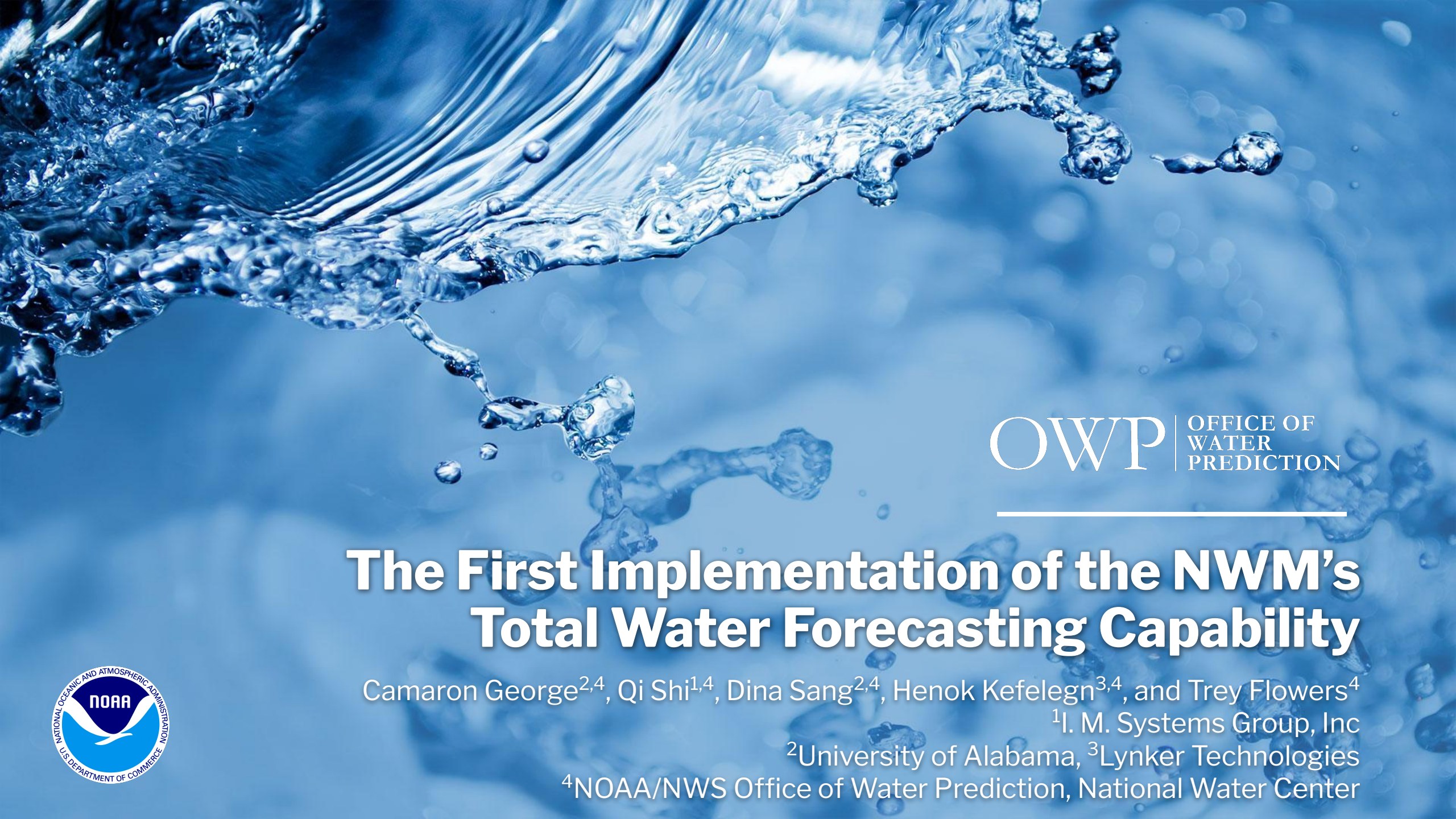

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The First Implementation of the NWM's Total Water Forecasting Capability

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[1]I. M. Systems Group, Inc
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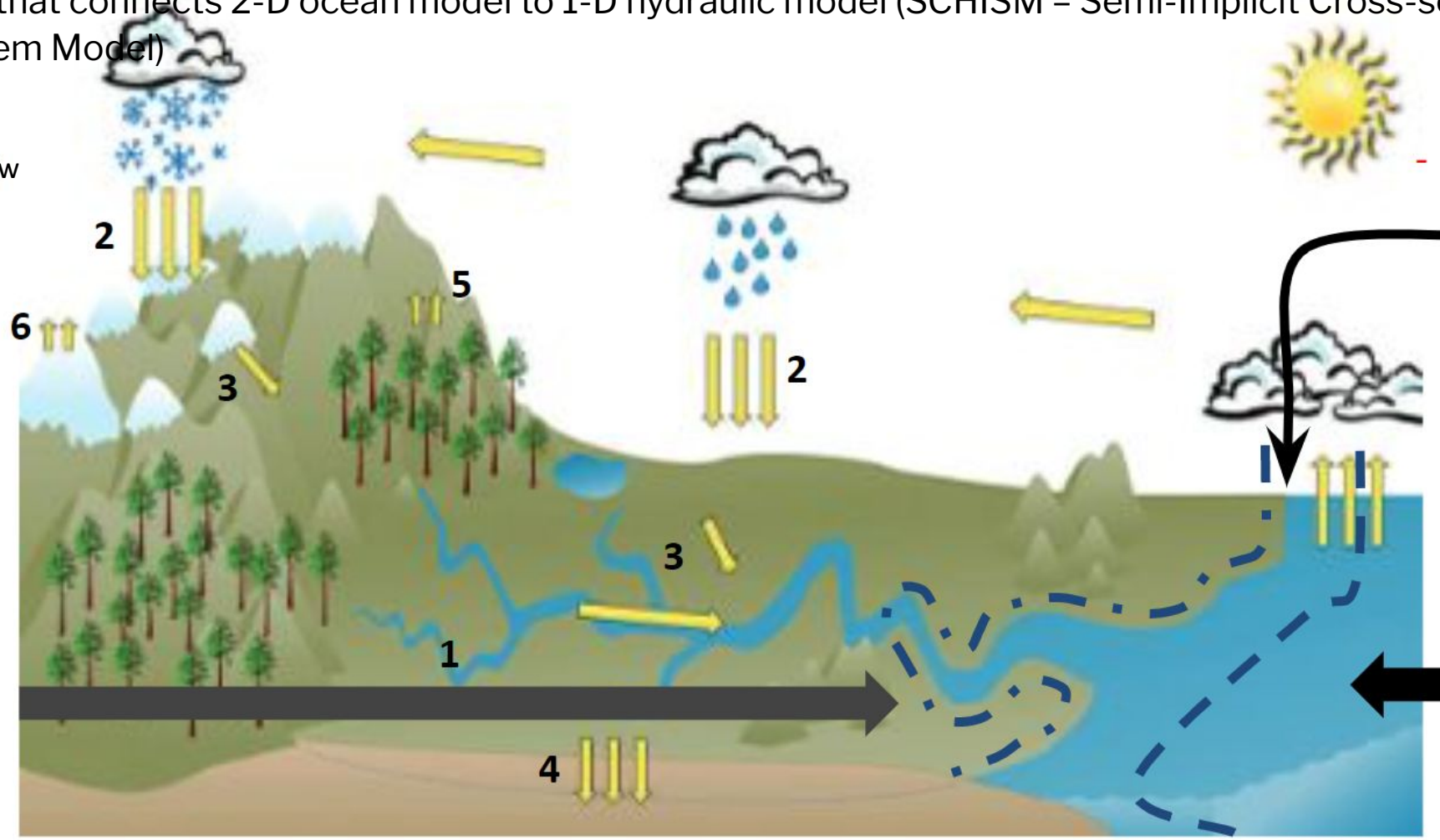
[4]NOAA/NWS Office of Water Prediction, National Water Center

Introduction

- Coastal flooding posts increasing risk to the coastal community (about 40% of the U.S. population)
- Goal: Produce a coupled modeling strategy that will provide total water level prediction for the National Water Model (NWM)
- Need a module that connects 2-D ocean model to 1-D hydraulic model (SCHISM – Semi-Implicit Cross-scale Hydroscience Integrated System Model)

Freshwater Forcing

1. 1-D Hydraulic Streamflow
2. Precipitation
3. Runoff
4. Groundwater
5. Evaporation
6. Sublimation



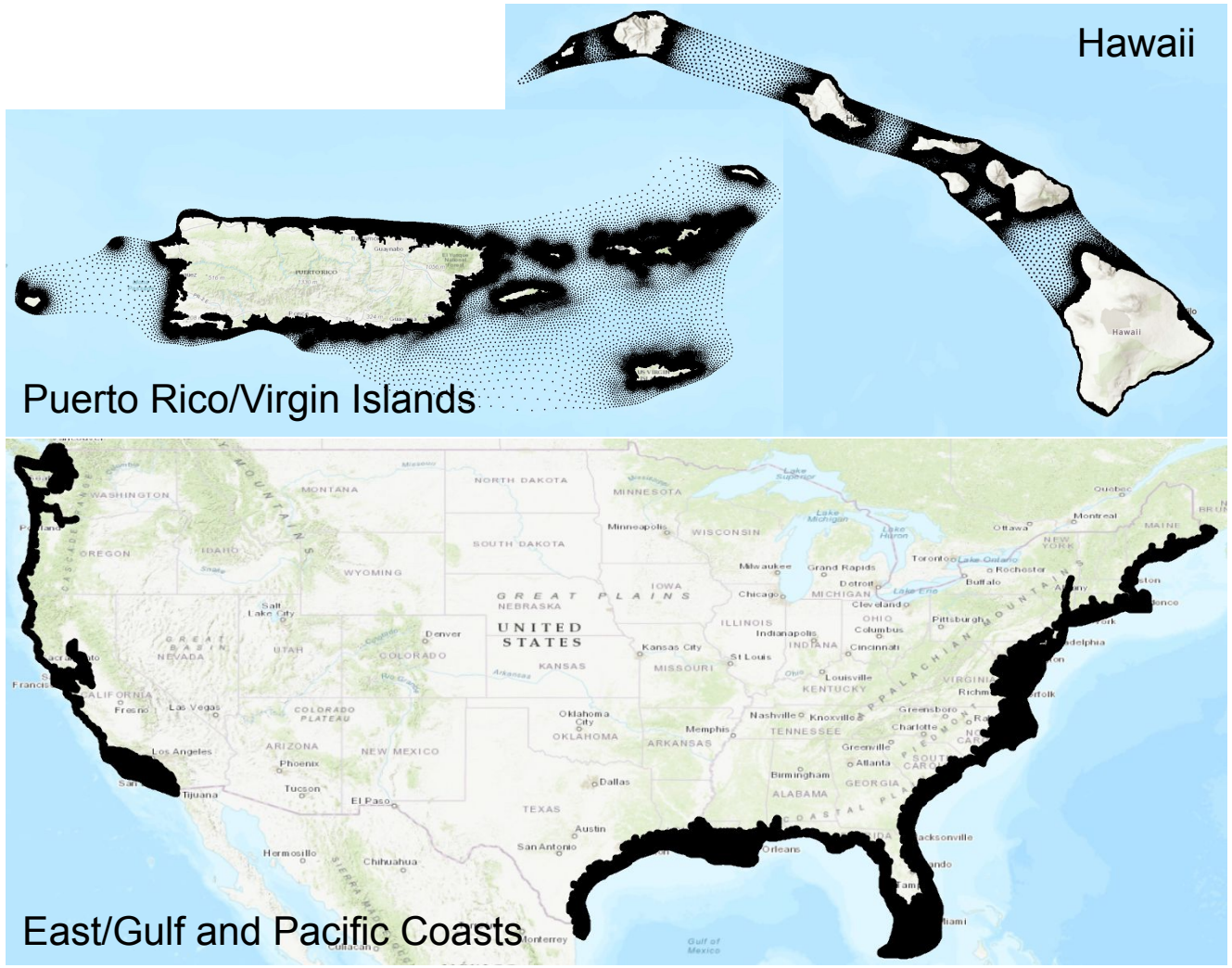
SCHISM (NWS/NOS)

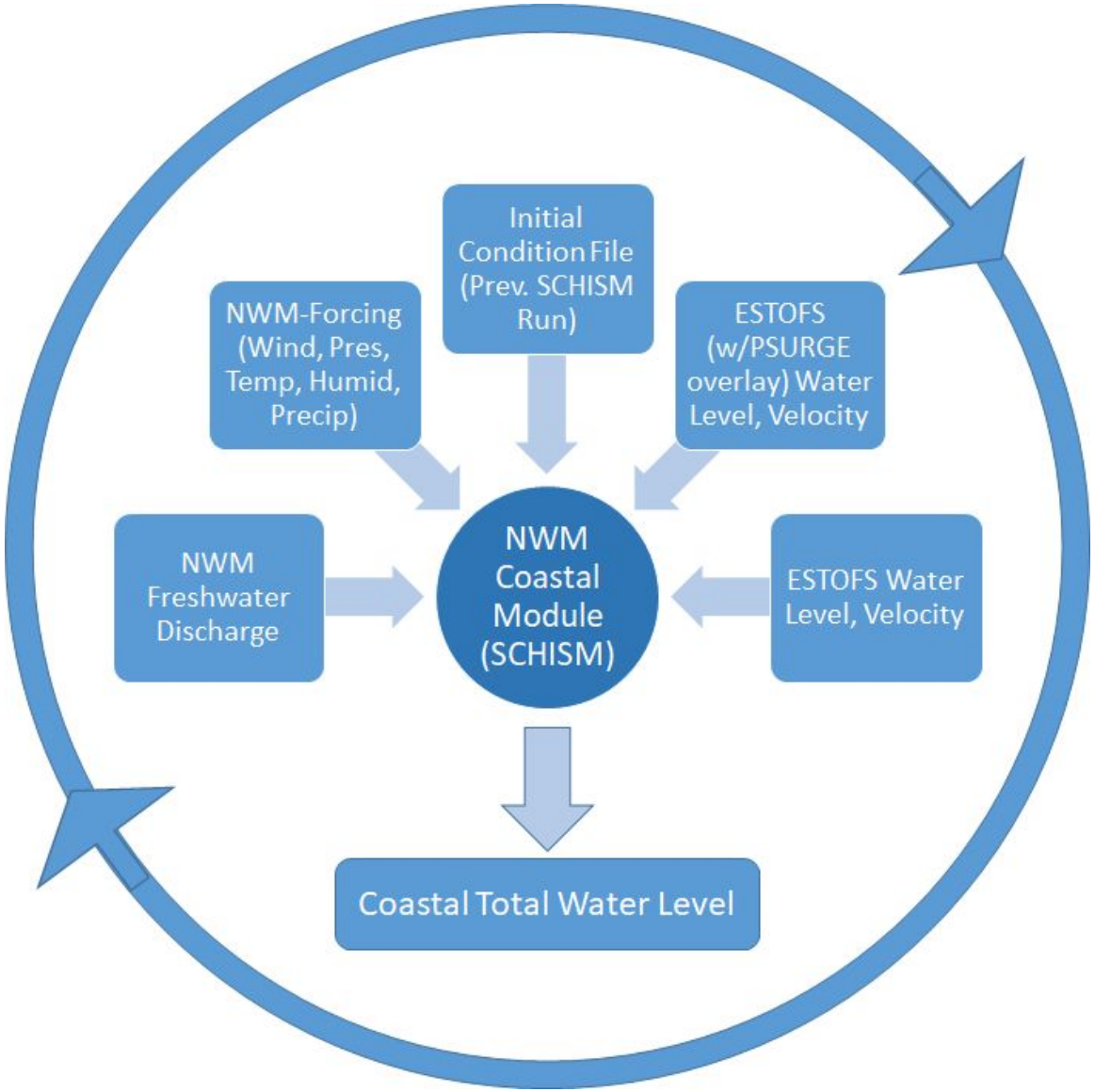
- "Middleware" that can resolve processes across multiple temporal and spatial scales

Ocean Forcing

- Tides
- Waves
- Surge

Coupling Framework

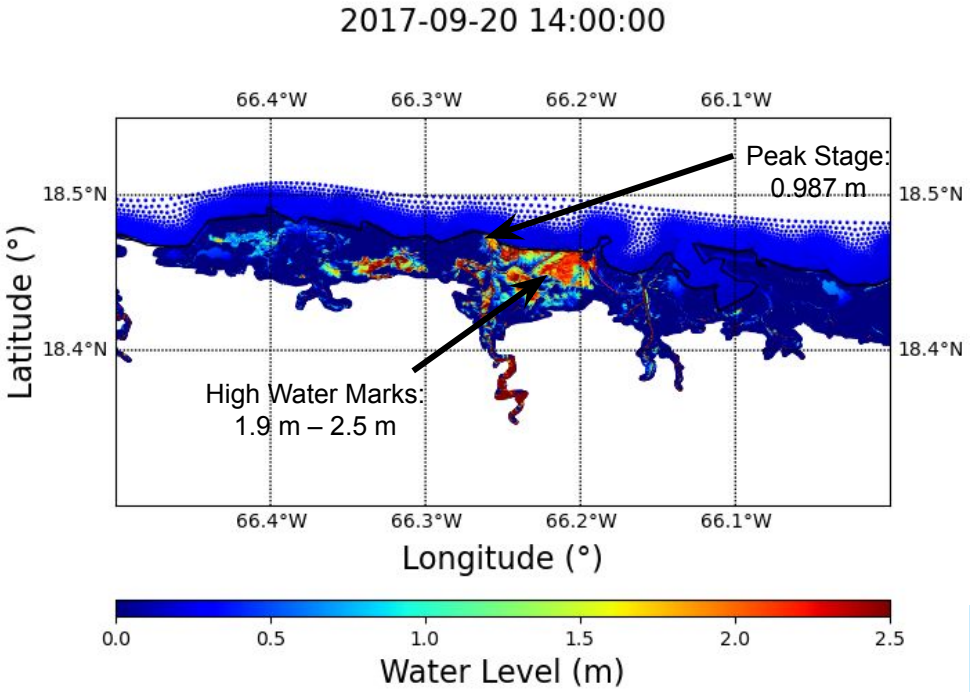




Unstructured mesh generated using a sizing function (paper 111-06 by Henok Kefelegn et al.)

ESTOFS – Extratropical Surge and Tide Operational Forecast System
P-SURGE – Probabilistic Tropical Storm Surge model

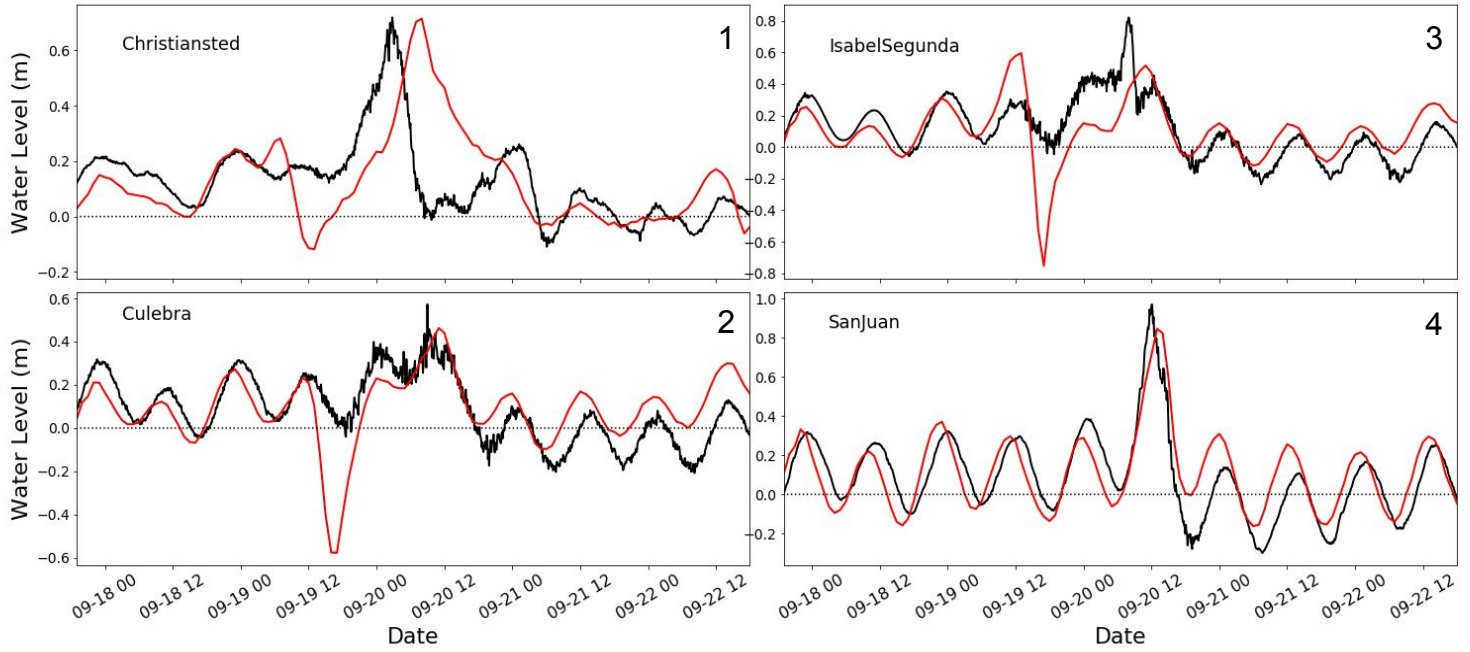
Hurricane Maria (2017)

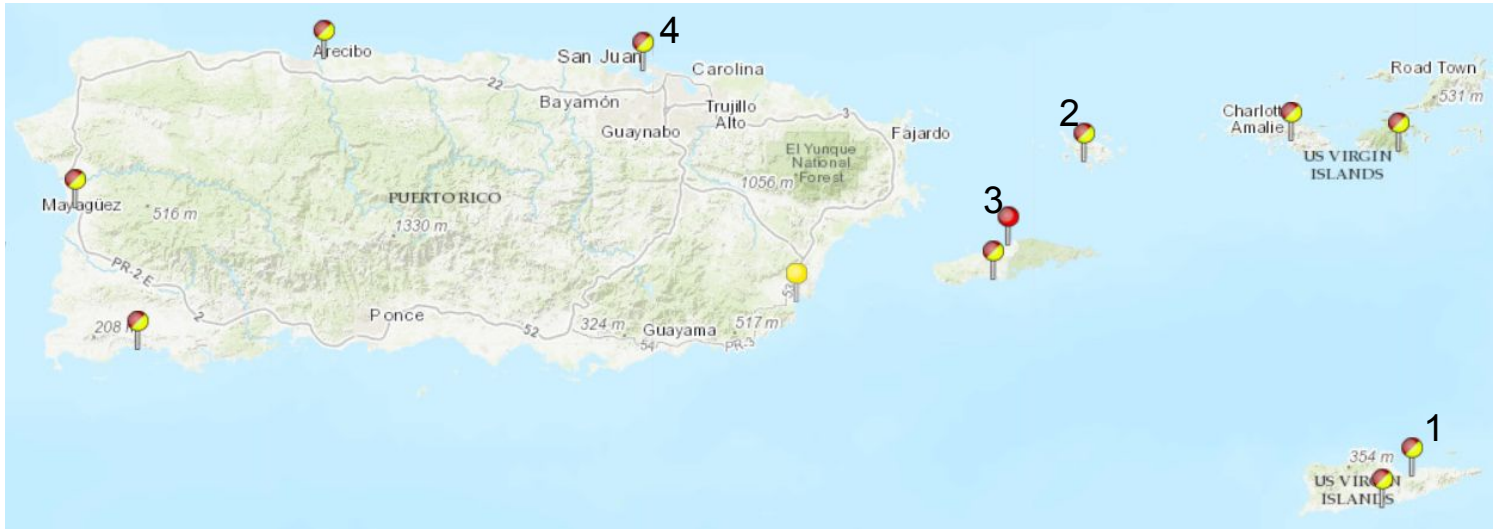


Simulation Start Date/Time:
09/17/17 19z

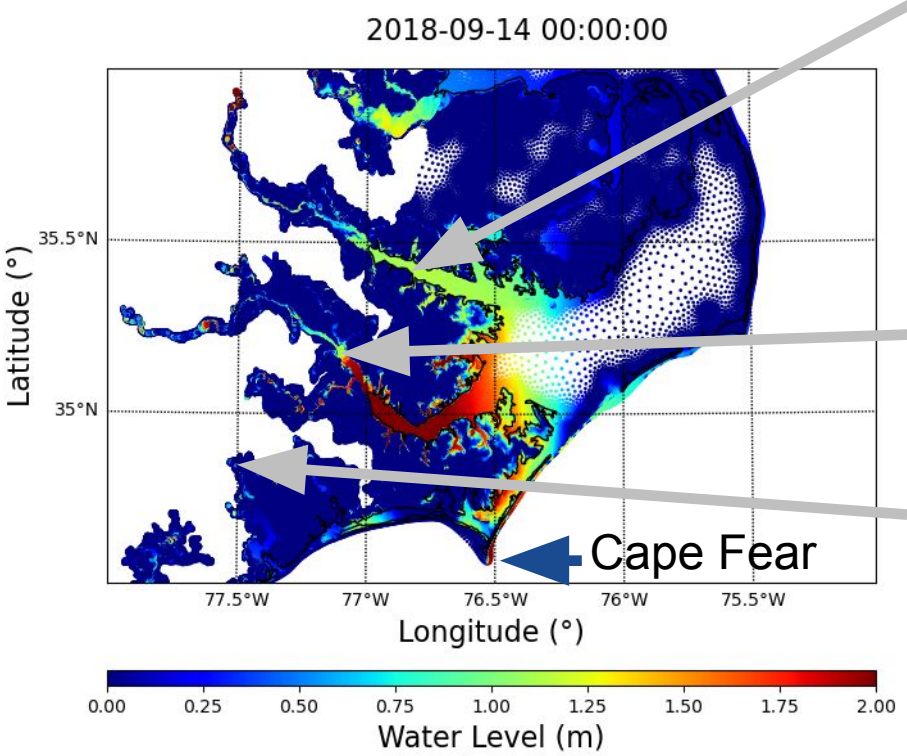
Using high water marks, peak stage reports, and NOAA tide gauges for validation

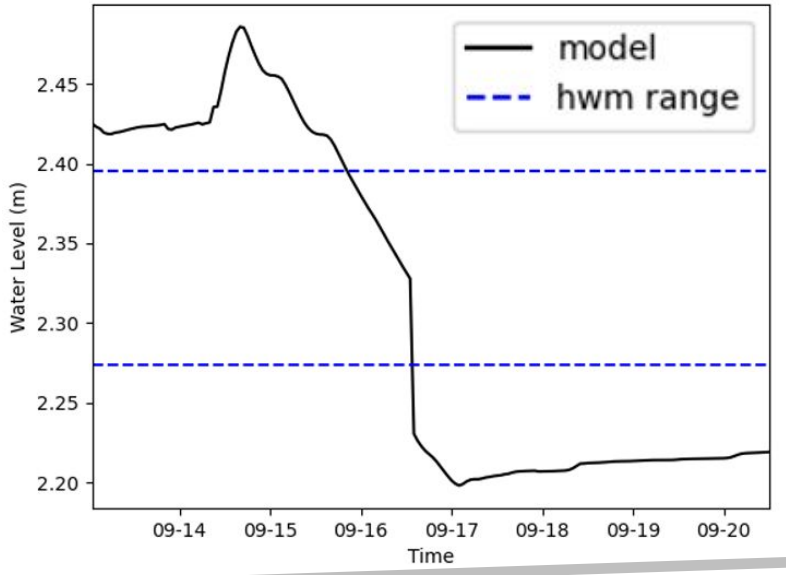
Model vs. NOAA water level Obs.

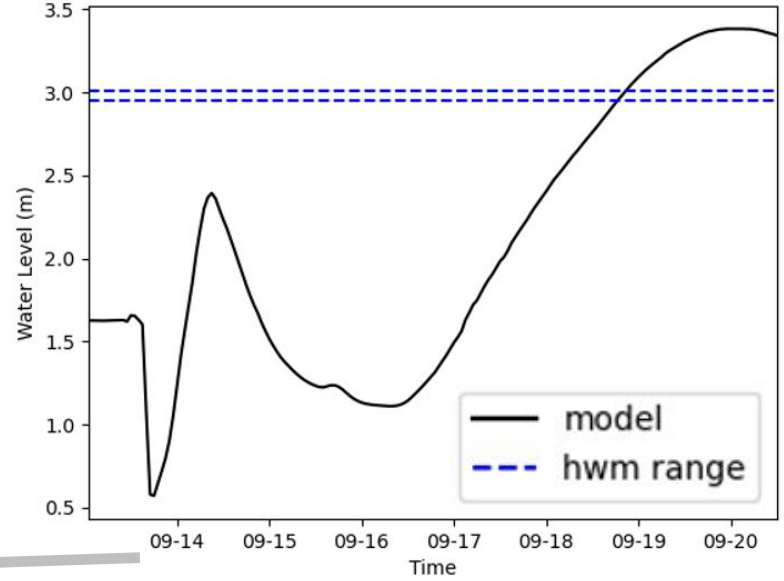


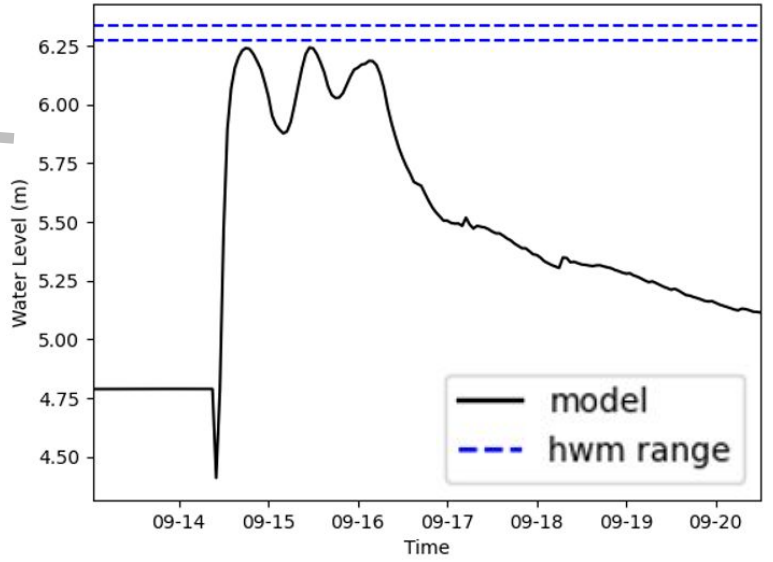


Hurricane Florence (2018)









Cape Fear: peak stage reports just under 2 m

Simulation Start Date/Time
09/13/18 at 00z

Using USGS river gauges, high water marks, peak stage reports, and NOAA tide gauges for validation in this domain

Conclusions

- Prototyped the total water forecast capability for NWM V3.0 using SCHISM to address a critical forecasting gap
- SCHISM, which resolves processes across multiple spatial and temporal scales, will operate along the East, Gulf, and Pacific coasts, over Puerto Rico with the U.S. Virgin Islands, and Hawaii
- The initial results show that our model performs well in coastal compound flooding forecast

Next Steps

- Two-way coupling with NWM
- Evaluation of module with RFCs
- Finalize first implementation of module for operations

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