Storm Surge Computing at NC State

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Storm surge predictions for Matthew (2016) for lower Neuse River (a) before and (b) after enhancing resolution.





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How Do We Use HPC at NC State?

We use our HPC resources at NC State mostly for development work

- Smaller jobs, rapid testing, visualization and post-processing
- Available resources:
 - 20 IBM Flex System x240 Compute Nodes (320 Cores)
 - 2 IBM Flex System IB6131 Infiniband Switches
- Typical jobs:
 - ▶ Storm surge simulations: 192 to 224 cores, up to 48 hr
 - Coastal erosion simulations: 80 to 96 cores, up to 12 hr
 - Visualization: 16 to 48 cores, up to 2 hr

For production work, we move to larger systems

- Collaborators at RENCI
- Allocations via XSEDE on TACC Stampede2, SDSC Comet

Summary

Large-domain predictions of storm surge and coastal flooding

- High-resolution of shelf, islands, sounds, rivers, floodplains
- Real-time predictions for stakeholders

Can we be smarter in our use of HPC resources?

- Dynamic load balancing for wet/dry problems
- Initial speed-up of 20%, but should get even better
- May require a significant code re-write

Can we gain efficiency by coarsening our mesh?

- Sub-mesh-scale parameterizations?
- GIS techniques with simplified physics?

