Thea Quistgaard

PHD STUDENT · DEPARTMENT OF ENVIRONMENTAL SCIENCE

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I am a second-year PhD student at Department of Environmental Science, Aarhus University, Denmark, with a research focus on developing and implementing deep learning models for high-resolution climate downscaling and modelling.

I believe it is crucial for researchers working with AI to understand the models they aim to emulate, the data they use to train the models on, and the HPC mechanisms that drive them. I am especially interested in how we can join forces between modelling and learning to improve the accuracy and efficiency of climate projections crucial for understanding and mitigating impacts of climate change.

Education

Aarhus University

Frederiksborgvej 399, 4000 Roskilde, Denmark
September 2022 - present

PHD IN CLIMATE MODELING (EXPECTED END DATE SEPTEMBER 2025)
- Main supervisor: Professor Peter L. Langen (AU ENVS)
- Co-supervisor: Professor Simon Stisen (GEUS HYDRO)
- Part of the "**PEA**tlands and **C**limate-driven variability in groundwater depth – Impacts on greenhouse gas **E**missions".
- High focus on developing Deep Learning methods for high resolution climate projections.
- Name of thesis

University of Copenhagen

Tagensvej 16, 2200 København N, Denmark
August 2018 - September 2021

MSC IN COMPUTATIONAL PHYSICS
- **Master's Thesis**: "Laki to Tambora: Signal Restoration and Pattern Recognition in Ultra High Resolution Volcanic and Isotopic Signals"
- Main supervisor: Professor Vasileios Gkinis (PICE NBI UCPH
- Co-supervisor: Professor James Avery (NBI UCPH)

University of Copenhagen

Blegdamsvej 17, 2400 København Ø, Denmark
August 2014 - January 2018

BSC IN PHYSICS
- **Bachelor's Thesis**: "Seismic Tomography and Two Dimensional RayTracing",
- Supervisor: Klaus Mosegaard

Professional Experience

2024	**Visiting researcher**, IDYST, Université de Lausanne, Lausanne Switzerland
2023-2024	**Researcher at the MAIA project,** Department of Environmental Science, Aarhus University
2021-2022	**Research Assistant,** Physics of Ice, Climate and Earth, Niels Borh Institute, University of Copenhagen
2017-2019	**Laboratory Assistant,** Physics of Ice, Climate and Earth, Niels Borh Institute, University of Copenhagen

Publications

PUBLISHED

K. B. Fals, **T. Quistgaard**, P. Almlund, M. Ejsing, I. Papazu, S. Christensen, J. D. Pøhler, M. Toft, K. L. Christiansen, L. Weldingh, C. A. Salling, N. G. Fiig, L. Horn. Regeringen afviser al klimaforskning, der ikke passer ind i dens kram. Information. Danish Newspaper. https://www.information.dk/debat/2023/09/regeringen-afviser-al-klimaforskning-passer-dens-kram

V. Gkinis, B. M. Vinther, T. J. Popp, **T. Quistgaard** et al. 2021. A 120,000-year long climate record from a NW-Greenland deep ice core at ultra-high resolution. Nature - Scientific Data, 8, 141. https://doi.org/10.1038/s41597-021-00916-9

In Review

V. Gkinis, S. Jackson, N. J. Abram, T. Blunier, M. Harlan, H. A. Kjær, A. D. Moy, K. M. Peensoo, **T. Quistgaard**, A. Svensson, and T. R. Vance. An East Antarctic, sub-annual resolution water isotope record from the Mount Brown South Ice core. Nature - Scientific Data

In Prep

T. Quistgaard, S. Stisen, T. Denager, R. M. Schneider, P. L. Langen. Dowsncaling with Diffusion models - A new Road to High-Resolution Climate Projections

T. Quistgaard, S. Stisen, T. Denager, R. M. Schneider, P. L. Langen. Bridging the gap between regional climate models and local reanalysis: From CORDEX to DANRA.

Awards, Fellowships, & Grants

2024	**Travel Grant**, The Faculty of Technical Sciences, Aarhus University	*DKK 20,000*
	Travel Grant, Knud Højgaards Fond	*DKK 14,000*

Presentations

Talks

Winter 2024. *Peatlands: To rewet or not to rewet?*. PhD Bundle Day, Department Of Environmental Science, Aarhus University, Roskilde.

Autumn 2023. *Grønlandske iskerner - En iskold tidsmaskine*. Invited talk: Guest Lecture, High School Inspirational Talk, Rysensteen Gymnasium, Copenhagen

Spring 2023. *A Song of Ice and Fire ...and Earth ...and Air*. PhD Bundle Day, Department Of Environmental Science, Aarhus University, Roskilde.

Spring 2023. *Peatlands, Hydrology and Emissions*. Invited talk: Science Slam, Planetarium, Copenhagen

Autumn 2023. *ML and AI in Climate and Meteorology*. Invited talk: Strategy Seminar for the Climate Modelling Group, Department of Environmental Science, Aarhus University, Roskilde.

Poster Presentations

T. Quistgaard, P. L. Langen, T. Denager, R. J. M. Schneider, S. Stisen. 2024. Diffusion Models and Multi-Channel Data Integration: A New Road to High-Resolution Statistical Downscaling. Poster at EGU General Assembly, Vienna, Austria.

T. Quistgaard, P. L. Langen, T. Denager, R. J. M. Schneider, S. Stisen. 2023. Deep Learning Guided Statistical Downscaling of Climate Projections for Use in Hydrological Impact Modelling in Danish Peatlands. Poster at EGU General Assembly, Vienna, Austria.

T. Quistgaard, M. Sahyoun, M. Larsen, A. S. Lansø, Z. Ye, P. L. Langen, . 2022. Eart System Modeling. Poster presentation: Department Seminar for the Department of Environmental Science, Helsingør.

Teaching Experience

January 2024	**Python Programming Course**, Lecturer and Teaching Assistant	*ENVS, AU*
May 2023	**Data Science Workshop: Introduction to Machine Learning**, Lecturer and Teaching Assistant	*ENVS, AU*
Spring 2018	**Electromagentism and Waves**, Laboratory Teaching Assistant	*NBI, UCPH*
Winter 2018	**Highschool 1st, 2nd and 3rd year mathematics**, High School Teacher (Maternity Leave Cover)	*Bagsværd Gymnasium*

Mentoring

2023-2024   **Rune Koktvedgaard Zeitzen**, MSc-student, Niels Bohr Institute, University of Copenhagen
2022-2024   **Jonathan Melcher**, MSc-student, Niels Bohr Institute, University of Copenhagen

Outreach & Professional Development

SERVICE AND OUTREACH

2022   **Outreach for Department of Environmental Science**, LinkedIn Content Creator
2019-2022   **High School Outreach for Physics of Ice, Climate and Earth**, Visiting high schools. Visits in lab from high school classes
Summer 2023   **Summer Hangout at Faculty of Technical Sciences, Aarhus University**, Poster presentations and dissemination

DEVELOPMENT

Assistant researcher, working on statistical analysis on the MAIA project for examining arctic aerosol fluxes and the effect of water vapour transport.

Workshop On Social Media for Professional Use, Autumn 2022, a one-day workshop specifically tailored to get researchers more engaged with the public by proper use of social media, especially through LinkedIn and Twitter.

Time and Project Management Workshop, Autumn 2023, focused on how to better spend your time, in your day-to-day work, and on larger project scale.

Moving your AI training jobs to LUMI: A Hands-On Workshop, Spring 2024, two-day short course focused on getting AI-jobs to run on the supercomputer LUMI, with AMD GPUs.

LUMI Intro Course, Spring 2024, a short course with focus on introduction to the Supercomputer LUMI's specific architecture and workings.

Communicating Science to and for the Public, Winter 2024, an afternoon in the Green Network for Researcher, with discussions on how we best disseminate our research and its urgency to the public.

PROFESSIONAL ENGAGEMENTS & AFFILIATIONS

Founder and chair of Sustainability Work Group, at Department of Environmental Science. Lead on developing an emissions inventory for the department.

Vice chair of the PhD Committee, at the Faculty of Technical Sciences, Aarhus University. Initiator and organiser of faculty-wide PhD Writing Camp Retreat. Pushing the faculty and management towards greener decisions, fair and ethical research, and equal opportunities for all.

Active member of the Green Network for Researchers, working with media and dissemination. Published opinion-editorial in Information.

Member of the Department Forum, at Department of Environmental Science. Focus on implementing green accountability at department level and creating a sustainable working environment - in all aspects of the word.

Member of Kvinder i Fysik, a Danish network for women in phsyics.

Founder of PhD Student Committee, to organize the PhD students at the Department of Environmental Science and improve the work-lives of the students. Established a yearly writing camp for PhD students at department level, started weekly PhD-lunches, monthly PhD-committee meetings, and monthly friday bars.

Educational information & skills

Relevant coursework

Science Teaching (2.5 ECTS), Spring 2024, Graduate School of Technical Sciences, Aarhus University

Science Writing and Communication (4 ECTS), Winter 2024, Graduate School of Technical Sciences, Aarhus University

Advanced Deep Learning (7.5 ECTS), Spring 2023, Department of Computer Science, University of Copenhagen

Modelling and Statistical Analysis of Extremes in Time Series (2 ECTS), Autumn 2023, Department of Mathematical Sciences, University of Copenhagen

Interdisciplinary Journal Club (2 ECTS), Autumn 2022 to Autumn 2025, Department of Environmental Science, Aarhus University

Skills

Technical skills

- Programming languages: Python, C++, MatLab, Julia
- Deep Learning Frameworks: TensorFlow, PyTorch
- HPC tools: MPI, OpenMP
- Climate modelling tools: CDO, Copernicus CDS API

Analytical skills

- Statistical analysis and modelling
- Data analysis and visualization: pandas, seaborn, matplotlib
- Version control with git
- Latex and MS office

Soft skills

- Problem-solving and critical thinking
- Teamwork and collaboration
- Creative and clear visualization
- Communication and dissemination (written and verbal)
- Languages: Danish, English, (German, French)