C.M. (Kees) Nederhoff, Ph.D.

Coastal Scientist — Natural Hazard and Risk Engineering

Oakland, CA — cmnederhoff@gmail.com — 408-582-4690 — U.S. Permanent Resident (Dutch Citizen)

Google Scholar — ORCID — GitHub — LinkedIn

Education

Delft University of Technology Delft, the Netherlands

Ph.D. in Coastal Engineering (completed part-time while employed full-time) *2022-2024*

- Dissertation: "Navigating the Storm: New Approaches to Tropical Cyclone Risk Analysis"
- Developed probabilistic frameworks for tropical cyclone hazard assessment, now adopted by USGS CoSMoS, Navy forecasting systems, and state-level agencies nationwide
- Supervised by Prof. Dano Roelvink, Dr. Ap van Dongeren & Dr. José Álvarez Antolínez

Delft University of Technology Delft, the Netherlands

Master of Science in Hydraulic Engineering *2012-2014*

- Thesis: "Modeling the Effects of Hard Structures on Dune Erosion and Overwash"
- Specialized in coastal hydrodynamics, morphodynamics, and physics-based modeling of extreme events
- Supervised by Prof. Marcel Stive (Former Chair, Coastal Engineering, TU Delft)

Delft University of Technology Delft, the Netherlands

Bachelor of Science in Civil Engineering *2008-2012*

Professional Experience

Lead Coastal Scientist 2019–Present

Deltares USA *Oakland, CA*

- Principal Investigator on >$6.0M in federal research grants (USGS, ONR) advancing compound flooding, Arctic erosion, and probabilistic tropical cyclone forecasting systems
- Project Lead on >$1.0M in applied coastal modeling projects (Alameda County, SFEI) supporting regional hazard assessment and wetland restoration in the San Francisco Bay
- Total research portfolio of >$20M including PI and Co-I roles (NSF, ONR, USGS, ERDC, ESTCP)
- Published 32 peer-reviewed articles (h-index 19, 1,361 citations)
- Co-developed fast flood model SFINCS adopted by USGS & Navy, used in >20 countries, downloaded 951 times
- Supervised 23 graduate students (2015–present) with placements at firms, government, and academia

Visiting Scientist 2019–Present

U.S. Geological Survey (USGS), Pacific Coastal and Marine Science Center *Santa Cruz, CA*

- Co-led Coastal Storm Modeling System (CoSMoS) development, assessing compound flooding and sea-level rise impacts for millions of coastal residents across the continental United States
- Developed integrated methodologies coupling storm surge, wave overtopping, riverine discharge, and shallow groundwater dynamics for urban estuarine flood prediction
- Co-authored high-impact federal reports and peer-reviewed publications; mentored interdisciplinary research teams

Coastal Engineer and Research Scientist 2015–2019

Stichting Deltares Netherlands *Delft, The Netherlands*

- Developed and validated process-based coastal models (Delft3D, XBeach, SWAN) advancing storm surge, wave-driven morphodynamics, and compound flood science
- Led synthetic tropical cyclone modeling innovation formalized during doctoral research and used by NOAA, World Bank, and international agencies
- Guest lecturer at TU Delft and IHE Delft (2015-2019), teaching MSc coastal modeling courses

Grants and Funding

Secured >$6M as Principal Investigator and >$20M total portfolio (NSF, ONR, USGS, ERDC)

Federal Research Grants

Advanced Arctic Coastal Erosion Modeling, Mechanisms, and Rates 2025 – 2028
Department of Defense – Office of Naval Research (ONR MURI Program) *Fairbanks, AK*

- Co-Investigator; Funding: $4.5M total, Deltares USA share: $399K
- Lead: University of Alaska Anchorage (UAA); partners: Oregon State University (OSU), George Mason University (GMU)

Emulating Hydro- & Morphodynamics for Nature-Based Solutions 2025 – 2028
U.S. Army Engineer Research and Development Center (ERDC) *San Francisco Bay, CA*

- Principal Investigator; Funding: $690K, Deltares USA lead partner
- Develop emulator frameworks to replicate hydro- and morphodynamic conditions supporting the design and evaluation of nature-based coastal protection strategies

ACTION – Alaska Coastal Cooperative 2023 – 2027
National Science Foundation (NSF) *Anchorage, AK*

- Co-Investigator; Funding: $9.5M total, Deltares USA share: $243K
- Lead: University of Alaska Fairbanks (UAF); partners: Arizona State University (ASU), University of Northern Iowa, The University of Texas at El Paso (UTEP)

Comparative Assessment of Total Water Levels for Flood Risk 2022 – 2026
Environmental Security Technology Certification Program (ESTCP) *Newark, DE*

- Co-Investigator; Funding: $2.6M total, Deltares USA share: $236K
- Lead: University of Delaware; partners: North Carolina State University (NSCU), Texas A&M, USGS

Probabilistic Coastal Flood Forecasting Systems 2021 – 2028
Office of Naval Research (ONR) *John C. Stennis Space Center, MS*

- Principal Investigator; Funding: $1.54M cumulative across 3 ONR projects (2PSIPS, FHICS, and PSIPS)
- FHICS received the 2025 National Oceanographic Partnership Program (NOPP) Excellence in Partnering Award
- Developed and implemented next-generation probabilistic flood forecasting systems
- Advanced real-time hazard forecasting and uncertainty quantification for tropical cyclone impacts

Integrated Modeling of Natural Hazards 2019 – 2029
U.S. Geological Survey (USGS) *Santa Cruz, CA*

- Principal Investigator; Funding: $3.8M cumulative, Deltares USA lead partner
- CoSMoS Continental U.S. Expansion ($1.3M): Led nationwide compound flood hazard assessment framework for 100+ million coastal residents across Southeast Atlantic, Alaska, Caribbean, and Pacific Northwest
- MODFLOW development ($1.2M): Development of groundwater model source code including integration with surface water modeling capabilities for compound flooding, saltwater intrusion, and climate adaptation assessments
- Other topics ($1.3M): Topics ranging from advanced permafrost-coastline interaction models to coastal-riverine modeling of the Columbia River work and San Francisco Bay to regional wave climate characterization to assessments for Alaska climate adaptation
- Supported nationwide modeling and trained staff in SFINCS, CoSMoS, XBeach and Delft3D applications

Consultancy and Applied Research Projects

Eden Landing and Alameda Creek Restoration Modeling 2023 – 2025
Alameda County Flood Control and Water Conservation District *Hayward, CA*

- Project Lead; Funding: $499,800
- Hydrodynamic, sediment, and groundwater modeling to inform tidal wetland restoration design

Coastal and Riverine Hazard Assessment for the San Francisco Bay 2019 – 2025
Alameda County Flood Control and Water Conservation District *Hayward, CA*

- Project Lead; Funding: $394,120

- Developed regional flood and wave hazard maps integrating tide, surge, and fluvial processes

Sand Mining Study in San Francisco Bay 2021 – 2023
San Francisco Estuary Institute (SFEI) *Richmond, CA*

- Project Lead; Funding: $152,905
- Morphodynamic impacts of sediment extraction on estuarine hydrodynamics and shoreline stability

Selected Publications

32 peer-reviewed publications — h-index = 19 — 1,361 citations (Google Scholar, October 2025)

First-Author Publications

1. **Nederhoff, K.**, Saleh, R., Barnard, P. L., & Stacey, M. (2025). Mitigating Flood Risks in Urban Estuaries: Tidal Dynamics, Shoreline Hardening, Nature-Based Solutions, and Floodgates in San Francisco Bay. Journal of Waterway, Port, Coastal, and Ocean Engineering, 151(6). https://doi.org/10.1061/jwped5.wweng-2342.
2. **Nederhoff, K.**, Leijnse, T. W. B., Parker, K., Thomas, J., O'Neill, A., van Ormondt, M., McCall, R., Erikson, L., Barnard, P. L., Foxgrover, A., Klessens, W., Nadal-Caraballo, N. C., & Massey, T. C. (2024). Tropical or extratropical cyclones: what drives the compound flood hazard, impact, and risk for the United States Southeast Atlantic coast? *Natural Hazards*, 120(9). https://doi.org/10.1007/s11069-024-06552-x. Citations: 20
3. **Nederhoff, K.**, van Ormondt, M., Veeramony, J., van Dongeren, A., Antolínez, J. A. Á., Leijnse, T., & Roelvink, D. (2024). Accounting for uncertainties in forecasting tropical cyclone-induced compound flooding. *Geoscientific Model Development*, 17(4), 1789–1811. https://doi.org/10.5194/gmd-17-1789-2024. Citations: 12
4. **Nederhoff, K.**, Crosby, S. C., Van Arendonk, N. R., Grossman, E. E., Tehranirad, B., Leijnse, T., Klessens, W., & Barnard, P. L. (2024). Dynamic Modeling of Coastal Compound Flooding Hazards Due to Tides, Extratropical Storms, Waves, and Sea-Level Rise: A Case Study in the Salish Sea, Washington (USA). Water, 16(2), 346. https://doi.org/10.3390/w16020346. Citations: 13
5. **Nederhoff, K.**, Erikson, L., Engelstad, A., Bieniek, P., & Kasper, J. (2022). The effect of changing sea ice on wave climate trends along Alaska's central Beaufort Sea coast. *The Cryosphere*, 16(5), 1609–1629. https://doi.org/10.5194/tc-16-1609-2022. Citations: 32
6. **Nederhoff, K.**, Hoek, J., Leijnse, T., van Ormondt, M., Caires, S., & Giardino, A. (2021). Simulating synthetic tropical cyclone tracks for statistically reliable wind and pressure estimations. *Natural Hazards and Earth System Sciences*, 21(3), 861–878. https://doi.org/10.5194/nhess-21-861-2021. Citations: 39
7. **Nederhoff, K.**, Saleh, R., Tehranirad, B., Herdman, L., Erikson, L., Barnard, P. L., & van der Wegen, M. (2021). Drivers of extreme water levels in a large, urban, high-energy coastal estuary – A case study of the San Francisco Bay. *Coastal Engineering*, 170, 103984. https://doi.org/10.1016/j.coastaleng.2021.103984. Citations: 38
8. **Nederhoff, K.**, Giardino, A., van Ormondt, M., & Vatvani, D. (2019). Estimates of tropical cyclone geometry parameters based on best-track data. *Natural Hazards and Earth System Sciences*, 19(11), 2359–2370. https://doi.org/10.5194/nhess-19-2359-2019. Citations: 26

High-Impact Co-Authored Publications (10 selected from 22)

1. Barnard, P. L., Befus, K. M., Danielson, J. J., Engelstad, A. C., Erikson, L. H., Foxgrover, A. C., Hayden, M. K., Hoover, D. J., Leijnse, T. W. B., Massey, C., McCall, R., Nadal-Caraballo, N. C., **Nederhoff, K.**, O'Neill, A. C., Parker, K., Shirzaei, M., Ohenhen, L. O., Swarzenski, P. W., Thomas, J. A., Jones, J. L. (2025). Projections of multiple climate-related coastal hazards for the US Southeast Atlantic. *Nature Climate Change*, 15(1), 101–109. https://doi.org/10.1038/s41558-024-02180-2. Citations: 11

2. van Ormondt, M., Leijnse, T., de Goede, R., **Nederhoff, K.**, & van Dongeren, A. (2025). Subgrid corrections for the linear inertial equations of a compound flood model – a case study using SFINCS 2.1.1 Dollerup release. *Geoscientific Model Development*, 18(3), 843–861. https://doi.org/10.5194/gmd-18-843-2025. Citations: 6
3. Sebastian, A., Bader, D. J., **Nederhoff, K.**, Leijnse, T., Bricker, J. D., & Aarninkhof, S. G. J. (2021). Hindcast of pluvial, fluvial and coastal flood damage in Houston, TX during Hurricane Harvey (2017) using SFINCS. *Natural Hazards*. https://doi.org/10.1007/s11069-021-04922-3. Citations: 64
4. de Ridder, M. P., Smit, P. B., Van Dongeren, A., McCall, R. T., **Nederhoff, K.**, & Reniers, A. J. H. M. (2021). Efficient two-layer non-hydrostatic wave model with accurate dispersive behaviour. Coastal Engineering, 164(February). https://doi.org/10.1016/j.coastaleng.2020.103808. Citations: 51
5. Leijnse, T., van Ormondt, M., **Nederhoff, K.**, & van Dongeren, A. (2021). Modeling compound flooding in coastal systems using a computationally efficient reduced-physics solver: Including fluvial, pluvial, tidal, wind- and wave-driven processes. *Coastal Engineering*, 163, 103796. https://doi.org/10.1016/j.coastaleng.2020.103796. Citations: 141
6. van Ormondt, M., **Nederhoff, K.**, & Van Dongeren, A. (2020). Delft Dashboard: a quick setup tool for hydrodynamic models. Journal of Hydroinformatics, 22(3), 510–527. https://doi.org/10.2166/hydro.2020.092. Citations: 65
7. Giardino, A., Schrijvershof, R.,**Nederhoff, K.**, de Vroeg, H., Brière, C., Tonnon, P.-K., Caires, S., Walstra, D.-J., Sosa, J., Verseveld, W. Van, Schellekens, J., & Slo, C. J. (2018). A quantitative assessment of human interventions and climate change on the West African sediment budget. Ocean and Coastal Management, February. https://doi.org/10.1016/j.ocecoaman.2017.11.008. Citations: 97
8. Roelvink, D., Mccall, R., Mehvar, S., **Nederhoff, K.**, & Dastgheib, A. (2018). Improving predictions of swash dynamics in XBeach : The role of groupiness and incident-band runup. Coastal Engineering, February, 1–21. https://doi.org/10.1016/j.coastaleng.2017.07.004. Citations: 224
9. Giardino, A., **Nederhoff, K.**, & Vousdoukas, M. (2018). Coastal hazard risk assessment for small islands: Assessing the impact of climate change and disaster reduction measures on Ebeye (Marshall Islands). *Regional Environmental Change*, 18(8), 2237–2248. https://doi.org/10.1007/s10113-018-1353-3. Citations: 79

Complete publication list (32 papers) available at Google Scholar

Teaching and Mentoring

- **Graduate Student Supervision** (2015–present) — Supervised, co-supervised, and provided technical mentorship to 23 graduate students from UC Berkeley, UCLA, UC Santa Cruz, University of Delaware, University of Alaska Fairbanks, and TU Delft: 7 Ph.D. students (2 completed), 16 MS students (14 completed). Student projects resulted in 6 peer-reviewed publications and career placements at Deltares (3), USGS (1), government (1), engineering consultancies (8), and universities (3)
- **Guest Lecturer** — University of California, Berkeley: Developed and delivered week-long coastal modeling module for *Environmental Fluid Mechanics* (2021); University of Santa Cruz (UCSC): 2 guest lectures on coastal hazards (2024-2025); Delft University of Technology & IHE Delft (2015-2019): Annual guest lectures on coastal modeling for MSc Coastal Engineering students (2015-2019)
- **Workshop Instructor** — Developed and delivered 20+ international modeling training workshops (2018–present) on Delft3D, XBeach, and SFINCS for 200+ engineers and scientists across academia, government, and consulting sectors

Selected Presentations

- **Invited Talk** — "Accounting for Uncertainties in Forecasting Tropical Cyclone-Induced Compound Flooding", 17th IHE Delft Ph.D. Symposium, Delft, Netherlands (2023)
- **Invited Talk** — "CoSMoS Modeling Framework", California Water and Environmental Modeling Forum (2022)
- **Invited Talk** — "Storms, Flooding & Sea Level Defense", Propeller Club Northern California (2019)

- **Invited Talk** — "Application of XBeach in Ports", XBeach Conference (2017)
- **Oral Presentations** — Coastal Sediments (2023, 2019, 2015—Best Student Paper Award); Ocean Sciences Meeting (2022, 2016); American Meteorological Society (2024, 2017); Floodplain Management Association Annual Conference (2025, 2024, 2022, 2020); American Shore and Beach Preservation Association (2025, 2022, 2019, 2018)
- **Webinar** — "The San Francisco Bay Community Model", USGS/Alameda County Flood Control District (2024)

Professional Service and Leadership

- **Peer Reviewer** — Reviewed 50+ manuscripts for *Coastal Engineering*, *Natural Hazards and Earth System Sciences* (NHESS), *Geoscientific Model Development* (GMD), *Natural Hazards*, *Journal of Geophysical Research* (JGR), *Ocean Modelling*, *Continental Shelf Research*, *Nature Communications Earth & Environment* (2015–present)
- **Proposal Reviewer** — Reviewed 7 research proposals for Delta Stewardship Council Science Panel (3 proposals), California and South Carolina Sea Grant (3 proposals), and National Science Foundation (1 proposal) (2023–present)
- **Conference Session Leadership** — Session Organizer: "Enhancing Hurricane Impact Forecasting and Coastal Hazard Assessment through Innovative Uses of In-Situ Observations, Modeling, and Real-time Remote Sensing Data," Ocean Sciences Meeting (2024); Session Chair: "SFINCS Compound Flooding Applications," Exploring Coastal Hazards Symposium (2024)
- **Conference and Workshop Organization** — Organized "XBeach X" 10th Anniversary User Conference, Delft Software Days (2017); Led 20+ SFINCS and XBeach training workshops at Delft Software Days (2018, 2022, 2023, 2024), Coastal Sediments (2023, 2019), Ocean Sciences (2024), and international venues (2015–present)
- **Open Science Leadership** — Lead developer and maintainer, San Francisco Bay Community Model (2019–present); Core developer, SFINCS compound flood model (2019–present); Contributing developer, XBeach morphodynamic model (2015–present); Contributor, Delft3D Flexible Mesh open-source development (2015–present)
- **Professional Memberships** — American Geophysical Union (AGU), American Shore and Beach Preservation Association (ASBPA), Floodplain Management Association (FMA), European Geosciences Union (EGU)

References

- **Prof. Mark Stacey**, Professor and former Department Chair, Civil and Environmental Engineering, University of California, Berkeley. Email: mstacey@berkeley.edu
- **Prof. Dano Roelvink**, Professor of Coastal Engineering, IHE Delft / Delft University of Technology. Email: d.roelvink@un-ihe.org
- **Dr. Patrick Barnard**, Research Director of the Center for Coastal Climate Resilience at the University of California, Santa Cruz (formerly at U.S. Geological Survey, Pacific Coastal and Marine Science Center, Santa Cruz, CA). Email: pbarnard1@ucsc.edu
- **Dr. Ap van Dongeren**, Senior Specialist, Deltares & Associate Professor, IHE Delft, Netherlands. Email: ap.vandongeren@deltares.nl
- **Prof. Chris Maio**, Associate Professor, University of Alaska Fairbanks. Email: cvmaio@alaska.edu