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Department of Marine Sciences
Presents Seminars by

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Wave energy resource characterization for advancing a nascent marine renewable energy

Quality data on marine energy resources and environmental conditions is essential for advancing the marine renewable energy industry and other maritime industries of the Blue Economy. Resource and environmental conditions characterization (wind, wave, currents) is needed to assess project site opportunities to capture energy resources and risks to operation, maintenance, reliability, and survival. This process requires the selection, computation and cataloging of metrics that best represent and parameterize the main attributes of the energy resource and environmental conditions; as well as their spatial, temporal and statistical distributions. Best available data sources for computing these metrics are derived from validated model hindcasts and measurements. Characterization also supports the development of classification systems that emulate those developed for the wind industry: *Resource* (project) classification systems designed to support resource assessment studies for energy planning and projects, and *conditions* (device) classification systems designed to streamline and reduce costs for design, device-type certification, product-line development and manufacturing. This presentation will provide an overview of wave energy resource characterization efforts in the United States as part of a multi-laboratory project supported by the US Department of Energy. Methods described include those for generating resource and conditions data sources with high-resolution regional wave model hindcasts, and statistical methods used to compute metrics characterizing extreme conditions.

Teresa Mathews

Oak Ridge National Laboratory

Sustainable Algal biofuel production: Opportunities, Challenges, and Research Needs

Algae holds much promise as a potential feedstock for biofuels, but large-scale algal biomass production has not yet demonstrated the performance required for the economical production of biofuels. To date, the biofuel industry has focused on algal monocultures- single species of algae that have high growth rates and lipid accumulation potentials when cultured under controlled laboratory conditions. However, scaling up monocultural production has remained a significant challenge because monocultures are extremely susceptible to pests and disease. Further, nutrient and water supplies will become limiting as we scale up production unless new approaches are developed to mitigate these resource constraints. The use of wastewater resources that are rich in nitrogen and phosphorus to supplement a portion, or completely replace, traditional fertilizer and water requirements may help significantly reduce algal production costs and conserve freshwater resources. Here we examine the performance of monoculture and polyculture algal crops in two case studies: municipal wastewater, and the waste from biofuel production. We examine the economic and environmental benefits, tradeoffs, and scalability of each of these case studies. Our results suggest that cultivating and managing algal polycultures in wastewater may be a more sustainable and cost-effective solution for the biofuel industry than the current practice of monoculture production.

Host: Zosia Baumann
Time & Date: 11:00 am, Friday, October 25, 2019
Place: Marine Sciences Building, Seminar Room 103

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