

# MARTIN HENKE, Ph.D., EIT

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Marine Dynamics and Modeling  
Pacific Northwest National Laboratory  
(509) 372-6661, martin.henke@pnnl.gov

## Summary

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I am a researcher of engineering background with experience assessing coastal and ocean processes, hazards, and marine renewable energy. With broad experience in a wide range of environments and expertise in the Arctic, I combine cutting-edge research techniques and sound engineering analysis towards enabling coastal development.

## Education

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### *Ph.D. in Civil Engineering - Apr 2024*

- George Mason University

### *M.S. in Mechanical Engineering – Dec 2020*

- University of Alaska Anchorage

### *B.S. in Mechanical Engineering & Minor in Mathematics – May 2016*

- University of Alaska Anchorage

## Expertise

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- Ocean Circulation – Currents, water levels, and energy
- Coastal Flooding – Extreme events, surge, compound effects
- Ocean Waves – Climate, extreme events, current/ice interaction
- Marine Energy – Environmental assessment, characterization
- Nearshore Morphological Processes – Erosion, accretion, marsh-migration
- Coastal Management – Design, structures, and nature-based features
- Arctic Physical Oceanography – Ice-wave interaction, landfast ice, coastal permafrost
- Climate Projection – Sea level rise, arctic sea ice retreat, and wave climatology.

## Skills

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- Programming Languages: Python, MATLAB, Fortran
- Ocean and Wave Models: ADCIRC, WaveWatch3, SWAN, Xbeach
- Hydrologic Models: HEC-HMS, HEC-RAS
- Software: Arc/QGIS, AutoCAD, SolidWorks, Ansys Fluent
- High-Performance Computing Environments
- Building Multi-Agent AI Systems
- Languages: English, Swahili, German

## Articles

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- **Henke M., Yang Z., (2025)** "The influence of tidal currents and sea ice on wave dynamics in Cook Inlet, Alaska" – *Ocean Engineering*

- Li W., **Henke M.**, Pundt R., Miller-Hooks E., (2025) "A data-driven Bayesian network methodology for predicting future incident risk in Arctic maritime-based cargo transit" – *Ocean Engineering*
- Miesse T., **Henke M.**, de Lima A.S., Ferreira C.M., Ravens T., (2025) "The Critical Role of Sea Ice Products for Accurate Wind-Wave Simulations in the Arctic" - *Earth and Space Science*
- de Lima A.S., Cassalho F., Miesse T., **Henke M.**, Canick M., Ferreira C.M., (2024) "Assessing the potential long-term effects of sea-level rise on salt marsh's coastal protective capacity under different climate pathway scenarios" – *Environmental Monitoring and Assessment*
- **Henke M.**, Miesse T., de Lima A.S., Ferreira C.M., Ravens T., (2024) "Evolving Arctic maritime hazards: Declining sea ice and rising waves in the Northwest Passage" – *Proceedings of the National Academy of Sciences*
- **Henke M.**, Miesse T., de Lima A.S., Ferreira C.M., Ravens T. (2024) "The Expanding Open Water Season and Coastal Wave Exposure in the Alaskan Arctic" - *Nature Communications Earth & Environment*
- Cassalho F., de Lima A.S., Coleman D.J., **Henke M.**, Miesse T., Coelho G.A., Ferreira C.M., (2023) " Projecting future wave attenuation by vegetation from native and invasive saltmarsh species in the United States" - *Regional Studies in Marine Science*
- **Henke M.**, Cassalho F., Miesse T., Ferreira C.M., Ravens T., Jinlun Z., (2023) "Assessment of Arctic Sea Ice and Surface Climate Conditions in Nine CMIP6 Climate Models" - *Arctic, Antarctic, and Alpine Research*
- Ravens T., Ferreira C.M., **Henke M.**, "Arctic Coastal Storms, Unique in Character and Impact" - *The Proceedings of the Coastal Sediments 2023*
- Hailu, G., **Henke, M.**, Petersen T., (2022) "Stationary Battery Thermal Management: Analysis of Active Cooling Designs" - *Batteries*
- **Henke, M.**, Hailu, G. (2020) "Thermal Management of Stationary Battery Systems: A Literature Review" - *Energies*

## Projects

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### ONGOING:

#### *Arctic Pacific Infrastructure for Sustaining Continuous Engineering and Science (PISCES)*

- Investigating the impact of wind-waves affecting the seasonal cycle of landfast ice in the Beaufort and Chukchi coastal regions through numerical simulation and analysis of in-situ data.

### ***WPTO Alaskan Arctic Wave Resource Assessment Hindcast***

- Producing and analyzing a high-resolution simulation of Alaskan Arctic wave energy resources in the U.S. Exclusive Economic Zone from 1979-2021.

### **PAST:**

#### ***Cook Inlet Wave Model Validation and Site Characterization***

- Simulating the effects of wave-current interaction the extreme tidal environment of Cook Inlet, Alaska and deriving design conditions informing tidal power development in the area.

#### ***NSF NNA: Arctic impacts and reverberations of expanding global maritime trade routes:***

- Collaborated with an inter-disciplinary team to predict future risk of Arctic maritime shipping by assessing how future sea ice loss will affect nearshore extreme wave hazards impacting Alaskan Arctic coastlines.

#### ***SHORE-BREAK: Assessing and predicting Arctic Coastal Erosion Hazards with ICESat-2:***

- Worked in writing the grant proposal, eventually securing funding for the creation of the project and performed processing of satellite altimetry data yielding transects capable of resolving coastal erosion.

#### ***Ecological Effects of Sea Level Rise 2019: Quantifying the benefits of natural and nature-based features in Maryland's Chesapeake and Atlantic Coastal Bays***

- Participated in coastal field data collection, including water levels, waves, bathymetry, and vegetation sampling and built a tool for measuring the effect of vegetation in attenuating coastal waves in numerical simulations.

## **Presentations**

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Henke, M., (2024) "Wave dynamics and the role of current interaction affecting the sea state of Cook Inlet, Alaska" American Geophysical Union Fall Meeting 2024, Washington D.C..

Henke, M., (2024) "Investigating Future Coastal and Marine Wave Hazards in the Changing Arctic" Interagency Arctic Research Policy Committee - Coastal Resilience Community of Practice Meeting - Online

Henke, M. (2023). "Growing coastal wave hazards in the Alaskan Arctic in response to sea ice loss: projecting future exposure and assessing hazards" GMU CEIE Luncheon, Fairfax, VA.

Henke, M. (2022). "Impacts of Changing Arctic Hydrodynamics and Wave Conditions on Maritime Transportation and Reverberations," American Geophysical Union Fall Meeting 2022, Chicago, IL.

Henke, M. (2022). NSF NNA Annual Meeting, "A High-Resolution Projection of Arctic Sea Ice and Application in Predicting Arctic Maritime Navigability," National Science Foundation Annual Navigating the New Arctic Meeting. Anchorage, AK.

Henke, M. (2022). "Simulating Waves and Storm Surge in Utqiagvik, Alaska", Observing and Modelling ocean waves Workshop. Brest, France.

Henke, M., (2020), "Assessing Global Climate Models Arctic Sea-Ice Prediction Through Comparison with Observational Data" AGU Fall 2020 Meeting, Online

## Experience

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Research Associate April 2024 – Present

*Coastal Science Division, Pacific Northwest National Laboratory, Seattle, WA*

- Employed various numerical methods in simulating coastal flood hazards affecting the Chesapeake Bay and Alaska.
- Brought new numerical models into use and revised existing implementations in support of hindcasting and forecasting flood events.

Graduate Research Assistant August 2021 – May 2024

*Flood Hazards Research Lab, George Mason University, Fairfax, VA*

- Employed various numerical methods in simulating coastal flood hazards affecting the Chesapeake Bay and Alaska.
- Brought new numerical models into use and revised existing implementations in support of hindcasting and forecasting flood events.

Graduate Teaching and Research Assistant May 2019 – December 2020

*University of Alaska Anchorage, Anchorage, AK*

- Led independent research resulting in the publication of two academic manuscripts
- Managed the thermal and fluids laboratory, coordinating experiments and overseeing equipment
- Facilitated thorough and inclusive teaching methods encouraging student learning
- Self-taught new and applicable skills, relevant to research needs

Physics Education Volunteer July 2016 - August 2018

*United States Peace Corps, Zanzibar, Tanzania*

- Volunteered as a physics and math teacher in a rural Tanzanian school
- Reached fluency in the local language, Swahili
- Led in the creation and implementation of a grant impacting the health of over 400 students
- Utilized minimal resources to create laboratory experiments and demonstrations

## **Professional Memberships**

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- American Geophysical Union (AGU)
- American Society of Civil Engineers (ASCE)
- Coasts, Oceans, Ports & Rivers Institute (COPRI-ASCE)