

AT A GLANCE

What is it?

The probabilistic surge and inundation prediction system (PSIPS) estimates water elevation, maximum water elevation, and likelihoods of exceeding water thresholds resulting from landfall of a tropical cyclone.

How does it work?

Given a tropical cyclone forecast track, PSIPS represents possible errors in cyclone position and intensity. It utilizes a modeling suite with Delft3D-Flexible Mesh (DFM) to estimate water elevations for the ensemble of analytical wind fields. The system then calculates maximum water elevations and probabilities of exceeding water elevation thresholds.

What will it accomplish?

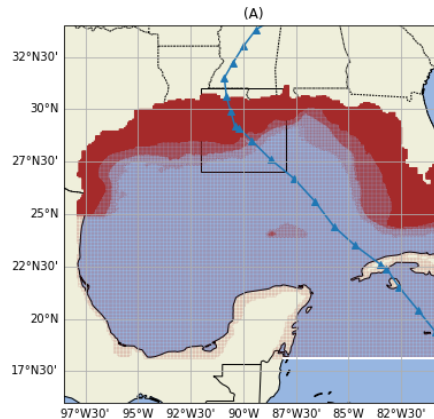
PSIPS provides detailed water elevation estimates without compromising time to solution. The ensemble approach accounts for uncertainty in the tropical cyclone forecast track and intensity.

R&D Sponsor(s)

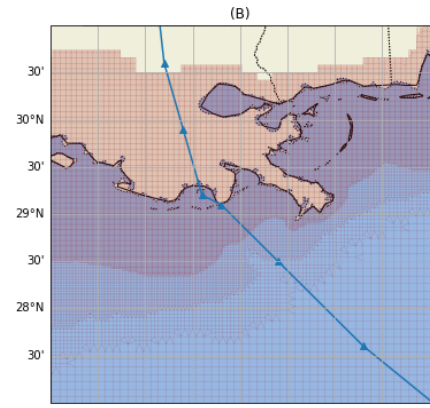
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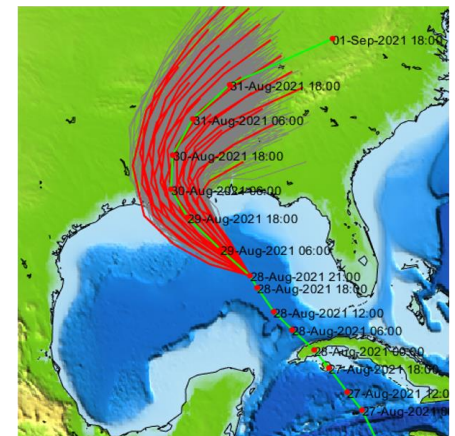
Full (A) DFM grid covering the Gulf of Mexico and detailed view (B) showing the grid refinement for Hurricane Ida (blue line).



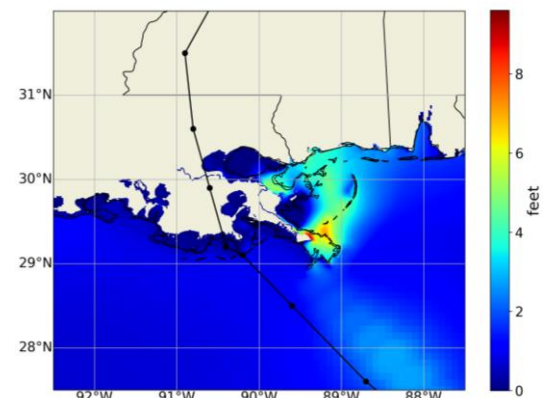
PSIPS provides surge forecasts resulting from a tropical cyclone. The system utilizes the Delft3D-Flexible Mesh (DFM) modeling suite. Because DFM is not restricted to quadrilateral elements, the modeling suite facilitates large area simulations with high-resolution elements only in areas of high interest resulting in more streamlined and efficient models. With a streamlined, efficient model at its core, PSIPS provides forecasts and forecast uncertainty using an ensemble modeling approach.

Given a tropical cyclone forecast track, PSIPS generates 1000 variations based on possible errors in cyclone position and intensity and determines 63 representative tracks from which PSIPS creates analytical atmospheric inputs. The model is run for each of the atmospheric inputs resulting in an ensemble of model results.

The ensemble of model results provides a range of conditions expected from the tropical cyclone and the probability that a given result will occur. Furthermore, from the ensemble of model results, more complex systems of models are used to provide increased detail and inundation predictions.



Ensemble of forecast tracks for Hurricane Ida.



Hurricane Ida maximum water elevations.