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Abstract:

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Tidal Energy Resource Assessment in the Grand Passage using a 3D Coastal-Ocean Model

The optimal design and placement of tidal turbines requires a careful and accurate characterization of the tidal flow at the site. But, direct measurements of tidal flow at a site are limited by the cost and time available to collect data. Thus, a full site assessment relies on numerical modelling to develop an understanding of the site's long-term potential and provide flow characteristics necessary for turbine design. Fully 3D CFD models are computationally expensive and thus impractical for long term studies. Simplifying the complexity of the models increases the timescales that can practically simulated, but then raises questions of the validity of the results.

In this study, a hydrostatic, coastal-ocean model (FVCOM) was used to analyze possible COMFIT tidal energy sites in Grand Passage. The 3D model simulations are validated against data collected by acoustic doppler current profilers and previous 2D simulations. The 3D simulations are used to characterize the vertical profiles, in particular identifying regions of reverse shear. As well, the simulations are also used to examine the structure and propagation of large eddies that create large fluctuations in the flow. In the end, locations with strong flow and low levels of eddy activity are identified for possible turbine deployment.