Hameed Moqadam

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Education

- **Ph.D. in Glaciology & Computer Science** *09.2021 – 04.2025*
  Alfred Wegener Institute / Constructor University Bremen Bremerhaven/Bremen, Germany
  - Thesis: "Tracing Extended Internal Stratigraphy in Ice Sheets using Computer Vision Approaches"
  - Developed novel machine learning (ML) and deel learning (ML) and mathematical models for radar image analysis.

- **MS.c in Environmental Engineering** *2014 – 2017*
  Lappeenranta University of Technology (LUT) Lappeenranta, Finland
  - Thesis: "Modelling of biomass combustion chemistry to investigate gas phase alkali sulfate formation"
  - Computational Fluid Dynamics (CFD) methods using both open-source and commercial approaches.

- **BS.c in Thermo-fluid Mechanical Engineering** *2005 – 2009*
  Tehran South University Tehran, Iran
  - Thesis: "Thermodynamic analysis of Brayton cycle and gas turbine"
  - Core studies in fluid mechanics, thermodynamics, mechanical design, and heat transfer.

Research Experience

- **Doctoral researcher** *09.2021 – 04.2025*
  Alfred Wegener Institute Bremerhaven, Germany
  - Automatic **ice sheet stratigraphy** mapping, using **deep learning**
  - Generation of stratigraphy mapping **benchmark dataset**
  - Interpolated slope field, synthetic slope traces
  - Novel evaluation metrics
  - Performed research expedition to Antarctica for field data collection
  - **Review** of shortcomings of different stratigraphy mapping methods

- **HIDA-NORA fellow, Visiting researcher** *11.2024 – 01.2025*
  University of Bergen, Informatics department, Machine Learning Group Bergen, Norway
  - Machine Learning group, Generative AI
  - Collaborated on integrating advanced computer vision techniques with glaciological research
  - HIDA-NORA funded research exchange program

- **Researcher** *12.2018 – 10.2020*
  Forschungszentrum Jülich Jülich, Germany
  - Stratospheric ice nucleation modelling using microphysics model MAID
  - Stratospheric dynamics using lagrangian model CLaMS

- **Research assistant** *03.2018 – 09.2018*
  Lappeenranta University of Technology, Thermodynamics Lab Lappeenranta, Finland
  - Numerical modelling of combustion
  - Computational fluid dynamics (CFD)

- **Junior Researcher (Master Thesis worker)** *06.2016 – 11.2016*
  TU Graz Graz, Austria
  - Combustion physics
  - Numerical simulation of combustion kinetics (Python implementation)

- **Junior Researcher** *10.2015 – 03.2016*
  The Netherlands Organization for applied scientific research (TNO) Petten, the Netherlands
  - Mathematical modelling of CO_2 adsorption (Matlab implementation)

- **Research Intern** *05.2015 – 09.2015*
  Lappeenranta University of Technology, Thermodynamics Lab Lappeenranta, Finland
  - Numerical tool for biomass combustion calculations

Publications

J=Journal, C=Conference Paper, P=Pre-print, S=In Submission

[J] **Moqadam**, H., Steinhage, D., Wilhelm, A., & Eisen, O. (2025). **Going deeper with deep learning: automatically tracing internal reflection horizons in ice sheets**. DOI, *Journal of Geophysical Research, Mchine Learning and Computation, AGU Publications*

[J] **Moqadam**, H. Eisen, O. (2025). **Review article: Feature tracing in radio-echo sounding products of terrestrial ice sheets and planetary bodies**. DOI, *The Cryosphere, EGU Publication*.

[S] **Moqadam**, H. Eisen, O. Bojesen, T. (2025). **Autoregressive mark-tracing for radiostratigraphy: A lightweight model for annotating internal reflection horizons in ice sheets**.

[C] **Hameed Moqadam**, Thomas Gruber (2017). **Modelling of Biomass Combustion Chemistry to Investigate Gas Phase Alkali Sulphate Formation**. DOI, *Proceedings of the 25th European Biomass Conference and Exhibition*, Session: 2BV.1.59, pp. 702 - 708, ISBN: 978-88-89407-17-2.

Grants

- **Funded** *11.2024 – 01.2025*
  Helmholtz Information & Data Science Academy (HIDA) - Norwegian AI Research Consortium (NORA)
  NORA report

Journal Reviews

- Reviewer for The Cryosphere (TC) (Copernicus Publications) – DOI
- Reviewer for Environmental Data Science (Cambridge University Press & Assessment) – DOI
- Reviewer for Journal of Applied Geophysics (Elsevier)

Field Experience

- **Antarctic Land Expedition** *10.2023 – 01.2024*
  Donning Maud Land, Antarctica
  - Phase-sensitive radar (ApRES) Measurements
  - Stake measurements 800 km (traverse between Neumayer III and Kohnen station, 1124 stakes measures. 411 new stakes mounted.)
  - Snow sampling (isotope measrement)
  - Snow Density measurements
  - Skidoo and snow groomer (Pistenbully) driving
  - Antarctic stations:
    - Kohnen (7 weeks), Neumayer III (3 weeks), Troll (1 week)

- **Crevasse Rescue training (1 week)** *09.2023*
  - Cravass rescue
  - Glacier first aid and emergency training
  Pitztal, Austria
- **Glacier expedition and field course (1 week)** *07.2022*
  - Snow pit digging
  - Snow density measurements
  - Radar measurements (GPR)
  Vernachtverner, Austria
- **Research cruise on RV Heincke (North sea, around Helgoland, 4 days)** *04.2022*
  - Echo-sounder, Multibeam
  - CTD, Multinet
  - Gravitycorer, Box corer, Multicorer
  North Sea

Conference Attendance

Oral Presentation

- **European Geosciences Union (EGU) general assembly** *04.2025*
  Autoregressive mark-tracing for radiostratigraphy: A lightweight model for annotating internal reflection horizons in ice sheets. Vienna, Austria
  Abstract
- **8th Geomar Data Science Symposium** *06.2023*
  Mapping Extended Internal Stratigraphy in Ice Sheets using Computer Vision Approaches. Kiel, Germany
  Book of Abstracts
- **European Geosciences Union (EGU) general assembly** *05.2023*
  Tracing Extended Internal Stratigraphy in Ice Sheets using Computer Vision Approaches. Vienna, Austria
  Abstract

Session Convener

- **European Geosciences Union (EGU) general assembly** *04.2025*
  Machine Learning for Cryospheric Sciences. Vienna, Austria
  Session Description
- **ICY MARE conference** *09.2023*
  Applications of machine learning in marine sciences. Oldenburg, Germany

Poster Presentation

- **FRISP - Forum for Research into Ice Shelf Processes** *07.2024*
  Going deeper with deep learning, tracing deep internal reflection horizons in ice sheets. Bremerhaven, Germany
- **European Geosciences Union (EGU) general assembly** *04.2024*
  Mapping of deep internal reflection horizons, method modifications and applications. Vienna, Austria
  Abstract
- **The Willi Dansgaard Centenary Symposium, Niels Bohr Institute** *08.2022*
  Automatic Mapping of Internal Stratigraphy in Ice Sheets, using conventional and learning methods. Copenhagen, Denmark
- **StratoClim final meetings and conference** *05.2019*
  Cirrus clouds evolution and origin observed through StratoClim campaign. Potsdam, Germany

Skills

- **Programming Languages:** Python, Matlab, Fortran, HPC
- **Technical skills:** Linux, Unix, Git CI/CD pipeline, HPC, LaTeX
- **Climate and geospatial data:** GIS, QGIS, NetCDF, ECMWF reanalysis (Era-interim, Era-5)
- **Data Science & Machine Learning:** Segmentation, Classification, Auto-encoders, CNN, GNN, Generative AI, TensorFlow, PyTorch
- **Soft skills:** Excellent communication, Public speaking, Team-worker and sociable, Fast learner
- **Mathematical modelling:** Finite Volume (FVM), Finite Difference (FDM), Turbulence models, CFD
- **Field skills:** Skidoo and snow groomer driving
- **Engineering:** COMSOL, ParaView, Ansys CFX
- **Languages:** English (C2), German (B1), French (B1), Persian (Mother tongue)

Invited Talks / Guest Lecture

- The Nansen Center - NERSC (link) *January 2025*
- University of Bergen, Geoscience department *December 2024*
- University of Bergen, Informatics Department (link) *November 2024*
- University of Tübingen, Glaciology & Geophysics group *March 2023*
- Talk for the winners of German AI national competitions (Bundeswettbewerbe KI, www.bw-ki.de) *April 2023*

Professional Memberships

- **European Geoscience Union – EGU** *2019 – present*
- **International Glaciological Society – IGS** *2021 – present*
- **Dokteam member (PhD students representatives at Alfred Wegener Institute)** *2021 – 2022*
  - Attending department and directorate meetings.
  - Organising PhD days 2023 in Potsdam (internal conference for AWI PhD students).
  - Contact person for PhD student queries.
  - Organising social events.
- **Association of Polar Early Career Scientists – APECS** *2021 – present*
- **Scientists for Future (S4F Deutschland)** *2019 – present*

Summer Schools

- **Summerschool on Ice Sheets and Glaciers in the Climate System** *06.2022*
  Mapping Extended Internal Stratigraphy in Ice Sheets using Computer Vision Approaches. karthaus, Italy
  Karthaus 2022 Summerschool
- **Science and Climate change communication, education and engagement** *09.2023*
  DEEPICE training program Meielisalp, Switzerland
  DEEPICE Training School

Service and Outreach

- Development of Cape Verde digital twin in the frame of MarDATA-WASCAL program collaboration (Mindelo, Cape Verde, March 2024).
- Scientist for Future representative at Research Mile at the Maritime Week in Bremen (Bremen, Germany, September 2023).
- Gave a speech at the Ju-Docs ceremony 2019 at the Jülich research center for the scientists and doctoral researchers of the entire center, ∼500 audience (Jülich, Germany, September 2019).

References

Prof. Dr. Olaf Eisen
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Relationship: PhD supervisor

Prof. Dr. Adalbert Wilhelm
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Relationship: Research visit supervisor

Bremerhaven, Germany, July 25, 2025