Developing BMI Compatibility with Coastal Hydraulic Models for the Next Generation Water Resources Modeling Framework (NextGen)

SESSION H31W-1814

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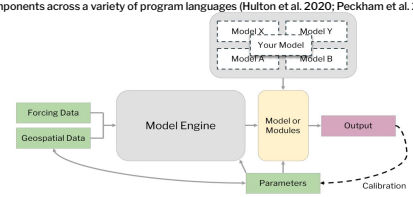
NextGen Motivation

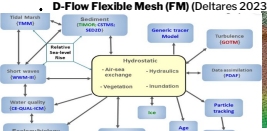
NextGen is an open source, model-agnostic water resources model interoperability software infrastructure. NextGen aims to support both operational and research hydrology and coastal models running simultaneously **while** interacting with a common hydrofabric. The NextGen Framework uses the Basic Model Interface (BMI) model coupling standard. A BMI is a list of "self-describing" functions used to standardize a model's main program and **to** exchange variable fields between model components across a variety of program languages (Hulton et al. 2020; Peckham et al. 2013).

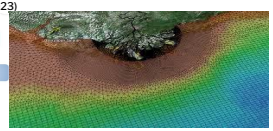


With the recent release of the National Water Model (NWM) v3.0 Total Water Level (TWL) capability, it is critical for the NextGen framework to integrate coastal model BMIs and enhance **its** TWL capability in order to address the critical need for coastal flooding forecasts within our coastal communities.

Coastal Models

- **Semi-implicit Cross-scale Hydroscience Integrated System Model (SCHISM)** (Zhang et al., 2008, 2016)
- **D-Flow Flexible Mesh (FM)** (Deltares 2023)

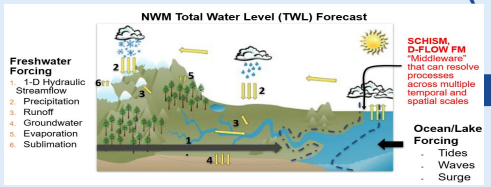




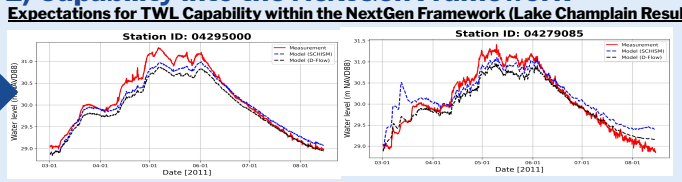
AGU 2023 Presentations for coastal model setup and validation for NextGen (Session H09S)

Julio Zyserman - H34D-07 (Oral presentation)
Henok Kefelegn- H31W-1813 (Online Poster)
Hassan Mashriqui - H31W-1802 (Poster Hall)

OWP is Addressing a Critical Gap in Coastal Flooding Forecast Capability by Integrating the Total Water Level (TWL) Capability into the NextGen Framework



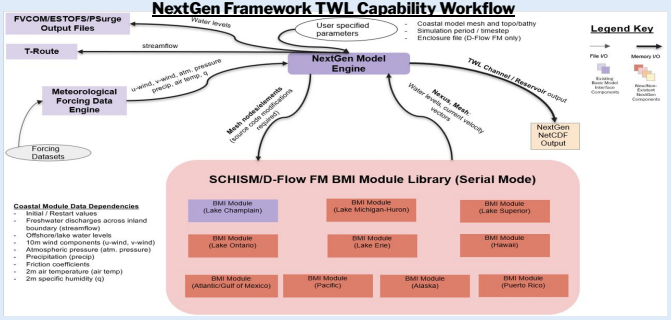
Expectations for TWL Capability within the NextGen Framework (Lake Champlain Results)



When coastal model BMI capabilities are fully developed long-term, OWP will be able to produce a reliable TWL forecasting scheme within the NextGen framework.

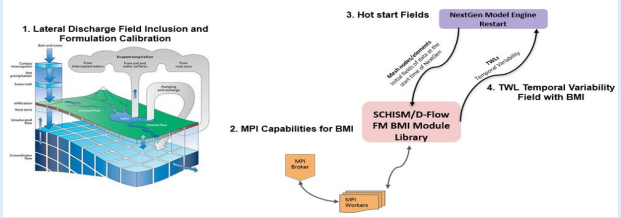
Model	Bias	Root Mean Square Error	Skill Score
Dflow FM	-0.109	0.252	0.958
SCHISM	-0.026	0.179	0.979

NextGen Framework TWL Capability Workflow



Here, we have demonstrated the capability to integrate the NWMv3.0 TWL fields into the NextGen Framework, which will allow OWP and the science community to continue to help improve our coastal forecasting capabilities in the long term.

NextGen Optimizations Ongoing



ACKNOWLEDGEMENTS:

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