

High resolution tidal energy resource assessment in Western Passage, Maine

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Although significant efforts have been taken to assess the maximum potential of tidal stream energy at system-wide scale, accurate assessment of tidal stream energy resource at project design scale requires detailed hydrodynamic model simulations based on high-resolution three-dimensional (3-D) numerical models and model validation against high quality measured data. Western Passage has been identified as one of the top ranking sites for tidal energy development in US coastal waters in a previous study, based on a number of criteria including tidal power density, market value and transmission distance. This poster presents a detailed modeling effort to characterize the tidal stream energy resource in Western Passage, Maine, using the unstructured-grid Finite Volume Community Ocean Model (FVCOM). The model domain covers a large region including the entire the Bay of Fundy and has a model grid resolution varies from 20 m in the Western Passage to approximately 1000 m along the open boundary near the mouth of Bay of Fundy. Preliminary model validation was conducted using existing NOAA measurements for water level and currents. Extractable tidal energy can be simulated with a tidal turbine module embedded in FVCOM at locations of interest within the model domain. This study provides an example of high-resolution resource assessment using a 3-D coastal ocean model to support tidal energy developers for optimal siting and array deployment, following the guidance recommended by the International Electrotechnical Commission Technical Specification.