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Integrated high-resolution coastal flood modeling

Mithun Deb
on behalf of the team

U.S. DEPARTMENT OF ENERGY BATTELLE

PNNL is operated by Battelle for the U.S. Department of Energy

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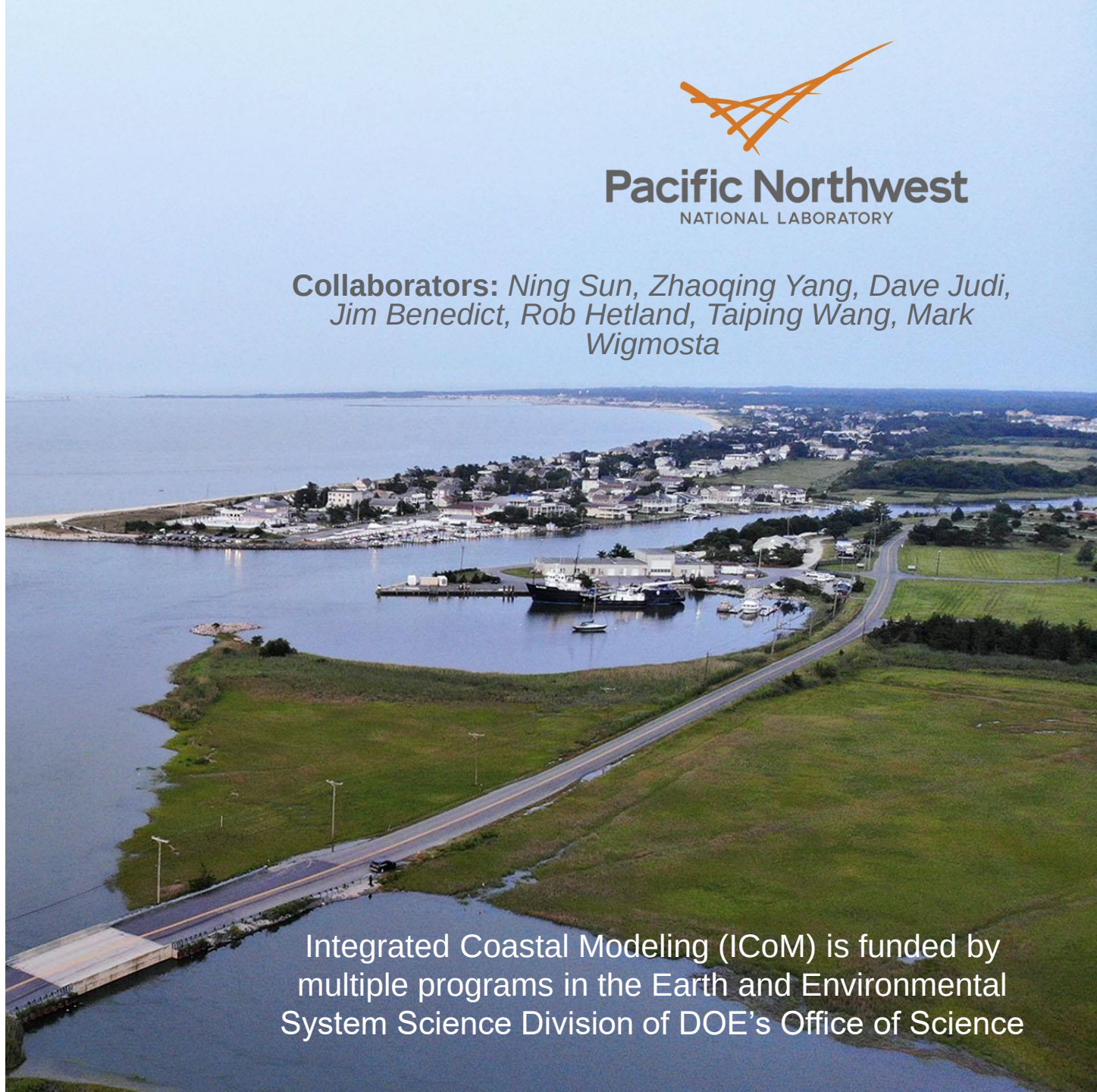
Collaborators: *Ning Sun, Zhaoqing Yang, Dave Judi, Jim Benedict, Rob Hetland, Taiping Wang, Mark Wigmosta*



Integrated Coastal Modeling (ICoM) is funded by multiple programs in the Earth and Environmental System Science Division of DOE's Office of Science

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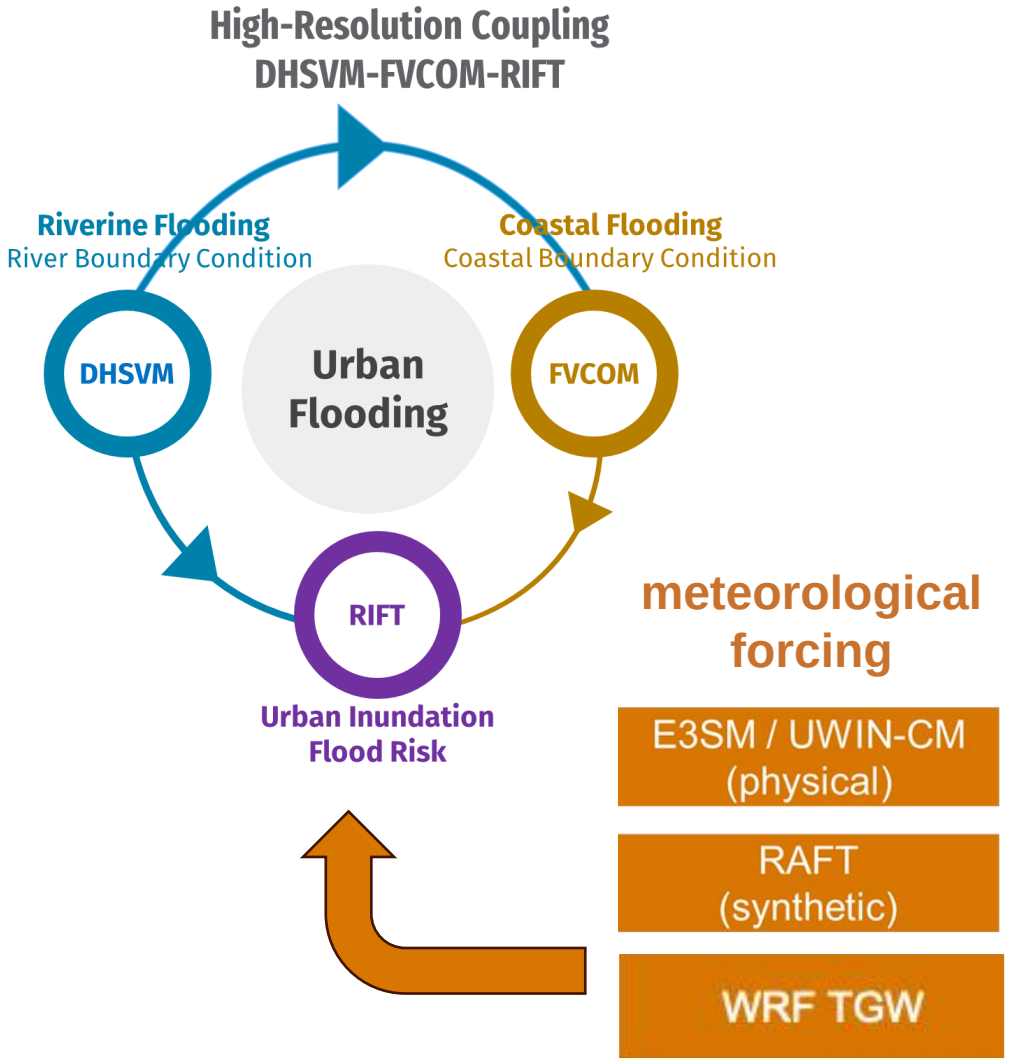
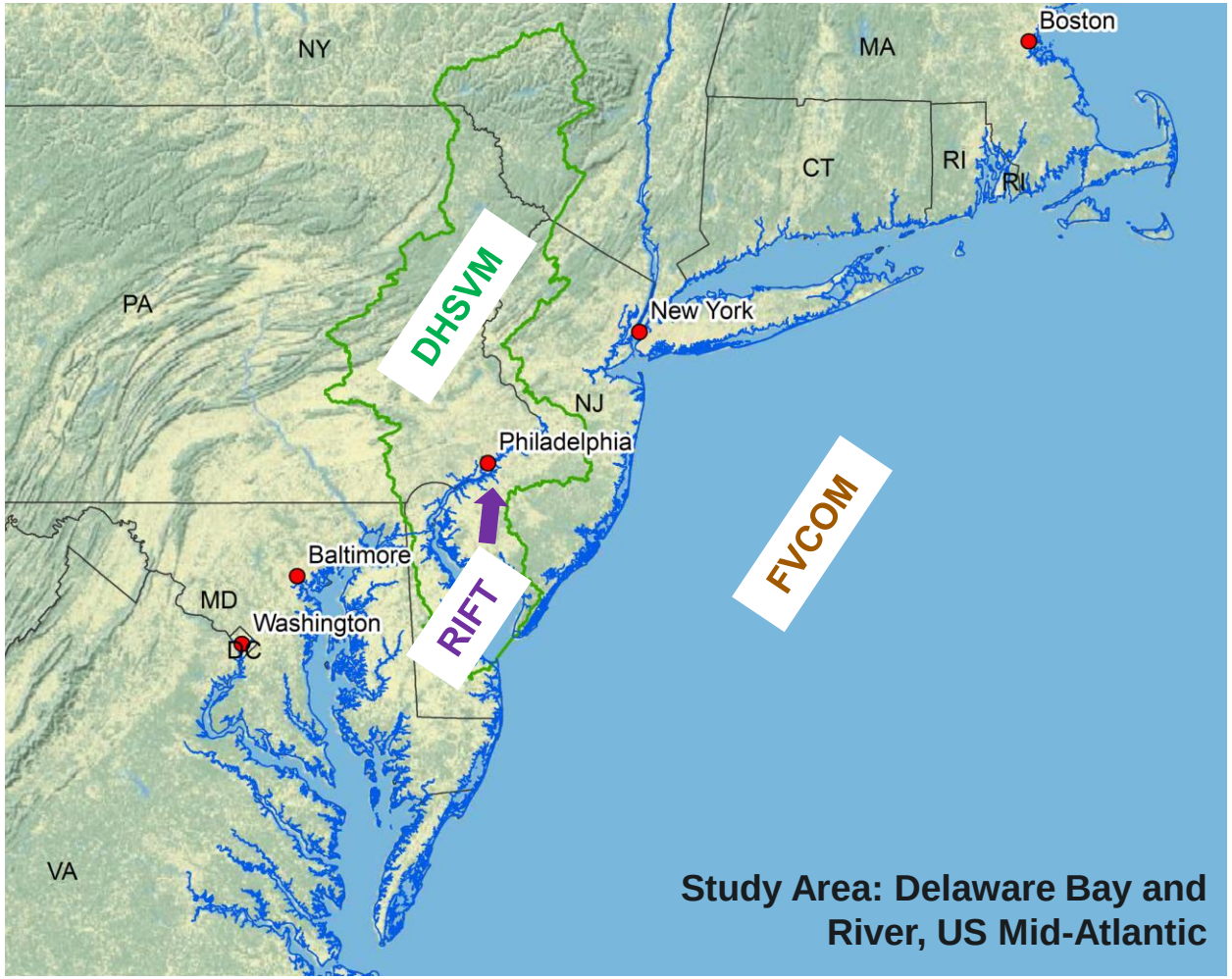
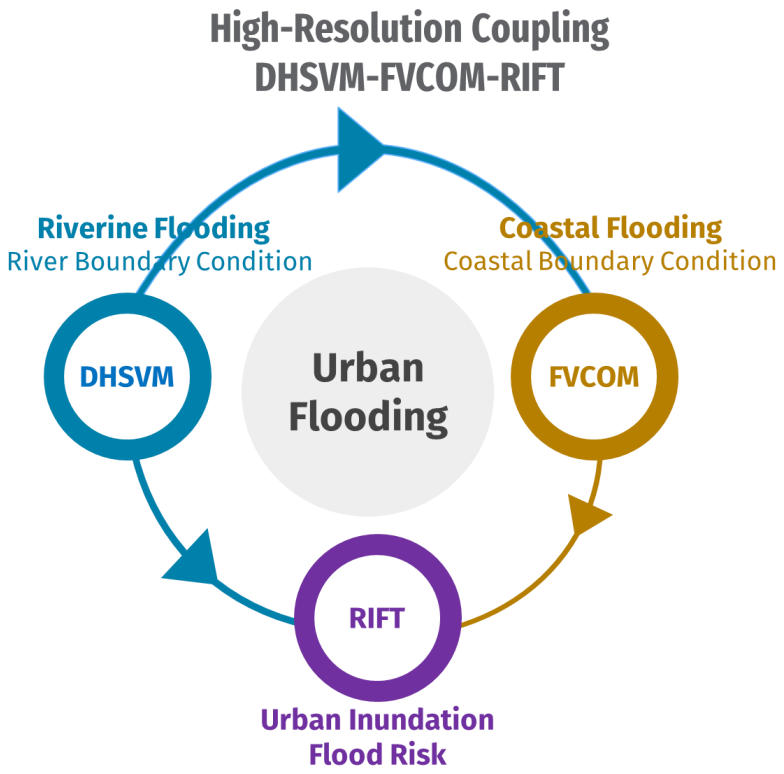
Integrated terrestrial-coastal-urban modeling system



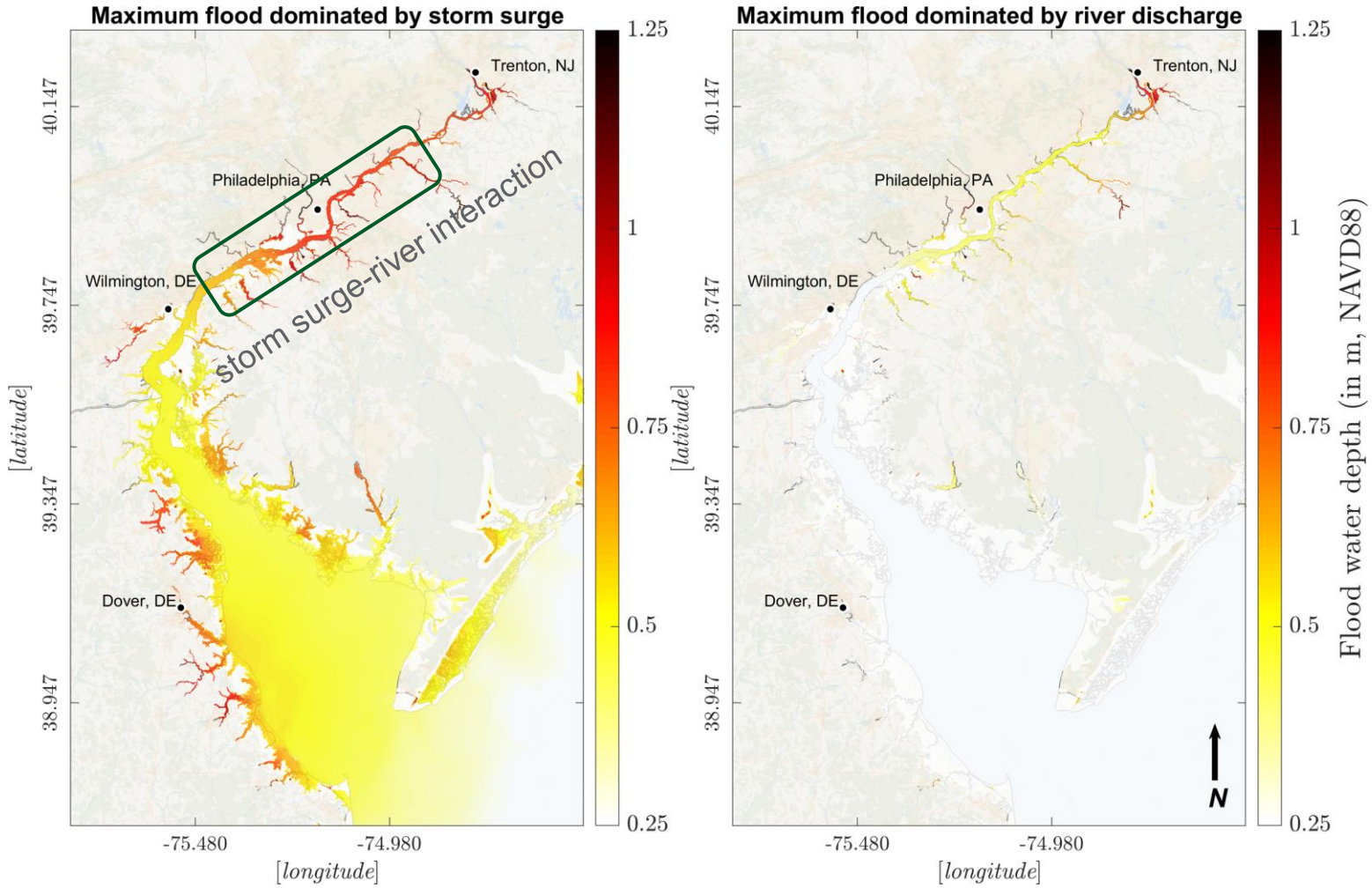


Why did we select this testbed/region?



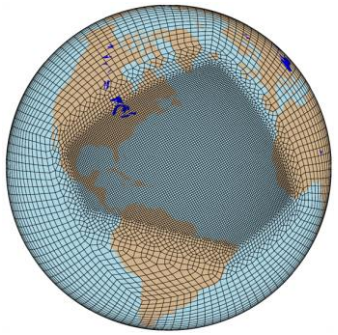
Earth's Future

Deb et al. (2023)
https://doi.org/10.1029/2022EF002947



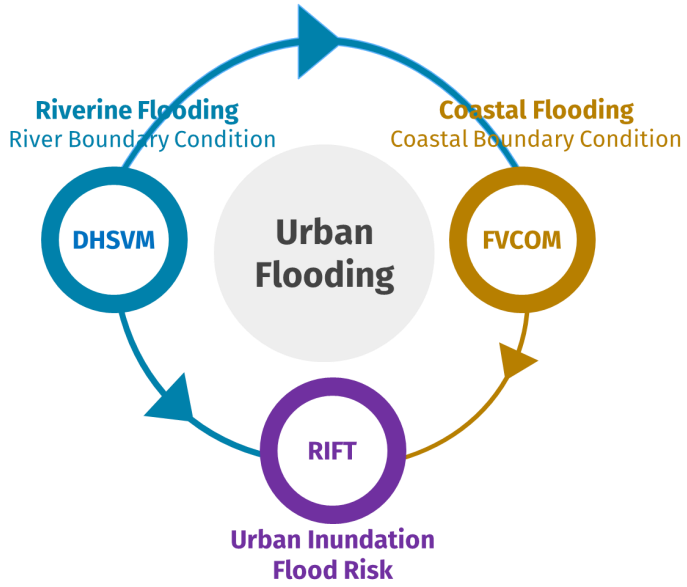
DHSVM-FVCOM simulated Hurricane Irene (2011) flooding

Physics-based integrated modeling and improved flood water level estimates

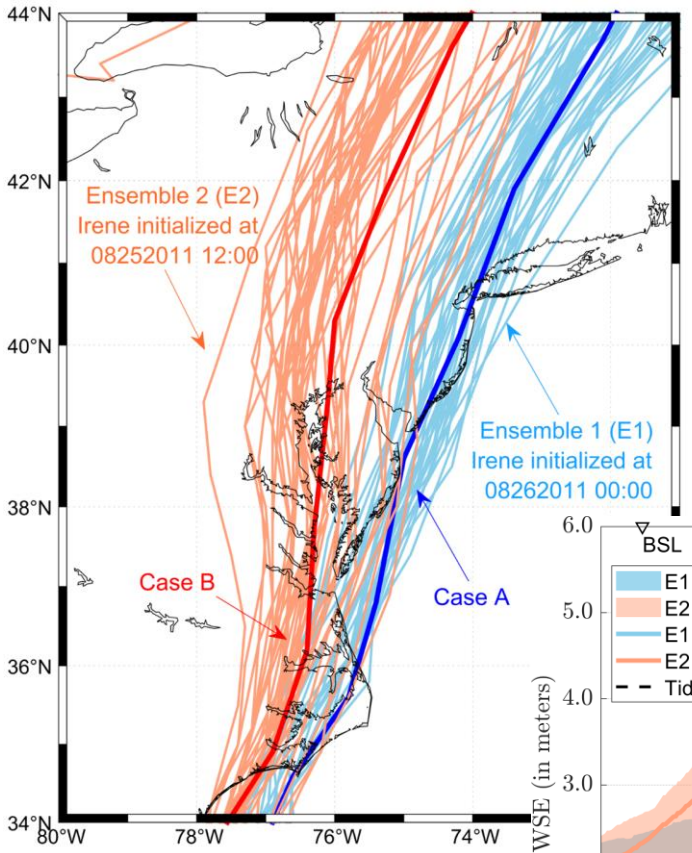


E3SM
meteorological variables

High-Resolution Coupling
DHSVM-FVCOM-RIFT

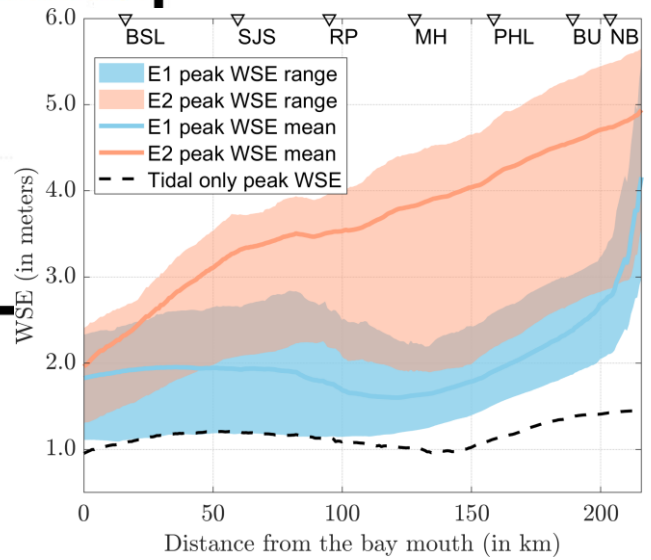


E3SM tracks of Hurricane Irene (2011)



Deb et al. (2024)
https://doi.org/10.5194/nhess-24-2461-2024

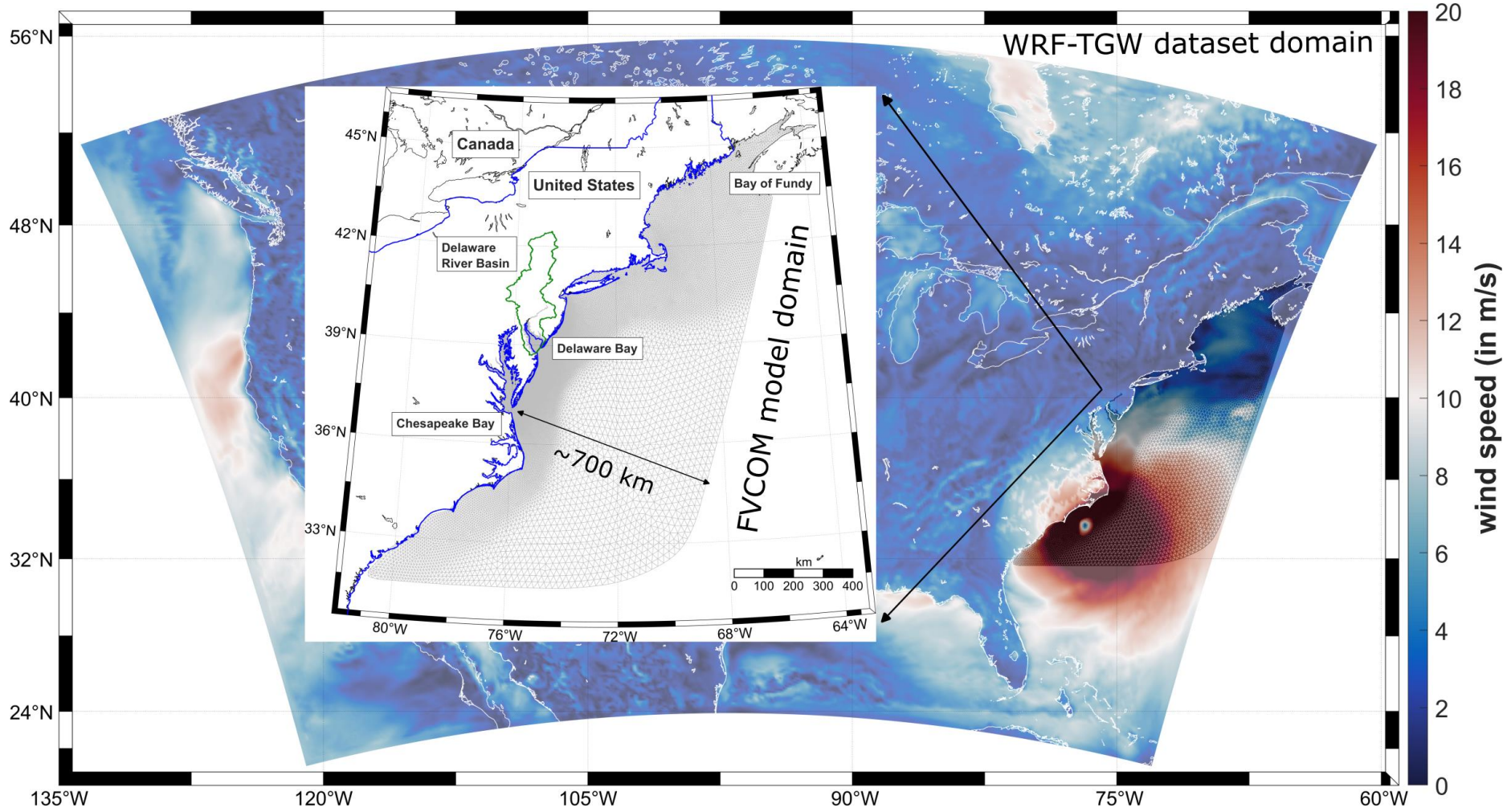
Water level



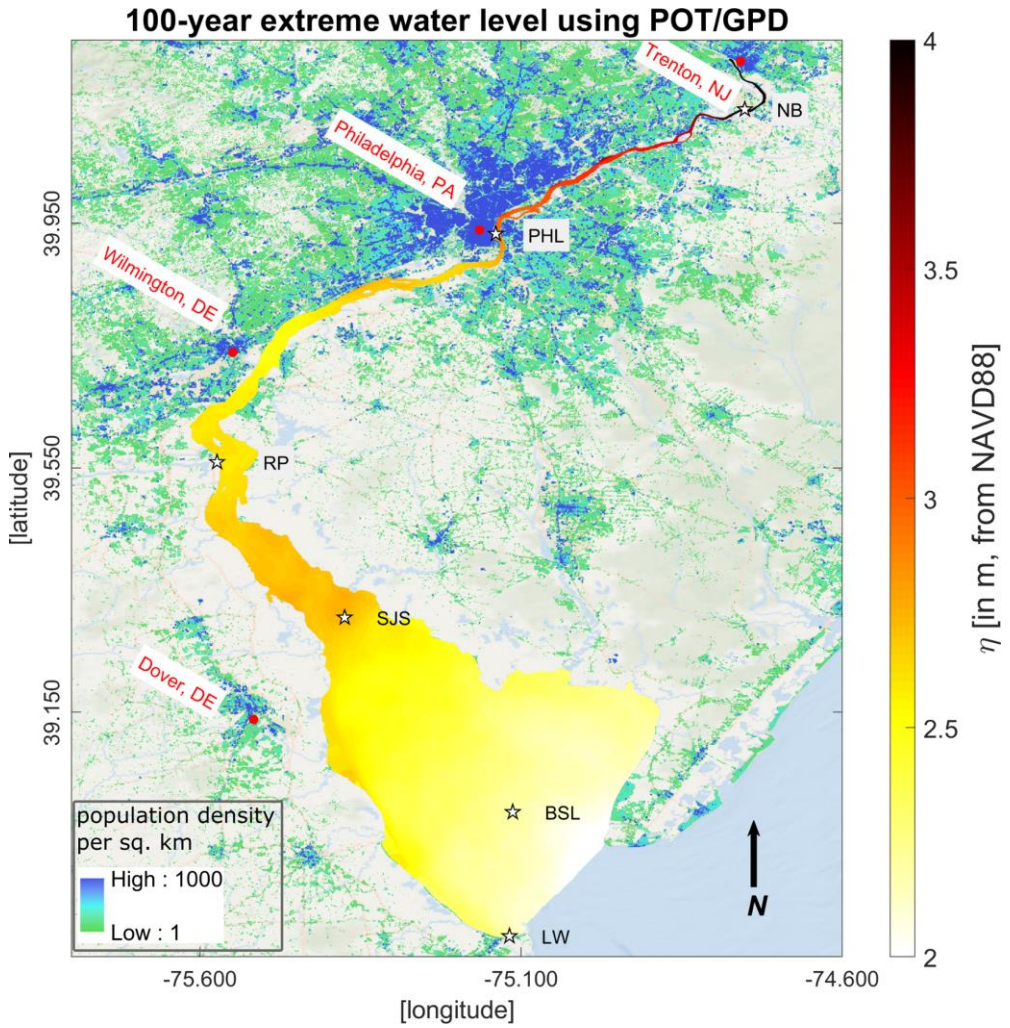
Physics-based integrated modeling and improved flood water level estimates

Deb et al. (2024); submitted

scientific data



Result, Limitations, and Future works



- Morphological evolution of the tidal wetlands/salt marshes
- Antecedent soil moisture condition
- Resolution of the wind forcing
- Hurricanes in a future climate; WRF-TGW missed many extreme cases

All these variables would impact the water level extremes in coastal areas, which is directly related to the **future projection of human system dynamics (MSD)**