

WAVE ENERGY CONVERTER ARRAY CHARACTERIZATION

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Overall Research Question: Can we better inform the optimal location of wave energy converters (WECs) for different, global, wave resources?

Description of Research Project and Objective: Given the need for clean, renewable energy and the localization of populations by coastlines, wave energy is poised to become a significant producer of electricity. In this project, I want to understand what WEC designs and control scenarios are optimal for different wave conditions. We have undertaken a preliminary study to explore WECS currently operational; from this, we have identified eight global regions of interest for WEC development and are finding high-fidelity wave-resource data for each. We intend to use this data to inform an existing WEC array optimization tool, which optimizes the locations of WECs within an array to capitalize on potential positive interactions between devices. My *objective* is to understand what array characteristics are related to the resource at a site, and to develop “best practices” for array orientation based on these correlations.

Significance of the Proposed Work: Our previous research has indicated that WEC array layouts are highly sensitive to the wave resource. This clarifies that an optimal array for the coast of Oregon is not optimal for the coast of Denmark, and vice versa. Our work is significant because it will give developers a means of assessing the applicability of their devices as they design them.

Approach: To do this, I will assess the wave resource at the sites of interest and use data processing methods to create probabilistic models that represent these waves. I will use this model in an existing WEC array optimization code to assess which designs perform best in each of the locations, by finding statistical correlations between layout behavior and wave resource characteristics.