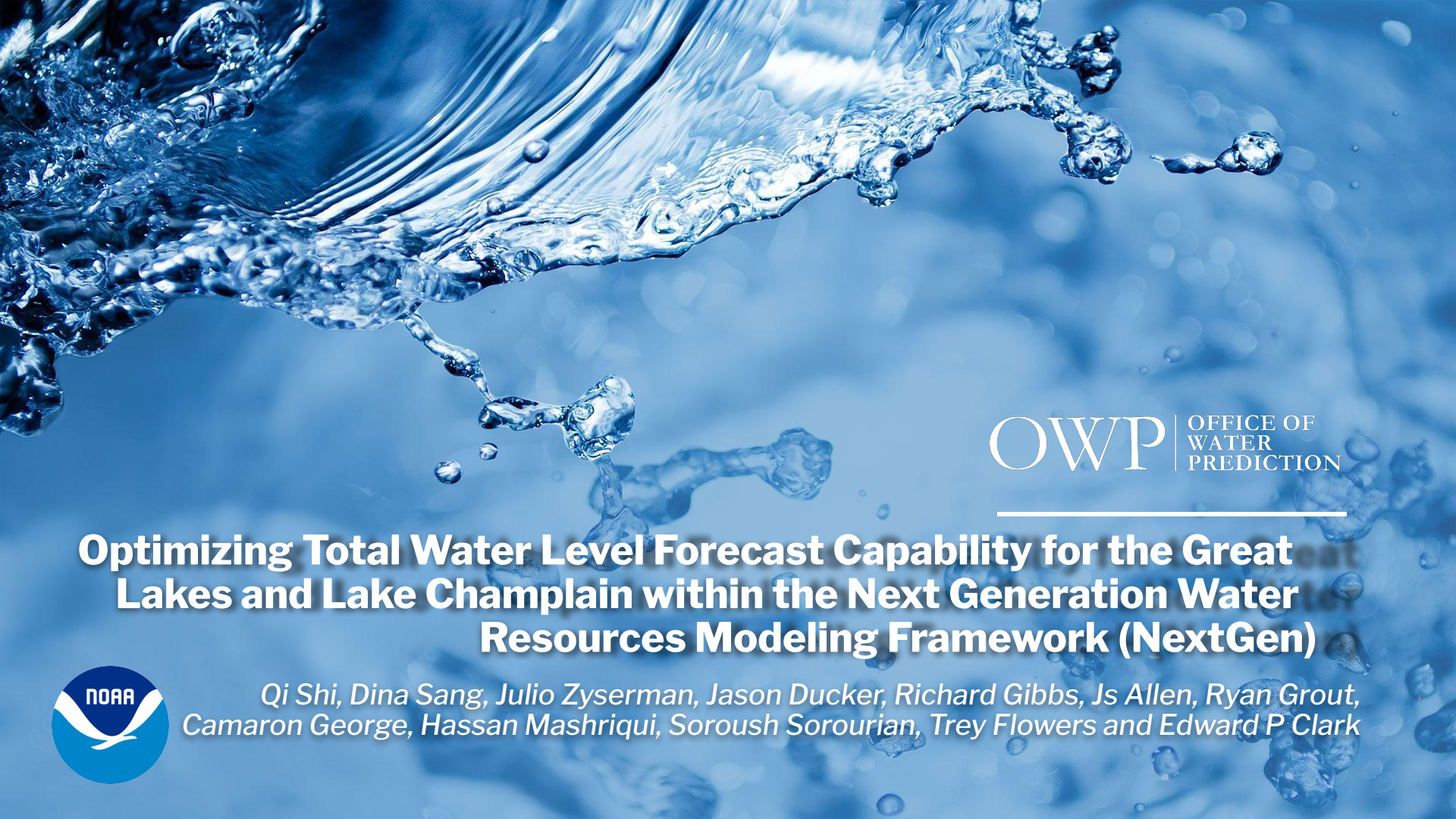

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# Optimizing Total Water Level Forecast Capability for the Great Lakes and Lake Champlain within the Next Generation Water Resources Modeling Framework (NextGen)

*Qi Shi, Dina Sang, Julio Zyserman, Jason Ducker, Richard Gibbs, Js Allen, Ryan Grout, Camaron George, Hassan Mashriqui, Soroush Sorourian, Trey Flowers and Edward P Clark*

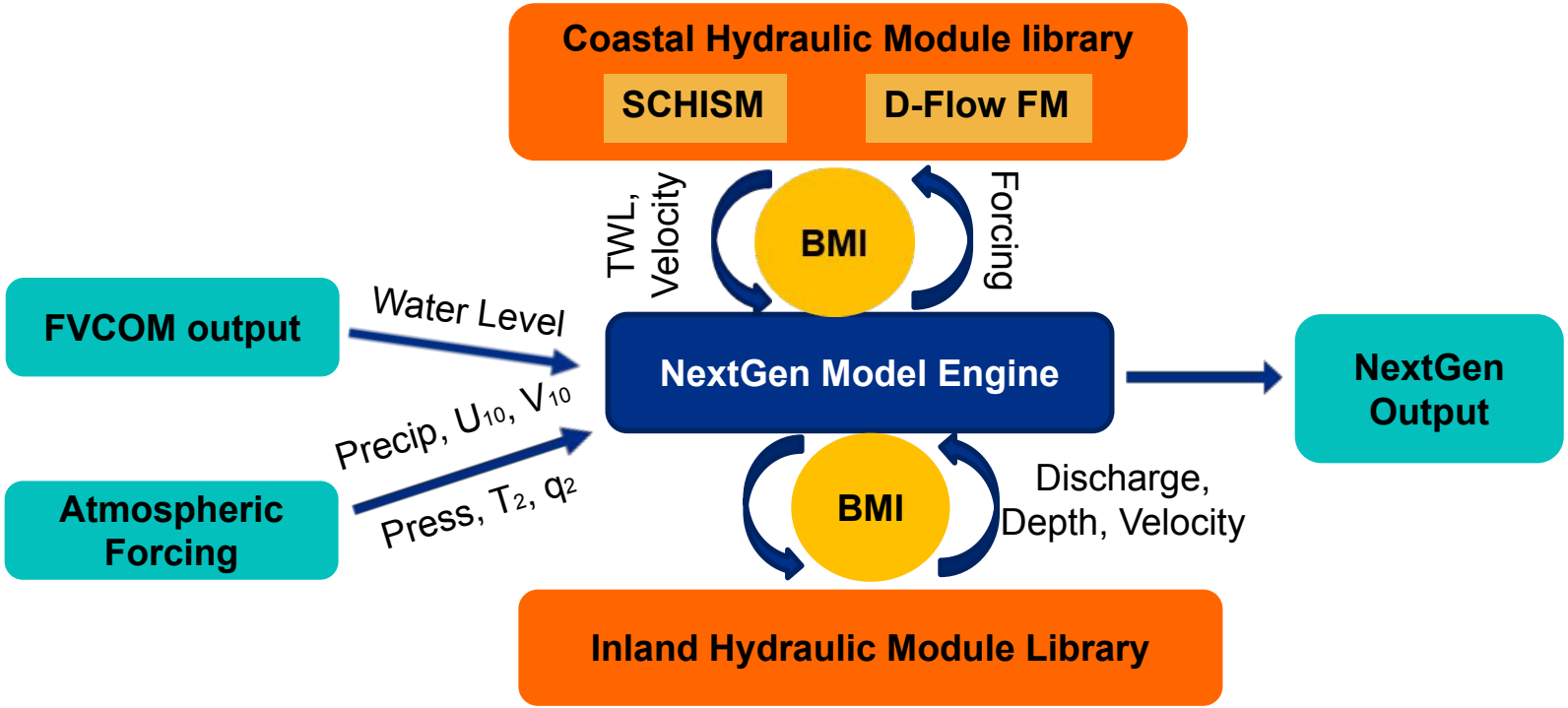
# OWP is expanding its TWL Forecast Capability to the Great Lakes and Lake Champlain

- With a population of 34 million, 3,500+ species and 11,000 miles shoreline, the Great Lakes is one of the most important economic and population centers.
- The fluctuations of water levels at the Great Lakes impact the regional economy and ecosystems.

From Mlive.com

https://www.weather.gov/lot/LakeMichiganHighWater

# Coastal Module Library in the NextGen Framework



# River Discharge Comes from NWM T-Route Model

- Riverine inflows were calculated from Tree-Based Channel Routing (T-Route) Model.
- Great Lakes data assimilation module is implemented within t-route. Defaults to climatological outflows when no good observations are available (obtained from USACE).

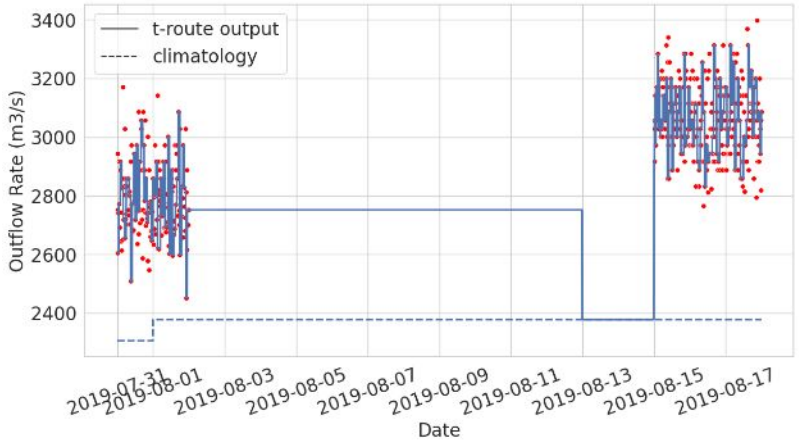
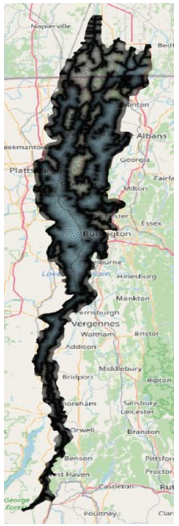




**Fig**. Sample output for Lake Superior

# Model Domains

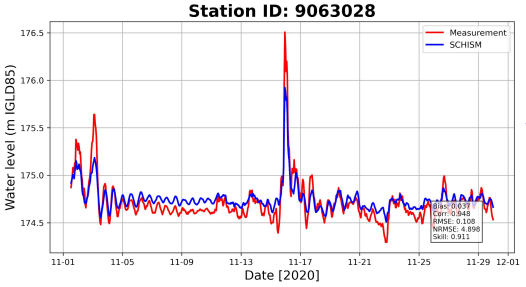
- Four ring model meshes for the Great Lakes
- Mesh were developed based on density function

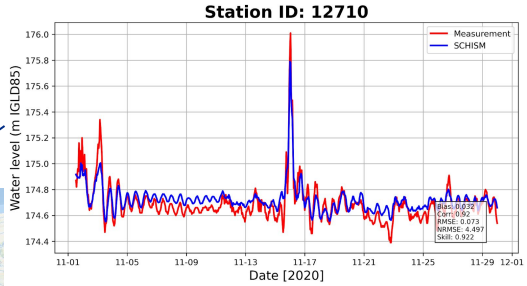

**Lake Champlain**

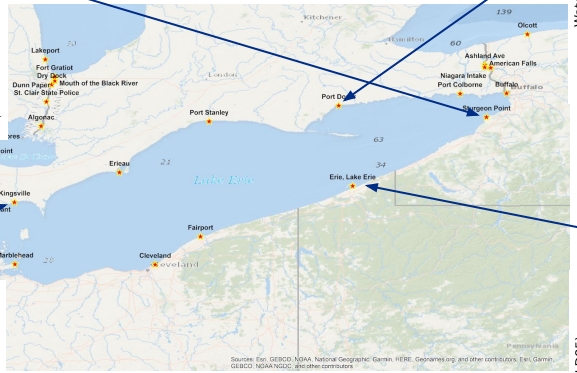


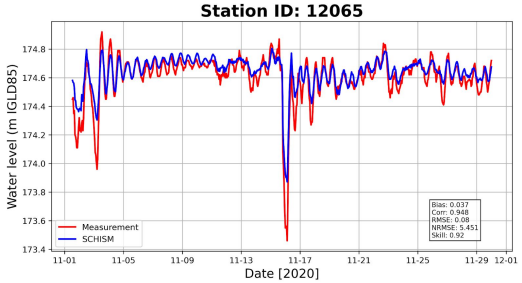
# Model Results

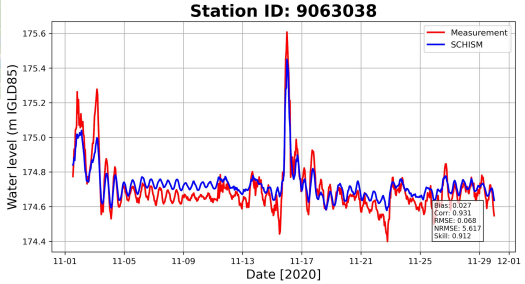
## Lake Erie



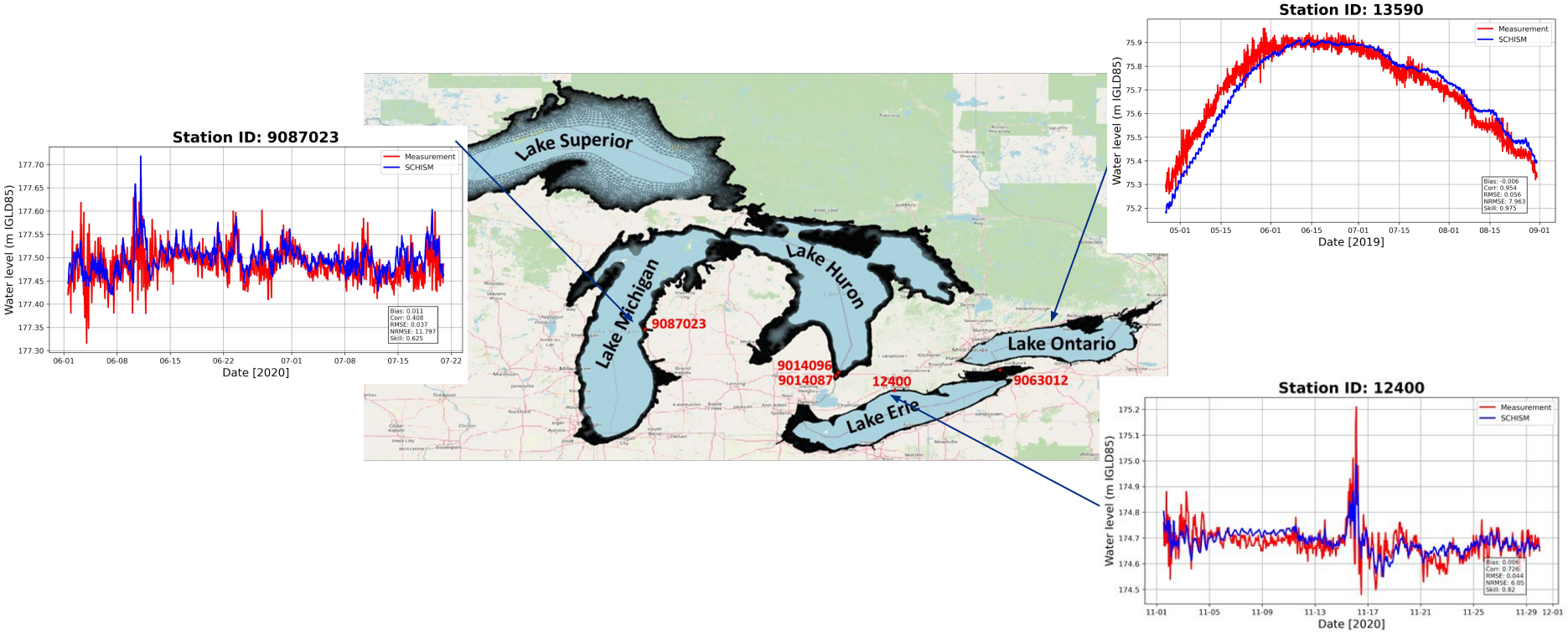



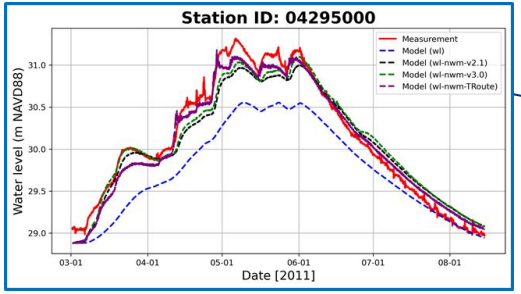

Observation
Model

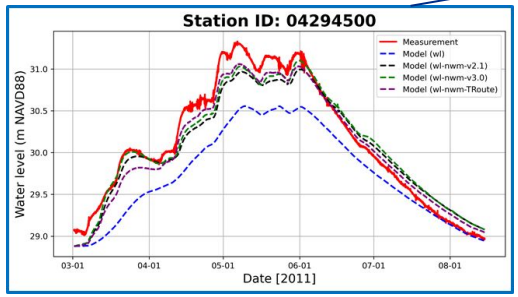
# Model Results Cont.

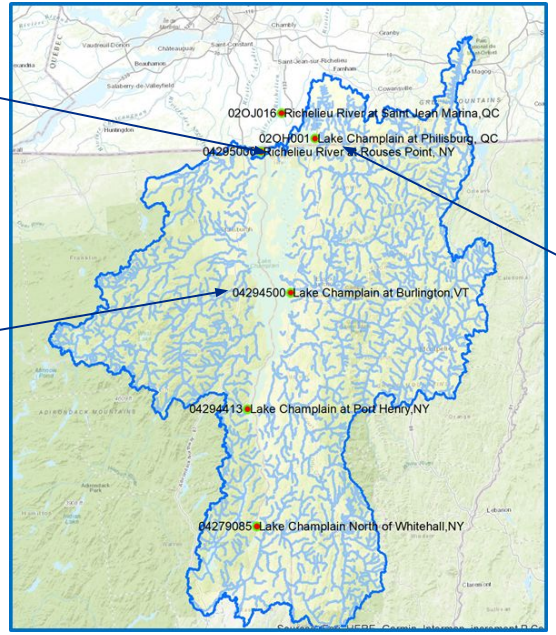


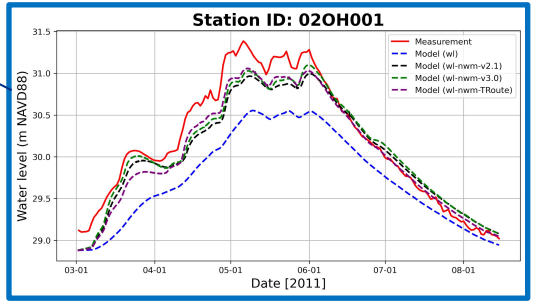
# Sensitivity to River Discharge

## Lake Champlain

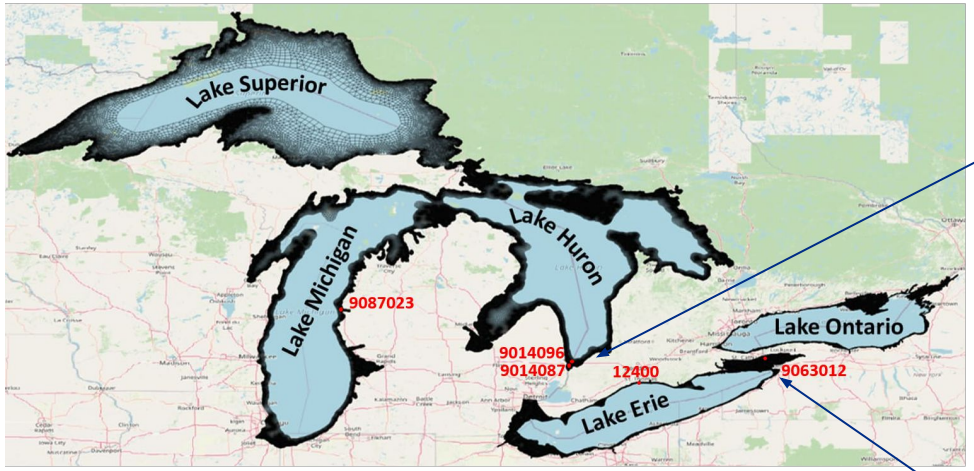


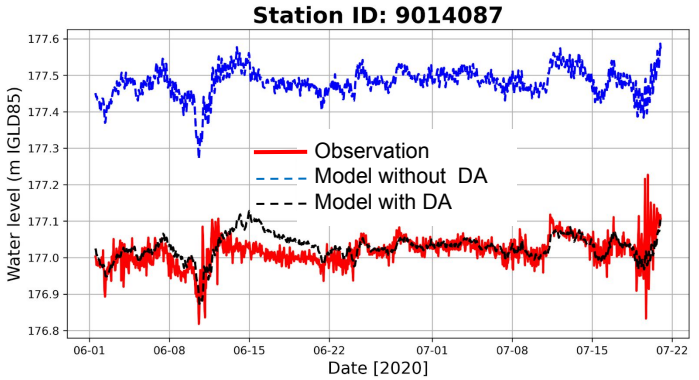



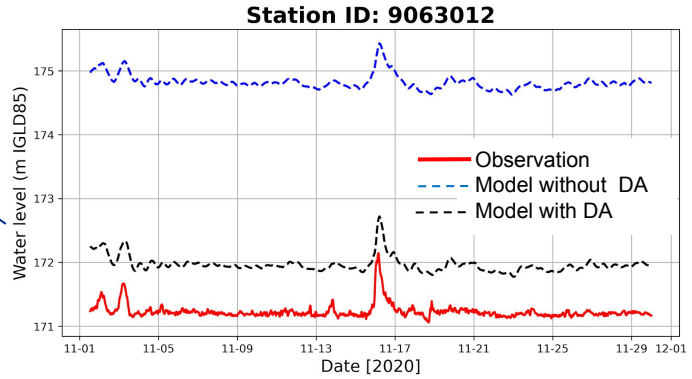



# Impact of Data Assimilation

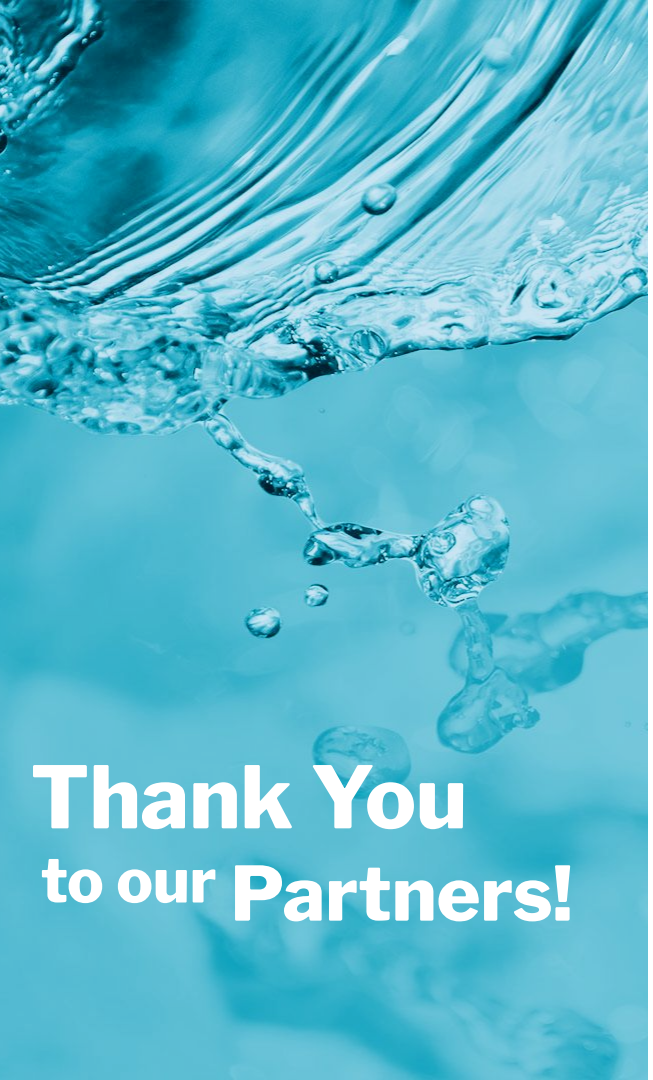


# Summary

- The TWL forecast capability developed by OWP can capture water level variations well from daily to monthly scales in the Great Lakes and Lake Champlain.
- TWL forecast is sensitive to the river discharge, and T-route discharge produced the best results in the Lake Champlain simulation.
- Data assimilation in T-route improves TWL accuracy.




## Related Presentations on Wednesday

- ***Wednesday 8:30-12:20***: Optimizing D-Flow FM into the NextGen Framework for Improved Coastal Water Level Predictions: Lake champlain Study by Soroush et al. (***Poster Hall)***

- ***Wednesday 8:30-12:20*** Evaluation of Alaska's Coastal Zone Total Water Level Modeling System Developed for the Next Generation Water Resources Modeling Framework (NextGen) by Mashriqui et al. (***Poster Hall)***

Lynker

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