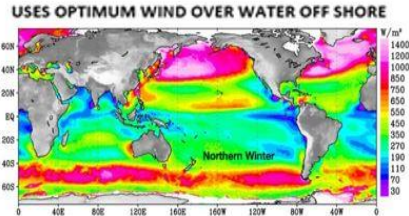
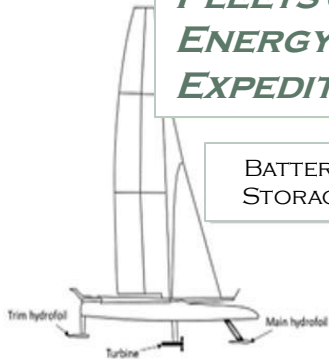


Modeling and Simulation Family of Systems for the Green Energy Ship (GES) Concept

FLEETS OF AUTONOMOUS GREEN ENERGY SHIPS FOR EXPEDITIONARY POWER



GES Concept: Sailboat with hydrokinetic turbine and battery

Problem Statement

- Green Energy Ships (GES) are autonomous sailboats equipped with hydrokinetic turbines for electrical power generation
- This project will develop a family of modeling and simulation tools that enable exploration of the GES concept at varying scales
 - GES power generation and transfer to a mothership
 - GES trajectory dynamics and control
 - Fleet-level swarm motion and parametric analysis
- The research will advance the body of knowledge on optimal GES fleet structure for operation in USN and USMC environments

Impact

- This project will advance the knowledge base for the energy ship concept and create infrastructure to support larger-scale follow-on efforts
- If feasible, the adoption of energy ships will create a clean, renewable source of power in the areas of most interest to USN and USMC forces, both coastal-based and, shortly, in the open ocean as part of the sea-basing concept
- The research will result in two student theses, a peer-reviewed paper, and a simulation environment, which will be used to demonstrate a seabasing energy ship resupply scenario

Transition

- Previous seed funding from the Office of Naval Research (Code 331) through the Navy Decarbonization Research Consortium (CY23) has been used to investigate high-level CONOPS and first-order performance of a GES system within the military operational environment
- We will continue working with the Decarbonization community of interest and plan to submit a joint proposal with UC Davis to the Consortium sponsor, ONR Code 331, for 2024-2025 funding
- We will also we will seek opportunities to communicate with ONR Code 34 Div. 342 (Expeditionary Robotics), MCWL, and the ONR Expeditionary Energy program