

# Christopher William Moore

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References available

## Education

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M.S. 1996 Physical Oceanography, University of Washington, Seattle

B.A. 1992 Physics, University of California, Santa Cruz

## Professional Experience

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### **Supervisory Research Physical Scientist/Oceanographer (ZP-1301-05/1) (*current position*)**

Director, NOAA Center for Tsunami Research

Pacific Marine Environmental Lab, Seattle, WA

- Dates: January 14, 2024 – present
- Full-time (40 hours/week) – hybrid
- Senior research scientist and manager with oversight for operational tsunami forecast system and tsunami hazard assessments. Group representative on the National Tsunami Hazards Mitigation Program.
- Oversight of international collaborations in Pacific-wide tsunami forecasting and utilization of DART 4G buoy system through Pacific Tsunami Warning System, co-chair of UNESCO Intergovernmental Oceanographic Commission Data Buoy Cooperation Panel.
- Budget/purchase authorizations for NOAA Center for Tsunami Research including Cooperative Institute transfers, contract support, and overall project management using the Management Analysis and Reporting System.
- Contracts writing in support of current PMEL research under Memorandums of Understanding formed between PMEL and New Zealand GNS Science and between PMEL and the University of Malaga.
- Science lead for data integration and analysis for ocean monitoring and forecast systems design.

### **Physical Scientist/Oceanographer (GS13-1360-06)**

Research Scientist, NOAA Center for Tsunami Research, Pacific Marine Environmental Lab

Seattle, WA

- Dates: March 12, 2012 – January 14, 2024
- Full-time (40 hours/week)
- Performs and oversees multiple tsunami hazard assessments using GPU-based models of tsunami inundation including HySEA-Tsunami and Method of Splitting Tsunamis ([MOST](#)) models. Assessments performed for both US coastlines and for several overseas locations including the US Virgin Islands, Grenada and Barbados in the Caribbean, and Fiji and the Cook Islands in the Pacific leading to evacuation maps and procedures in many of these locations as part of the NOAA [TsunamiReady](#) program.

- Tsunami forecast systems development, research-to-operations specialist, coordinated transfer of joint forecast system SIFT to the Tsunami Warning Centers.
- Principal Investigator on projects using machine-learning techniques such as Google Big Query and Google Cloud to explore the use of cloud artificial intelligence techniques in tsunami forecasting to be ported to the operational NOAA tsunami forecast system directly impacting the Tsunami Warning Center's ability to warn for tsunami and hence protect life and property.
- Taught over 26 Community Model Interface for Tsunami ([ComMIT](#)) tsunami modeling workshops worldwide, training 430 people from 68 countries, most recently in Grenada as part of the [ITIC](#) Tsunami Evacuation Maps, Plans & Procedures (TEMPP) program.

### **Support Scientist, NOAA Tsunami Research Group**

Research Scientist, NOAA Cooperative Institute: Joint Institute for the Study of the Atmosphere and Ocean, University of Washington, Seattle, WA

- Dates: November 5, 2005 – March 11, 2012
- Supervisory role for 4 Cooperative Institute employees working within the NOAA Tsunami research group, including university hiring actions, job advertising, interviewing, annual review, and HR actions.
- Managed all aspects of employee performance, heard and resolved grievances, addressed employee complaints, and managed a broad range of personnel issues. Established and maintained strong working relationships between PMEL and the Cooperative Institute, and consistently showed good judgment in dealing with subordinates and superiors alike. Actively worked to improve employee performance through regular consultations, ongoing advice, promotion opportunities, recognition and awards for strong performance, and professional growth and mentoring support.
- Tsunami modeling and systems designer and developer for Community Model Interface for Tsunami, a tool for modeling and outreach for tsunami inundation studies.

### **Science Software Developer, PMEL Data Integration Group**

Visualization and Mapping Developer, NOAA Cooperative Institute: Joint Institute for the Study of the Atmosphere and Ocean, University of Washington, Seattle, WA

- Dates: August 15, 1998 – November 4, 2005
- Geographic Information Systems (GIS) development: created tools for ocean mapping and visualization, including the GeoTools library.
- Created a new desktop application, the Tsunami Coastal Assessment Tool (TsuCAT), utilizing the operational NOAA Propagation Database to rapidly assess the tsunami impact of seismic sources of any magnitude and location worldwide (<https://nctr.pmel.noaa.gov/TsuCAT>).
- Scientific visualization and data management systems including stereoscopic 3D visualization systems based on OpenGL and DirectX.

### **Oceanographer, Water Quality Team**

Field Oceanographer, Washington State Department of Ecology

- Dates: January 12, 1997-August 14, 1998
- Water-quality monitoring via small-boat operations in Puget Sound, Greys Harbor and Willapa Bay involving CTD and primary-productivity analysis along transects through all Washington state saline bodies of water four days a month, year-round.
- Performing tidal analysis and tracking trends in measured field quantities over time to assess changes in circulation and health of the ecosystem over time.

## Research Techniques

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### Numerical modeling:

- developer and user of several tsunami models, including NOAA's operational inundation model, MOST, the HySEA-Tsunami model, Neowave and COULWAVE.
- familiar with supercomputer cluster environment: MPI, OpenMP and CUDA parallelization techniques, debugging tools, and C, C++, FORTRAN-90, and Java
- model coupling (e.g., WRF to ROMS) using MPH and the Model Coupling Toolkit (developed at Argonne National Labs)
- designed and wrote various model analysis libraries for benchmarking using Matlab and Python

### Data analysis and systems development:

- Time series analysis using spectral techniques, tide-period harmonics, wavelet transforms.
- GIS application development, including ESRI API, GeoTools, and custom map-server applications such as Mapbox, GoogleMaps API, and Django
- Serving geospatial data using OpenDAP/DODS and custom java servlets
- Developed the Community Model Interface for Tsunami ([ComMIT](#)) a Java-based model framework for running the MOST tsunami model.

### Field experience

- Oceanographic research cruises to the Chukchi Sea (on US Coast Guard Icebreaker Polar Star), the Bahamas (on various small craft), and the Washington coast (on the NOAA Ship McArthur).
- Data collection and post-processing: CTD hydrographic casts, chemical sampling, multibeam SONAR, post-tsunami survey work, sediment coring
- SCUBA research certification, including current meter deployment and recovery in Willapa Bay and Grey's Harbor, WA and Coos Bay, OR.

## Recent Publications

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Guerrero Fernández, E., M.J. Castro Díaz, Y. Wei, C. Moore (2024): [Modeling sediment movement in the shallow-water framework: A morpho-hydrodynamic approach with numerical simulations and experimental validation](#), *Ocean Modelling*, 192, 102445, ISSN 1463-5003, doi: 10.1016/j.ocemod.2024.102445

Titov, V.V., and C. Moore (2021): [Meteotsunami model forecast: Can coastal hazard be quantified in real time?](#) *Nat. Hazards*, doi: 10.1007/s11069-020-04450-6

Dolcimascolo, A., D.W. Eungard, C. Allen, R.J. LeVeque, L.M. Adams, D. Arcas, V.V. Titov, F.I. González, C. Moore, C.E. Garrison-Laney, and T.J. Walsh (2021): [Tsunami Hazard Maps of the Puget Sound and Adjacent Waters](#)—Model Results from an Extended L1 Mw 9.0 Cascadia Subduction Zone Scenario. WGS, NTHMP and Washington EMD, State of Wash.

Moore, C., and D. Arcas (2018): Modeling tsunami inundation for hazard assessment of the U.S. Virgin Islands. NOAA Tech. Memo. OAR PMEL-4827. [In prep]

Rabinovich, A.B., V.V. Titov, C.W. Moore, and M.C. Eblé (2017): [The 2004 Sumatra tsunami in the southeastern Pacific Ocean: New global insight from observations and modeling](#). *J. Geophys. Res.*, 122, 7992–8019, doi: 10.1002/2017JC013078.

Tang, L., V.V. Titov, C. Moore, and Y. Wei (2016): Real-time Assessment of the 16 September 2015 Chile Tsunami and Implications for Near-Field Forecast, *Pure Appl. Geophys.*, DOI: 10.1007/s00024-015-1226-3.

Titov, V., C. Moore, M. Spillane, Y. Wei, E. Gica, and H. Zhou (2016): [Tsunami Hazard Assessment on Wave Generation, Propagation, and Inundation Modeling for the US East Coast](#). In U.S. Nuclear Regulatory Commission, NUREG.

Gica, E., V.V. Titov, C. Moore, and Y. Wei (2015): [Tsunami simulation using sources inferred from various measurement data: Implications for the model forecast](#). *Pure Appl. Geophys.*, Mar 2015, Vol. 172, Issue 3-4, pp 773-789, doi: 10.1007/s00024-014-0979-4.

Dall’Osso, F., D. Dominey-Howes, C. Moore, S. Summerhayes, and G. Withycombe (2014): [The exposure of Sydney \(Australia\) to earthquake-generated tsunamis, storms and sea level rise: a probabilistic multi-hazard approach](#). *Sci. Rep.*, 4, 7401, doi: 10.1038/srep07401

Greenslade, D.J.M., A. Annunziato, A. Babeyko, D. Burbidge, E. Ellguth, N. Horspool, T. Srinivasa Kumar, Ch. Patanjali Kumar, C. Moore, N. Rakowsky, T. Riedlinger, A. Ruangrassamee, P. Srivihok, and V.V. Titov (2014): [An assessment of the diversity in scenario-based tsunami forecasts for the Indian Ocean](#). *Cont. Shelf Res.*, 79, doi: 10.1016/j.csr.2013.06.001, 36–45.

Kânoğlu, U., Titov, V.V., Aydın, B., Moore, C., Stefanakis, T.S., Zhou, H., Spillane, M. and Synolakis, C.E., (2013): [Focusing of long waves with finite crest over constant depth](#), Proceedings of the Royal Society, Series A, <http://dx.doi.org/10.1098/rspa.2013.0015>, Published Feb 27, 2013.

Tang, L., V.V. Titov, E. Bernard, Y. Wei, C. Chamberlin, J.C. Newman, H. Mofjeld, D. Arcas, M. Eble, C. Moore, B. Uslu, C. Pells, M.C. Spillane, L.M. Wright, and E. Gica (2012): [Direct energy estimation of the 2011 Japan tsunami using deep-ocean pressure measurements](#), *J. Geophys. Res.*, 117, C08008, doi: 10.1029/2011JC007635.

Titov, V.V., C. Moore, D.J.M. Greenslade, C. Pattiaratchi, R. Badal, C.E. Synolakis, and U. Kânoğlu (2011): [A new tool for inundation modeling: Community Modeling Interface for Tsunamis \(ComMIT\)](#). *Pure Appl. Geophys.*, 168(11), doi: 10.1007/s00024-011-0292-4, 2121–2131.

Zhou, H., C. Moore, Y. Wei, and V. V. Titov (2011): [A nested-grid Boussinesq-type approach to modeling dispersive propagation and runup of landslide-generated tsunami](#). *Nat. Hazards Earth Sys. Sci.*, 11(10), doi: 10.5194/nhess-11-2677-2011, 2677–2697.