ABSTRACT
Accurate forecasts of total water level (i.e., a combination of river flow, tide, surge and wave-induced water level) is imperative for stakeholders that need to rapidly adopt strategies for potential flooding hazards. Based on a systematic set of scenarios, we analyze the influence of relevant forcing conditions on total water level (TWL) prediction in Delaware Bay USA, and quantify the contribution of each forcing to TWL peak for Hurricane Isabel (September, 2003) and Sandy (October, 2012).

RESEARCH OBJECTIVES
1. Investigate relevant forcing conditions in Delaware Bay and quantify their relative contribution to TWL.
2. Evaluate the accuracy of TWL prediction (in space and time) around the TWL peak of Hurricane Isabel and Sandy.

BACKGROUND
This research was developed as part of the National Water Center Innovators Program - SI 2019. Our team studied the complex interactions of forcing conditions in coastal transition zones that affect the NWM’s ability to generate accurate TWL forecasts.

MODEL FRAMEWORK
We leverage a previously established model framework that accounts for a calibrated Delft3D-FM model of DB coupled with HWRF, CFSR, NWM, ADCIRC and WW-III models. Figure 2 presents a schematic of the model framework where atmospheric forcing is used to generate wind setup for the NWM and Delft3D-FM models. The NWM in turn generates river discharge input for WW-III, ADCIRC and Delft3D-FM. Likewise, WW-III and ADCIRC interact with each other sharing water level and velocities, and subsequently producing wave-induced water level as ocean/offshore boundary condition for Delft3D-FM.

RESULTS
Relative contributions of atmospheric tides (AT), river discharge (RD) and storm-surge (SS) to TWL are calculated at five NOAA stations of DB. Distances are measured from Brandywine station (0 km) and continuing in upstream direction (Fig. 3). Influence of forcing conditions on spatiotemporal patterns of RMSE around the TWL peak of both hurricanes (Fig. 4)

CONCLUSIONS
It is revealed that in both hurricanes, storm surge-induced water level was the main contributor to TWL. Analyses of spatiotemporal patterns suggest that local wind played a key role to accurately simulate TWL in DB; especially for Sandy due to the hurricane’s track proximity to DB.

REFERENCES

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