

DION HÄFNER

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I am a Physics graduate specialized on all things scientific computing, with industry experience in data processing and machine learning.

My main research interest is “human learning”: How can we build machines that teach us something about our physical world?

Education

Dec 2018 – **PhD in Physical Oceanography @ University of Copenhagen**

present In my PhD project, I infer the relative importance of different hypothesized causes of extreme ocean waves (“rogue waves”) in the real world. To this end, I analyze over 1 Terabyte of observational data with data mining and probabilistic machine learning to extract robust, interpretable insights.

Sep 2015 – **Master of Science (MSc) in Physics @ Heidelberg University**

Dec 2016 GPA of 1.2 (“very good”). Specialization in computational physics.

Sep 2013 – **Exchange semester @ KTH Stockholm**

Apr 2014 Exchange semester during my Bachelor’s.

Sep 2011 – **Bachelor of Science (BSc) in Physics @ Heidelberg University**

Sep 2015 GPA of 1.3 (“very good”). Bachelor’s thesis at Terrestrial Physics group, IUP Heidelberg: Implementing adaptive grid refinement into DORiE, a numerical PDE solver based on the DUNE framework.

Work Experience

Sep 2017 – **Software development specialist @ DHI GRAS**

Dec 2018 At DHI GRAS, I built robust data pipelines, powerful statistical tools, and optimized remote sensing workflows.

Jan 2017 – **Scientific assistant @ Niels Bohr Institute**

Aug 2017 I developed a full-blown, high-performance ocean model in pure Python. I was responsible for everything from the implementation of the numerics and the simulation framework, to quality assurance and documentation.

Jun 2014 – **Research assistant @ Institute of Environmental Physics**
Dec 2016 Working in a small team of developers on a numerical software suite. Using C++, Python, Git; responsibilities include specification, implementation, testing, and deployment.

Programming and Technology

ML frameworks I am familiar with modern machine learning workflows and have good knowledge of scikit-learn, Tensorflow / Keras, PyMC3, and JAX.

Python I have both deep and broad experience within the Python ecosystem, especially concerning (but not limited to) **data analysis, machine learning, visualization, and scientific computing**.

I love working with the modern scientific Python stack and am well-versed with NumPy, SciPy, matplotlib, xarray, JAX, Numba, and Pandas.

Other languages Basic knowledge of object-oriented programming in C++, including debugging applications with GDB. Elementary knowledge of OpenCL / CUDA.

Tools Experience with tools handling version control (git), documentation (Sphinx, Doxygen), build systems (CMake), deployment (Docker), testing (pytest), GUI (Qt), continuous integration (Travis CI / Github Actions), typesetting (\LaTeX).

I am comfortable working in all major operating systems, and am familiar with basic server administration tasks.

Other Skills & Interests

- » Strong mathematical and analytical skills, and an affection for data
- » A knack for Bayesian data analysis: I like to make my assumptions and uncertainties explicit.
- » I am passionate about open-source software development, and am a frequent contributor to various projects on GitHub (github.com/dionhaefner).
- » A special interest in **effective communication** through writing, oral presentations, and data visualization. I take the quality of my publications seriously, and love to present my work.
- » **Languages:** German (native), English (fully proficient), Swedish (proficient), Danish (elementary).

Peer-reviewed Publications

- [1] **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). DOI: 10.1029/2021ms002717. URL: <https://doi.org/10.1029/2021ms002717>.

- [2] **Häfner, D.**, Vicentini, F., “mpi4jax: Zero-copy MPI communication of JAX arrays”. In: *Journal of Open Source Software* 6.65 (Sept. 2021), p. 3419. DOI: 10 . 21105 / joss . 03419. URL: <https://doi.org/10.21105%2Fjoss.03419>.
- [3] **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). DOI: 10 . 1175 / jtech - d - 20 - 0185 . 1. URL: <https://doi.org/10.1175%2Fjtech-d-20-0185.1>.
- [4] **Häfner, D.**, Gemmrich, J., Jochum, M., “Real-world rogue wave probabilities”. In: *Scientific Reports* 11.1 (May 2021). DOI: 10 . 1038 / s41598 - 021 - 89359 - 1. URL: <https://doi.org/10.1038%2Fs41598-021-89359-1>.
- [5] Riedel, L., Ríos, S. D., **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. DOI: 10 . 21105 / joss . 02313. URL: <https://doi.org/10.21105%2Fjoss.02313>.
- [6] **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. DOI: 10 . 5194 / gmd - 11 - 3299 - 2018. URL: <https://doi.org/10.5194%2Fgmd-11-3299-2018>.

(see also [Google Scholar](#))

Awards & Honors

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

References

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