



# Development of a Continental Scale Coastal Flood Model Using a Sub-Setting Approach

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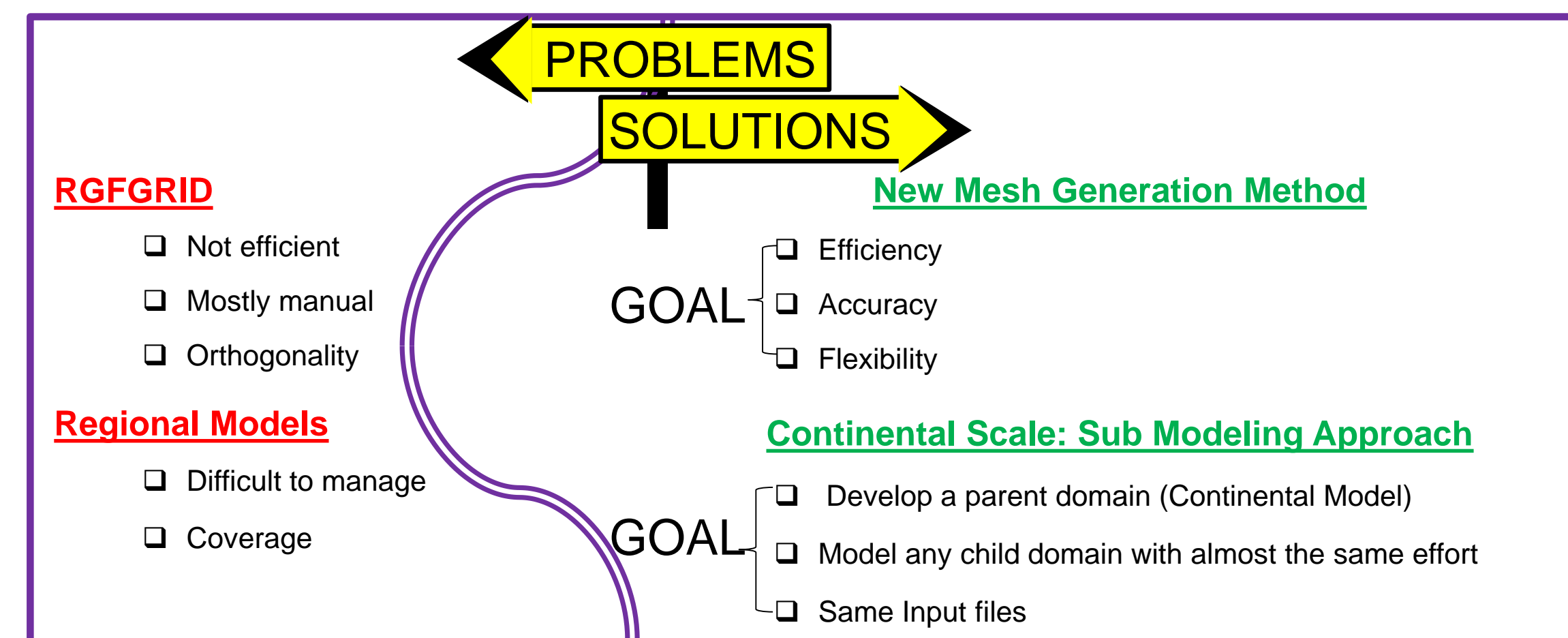
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## INTRODUCTION



## SUB-SETTING APPROACH

**Objective**

- Optimize run times
- To develop a parent domain and multiple child domains with almost the same effort.
- To adaptively move child domain boundaries (allows dynamic behavior).
- Same boundary locations.

**Workflow**

- Determine spatial extent of child domain.
- Update MDU file with the child domain information.
- Preprocess boundary condition files.
- Run simulation

**Implication**

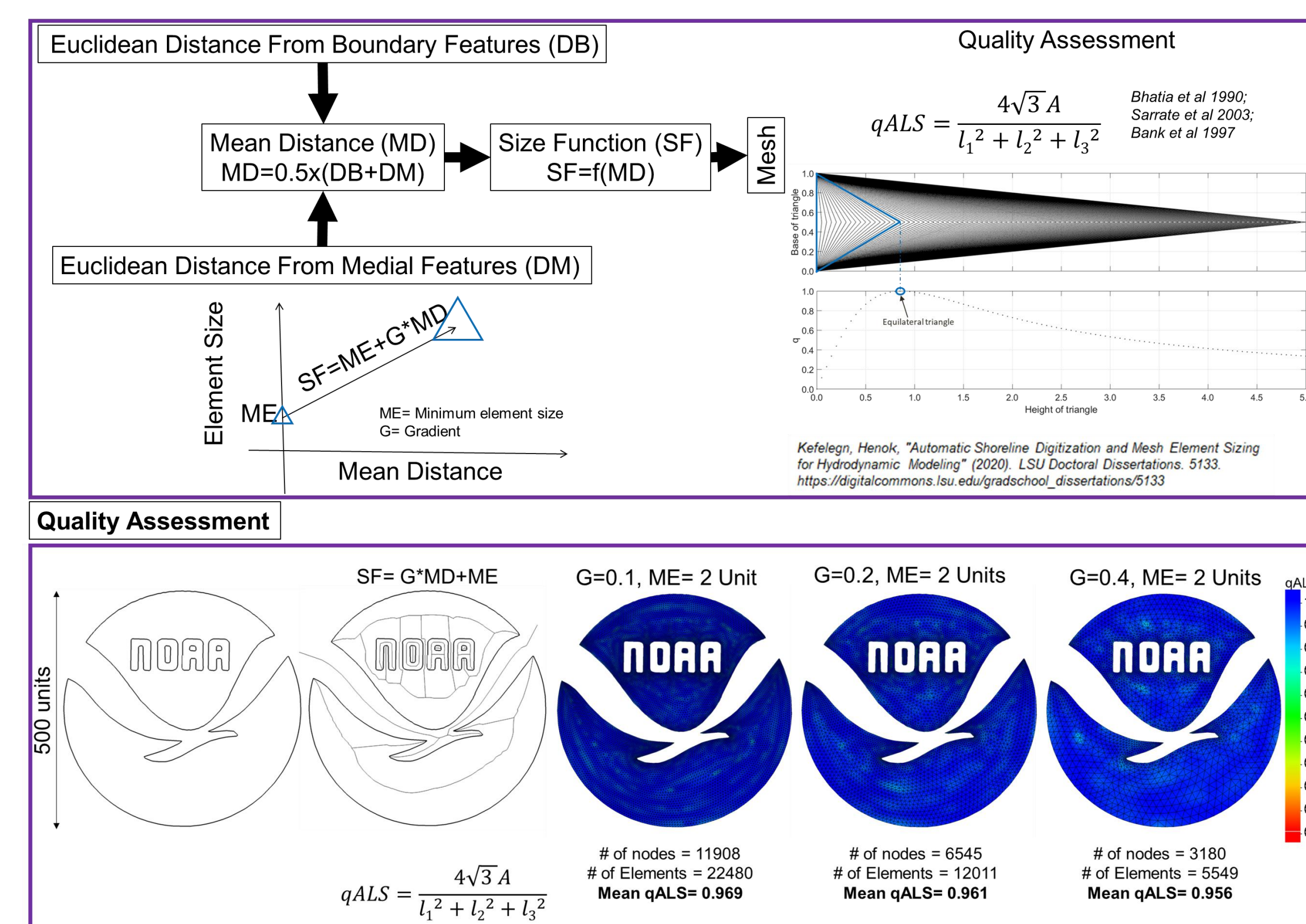
- A parent grid that spans Mexico-Canada border.
- Running simulation only for part of the grid!

**Benefits**

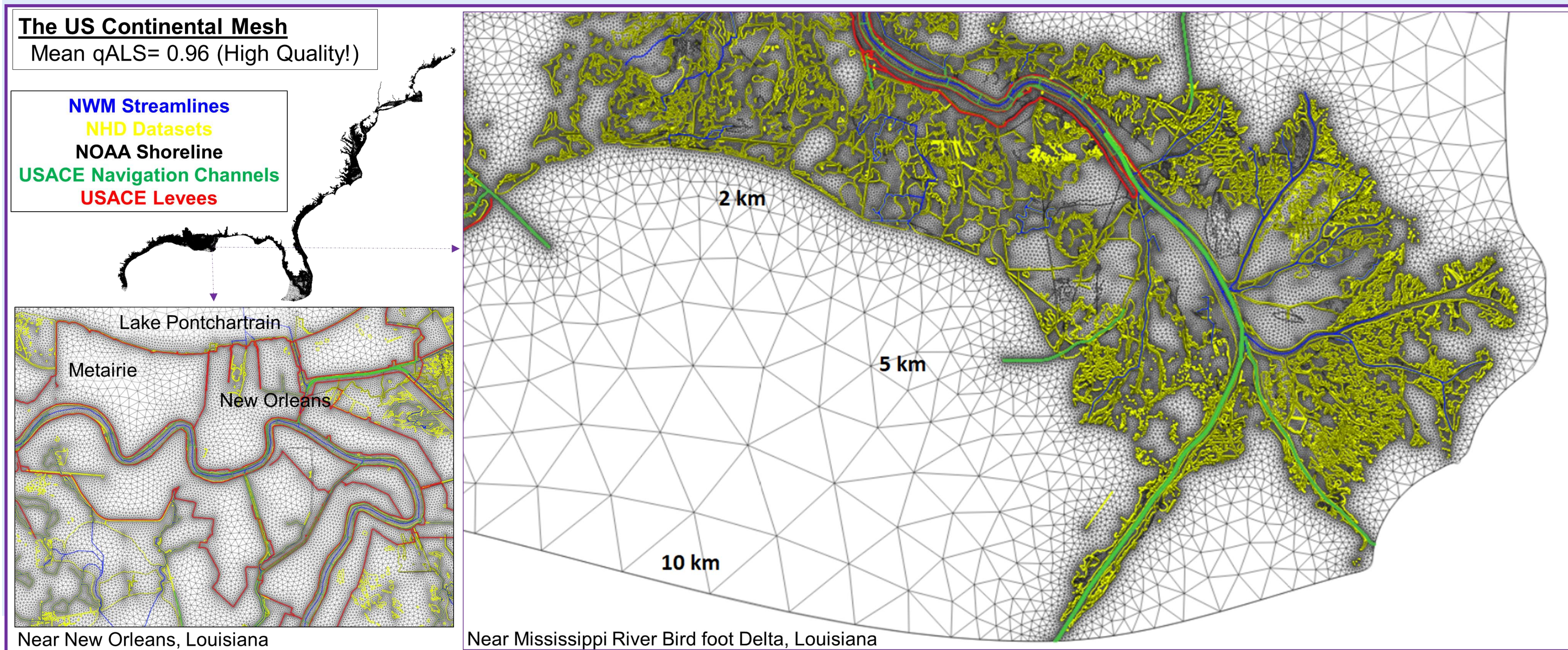
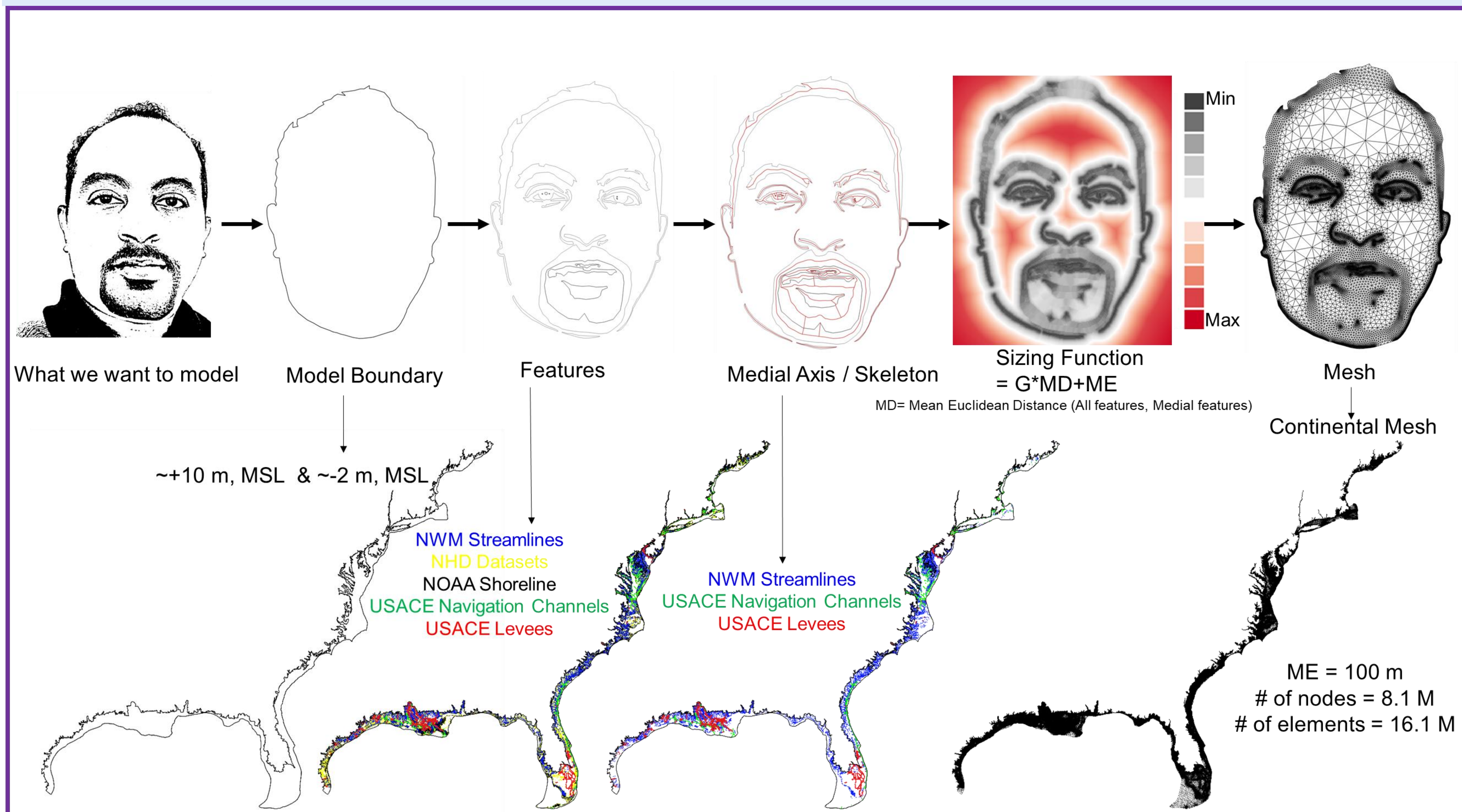
- Easiness and simplicity.
- Speeds up simulation time.
- Avoids a storm hitting at junction of static domains.
- Flexibility with spatial extent of child domain.

Subdomain Modeling: Enables assessment of local domains without requiring a full scale simulation (Baugh et al., 2015)

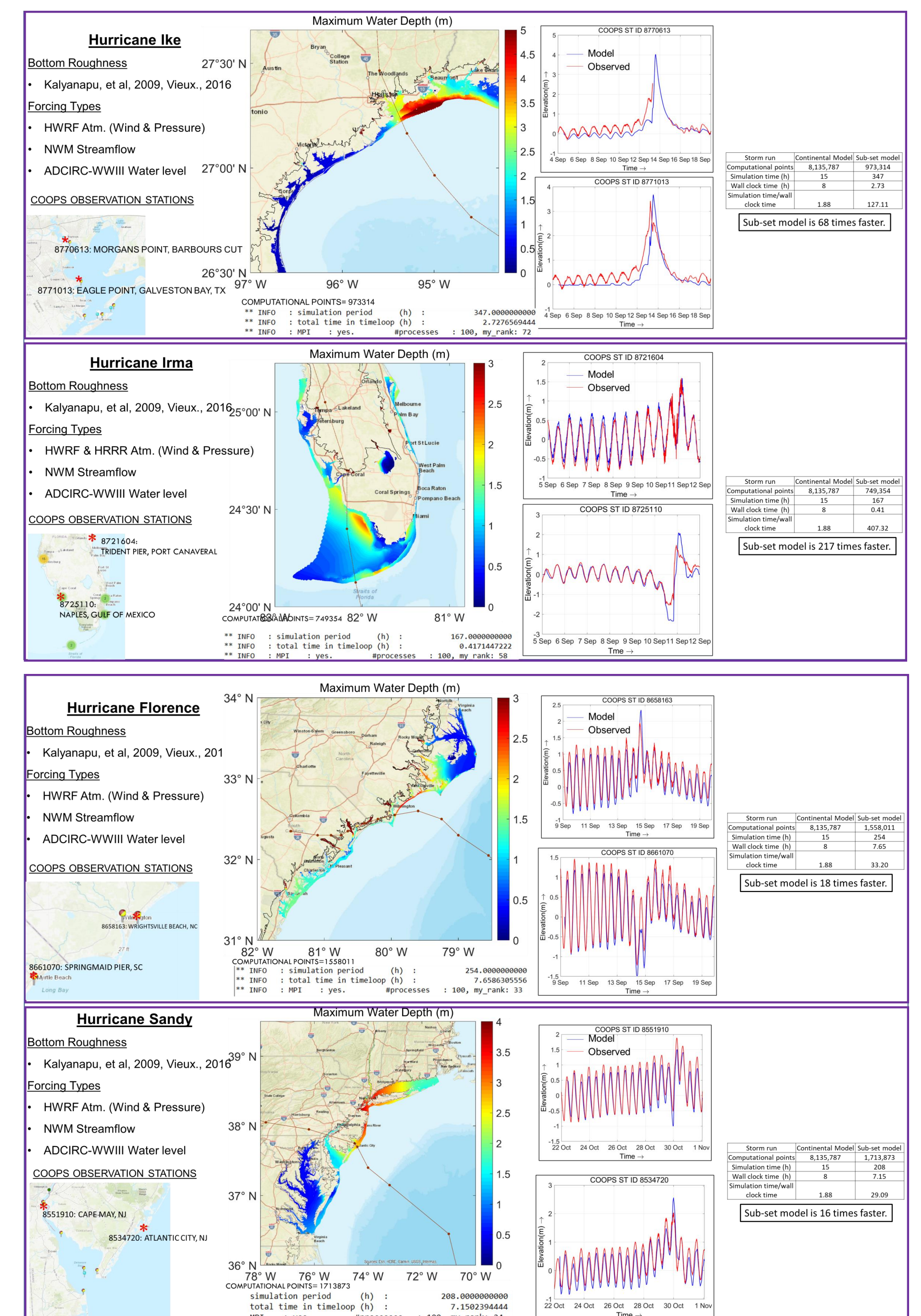
## MESH GENERATION METHOD



## Our methods, mesh generation and sub-setting approach, improve runtimes by up to 200 times.



## APPLICATION: MODEL RUNS



## CONCLUSIONS

- Developed a high quality 2D unstructured mesh using a sizing function that assigns element sizes based on proximities of coastal features at given spatial locations.
- Developed continental domain model that covers the US Gulf and Atlantic Coasts, extending from the US-Canada border to the US-Mexico border.
- Domain sub-setting reduces runtimes significantly without loss of accuracy.

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