

Predicting Performance of Macroalgae Farms with Hydrodynamic and Biological Modeling

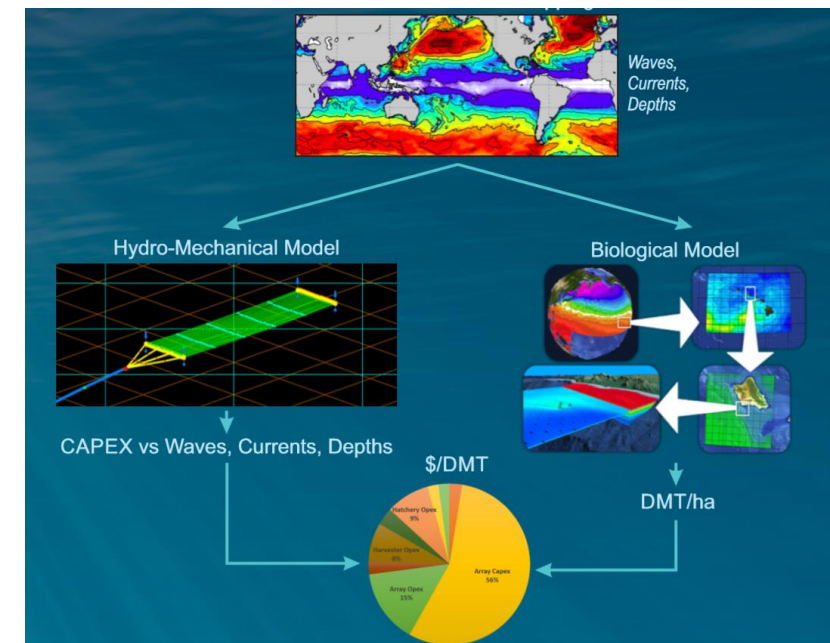
Greg Rocheleau, Makai Ocean Engineering Inc.

Project Vision

We are providing physical, chemical, and biological modeling for prediction of offshore macroalgae performance under realistic offshore conditions.

Project Impact

We expect this work to provide the tools and data needed to robustly address the costs and harvest potential of various offshore macroalgae technologies and designs.



Project Team

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Modeling & Engineering Design

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EFDC & Algal Modeling



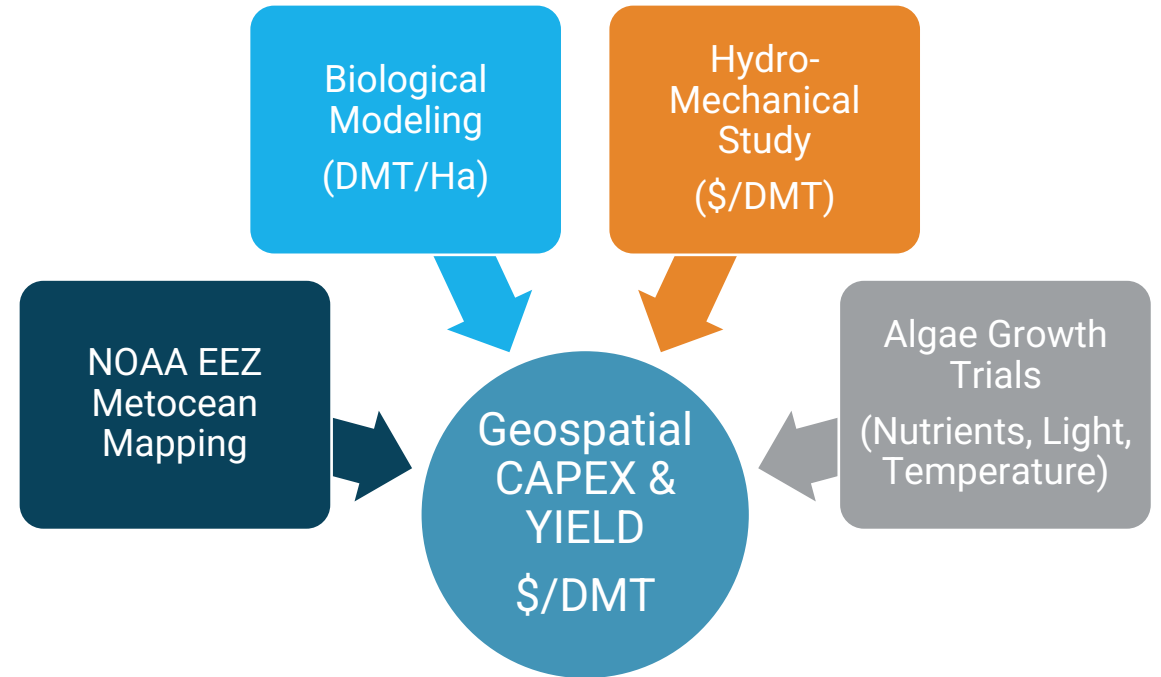
Innovation & Objectives

Innovation

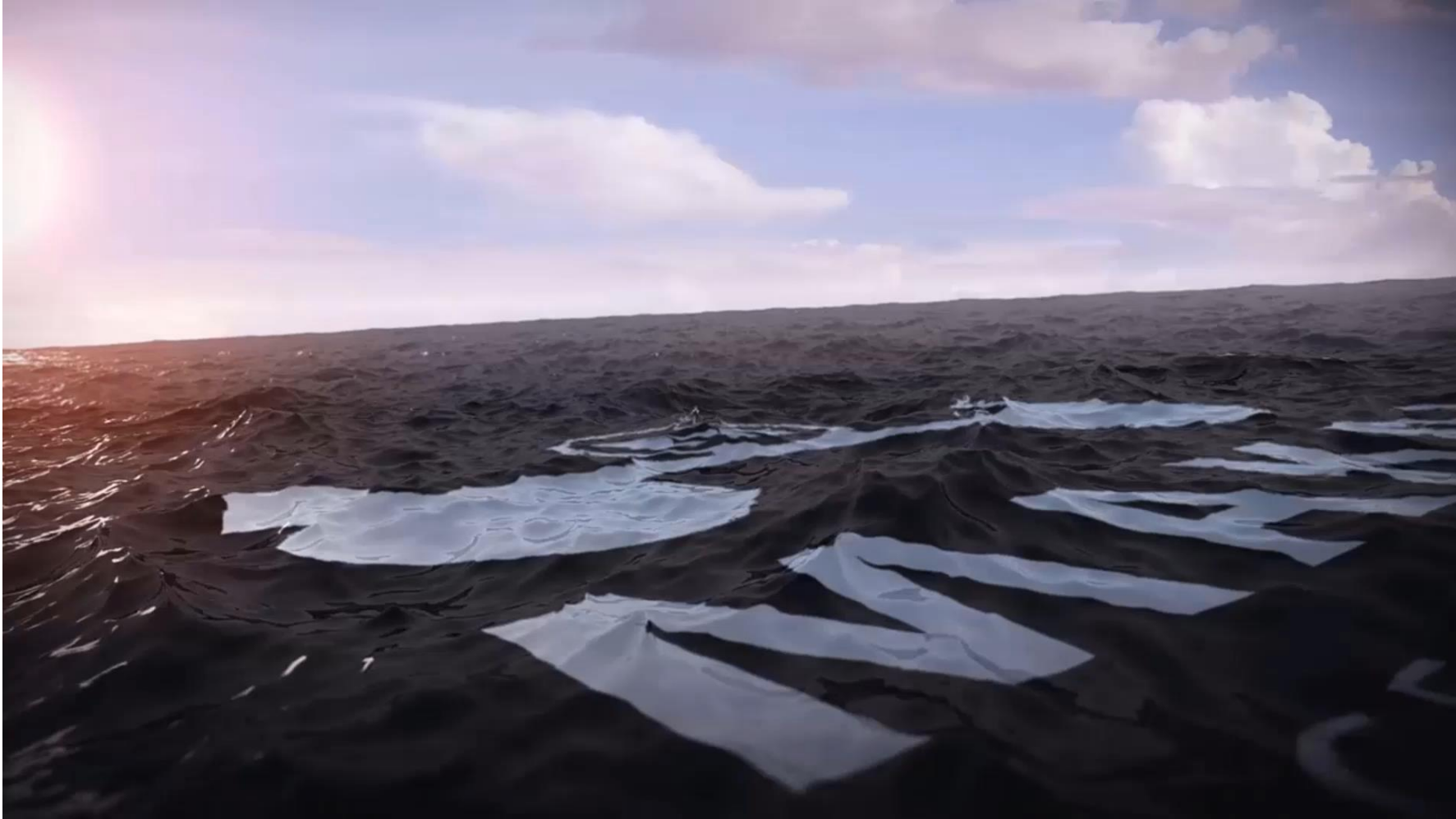
M-EFDC is an EPA approved 3D ocean circulation and water quality model.

This work will expand M-EFDC capabilities to answer fundamental questions about macroalgae farm performance as function of farm configurations on the individual and regional scale.

- Hydro-mechanical modeling and CAPEX cost parameterizations.
- Biological modeling with M-EFDC and prediction of harvest yields.
- Algae growth tests at NELHA.



Technology Progress



Commercial Opportunities/T2M

Makai-EFDC Source Code: Modernized source code for use in engineering services industry for efficient simulation of large scale algal arrays, environmental impact, and growth predictions.

Orcina Orcaflex w/Custom API's: Robust hydromechanical models for engineering services industry, with simulation automation via customized python API's for pre and post processing.

**Tools for project planning, environmental impacts & permitting,
and engineering design.**

Unique capabilities for offshore & deep water macroalgae systems.

Future Vision

- ▶ Ocean & biological models needed for early-stage design and project development.
- ▶ High-fidelity modeling needed for detailed design of offshore systems.
- ▶ Post-ARPA-E goals:
 - Publications & conferences
 - Continued PhII project support
 - **Commercial consulting services**

