

Julia Kaltenborn

Machine Learning for Cryospheric Sciences

🌐 juliakaltenborn.github.io

EDUCATION

2021–today	M.Sc. / Ph.D. Computer Science (Fast-Track) Machine Learning for Climate Modeling and Cryospheric Sciences McGill University & Mila - Quebec AI Institute, Canada <i>Supervised by Prof. David Rolnick</i>
2017–2021	B.Sc. Cognitive Science Machine Learning and Computational Statistics University of Osnabrück, Germany <i>GPA: 4.0 (A+) out of 4.0, with distinction</i>
2019–2020	Semester Abroad at Chuo University Tokyo, Japan
2008–2016	Higher Education Entrance Qualification Private Secondary School Pindl, Regensburg <i>GPA: 4.0 (A+) out of 4.0, with distinction</i>
2013–2015	Early Studies for A-Level Students Chemistry at University of Regensburg

EXPERIENCE

07/2024–now	AI4Snow: AI for Snow Cover in Mountain Regions German Aerospace Center, European Space Agency, enveo, et al. <i>Supervised by Dr. Andreas Ditz, and Dr. Celia Baumhoer</i>
08/2025–now	ML4Cryo: Review Paper Kim Bente, Andrew McDonald, Prof. David Rolnick, and Dr. Chris Derksen <i>Initiating the ML4Cryo community and organizing a large review paper.</i>
01/2022–07/2024	Building Climate Emulators with Causal Machine Learning Mila - Quebec AI Institute & Intel AI. PI: Prof. David Rolnick. <i>Main lead of research project, milestones and resource management, developing of project vision and goals, alignment of different project streams, conflict management, support for and supervision of several intern and students.</i>
01/2024–07/2024	Snow Sound Pen: Support in Development of Novel Snow Measurement Device WSL Institute for Snow and Avalanche Research (ETH), Switzerland <i>Supervised by Tiziano Di Pietro, and Dr. Martin Schneebeli</i>
06/2023–08/2023	Juneau Icefield Research Program Foundation for Glacier and Environmental Research <i>Traverse of Juneau icefield with focus on glaciology & cryospheric sciences, mountaineering, wilderness survival, and research expedition skills.</i>

05/2021–05/2022	Extratropical Cyclone Prediction with Fourier Neural Operators Intern, Climate Modeling Alliance Team, California Institute of Technology <i>Supervised by Prof. Tapio Schneider, Dr. Lenka Novak and Dr. Jinlong Wu</i>
11/2020–04/2021	Bachelor Thesis on Automatic Snow Classification WSL Institute for Snow and Avalanche Research (ETH), Switzerland <i>Supervised by Dr. Martin Schneebeli, Dr. Viviane Clay and Amy Macfarlane</i>
07/2019–09/2019	Mitacs Globalink Research Internship “Integrated Regional Management of Water Resources” Université INRS, Québec; <i>Supervised by Prof. Taha Ouarda</i>

SCHOLARSHIPS AND AWARDS

2017–2023	Scholarship of the German Academic Scholarship Foundation , awarded to less than 1% of German students (> 66k CAD)
2021–2023	McGill DeepMind Fellowship (40k CAD / year)
2021–2022	Mitacs Globalink Graduate Fellowship (14k CAD)
2023–2025	Differential Fee Waiver Award, School of Computer Science, McGill University (15k CAD / semester)
2022	Mila Startup Status (15k CAD for “Our Dialogue About AI”)
2024	Grad Excellence Award, McGill University (6k CAD)
2023	Joan W. Miller Scholarship (Juneau Icefield Research Program) (1k USD)

PUBLICATIONS

- [1] S. Hickman, I. Trajkovic, J. Kaltenborn, F. Pelletier, A. Archibald, Y. Gurwicz, P. Nowack, D. Rolnick, and J. Boussard, “Causal climate emulation with bayesian filtering”, *Advances in Neural Information Processing Systems*, 2025.
- [2] J. Kaltenborn, C. Lange, V. Ramesh, P. Brouillard, Y. Gurwicz, C. Nagda, J. Runge, P. Nowack, and D. Rolnick, “Climateset: A large-scale climate model dataset for machine learning”, *Advances in Neural Information Processing Systems*, vol. 36, pp. 21 757–21 792, 2023.
- [3] J. Boussard, C. Nagda, J. Kaltenborn, C. E. E. Lange, P. Brouillard, Y. Gurwicz, P. Nowack, and D. Rolnick, “Towards causal representations of climate model data”, in *NeurIPS 2023 Workshop on Tackling Climate Change with Machine Learning*, 2023.
- [4] J. Kaltenborn, V. Clay, A. R. Macfarlane, and M. Schneebeli, “Automatic snow type classification of snow micropenetrometer profiles with machine learning algorithms”, *Geoscientific Model Development*, vol. 16, no. 15, pp. 4521–4550, 2023.
- [5] J. Kaltenborn, V. Clay, A. R. Macfarlane, and M. Schneebeli, “Machine learning for snow stratigraphy classification”, in *NeurIPS 2021 Workshop on Tackling Climate Change with Machine Learning*, 2021.
- [6] T. Di Pietro, J. Kaltenborn, S. Groninger, C. Mitterer, and M. Schneebeli, “Acoustic snow stratigraphy measurements - from the sound of breaking snow towards enhanced snowpack stability assessment”, in *International Snow Science Workshop*, 2024, pp. 1065–1072.
- [7] A. Moreno-Rodenas, K. Verbist, A. Mertens, ..., J. Kaltenborn, ..., and G. Amarnath, “Applications of ai for water management”, UNESCO, Tech. Rep., 2025, (Contribution: Chapter 3.1.4 “Assessment of the Cryosphere”).

TALKS

- “Towards Snowpack Emulation”, *Machine Learning for Earth System Modelling*, Bonn, Germany, 25 Aug 2025. *Oral*.
- “Assessing Machine Learning’s Impact on Cryospheric Sciences”, *International Atomic Energy Agency - Technical Meeting*, Vienna, Austria, 11 Mar 2025. *Invited Talk*.
- “Assessing Machine Learning’s Impact on Cryospheric Sciences”, *SIAM Conference on Computational Science and Engineering (CSE25)*, Fort Worth, Texas, 06 Mar 2025. *Invited Talk*.
- “ClimateSet: A Large-Scale Climate Model Dataset for Machine Learning”, *Large-Scale Deep Learning for the Earth System*, Bonn, Germany, 30 Aug 2024. *Oral*.
- “ClimateSet: A Large-Scale Climate Model Dataset for Machine Learning”, *Machine Learning for Earth System Modeling: Accelerating Pathways to Impact*, International Conference on Machine Learning (ICML) 2024, Vienna, Austria, 26th Mar 2024. *Invited Talk*.
- “ClimateSet: A Large-Scale Climate Model Dataset for Machine Learning”, Guest Lecture for the DataLearning Group Seminar, Imperial College London, 21st May 2024. *Invited Talk*.
- “ClimateSet: A Large-Scale Climate Model Dataset for Machine Learning”, Guest Lecture Series at Kungfu.ai, 1st Mar 2024. *Invited Talk*.
- “Machine Learning for the Cryosphere - A Call for Collaboration”, C42A - Machine Learning and the Cryosphere, AGU Annual Meeting 2023, San Francisco, USA, 14th Dec 2023. *Invited Talk*.
- “Juneau Icefield Research Program 2023”, Sustainability Reading Group, Mila - Quebec Artificial Intelligence Institute, Montreal, Canada, 2nd Oct 2023.
- “What is AI?”, Our Dialogue, Germany, 06th Aug 2022. Available in German on YouTube.
- Invited Panelist: “The future of Neuro-AI: Climate change”, Unique Student Symposium 2022, 10th Jun 2022.
- “Climate Change and Machine Learning: An Overview”, NEC Laboratories Europe GmbH, Heidelberg, 6th Apr, 2022.
- “Machine Learning for Climate Science”, Institute of Cognitive Science, Osnabrück, 14th Oct, 2021.

MEDIA

- “Using AI to predict climate variations over a century”, Mila - Quebec AI Institute, News and Announcements, 5th Dec 2023. Available online.
- “How can AI help us fight climate change?”, AI by You - Julia’s story, DeepMind, UK, 7th Nov 2022. Social media content, available on YouTube, Twitter, LinkedIn and Instagram.
- “Julia Kaltenborn: Being a climate activist, Arctic expeditions, participatory democracy and hope”, The Polymess Podcast, Benno Krojer, 14th Mar 2023. Available on Spotify.
- “Women, science and changing the world with Julia Kaltenborn”, Why we will make it Podcast, Ariana Gomez, 3rd May 2023. Available on Spotify.
- “Using AI to predict climate variations over a century”, Mila Interview, Julien Besset, 5th Dec 2023. Available on Mila’s website.

MENTORING AND SUPERVISION

- Marlena Reil (BSc), mentoring of MSc studies and research projects, 07/2024 - 08/2026.
- Christina Isaicu (MSc), mentoring of MSc thesis, 01/2025 - 08/2025.
- Charlotte Lange (BSc), 2 years of full-time collaboration and direct supervision, 2022 - 2024.
- Leandra Brauchel (BSc), co-supervision of BSc thesis on “Automated Segmentation of Near-Infrared Snow Imager”, 2024.
- Felix Nahrstedt (MSc), supervision of MSc thesis on “Scaling the Superemulator for ClimateSet: Extending Machine Learning Capabilities to 36 Climate Models”, 2024.

TEACHING EXPERIENCE

- 02/2025 **Teaching and Co-Organization of "AI and Drone Workshop"**
Landscape Carbon Workshop 2025 (Yellowknife, Northwest Territories)
Participants: Indigenous Community Members, Policy Makers, & Scientists
- 10/2018–03/2021 **Teaching and Research Assistant at the Institute of
Cognitive Science (University of Osnabrück, AI Department)**
(2020) Teaching Assistant for "Methods of Artificial Intelligence"
(2019) Tutoring in "Introduction to AI and Logic Programming"

SELECTED SERVICE

- 2026 **Lead Organizer of the Polar ECLIPSE School**
🌐 polar-eclipse-school.github.io
Early Career Learning and Integration in Polar Science Engagement.
Iceland, 2026. Funded by the IGS (International Glaciology Society).
- 2025 **Co-Founder of "ML4Cryo"**
🌐 ml4cryo.github.io
Community Platform for those working at the intersection between machine
learning and cryospheric sciences. Co-Founders: Kim Bente and Andrew Mc-
Donald.
- 2025 **Convening "ML for Cryospheric Sciences" Session, EGU 2025**
Organizing and coordinating workshop-style session
- 2024 **Co-Convening "AI and ML for the Cryosphere" Session, AGU 2024**
Organizing and coordinating workshop-style session
- 2023 **Member of Mila's Sustainability Committee**
Supporting Mila to become a sustainable AI research institute
- 2022 **Committee member of "AI Helps Ukraine - Charity Conference"**
🌐 aihelpsukraine.cc
- 2020 **Co-Founder of "Unser Dialog"**
Building effective solutions from diverse and structured dialogue
Organizing "Our Dialogue About AI", an educational program for the public
🌐 unserdialog.org