

Can Offshore Wind Thrive Amid Changing Storm Patterns? Risks, Opportunities, and the Role of AI/ML

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Abstract: This seminar presents a simulation-based framework for evaluating how offshore wind energy systems may be affected by evolving storm patterns, particularly tropical cyclones, under future climate scenarios. The analysis examines both the risks of turbine failure and the potential for increased power generation, drawing on projections from selected Shared Socioeconomic Pathways (SSPs) in the IPCC AR6 that reflect anticipated changes in sea surface temperatures and other environmental drivers. Hazard curves for projected hurricane wind speeds indicate moderately increasing risks for offshore wind infrastructure, especially along Northeastern U.S. coastlines. At the same time, northern regions may benefit from greater energy generation potential as weakened tropical systems reach higher latitudes more often. The seminar also highlights opportunities to leverage artificial intelligence (AI) and machine learning (ML) techniques to better capture the links between large-scale climate variability and storm behavior, supporting more adaptive and resilient offshore wind energy development.

Bio: Dr. Weichiang Pang is a Professor of Civil Engineering at Clemson University in South Carolina, USA. His research focuses on the risk assessment of civil infrastructure exposed to large-scale natural hazards such as hurricanes, tornadoes, and earthquakes; renewable energy and offshore wind; and the use of sustainable and renewable construction materials, with an emphasis on wood in structural applications. He also serves on the advisory board of the South Carolina Department of Insurance's SC Safe Home Program, contributing his expertise to community resilience and disaster mitigation initiatives.



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