

Tsunami Science: The View from Modeling and Observations

A Webinar from the Committee on Solid Earth Geophysics

The National Academies of Sciences, Engineering, and Medicine

July 5, 2022

3:00-4:00 pm ET/noon-1:00pm PT

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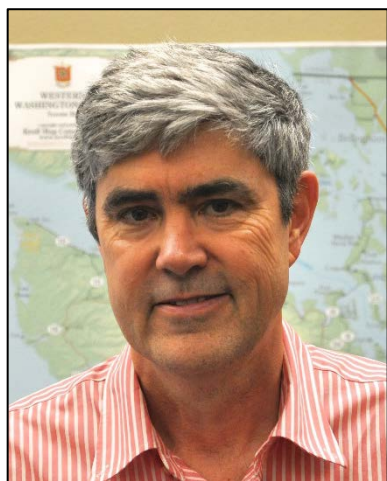
Large tsunamis of the past decades have poignantly underscored both the scientific challenges facing tsunami researchers and the potentially extreme hazards impacts of these events. In this webinar experts will survey the state of the art of tsunami science - an inherently multi-disciplinary field that encompasses everything from advanced hydrodynamics, data science and machine learning, geophysical modeling, and inversion, to field geological investigations of past and recent events. In addition to their talks, our panelists will have open discussion as well on what the future of this discipline might hold.

Speakers for this event are:

- Dr. Randall LeVeque, Professor Emeritus of Applied Mathematics, University of Washington
- Dr. Shuo Ma, Professor of Geophysics in the Department of Geological Sciences, San Diego State University
- Dr. Lydia Staisch, Research Geologist with the Geology, Minerals, Energy, and Geophysics Science Center, U.S. Geological Survey

Followed by a discussion period moderated by Dr. Diego Melgar, COSEG Committee Member

Speaker Biographies



Randall J. LeVeque is Professor Emeritus of Applied Mathematics at the University of Washington in Seattle, and also holds an adjunct position in the Department of Earth and Space Sciences. Dr. LeVeque is a Fellow of both the American Mathematical Society and the Society for Industrial and Applied Mathematics, and a member of the National Academy of Sciences. His research has focused on the development and implementation of numerical methods for solving hyperbolic partial differential equations, which are used to model a wide variety of wave propagation phenomena. In 1994, he initiated the open source software project Clawpack (Conservation Laws Package), implementing a general class of shock-capturing finite volume methods, and together with Marsha Berger incorporated adaptive mesh refinement capabilities to handle multiscale problems. Since 2004, Dr. LeVeque's

research interests have shifted largely to the development of the GeoClaw branch of Clawpack, which

was originally developed for tsunami modeling. This software has been extensively developed with a group of collaborators, and is now also used for modeling storm surge and other overland floods. In the past decade, Dr. LeVeque has worked on many tsunami modeling projects, including the development of new techniques for probabilistic tsunami hazard assessment (PTHA) and machine learning approaches for real-time tsunami forecasting. He has also worked on several hazard mapping projects for Washington State, coastal communities, and tribal nations, including modeling to support the design of tsunami vertical evacuation structures. Much of this work has been funded by the National Tsunami Hazard Mitigation Program (NTHMP), FEMA, and/or the National Science Foundation. He is currently collaborating with a large interdisciplinary team as part of the NSF-funded Cascadia CoPes Hub (<https://cascadiacopeshub.org/>). He received his Ph.D. in Computer Science from Stanford University.



Shuo Ma is a professor of geophysics in the Department of Geological Sciences at the San Diego State University. His research uses numerical models to understand earthquake rupture dynamics and the associated fault zone structure, ground motion, and crustal deformation. In recent years, he expanded his interest to tsunami and has been working on coupled models of earthquake and tsunami. His group is one of the pioneers in applying wedge plasticity theory in understanding physics of tsunamigenesis and anomalous seismic radiation in shallow subduction zones. His recent work involves tsunamigenesis by strike-slip earthquakes as well. He holds a B.S. in Geotechnical Engineering from Tongji University, a Ph.D. in Geological Sciences from the University of California, Santa Barbara, and was a postdoctoral scholar in the Department of Geophysics at Stanford University.



Lydia Staisch is a Research Geologist with the Geology, Minerals, Energy, and Geophysics Science Center of the U.S. Geological Survey. Her research interests include on structural geology, tectonic geomorphology, geologic mapping, and seismic hazards in the Pacific Northwest. Her graduate work focused on the deformation history of the northern Tibetan Plateau and coseismic landslide hazards in the Himalayas. Afterwards, Dr. Staisch was a Mendenhall Postdoctoral Fellow with Brian Sherrod at the Earthquake Science Center. Her general research interests are in continental deformation and landscape evolution. She tends to employ a multi-faceted approach in her research, including field work, structural-stratigraphic analysis, geochemical analysis, geodynamic modeling, remote sensing and geodesy. She holds a B.A. in Geology from Carleton College and a Ph.D. in Geological Sciences from the University of Michigan.