkasra, Raquel Ruiz-Díaz, Carys Richards, Pratik Pokharel, Jan Petzold, Josep Penuelas, Julia Pelaez Avila, Julia B. Pazmino Murillo, Souha Ouni, Jennifer Niemann, Miriam Nielsen, Mark New, Patricia Nayna Schwerdtle, Gabriela Nagle Alverio, Cristina A. Mullin, Joshua Mullenite, Anuszkka Mosurska, Mike D. Morecroft, Jan C. Minx, Gina Maskell, Abraham Marshall Nunbogu, Alexandre K. Magnan, Shuaib Lwasa, Megan Lukas-Sithole, Tabea Lissner, Oliver Lilford, Steven F. Koller, Matthew Jurjonas, Elphin Tom Joe, Lam T. M. Huynh, Avery Hill, Rebecca R. Hernandez, Greeshma Hegde, Tom Hawxwell, Sherilee Harper, Alexandra Harden, Marjolijn Haasnoot, Elisabeth A. Gilmore, Leah Gichuki, Alyssa Gatt, Matthias Garschagen, James D. Ford, Andrew Forbes, Aidan D. Farrell, Carolyn A. F. Enquist, Susan Elliott, Emily Duncan, Erin Coughlan de Perez, Shaugn Coggins, Tara Chen, Donovan Campbell, Katherine E. Browne, Kathryn J. Bowen, Robbert Biesbroek, Indra D. Bhatt, Rachel Bezner Kerr, Stephanie L. Barr, Emily Baker, Stephanie E. Austin, Ingrid Arotoma-Rojas, Christa Anderson, Warda Ajaz, Tanvi Agrawal, and Thelma Zulfawu Abu. A systematic global stocktake of evidence on human adaptation to climate change. *Nature Climate Change*, 11(11):989–1000, November 2021.
- [8] Anne J. Sietsma, James D. Ford, **Max W. Callaghan**, and Jan C. Minx. Progress in climate change adaptation research. *Environmental Research Letters*, 16(5):054038, April 2021.
- [9] Vivien Fisch-Romito, Céline Guivarch, Felix Creutzig, Jan C. Minx, and **Max W. Callaghan**. Systematic map of the literature on carbon lock-in induced by long-lived capital. *Environmental Research Letters*, 16(5):053004, April 2021.
- [10] Felix Creutzig, **Max Callaghan**, Anjali Ramakrishnan, Aneeqe Javaid, Leila Niamir, Jan Minx, Finn Müller-Hansen, Benjamin Sovacool, Zakia Afroz, Mark Andor, Miklos Antal, Victor Court,

Nandini Das, Julio Díaz-José, Friederike Döbbe, Maria J. Figueroa, Andrew Gouldson, Helmut Haberl, Andrew Hook, Diana Ivanova, William F. Lamb, Nadia Maïzi, Érika Mata, Kristian S. Nielsen, Chioma Daisy Onyige, Lucia A. Reisch, Joyashree Roy, Pauline Scheelbeek, Mahendra Sethi, Shreya Some, Steven Sorrell, Mathilde Tessier, Tania Urmee, Doris Virág, Can Wan, Dominik Wiedenhofer, and Charlie Wilson. Reviewing the scope and thematic focus of 100,000 publications on energy consumption, services and social aspects of climate change: A big data approach to demand-side mitigation. *Environmental Research Letters*, 16(3):033001, February 2021.

- [11] Finn Müller-Hansen, **Max W. Callaghan**, Yuan Ting Lee, Anna Leipprand, Christian Flachsland, and Jan C. Minx. Who cares about coal? Analyzing 70 years of German parliamentary debates on coal with dynamic topic modeling. *Energy Research & Social Science*, 72:101869, February 2021.
- [12] Lea Berrang-Ford, Anne J. Sietsma, **Max Callaghan**, Jan C. Minx, Pauline F. D. Scheelbeek, Neal R. Haddaway, Andy Haines, and Alan D. Dangour. Systematic mapping of global research on climate and health: A machine learning review. *The Lancet Planetary Health*, 5(8):e514–e525, August 2021.
- [13] Francesca Diluiso, Paula Walk, Niccolò Manych, Nicola Cerutti, Vladislav Chipiga, Annabelle Workman, Ceren Ayas, Ryna Yiyun Cui, Diyang Cui, Kaihui Song, Lucy A. Banisch, Nikolaj Moretti, **Max W. Callaghan**, Leon Clarke, Felix Creutzig, Jérôme Hilaire, Frank Jotzo, Matthias Kalkuhl, William F. Lamb, Andreas Löschel, Finn Müller-Hansen, Gregory F. Nemet, Pao-Yu Oei, Benjamin K. Sovacool, Jan C. Steckel, Sebastian Thomas, John Wiseman, and Jan C. Minx. Coal transitions—part 1: A systematic map and review of case study learnings from regional, national, and local coal phase-out experiences. *Environmental Research Letters*, 16(11):113003, October 2021.
- [14] Tarun M. Khanna, Giovanni Baiocchi, **Max Callaghan**, Felix Creutzig, Horia Guias, Neal R. Haddaway, Lion Hirth, Aneeqe Javaid, Nicolas Koch, Sonja Laukemper, Andreas Löschel, Maria del Mar Zamora Dominguez, and Jan C. Minx. A multi-country meta-analysis on the role of behavioural change in reducing energy consumption and CO2 emissions in residential buildings. *Nature Energy*, 6(9):925–932, September 2021.
- [15] Pauline F. D. Scheelbeek, Alan D. Dangour, Stephanie Jarmul, Grace Turner, Anne J. Sietsma, Jan C. Minx, **Max Callaghan**, Idowu Ajibade, Stephanie E. Austin, Robbert Biesbroek, Kathryn J. Bowen, Tara Chen, Katy Davis, Tim Ensor, James D. Ford, Eranga K. Galappaththi, Elphin T. Joe, Issah J. Musah-Surugu, Gabriela Nagle Alverio, Patricia Nayna Schwerdtle, Pratik Pokharel, Eunice A. Salubi, Giulia Scarpa, Alcade C. Segnon, Mariella Siña, Sienna Templeman, Jiren Xu, Carol Zavaleta-Cortijo, and Lea Berrang-Ford. The effects on public health of climate change adaptation responses: A systematic review of evidence from low- and middle-income countries. *Environmental Research Letters*, 16(7):073001, July 2021.
- [16] Neal R. Haddaway, **Max W. Callaghan**, Alexandra M. Collins, William F. Lamb, Jan C. Minx, James Thomas, and Denny John. On the use of computer-assistance to facilitate systematic mapping. *Campbell Systematic Reviews*, 16(4):e1129, 2020.
- [17] **Max Callaghan** and Finn Müller-Hansen. Statistical Stopping Criteria for Automated Screening in Systematic Reviews. *Systematic Reviews*, September 2020.

- [18] **Max W. Callaghan**, Jan C. Minx, and Piers M. Forster. A topography of climate change research. *Nature Climate Change*, 10(2):118–123, February 2020.
- [19] Diana Ivanova, John Barrett, Dominik Wiedenhofer, Biljana Macura, **Max Callaghan**, and Felix Creutzig. Quantifying the potential for climate change mitigation of consumption options. *Environmental Research Letters*, 15(9):093001, August 2020.
- [20] Vivien Fisch-Romito, Celine Guivarch, Felix Creutzig, Jan C. Minx, and **Max W. Callaghan**. Systematic map of the literature on carbon lock-in induced by long-lived capital. *Environmental Research Letters*, 2020.
- [21] Finn Müller-Hansen, **Max W. Callaghan**, and Jan C. Minx. Text as big data: Develop codes of practice for rigorous computational text analysis in energy social science. *Energy Research & Social Science*, 70:101691, December 2020.
- [22] William F. Lamb, Felix Creutzig, **Max W. Callaghan**, and Jan C. Minx. Learning about urban climate solutions from case studies. *Nature Climate Change*, 9(4):279–287, April 2019.
- [23] Jérôme Hilaire, Jan C. Minx, **Max W. Callaghan**, Jae Edmonds, Gunnar Luderer, Gregory F. Nemet, Joeri Rogelj, and Maria del Mar Zamora. Negative emissions and international climate goals—learning from and about mitigation scenarios. *Climatic Change*, 157(2):189–219, November 2019.
- [24] Gregory F. Nemet, **Max W. Callaghan**, Felix Creutzig, Sabine Fuss, Jens Hartmann, Jérôme Hilaire, William F. Lamb, Jan C. Minx, Sophia Rogers, and Pete Smith. Negative emissions—Part 3: Innovation and upscaling. *Environmental Research Letters*, 13(6):063003, May 2018.
- [25] William F Lamb, **Max W Callaghan**, Felix Creutzig, Radhika Khosla, and Jan C Minx. The literature landscape on 1.5[deg]C climate change and cities. *Current Opinion in Environmental Sustainability*, 30:26–34, February 2018.
- [26] Sabine Fuss, William F. Lamb, **Max W. Callaghan**, Jérôme Hilaire, Felix Creutzig, Thorben Amann, Tim Beringer, Wagner de Oliveira Garcia, Jens Hartmann, Tarun Khanna, Gunnar Luderer, Gregory F. Nemet, Joeri Rogelj, Pete Smith, José Luis Vicente Vicente, Jennifer Wilcox, Maria del Mar Zamora Dominguez, and Jan C. Minx. Negative emissions—Part 2: Costs, potentials and side effects. *Environmental Research Letters*, 13(6):063002, May 2018.
- [27] Jan C. Minx, William F. Lamb, **Max W. Callaghan**, Sabine Fuss, Jérôme Hilaire, Felix Creutzig, Thorben Amann, Tim Beringer, Wagner de Oliveira Garcia, Jens Hartmann, Tarun Khanna, Dominic Lenzi, Gunnar Luderer, Gregory F. Nemet, Joeri Rogelj, Pete Smith, Jose Luis Vicente Vicente, Jennifer Wilcox, and Maria del Mar Zamora Dominguez. Negative emissions—Part 1: Research landscape and synthesis. *Environmental Research Letters*, 13(6):063001, May 2018.
- [28] Jan C. Minx, **Max Callaghan**, William F. Lamb, Jennifer Garard, and Ottmar Edenhofer. Learning about climate change solutions in the IPCC and beyond. *Environmental Science & Policy*, 77:252–259, November 2017.

- [29] Jan C. Minx, William F. Lamb, **Max W. Callaghan**, Lutz Bornmann, and Sabine Fuss. Fast growing research on negative emissions. *Environmental Research Letters*, 12(3):035007, March 2017.
- [30] Christoph von Stechow, Jan C. Minx, Keywan Riahi, Jessica Jewell, David L. McCollum, **Max W. Callaghan**, Christoph Bertram, Gunnar Luderer, and Giovanni Baiocchi. 2[deg]C and SDGs: United they stand, divided they fall? *Environmental Research Letters*, 11(3):034022, March 2016.

Non peer reviewed publications

- July 2022 **Here are the most effective things you can do to fight climate change**, *Guest post for the Conversation*, link.
- November 2021 **What 100,000 studies tell us about climate impacts around the world**, *Guest post for Carbon Brief*, link.

Software

- NACSOS **A Django site for managing collections of documents, screening or coding them, and doing NLP tasks with them like topic modelling or classification**, <https://doi.org/10.5281/zenodo.4121526>.
- Climate and Health Map **An interactive site built with Dash to present the results of a machine learning-assisted systematic map of climate and health literature**, <https://apsis.mcc-berlin.net/climate-health/>.
- The Homero-manteion **A digitized version of the ancient method of divination using Homeric poetry**, <http://homeromanteion.com/>.