DION HÄFNER

PHD | PROGRAMMING SCIENTIST | SCIENTIFIC PROGRAMMER

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Professional Experience

Apr 2022 – present **Staff Research Engineer — R&D lead @ Pasteur Labs**
My team and I build efficient, scalable software for scientific advances at the interface between physical simulators and modern machine learning. As R&D lead, I guide the team in technical decision making, execution, and research-to-product transitions.

Sep 2017 – Dec 2018 **Software development specialist @ DHI GRAS**
At DHI GRAS, I built robust data pipelines at the Terabyte scale, powerful statistical / data science applications, and optimized remote sensing workflows.

Education

Dec 2018 – Apr 2022 **PhD in Physical Oceanography @ University of Copenhagen**
In my project, I used machine learning on large amounts of real-world data to infer the physical mechanisms behind extreme ocean waves (rogue waves).

Sep 2011 – Dec 2016 **BSc and MSc in Physics @ Heidelberg University**
GPA of 1.3 and 1.2, respectively ("very good"). Exchange year at KTH Stockholm in 2014. Specialization on computational physics.

Academic Grants and Projects

Jan 2025 – Jun 2028 **Co-PI, MADGOD @ University of Copenhagen**
I am co-PI on the MADGOD project (supervising 1 PhD student), which aims to develop a new generation of machine learning algorithms for the prediction and understanding of dynamical processes in the Earth system.

Software Projects

Veros — A high-performance ocean model in pure Python

I am the main developer and maintainer of Veros, a full-fledged ocean model capable of accurate, realistic simulations of the global ocean. Veros leverages the JAX library for state-of-the-art performance on CPU and GPU clusters. https://github.com/team-ocean/veros

(see all projects on **GitHub**)

Teaching

Courses 3 TA assignments in Physics MSc courses at the Niels Bohr Institute. Nominated for biannual TA prize in 2021.

Theses Formal co-advisor to 1 PhD student, 1 MSc student, 1 BSc student at Niels Bohr Institute. Closely involved in 5 MSc projects from other departments / universities.

Awards & Honors

» (2022) Diploma of Excellence (top 10 PhD thesis of 2022) by Faculty of SCIENCE, University of Copenhagen.

» (2021) Virtual Outstanding Student and PhD candidate Presentation (vOSPP) by European Geophysical Union.

Peer-reviewed Publications

[1] **Häfner, D.**, Gemmrich, J., Jochum, M., "Machine-guided discovery of a real-world rogue wave model". In: *Proceedings of the National Academy of Sciences* 120.48 (Nov. 2023). ISSN: 1091-6490. DOI: 10.1073/pnas.2306275120. URL: http://dx.doi.org/10.1073/pnas.2306275120.

[2] **Häfner, D.**, Nuterman, R., Jochum, M., "Fast, Cheap, and Turbulent—Global Ocean Modeling With GPU Acceleration in Python". In: *Journal of Advances in Modeling Earth Systems* 13.12 (Dec. 2021). ISSN: 1942-2466. DOI: 10.1029/2021ms002717. URL: http://dx.doi.org/10.1029/2021MS002717.

[3] **Häfner, D.**, Vicentini, F., "mpi4jax: Zero-copy MPI communication of JAX arrays". In: *Journal of Open Source Software* 6.65 (Sept. 2021), p. 3419. ISSN: 2475-9066. DOI: 10.21105/joss.03419. URL: http://dx.doi.org/10.21105/joss.03419.

[4] **Häfner, D.**, Gemmrich, J., Jochum, M., "FOWD: A Free Ocean Wave Dataset for Data Mining and Machine Learning". In: *Journal of Atmospheric and Oceanic Technology* (May 2021). ISSN: 1520-0426. DOI: 10.1175/jtech-d-20-0185.1. URL: http://dx.doi.org/10.1175/JTECH-D-20-0185.1.

[5] **Häfner, D.**, Gemmrich, J., Jochum, M., "Real-world rogue wave probabilities". In: *Scientific Reports* 11.1 (May 2021). ISSN: 2045-2322. DOI: 10.1038/s41598-021-89359-1. URL: http://dx.doi.org/10.1038/s41598-021-89359-1.

[6] Riedel, L., Ríos, S. O. D. L., **Häfner, D.**, Klein, O., "DORiE: A Discontinuous Galerkin Solver for Soil Water Flow and Passive Solute Transport Based on DUNE". In: *Journal of Open Source Software* 5.52 (Aug. 2020), p. 2313. ISSN: 2475-9066. DOI: 10.21105/joss.02313. URL: http://dx.doi.org/10.21105/joss.02313.

[7] **Häfner, D.**, Jacobsen, R. L., Eden, C., Kristensen, M. R. B., Jochum, M., Nuterman, R., Vinter, B., "Veros v0.1 – a fast and versatile ocean simulator in pure Python". In: *Geoscientific Model Development* 11.8 (Aug. 2018), pp. 3299–3312. ISSN: 1991-9603. DOI: 10.5194/gmd-11-3299-2018. URL: http://dx.doi.org/10.5194/gmd-11-3299-2018.

(see also **Google Scholar**)