

# A HIGH-RESOLUTION TIDAL MODEL TO SUPPORT FIELD SURVEY AND RESOURCE ASSESSMENT IN COOK INLET, ALASKA

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The development of tidal energy projects relies on consistent and accurate tidal resource characterization using fine-resolution tidal modeling at potential project sites. The modeling work is typically done with a three-dimensional (3-D) hydrodynamic model that is capable of resolving complex topography and 3-D current profiles. On one hand, the model needs to be validated against high-quality velocity measurements. On the other hand, a high-fidelity tidal hydrodynamic model can provide useful guidance on designing a good field measurements plan that will produce high-quality data for model validation. The Cook Inlet, AK has been identified as one of the top hot spots for tidal energy development based on a number of criteria, including tidal power density, market value, and transmission distance. In this study, a high-resolution tidal hydrodynamic model for the Cook Inlet was developed to characterize the tidal stream energy resource using the unstructured-grid Finite Volume Community Ocean Model (FVCOM). The model domain covers the entire Cook Inlet and has a grid resolution varying from ~1000 m at the entrance to ~300 m in the upper inlet. The preliminary model calibration was achieved by comparing model predictions at NOAA real-time tidal gauges for tidal elevation and at selected NOAA historical current survey stations for velocity. The model performance was evaluated based on error statistics for water level and current. Meanwhile, the model output was analyzed to identify hotspot regions with high energy potential that warrant additional high-quality current and turbulence measurements.

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