

## Validating a New Marine Forecasting Tool for Tidal Energy in Grand Passage, Bay of Fundy

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Grand Passage in the Bay of Fundy is in many ways an ideal passage for studying tidal energy. It is relatively small with sites easily access from shore, it has a range of water depths from 10 m to 30 m, has a reasonable range of flow speeds 2 to 3 m/s a peak flow, clear water that makes observation of marine life easy to observe, a reasonable wave climate, etc. The passage is one of the best observed and modelled tidal energy sites in the world, with over a decade of field work and research examining all aspects of tidal dynamics. In the fall of 2018, SME Canada deployed its PLAT I turbine platform in Grand Passage. The working turbine requires a detailed sea state forecasts to optimize turbine and marine operations.

In this talk, we will present a new marine forecasting tool developed in collaboration with Luna Ocean Consulting Ltd. The forecasting tool combines a variety of historical measurements from Grand Passage—tide gauge, ADCPs (bottom mounted and mobile), drifters, turbulence measurements, tide gauge, wave height measurements – and a two models – a coastal ocean model and a CFD model. The tool combines data using an innovative phase learning method developed by Luna Oceans that significantly improves the ability to predict the non-harmonic portion of the velocity time series, including turbulence. As well, the tool can make accurate predictions with only short observational time series and, therefore, is ideal for assimilating data from spatial mapping tools, like drifters, with time-series observations and model simulations.

The forecasting tool is validated for both short term forecasts suitable for marine operations and long term forecasts suitable for site assessment and turbine array design.