Finite Element Shallow Water Flow Model with Subgrid Corrections for Efficient Predictions of Storm-Driven Coastal Flooding

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Storm Surge Prediction

- Storm surge is the principal cause of loss of lives and damages to natural and built infrastructure during storms.
- Coastal hydrodynamic models such as the ADvanced CIRCulation (ADCIRC) model are used to predict high water levels during a storm to alert emergency managers of incoming threats to coastal communities.
- These models rely on high-resolution meshes to compute water levels and velocities across vast stretches of coastline.









Subgrid Corrections

- To fix computational inefficiency and improve accuracy, subgrid correction 50 factors were added to the code
- This allows for coarsened meshes by using information at smaller scales to correct flow variables











Simulation	Run time
Coarse Traditional	3,483 s
Coarse Subgrid	4,589 s
Fine Traditional	151,970 s

Speed up of 33x from Coarse Subgrid to Fine Traditional