NC STATE UNIVERSITY

Characterization and Prediction of Coastal Hazards

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NC State Lightning Presentations
Southeast CASC Coastal Resiliency Working Group
Virtual Meeting, 30 Sep 2020

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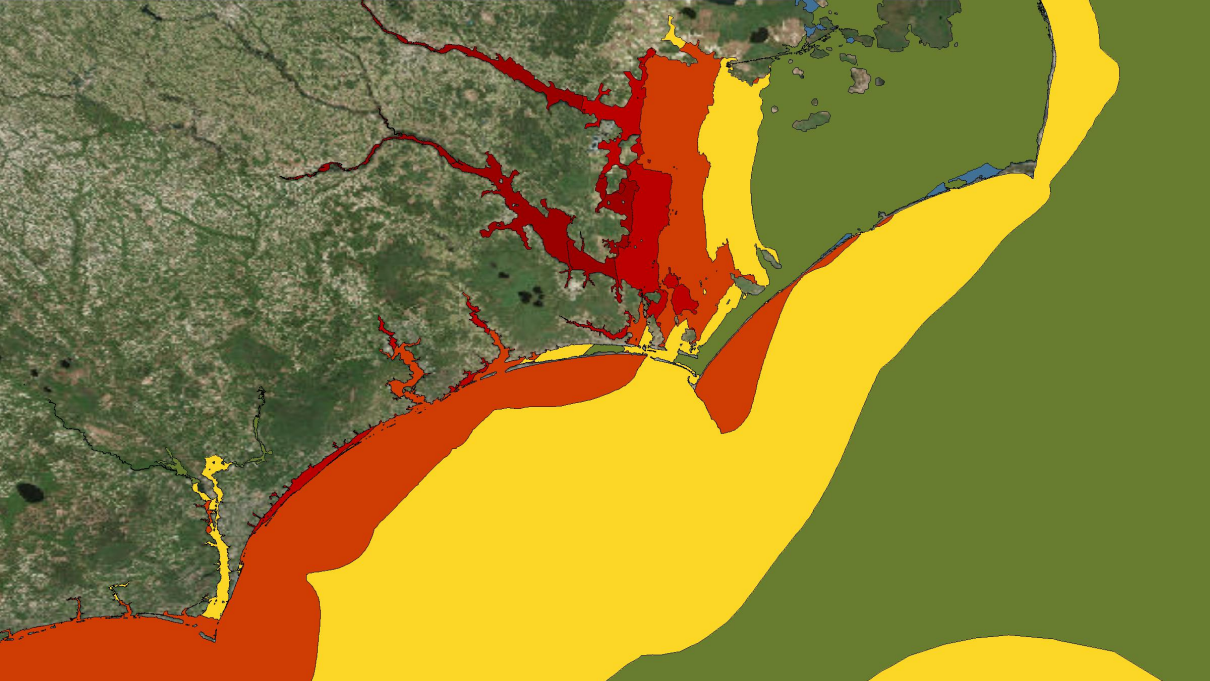

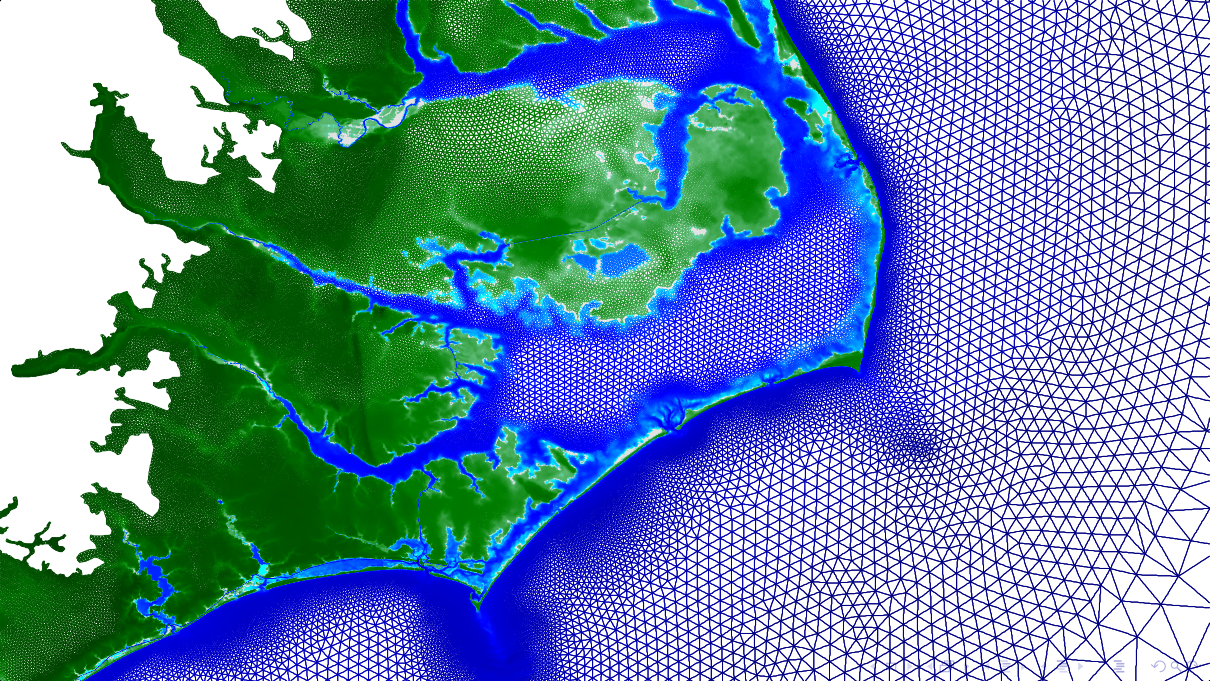

Increasing Efficiency of Coastal Flooding Models

1. Dynamic Load Balancing
2. Sub-Grid Corrections

Improving Representation of Coastal Processes

3. Density-Driven Estuarine Flows
4. Storm-Driven Erosion and Island Breaching

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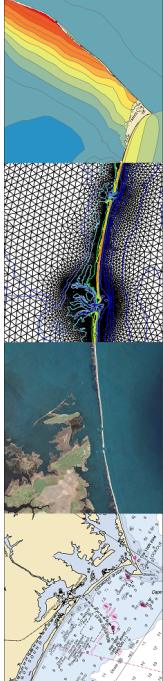

1. Dynamic Load Balancing

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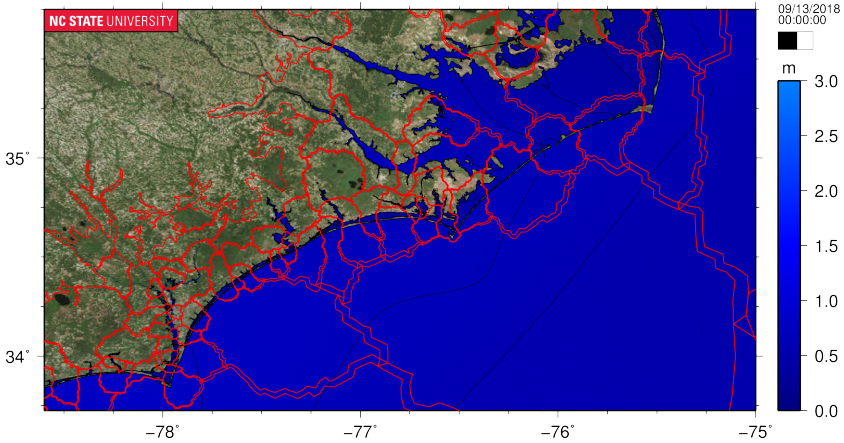
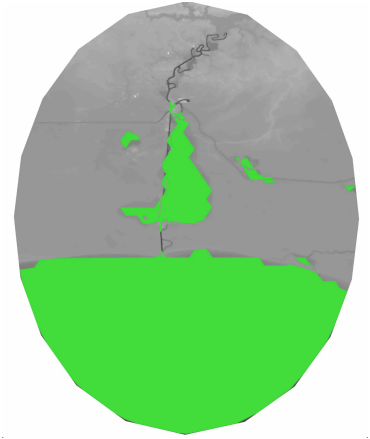
- Reallocate computational resources to optimize workload on CPUs
- Speed-ups of 20 percent, with no sacrifice in accuracy



KJ Roberts, JC Dietrich, et al. (in review), *Environmental Modelling and Software*.

2. Sub-Grid Corrections

- Average the governing equations over the grid/mesh scale
- Identify closures to upscale information from higher-resolution data sets (e.g. DEMs)



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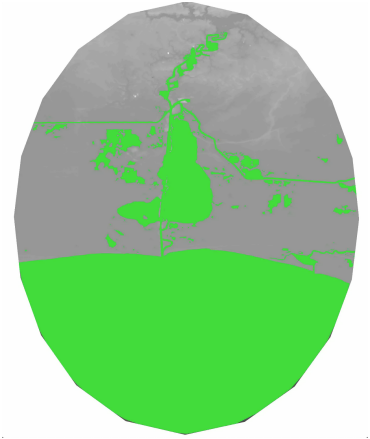

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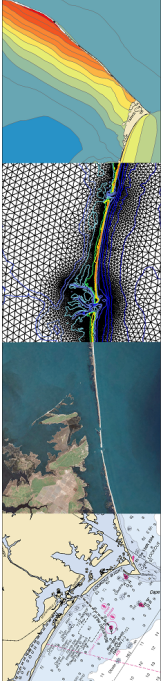
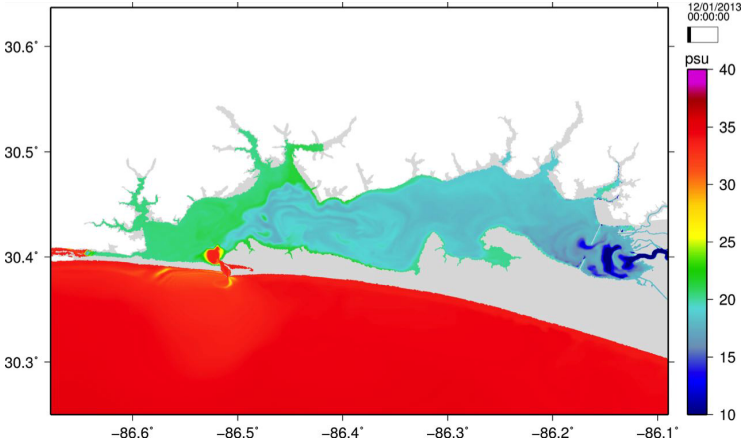


3. Density-Driven Estuarine Flows

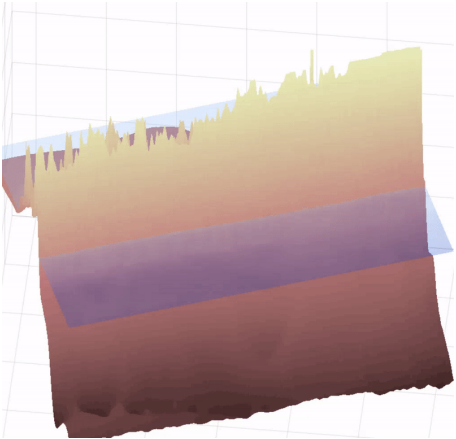
- Three-dimensional circulation and transport
- Simulation of mixing in Choctawhatchee Bay, Florida, during Dec 2013



R Cyriac*, JC Dietrich, et al. (2020), *Regional Studies in Marine Science*.

4. Storm-Driven Erosion and Island Breaching

- Predict erosion at island-scales, then map back to flooding at region-scales
- Simulation of 'Isabel Inlet' on Hatteras Island



A Gharagozlou*, JC Dietrich, et al. (in preparation), *Estuarine, Coastal, and Shelf Science*.

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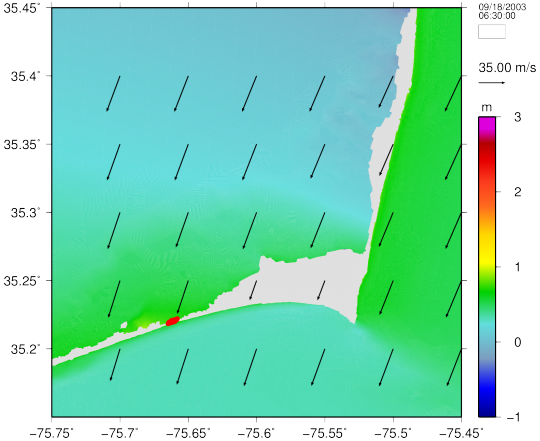

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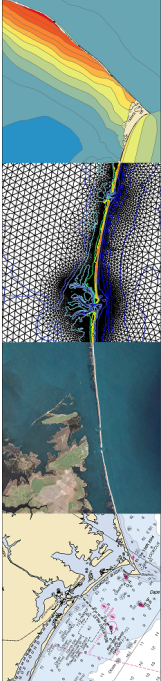

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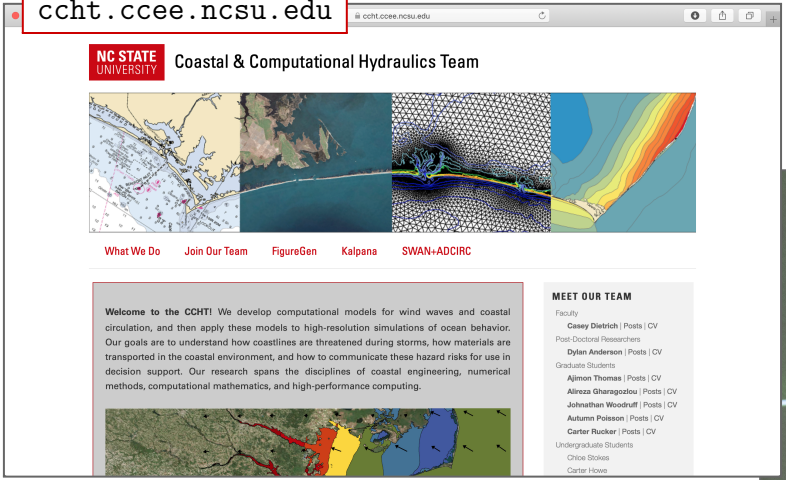

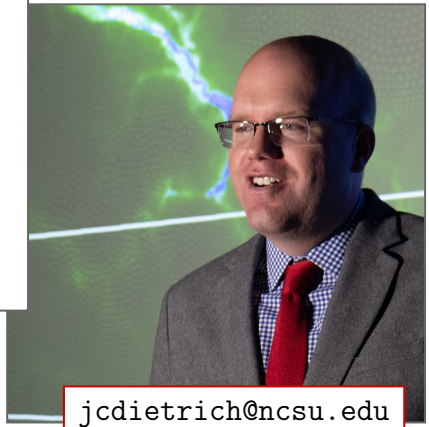

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