



OLD DOMINION UNIVERSITY

Center for Coastal Physical Oceanography



**INSTITUTE FOR COASTAL
ADAPTATION & RESILIENCESM**

Spring 2026 Virtual Seminar Series

“AI-Assisted Interpretation of Sediment Transport in Vulnerable Coasts”

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3:30 PM EST

ZOOM LINK

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Abstract

Low-lying island nations are experiencing accelerated shoreline change due to sea-level rise and increasing storm intensity. Traditional coastal engineering approaches rely on process-based numerical models; however, these methods often struggle in data-limited environments where sediment processes are highly nonlinear and spatially variable. As a result, predicting long-term shoreline response and selecting appropriate adaptation strategies remain challenging.

In this seminar, I present a data-driven framework that combines hydraulic understanding with artificial intelligence to interpret sediment transport and coastal evolution in Tuvalu, a Pacific island nation vulnerable to erosion and inundation. Using field observations, historical shoreline information, and experimental knowledge, the approach identifies dominant drivers of morphological change and evaluates the performance of different mitigation strategies, including gravel nourishment and nature-based solutions.

Through this case study, I demonstrate how data-driven analysis can complement traditional coastal models by revealing patterns not easily captured by physics-based simulations alone. The results suggest that integrating engineering knowledge with machine learning can improve prediction reliability and support decision-making for coastal resilience.

I conclude with a discussion on how hybrid approaches combining physics and AI may guide future coastal management, particularly in regions where monitoring data are sparse but adaptation planning is urgent.

Biography

Dr. Hyun Dong Kim is an Assistant Professor in the Department of Civil and Environmental Engineering at Old Dominion University. He earned his first Ph.D. in Civil Engineering with a focus on AI applications from Osaka University, Japan, followed by a Ph.D. in Coastal and Oceanographic Engineering from the University of Florida. Prior to academia, he worked in the engineering consulting industry and in professional engineering organizations. He currently serves on the Executive Board of PIANC (The World Association for Waterborne Transport Infrastructure) and on the Coastal Council of ASCE COPRI. His research focuses on nearshore hydrodynamics, nature-based solutions, and maritime engineering, with recent efforts integrating artificial intelligence to improve prediction of coastal change in data-limited environments. He was selected as one of Forbes Korea's 20 AI Rising Leaders for his work on AI applications in engineering.

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