






# Svenja Frey

M. SC. CANDIDATE CLIMATE CHANGE - THE PHYSICAL CLIMATE SYSTEM

## CONTACT

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## SKILLS

### Tools

Python   Matlab   ML  
LaTeX   ArcGIS Pro

### Languages

German   Native  
English   C2 (IELTS certified)  
French   B1

## HOBBIES

 Board Games  
 Trekking  
 Reading

## WORK EXPERIENCE

### Niels Bohr Institute, Copenhagen University

*Copenhagen, DK*

TEAMOCEAN (PROF. MARKUS JOCHUM) | RESEARCH STAFF (10H/WEEK)

FEB 2024 - MAY 2025

- Extracted and processed climate model data from an HPC server using terminal commands and remote connections.
- Conducted data analysis in Python, applying statistical methods to interpret model outputs.
- Analyzed Arctic air-sea flux variations in 21st-century climate projections from the CESM.
- Presented scientific findings at working group meetings, effectively communicating research results.
- Explored machine learning approaches for causal inference in the carbon cycle during the last glacial period, focusing on neural network forecasting and PCMC.
- Delivered a seminar on causal machine learning at a summer work retreat, sparking discussion and new approaches concerning its application in climate science.

### University of Gothenburg

*Gothenburg, SE*

PHYSICAL OCEANOGRAPHY (PROF. FABIEN ROQUET) | INTERNSHIP

SEP 2024 - NOV 2024

- Analyzed the Pacific Ocean's Oxygen Minimum Zone (OMZ) using data from a 21st-century CESM (SSP5-8.5) integration.
- Developed and applied Python-based metrics to quantify and describe OMZ characteristics.
- Calculated the full oxygen budget from CESM model outputs, following the model's user manual and resolving complex computational challenges.
- Adapted to technical difficulties and troubleshooting challenges during the oxygen budget analysis.
- Presented research findings in a poster session for prospective master's students.

### ICYMare Conference 2023

*Oldenburg, DE*

PRESENTATION

SEP 2023

- Topic talk: Ocean Heat and Carbon Storage under net-negative emissions.
- Gave a conference talk, preparing all presentation materials and managing the application process independently.
- Designed clear and engaging slides to convey key results.

### GEOMAR Helmholtz Center for Ocean Research

*Kiel, DE*

BIOGEOCHEMICAL MODELING | INTERNSHIP

MAR 2023 - MAY 2023

- Analyzed and visualized ocean heat and carbon storage/release during net-negative emissions using the UVic Earth System Model.
- Processed and interpreted ocean tracer data in MATLAB to assess key biogeochemical dynamics.
- Presented findings at a group meeting, ensuring knowledge transfer within the team.
- Contributed analyses and results that supported the development of a research paper (currently in writing).

## EDUCATION

### University of Copenhagen

Copenhagen, DK

#### M. SC. CLIMATE CHANGE - THE PHYSICAL CLIMATE SYSTEM

Sep 2023 - June 2025

- Developed a strong foundation in the physical climate system, and climate modeling and attribution, with an emphasis on interdisciplinary research approaches.
- Gained expertise in analyzing and interpreting climate data, with a focus on numerical modeling and data-driven methods.
- Elective coursework in machine learning applications for climate science and oceanography.
- Thesis: Neural Network Forecasting of Oxygen Minimum Zones in a warming world.

### University of Gothenburg

Gothenburg, SE

#### MARINE SCIENCES | ERASMUS EXCHANGE

Sep 2024 - Jan 2025

- Completed a research internship in marine science, enhancing research and analytical skills.
- Took specialized coursework in Physical Oceanography (Waves and Instabilities) and Ocean Data Analysis.

### Carl von Ossietzky University

Oldenburg, DE

#### B. SC. ENVIRONMENTAL SCIENCES | GRADE 1.2

Oct 2021 - Aug 2023

- Specialization in mathematical modeling and oceanography.
- Thesis: Modeling Dissolved Organic Matter (DOM) in the Ocean (Grade 1.0)

### Markgrafen Gymnasium

Karlsruhe, DE

#### ABITUR | GRADE 1.0

Sep 2011 - July 2020

### Parkland Secondary School

Sidney B.C., CA

#### STUDY ABROAD | YEAR 11

Aug 2017 - July 2018

## PROJECTS

### Selected Projects from University Courses

#### EDDY DETECTION AND TRACKING ALGORITHM

- Independent project: Developed and implemented a simple eddy detection and tracking algorithm in Python.
- Analyzed mesoscale eddies in the Kuroshio Current using GLORYS12V1 ocean reanalysis data from Copernicus.
- Applied sea surface height, potential vorticity, and the Okubo-Weiss parameter to identify and classify eddies.
- Successfully tracked eddy trajectories over multiple months, demonstrating the algorithm's effectiveness.

#### WILDFIRE FORECASTING

- Group project (3 people): Developed a wildfire forecasting algorithm using machine learning, involving collaborative planning and task coordination.
- Implemented both decision-tree (XGBoost) and CNN-based classification models to predict wildfire occurrences.
- Trained models on ERA5 reanalysis data to forecast wildfires using satellite observations from North America.
- Integrated spatial climate data into predictive frameworks to improve model accuracy and reliability.

#### MODELING FUTURE CARBON STORAGE IN FOREST

- Group project (6 people): The Northward Shift of Boreal Forest into Tundra under Climate Change: Analysis of Impacts on Climate, Society, and Biodiversity
- Led coordination and planning efforts, taking on leadership responsibilities within the team.
- Individually responsible for simulating future carbon storage and vegetation composition in Northern Sweden using the LPJ-GUESS Educational Model.
- Extracted and processed SSP scenario data from the IPCC, using it to force the model for future climate projections.
- Performed site-level bias correction, using in-situ data from Abisko to refine model accuracy.
- Ran the simulations independently, analyzed the model outputs, and visualized results using Python.