ICLR 2025 Workshop on Tackling Climate Change with Machine Learning: Data-Centric Approaches in ML for Climate Action

URL `https://www.climatechange.ai/events/iclr2025` (not yet active)

Overview Climate change is a complex, multifaceted, and far-reaching challenge with increasingly severe consequences for humanity, as natural disasters multiply, sea levels rise, and ecosystems falter. Climate action takes many different forms and includes both climate change mitigation, e.g. designing smart electric grids (Nweye et al. (2023)) or tracking greenhouse gas emissions through satellite imagery (Bonczak et al. (2023)), and climate change adaptation, e.g. building flood resilience (Hussain et al. (2023)). Machine learning is emerging as a valuable tool in mitigating and adapting to climate change (Rolnick et al. (2022)), while climate change has been noted as a valuable area for inspiring cutting-edge algorithms in machine learning (Rolnick et al. (2024)). However, using machine learning to address climate change, requires close interdisciplinary collaboration among various fields with diverse practitioners (Tsoumas et al. (2022)). This workshop is intended to form connections and foster cross-pollination between researchers in machine learning and experts in complementary climate-relevant fields, in addition to providing a forum for those in the machine learning community who wish to tackle climate change. As such, the workshop directly relates to the topic of "Important Applications in [...] climate change" outlined in the Call for Workshops.

Theme This workshop distinguishes itself from previous editions of the popular 'Tackling Climate Change with Machine Learning' workshop series by focusing on the following key aspect: **data-centric approaches to ML for climate action**. Data-centric machine learning is not only a timely topic within the ICLR community, as analyzing and engineering (pre)training datasets becomes increasingly important, but holds specific challenges and opportunities in climate-related areas.

Data-centric machine learning considers the design, (pre)-processing and improvement of training data a separate, important engineering problem within machine learning modeling pipelines (Zha et al.). Data-centric perspectives are often most relevant in applications and specifically in scenarios where real-world data environments are challenging and can complicate the deployment of ML solutions. This condition is common in ML applications for climate action and has been acknowledged in several survey papers. For example, Roscher et al. (2024) categorize data-centric approaches to learning with Earth observation data, while Patil et al. (2024) comment on the importance of data-centric ML for agriculture. Salehi and Schmeink (2024) further argue that data-centric approaches may be able to help decrease computational demands of ML. Data-centric approaches have already shown promise in climate related applications such as smart grid management (Saad et al. (2019)) or water engineering (Fu et al. (2024)).

The theme will be reflected in the workshop program in several ways. The keynote talks aim to convey data-related challenges in real-world ML applications to the audience. One of the keynotes by Dr. Esther Rolf will dive into Earth observation data. We are still finalizing the second keynote speaker, but aim to leverage Singapore's vast academic ecosystem and, for example, recruit Dr. Koh Lian Pin, a renowned ecologist and conservation scientist. We are also planning a panel dedicated to data-centric ML, featuring researchers and practitioners including. Lastly, we are planning a panel discussing the particular challenges and opportunities of AI for climate action in Asia, for which we are specifically recruiting practitioners. Here, we could already confirm Karen Wang, the founder and CEO of Climind, a startup in the climate data space. Another goal of the workshop is to help connect attendees from different areas at the intersection of climate change and ML, allowing them to share their experiences and learn from one another. This is reflected in our time allotments for networking and social sessions.

Format We plan to have **2 keynote talks** (40 minutes each, including 10 minutes of Q&A), **2 panel discussions** (1 hour each), **10 spotlight talks** (10 minutes each) featuring papers selected from the workshop submissions, and **2 poster sessions** (1 hour each) for attendees to discuss research and exchange ideas. We will encourage **networking** and discussion throughout the workshop, especially during the lunch and coffee breaks. The social aspect of the workshop is critical and aims to help

attendees make connections spanning different academic areas and geographies. We also plan to hold an (offsite) **social event** after the end of the regular workshop sessions.

This structure and program is built on learnings from the previous workshops at ICLR and NeurIPS, after which attendees reported that socialization opportunities were seen as particularly valuable. We have accordingly somewhat reduced the scheduled content planned for this workshop, so as to improve the quality of conversations and organic connections for attendees. We also aim to secure an appropriately sized room for the workshop audience to allow for organic mingling, without the space feeling either too crammed or too empty. As with previous editions of the workshop, we are planning to host a mentorship program that matches senior community members with junior researchers who are seeking mentorship for preparing a submission to the workshop. This way, we hope to grow the workshop community and attract new (and especially local) audience members.

Review Process and Timeline We will post calls for submissions in December with a due date in early February as suggested by the conference. We will solicit two types of submissions: full papers discussing research or deployed work, and short papers, aimed at proposals for novel research projects and brief research findings. The short paper track is a continuation of the "proposals track" which has been reoccurring track at "Tackling Climate Change with Machine Learning" workshops over the past years. We will specify in the call that we will only consider previously unpublished work that will not appear at the main NeurIPS conference. Each submission will go through a double-blind review process from multiple machine learning and applied domain reviewers, and one meta-reviewer, using Microsoft CMT. Reviewers will be matched according to relevant subject areas, while meta-reviewers will be matched following a bidding process. Submissions to the previous edition of this workshops received an average of 3.38 reviews per paper. We will appropriately handle conflicts of interest through CMT. Of the submissions, 10 will be chosen as spotlight paper presentations, and approximately 90 will be chosen as posters (number is based roughly on the experience with submissions to previous workshops). We will notify authors of the decisions by March 5 as required by the conference, and we will also abide by any other centralized ICLR deadlines.

Reviewers Through previous workshops and other events, the Climate Change AI (CCAI) initiative has built a large community of expert reviewers working on addressing climate change and on machine learning methods and implementation. We will leverage this community when building the Program Committee and the mentors for our mentorship program (to prepare potential submitters with guidance and feedback prior to submission, discussed more in the *Diversity Statement*).

Attendance Our previous ICLR workshop in this series, at ICLR 2024 in Vienna, was attended by 200 participants in person and about 650 people in a livestream we set up specifically for this workshop in partnership with ICLR. The ICLR 2024 workshop had 122 submissions (75 accepted) across paper and proposal tracks. We are aiming to increase the number of submissions by advertising the workshop broadly, putting a special emphasis on outreach within the Asian climate change and machine learning communities. As such, we plan to grow the number of attendees to around 400. We also plan to offer travel grants to help strengthen attendance from groups that might otherwise have difficulties in joining in person (see *Diversity Statement*).

Provisional List of Speakers We have aim to bring a diverse set of voices, some of them confirmed, to speak on topics relevant to the theme of data-centric ML for climate action. Furthermore, we hope to take the opportunity of ICLR being hosted in Singapore to bring in speakers from around Asia to provide insights into the unique challenges and opportunities of AI for climate action within the region. Talk and panel titles and abstracts will be announced on the workshop website well in advance of the workshop.

Keynotes:

- Dr. Koh Lian Pin (*invited*): Director of the Centre for Nature-based Climate Solutions, Associate Vice President & Chief Sustainability Scientist, National University of Singapore
- Dr. Esther Rolf (*confirmed*): Assistant Professor, CU Boulder

Panel 1: Data-Centric Machine Learning in Climate-relevant Applications

- Dr. Hal Finkel (*invited*): Director of Computational Science Research and Partnerships Division, Advanced Scientific Computing Research, U.S. Department of Energy

- Dr. Dipti Srinivasan (*invited*): Professor, National University of Singapore
- Dr. Miao Chun Yan (*invited*): Professor, Nanyang Technological University
- Dr. Clayton Miller (*invited*): Assistant Professor, National University of Singapore

Panel 2: Challenges and Opportunities of ML for Climate Action in Asia

- Karen Wang (*confirmed*): Founder & CEO, Climind
- Pia Faustino (*invited*): Director for Social Impact and Sustainability, Thinking Machines Data Science
- Urvashi Aneja (*invited*): Founder & Executive Director, Digital Futures Lab
- James Askew (*invited*): Chief Development Officer, NatureVerse Inc.

Diversity Statement Climate change disproportionally affects already marginalized populations and low-income countries (Blau and Moncada (2015); Raworth (2008)). It is of utmost importance that the machine learning community put in every effort possible to strengthen and support marginalized communities rather than exacerbate harms against them (Birhane et al. (2022)). We firmly believe that the most effective path forward includes taking contributions from diverse populations, amplifying traditionally less-emphasized perspectives, and understanding our effects on all populations. Within our workshop, we are committed to diversity, equity, and inclusion in several ways:

- **Speakers:** Part of our mission with the invited keynote speakers and panelists is to bring diverse views to the forefront and question existing assumptions in the field of machine learning. An essential component of achieving that goal is ensuring that our invited speakers spans diverse genders, races, locations, ethnicities, ages, seniority levels, and fields of study. This aspect is particularly relevant for this iteration of ICLR, hosted in Singapore and we commit to empowering voices from the Asian climate change and machine learning communities. This is specifically reflected in our proposed panel on "Challenges and Opportunities of ML for Climate Action in Asia".
- **Organizers:** Our organizing team similarly spans multiple genders, races, ethnicities, seniorities, and sectors, and includes members based in the United States, the United Kingdom, Canada, Switzerland and Singapore.
- **Mentorship:** We aim to continue the successful mentorship program that we have run at workshops in the past. We solicit potential submitters (particularly early-stage researchers and those from underrepresented backgrounds) and match them with expert mentors from our Climate Change AI network for guidance and feedback prior to submission. This program has been effective in the past in helping researchers create high-quality submissions to the workshop and provides junior researchers with an opportunity to attend and network at a leading AI conference.
- **Contributing authors:** The workshop series has worked to cultivate a wide international network of researchers and practitioners from diverse fields and institutions who are committed to expanding diversity, and who will aid in soliciting submissions for our workshop. We will also continue to perform direct outreach to encourage submissions from communities such as Black in AI, LatinX in AI, Women in ML, Queer in AI, DisAbility in AI, Muslims in ML, Indigenous in AI, and MLDS Africa. Given the location of ICLR, we will put a specific emphasis on soliciting submissions from the Asian machine learning and climate change communities.
- **Participation grants:** As in our previous workshops, we plan to provide registration, travel, and accommodation grants for speakers and attendees. We will select grant recipients with the aim to increase accessibility for a diverse set of participants.

Earlier Versions Our previous workshops in this series received overwhelming interest, at NeurIPS 2019, 2020, 2021, 2022, 2023 and 2024; ICML 2019 and 2021; and ICLR 2020, 2023 and 2024, with several of the 2020/21 virtual editions attracting over 2000 attendees each. The workshop series as a whole has now received over 900 total submissions from 58 countries (on 6 continents) and many different fields, indicating a clear need within the ML community for research venues and opportunities for collaboration in this area. NeurIPS has been the ideal venue for this topic, and the NeurIPS workshops in this series have drawn significantly more attendees and richer participantion, to our knowledge, than any other academic events on AI and climate change.

Comparison with Other Workshops While several past workshops at major ML conferences have included some climate-relevant work (e.g. ML4D, ML for the Physical Sciences, AI4Mat, ML for Earth System Modeling, ML for Remote Sensing), our workshop series continues to be unique in being scoped towards using ML to mitigate and adapt to climate change, including applications from energy to biodiversity. As in past iterations of the series, we will collaborate with relevant parallel workshops to explore synergies and grow the discussion on ML and climate change from different angles.

Technical Needs Our needs will be typical of a large workshop at ICLR. We hope to request a presentation space for spotlight paper presentations, keynote speakers, and panel discussions. We would also be grateful for guidance facilitating the poster sessions and a networking lunch event in the workshop venue. To support interested audience members who cannot attend in person, we would seek support in recording and potentially livestreaming the workshop program.

To broaden participation for those for whom geography and finances may prove a barrier, as well as non-ML researchers who are less likely to attend ICLR, we have found it valuable in the past to cover the financial costs of livestreaming the workshop to a global audience, in partnership with SlidesLive, We are keen to work with ICLR again to make this option available if possible.

ORGANIZERS

Our team is excited to present this workshop proposal with both experienced organizers of past workshops in this series (Konstantin Klemmer, Melissa Chapman and Yoshua Bengio) and new members with complementary expertise (Lily Xu, Patrick Emami, Ivan Poon and Mélisande Teng). Many of the organizers are also leaders within Climate Change AI, a volunteer initiative that works to catalyze meaningful applications of ML to climate change. Konstantin Klemmer and Melissa Chapman will co-lead the organizing committee.

Konstantin Klemmer
Affiliation: Microsoft Research (incoming)
Website: `https://konstantinklemmer.github.io/`
Email address: konstantin.klemmer16@alumni.imperial.ac.uk
Interests and expertise: Konstantin is a Research Scientist at Microsoft Research. His work focuses on the development of machine learning techniques for geographic data, with a focus on self-supervised learning for large-scale Earth observation data. Konstantin received his Ph.D. from the University of Warwick and spend time at the Alan Turing Institute, NYU and TUM during his doctoral studies, before spending two years as a postdoctoral researcher at Microsoft Research New England. Konstantin has previously helped organize several workshops at leading machine learning conferences, such as the "Machine Learning for the Developing World (ML4D)" workshops at NeurIPS 2020 and 2021, and the "Tackling Climate Change with Machine Learning" workshop at ICLR 2023.

Melissa Chapman
Affiliation: ETH Zürich
Website: `https://milliechapman.info`
Email address: melissa.chapman@usys.ethz.ch
Interests and expertise: Millie is a research fellow at the National Center for Ecological Analysis and Synthesis, a visiting research faculty at Google, and an incoming assistant professor of Environmental Policy at ETH Zürich. Her work focuses on devising strategies for implementing multilateral biodiversity policy. Millie received her PhD from the University of California Berkeley in 2023 and has helped organize several interdisciplinary workshops and conferences, including at the World Biodiversity Forum and International Convention for Conservation Biology.

Lily Xu
Affiliation: University of Oxford
Website: `https://lily-x.github.io/`
Email address: `lily_xu@g.harvard.edu`
Interests and expertise: Lily Xu is a postdoc at the University of Oxford with the Leverhulme Centre for Nature Recovery and will start as an assistant professor at Columbia University in July 2025. Her work develops AI methods across reinforcement learning, optimization, and causal

inference for planetary health challenges, focused on effective decision-making under uncertainty. She serves as AI Lead for the SMART Partnership to support protected area management, has co-organized the EAAMO research initiative since 2020, and has co-organized several workshops including *AI-Assisted Decision-Making for Conservation* and *AI for Social Impact*, both at Harvard CRCS with participants coming from across the globe.

Ivan Poon
Affiliation: National University of Singapore
Website: `https://www.linkedin.com/in/ivan-poon-bb95a76a/`
Email address: e0013542@u.nus.edu
Interests and expertise: Ivan Poon is a PhD candidate in the Department of Building at the National University of Singapore (NUS) and serving as the Community Platform Co-Lead at CCAI. Ivan has extensive experience in the sustainability industry, including working with NGOs and he focuses on the intersection of machine learning and climate action. Ivan's primary research interests revolve around the application of solar energy in urban environments, particularly in optimizing energy generation and consumption in buildings.

Mélisande Teng
Affiliation: Université de Montréal, Mila
Website: `https://melisandeteng.github.io`
Email address: tengmeli@mila.quebec
Interests and expertise: Mélisande Teng is a PhD candidate at Université de Montréal / Mila - Quebec AI Institute. Her research focuses on applications of AI for biodiversity, developing methods for species distribution modelling and forest monitoring using remote sensing and citizen science data. She also has experience working with non-profits on projects related to digital sustainability. She has previously co-organized several workshops including the New in ML workshop at NeurIPS in 2022 and 2023.

Patrick Emami
Affiliation: National Renewable Energy Lab
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Interests and expertise: Patrick is a research scientist and principal investigator in the Computational Science Center at the U.S. National Renewable Energy Laboratory, where he leads the center's research efforts on foundation models for science. He received his Ph.D. from the University of Florida in computer science where he studied deep learning for scene understanding applied to to intelligent transportation systems. Patrick is currently volunteering as a guest editor for the CCAI special issue in the Environmental Data Science journal and as a meta-reviewer for the CCAI NeurIPS 2024 workshop.

Yoshua Bengio
Affiliation: Université de Montréal, Mila, CIFAR, and IVADO
Website: `https://yoshuabengio.org/`
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Interests and expertise: Yoshua Bengio is a Professor in the Computer Science and Operations Research departments at Université de Montréal, the Founder and Scientific Director of Mila - Quebec AI Institute, the Scientific Director of IVADO, Canada Research Chair in Statistical Learning Algorithms, as well as a Canada AI CIFAR Chair. Bengio is a recipient of the 2019 Turing Award for pioneering deep learning, officer of the Order of Canada, member of the Royal Society of Canada, a member of the NeurIPS board, and co-founder and general chair for the ICLR conference. His goal is to contribute to uncovering the principles giving rise to intelligence through learning, as well as favor the development of AI for the benefit of all.

Program Committee We are fortunate to have a robust and diverse population from which we source our proposed Program Committee. We maintain continued engagement from peer reviewers who have actively contributed to our past review and meta-review processes, and we will confirm their contribution upon workshop acceptance. We also plan to use Climate Change AI platforms (large mailing list, social media, and website) to recruit additional reviewers to maintain freshness and avoid reviewer burnout. Our proposed program committee whom we will confirm upon acceptance is comprised of the following people:

Abdulrahman A Ahmed
Alberto C. Chapchap
Alexandra V. Puchko
Alexandre Lacoste
Amelia Taylor
Andrew Ross
Aneesh Rangnekar
Ankur Mahesh
Fred Otieno
Frederik Gerzer
Frederik Kratzert
Gavin D. Portwood
Gege Wen
Genevieve E. Flaspohler
Geneviève Patterson
Haishan Wu
Hannah R. Kerner
Hao Sheng
Henning Schwabe
Hongseok Kim
Hovig Bayandorian
Ioannis C. Konstantakopoulos
Isaac Waweru
Isabelle Tingzon
Jack Kelly
Jefferson Sankara
Jeremy Irvin
Jesse Dunietz
Jessica Fan
Jigar Doshi
Jingfan Wang
Johan Mathe
John Kieffer
Jonathan Fürst
Joris Guerin
Joyjit Chatterjee
Julius Kügelgen
K. Shankari
Olivia Mendivil Ramos
Duncan Watson-Parris
Eniko Székely
Evan D. Sherwin
Fabrizio Falasca
Felipe Oviedo
Felix Laumann
Femke van Geffen
Filip Tolovski
Kris Sankaran
Kyungnam Park
Lauren Kuntz
Lea Boche
Levente Klein
Lexie Yang
Linda Petrini
loubna benabbou
Lucas Kruitwagen
Lucas Liebenwein
Lucas Spangher
Lynn H. Kaack
Marcus Voss
Maria Kaselimi
Markus Leippold
Martin Gauch
Matias Quintana
Mauricio Barahona
Mayur Mudigonda
Meareg Hailemariam
Melrose Roderick
Michael Steininger
Michael F. Howland
Miguel Molina-Solana
Mir A. Matin
Mohammad Mahdi Kamani
Neel Guha
Niccolo Dalmasso
Nicolai Meinshausen
Nikola Milojevic-Dupont
Kasia Tokarska
Kate Duffy
Katherine Stapleton
Kelly Kochanski
Kelton Minor
Kidane W. Degefa
Komminist Weldemariam
Sadegh Farhang
Sajad Haghanifar
Sam Skillman
Sandip K. Agarwal
Sara El Mekkaoui
Sasha Luccioni
Saumya Sinha
Sebastian Sippel
Shamindra Shrotriya
Sharon Zhou
Shruti Kulkarni
Sibusisiwe Makhanya
Simona Santamaria
Sookyung Kim
Sophie Giffard-Roisin
Soukayna Mouatadid
Stephan Rasp
Tianle Yuan
Tristan C. Ballard
Valentina Zantedeschi
Victor Schmidt
Victoria Preston
Volodymyr Kuleshov
Xin Hou
Ydo Wexler
Yimeng Min
Yue Hu
Yumna Yusuf
Zhecheng Wang
Zutao Yang
Diego Kiedansk
Pedram Hassanzadeh
Peetak P. Mitra
Priya L. Donti
Rajesh Sankaran
Raphaela Kotsch
Robin Dunn
Ruben Glatt
Anthony Ortiz
Ao Teng
Arijit Patra
Armi Tiihonen
Arvind T. Mohan
Ashesh K. Chattopadhyay
Ashley Pilipiszyn
Athanasios Voulodimos
Bill Cai
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Daniel Kofman
Daniel Livescu
Dara M. Farrell
David Dao
David Rolnick
Deval Pandya
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REFERENCES

A. Birhane, E. Ruane, T. Laurent, M. S. Brown, J. Flowers, A. Ventresque, and C. L. Dancy. The forgotten margins of ai ethics. In *Proceedings of the 2022 ACM Conference on Fairness, Accountability, and Transparency*, FAccT '22, page 948–958, New York, NY, USA, 2022. Association for Computing Machinery. ISBN 9781450393522. doi: 10.1145/3531146.3533157. URL https://doi.org/10.1145/3531146.3533157.

J. Blau and A. Moncada. *Human rights: A primer*. Routledge, 2015.

B. Bonczak, B. Hong, and C. E. Kontokosta. A high-resolution, data-driven model of urban carbon emissions. In *ICLR 2023 Workshop on Tackling Climate Change with Machine Learning*, 2023. URL https://www.climatechange.ai/papers/iclr2023/34.

G. Fu, D. Savic, and D. Butler. Making waves: Towards data-centric water engineering. *Water Research*, 256:121585, 2024. ISSN 0043-1354. doi: https://doi.org/10.1016/j.watres.2024.121585. URL https://www.sciencedirect.com/science/article/pii/S0043135424004871.

M. Hussain, M. Tayyab, K. Ullah, S. Ullah, Z. U. Rahman, J. Zhang, and B. Al-Shaibah. Development of a new integrated flood resilience model using machine learning with gis-based multi-criteria decision analysis. *Urban Climate*, 50:101589, 2023. ISSN 2212-0955. doi: https://doi.org/10.1016/j.uclim.2023.101589. URL https://www.sciencedirect.com/science/article/pii/S2212095523001839.

K. E. Nweye, A. Wu, H. Park, Y. Almilaify, and Z. Nagy. Citylearn: A tutorial on reinforcement learning control for grid-interactive efficient buildings and communities. In *ICLR 2023 Workshop on Tackling Climate Change with Machine Learning*, 2023. URL https://www.climatechange.ai/papers/iclr2023/2.

R. Patil, N. P. Sable, P. N. Mahalle, G. R. Shinde, P. Dhotre, and P. Chandre. Role of data-centric artificial intelligence in agriculture. In *Data-Centric Artificial Intelligence for Multidisciplinary Applications*, pages 159–176. Chapman and Hall/CRC, 2024.

K. Raworth. *Climate Wrongs and Human Rights: Putting people at the heart of climate change policy*, volume 117. Oxfam, 2008.

D. Rolnick, P. L. Donti, L. H. Kaack, K. Kochanski, A. Lacoste, K. Sankaran, A. S. Ross, N. Milojevic-Dupont, N. Jaques, A. Waldman-Brown, A. S. Luccioni, T. Maharaj, E. D. Sherwin, S. K. Mukkavilli, K. P. Kording, C. P. Gomes, A. Y. Ng, D. Hassabis, J. C. Platt, F. Creutzig, J. Chayes, and Y. Bengio. Tackling climate change with machine learning. *ACM Comput. Surv.*, 55(2), feb 2022. ISSN 0360-0300. doi: 10.1145/3485128. URL https://doi.org/10.1145/3485128.

D. Rolnick, A. Aspuru-Guzik, S. Beery, B. Dilkina, P. L. Donti, M. Ghassemi, H. Kerner, C. Monteleoni, E. Rolf, M. Tambe, et al. Application-driven innovation in machine learning. In *International Conference on Machine Learning (ICML)*, 2024.

R. Roscher, M. Rußwurm, C. Gevaert, M. Kampffmeyer, J. A. dos Santos, M. Vakalopoulou, R. Hänsch, S. Hansen, K. Nogueira, J. Prexl, and D. Tuia. Better, not just more: Data-centric machine learning for earth observation, 2024. URL https://arxiv.org/abs/2312.05327.

A. Saad, T. Youssef, A. T. Elsayed, A. Amin, O. H. Abdalla, and O. Mohammed. Data-centric hierarchical distributed model predictive control for smart grid energy management. *IEEE Transactions on Industrial Informatics*, 15(7):4086–4098, 2019. doi: 10.1109/TII.2018.2883911.

S. Salehi and A. Schmeink. Data-centric green artificial intelligence: A survey. *IEEE Transactions on Artificial Intelligence*, 5(5):1973–1989, 2024. doi: 10.1109/TAI.2023.3315272.

I. Tsoumas, G. Giannarakis, V. Sitokonstantinou, A. M. Koukos, D. A. Loka, N. S. Bartsotas, C. Kontoes, and I. N. Athanasiadis. Evaluating digital tools for sustainable agriculture using causal inference. In *NeurIPS 2022 Workshop on Tackling Climate Change with Machine Learning*, 2022. URL https://www.climatechange.ai/papers/neurips2022/72.

D. Zha, Z. P. Bhat, K.-H. Lai, F. Yang, and X. Hu. *Data-centric AI: Perspectives and Challenges*, pages 945–948. doi: 10.1137/1.9781611977653.ch106. URL https://epubs.siam.org/doi/abs/10.1137/1.9781611977653.ch106.