glacier bay tidal modeling project

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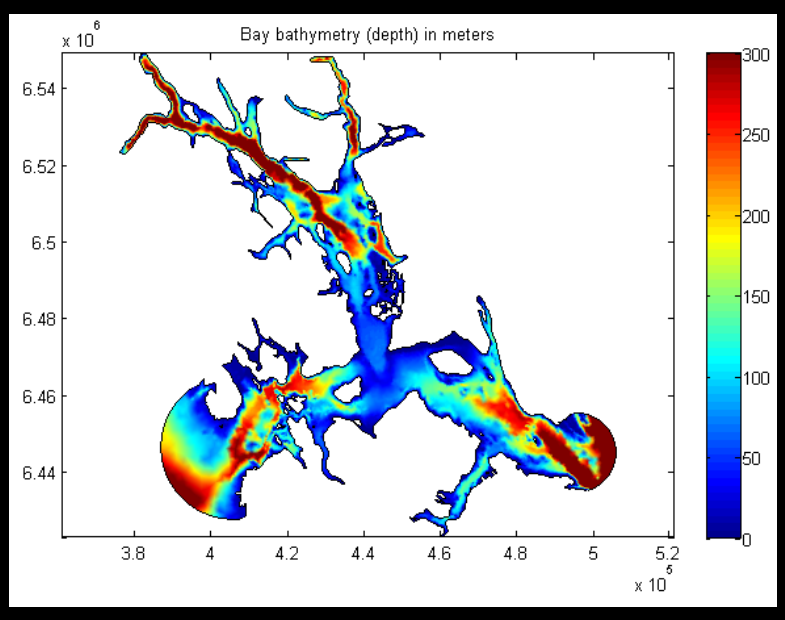
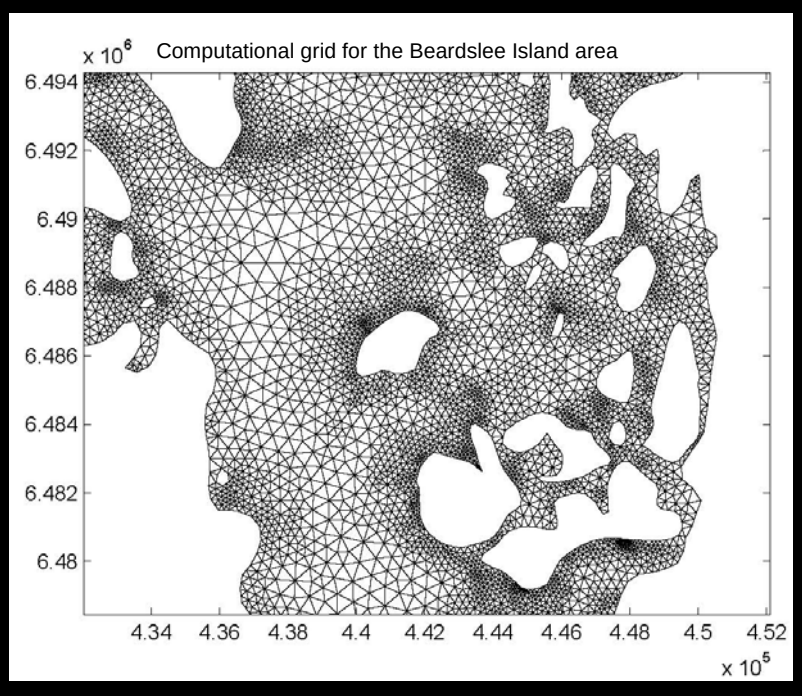
Motivation

Glacier Bay National Park experiences extreme tides, with differences of 25 feet between high and low tide. These large tides, combined with the complex bathymetry and shoreline of the bay, result in complicated and dramatic tidal currents, or 'circulations.' These tidal currents are important in terms of distributing heat, salt, nutrients, and other quantities throughout bay waters. The present project, supported by the National Park Service, was undertaken in order to further the understanding of the rich physical environment of Glacier Bay National Park.



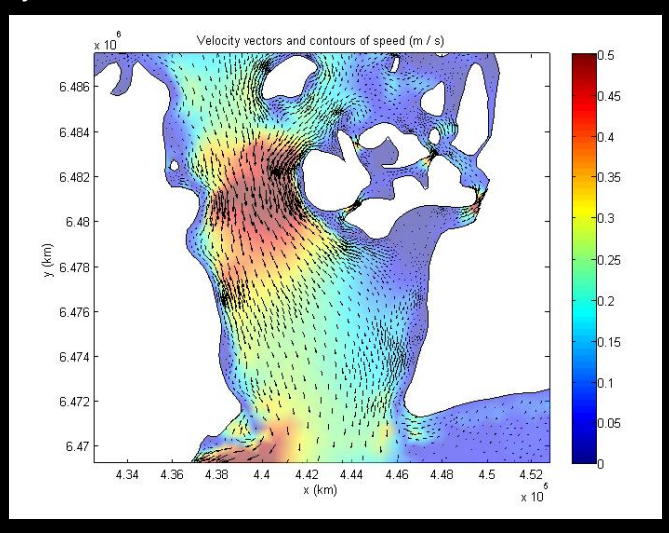
Methodology

To accomplish this goal, the ADCIRC (ADvanced CIRCulation) model was apapted to the Glacier Bay region. This model calculates the hydrodynamics on an approximate 'grid,' as driven by tides, winds, and freshwater inflows.

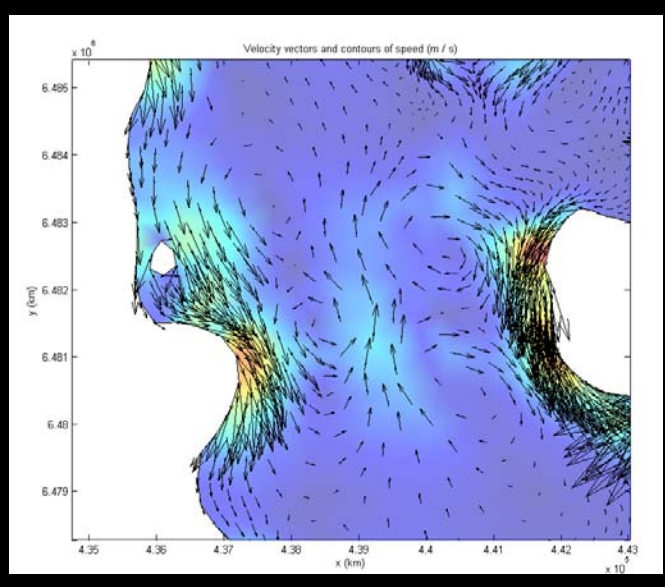


Results

The results of the model include detailed information on the tidal velocity field in the bay. Results confirm that velocities are highest in the Sitakaday Narrows area, just outside of Bartlett Cove.



The results also identify significant 'eddying.' Large rotating masses of water are created when the tides change from flood to ebb and vice versa.



The velocity fields can be used to track 'drifters' through the bay, helping to explain the fate of bay waters.