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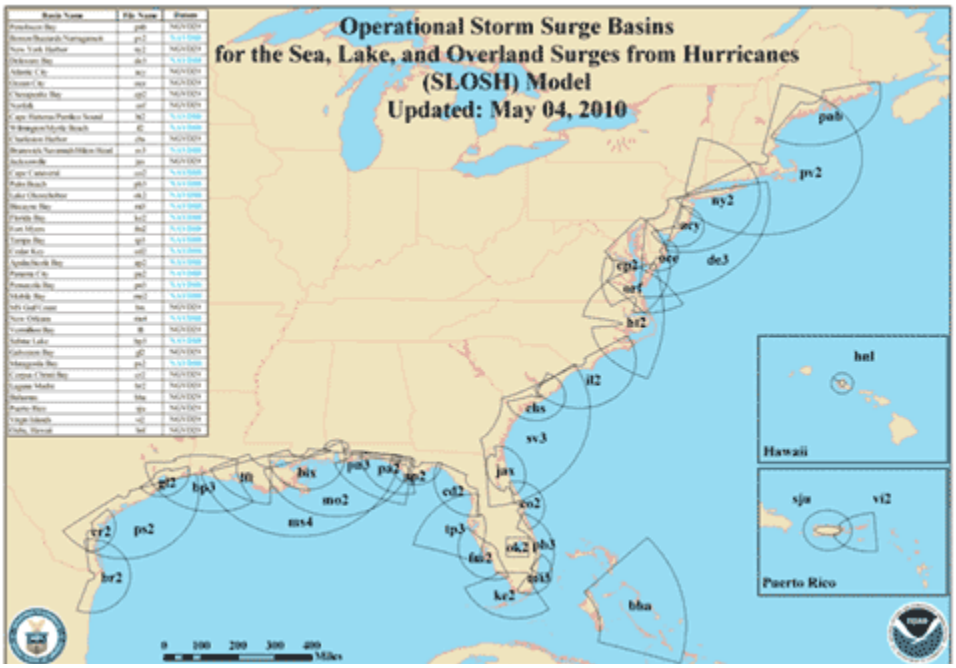
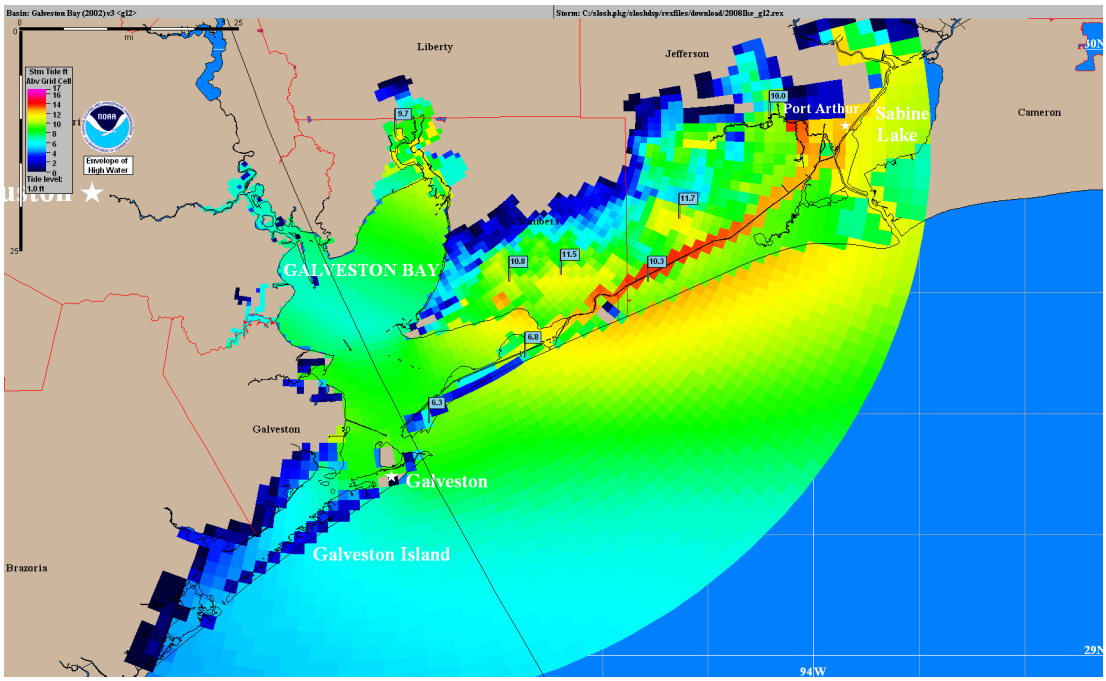
UNDERSTANDING STORM SURGE

HOW METEOROLOGISTS PREDICT AND MEASURE STORM SURGE

The many factors that impact the height of storm surge make predicting storm surge very difficult; however, scientists from NOAA and the NWS (National Weather Service) have created a computer model called SLOSH (Sea, Lake, Overland Surges from Hurricanes) to predict storm surge heights and evaluate the risk of a coastal strike. The model depends on a storm's atmospheric pressure, track, size, speed. Using complex physic equations, the model can apply this information to a specific location taking into consideration local water depth, land elevation, and other land features that could affect storm surge.



All the different locations where storm surges are predicted are called basins.



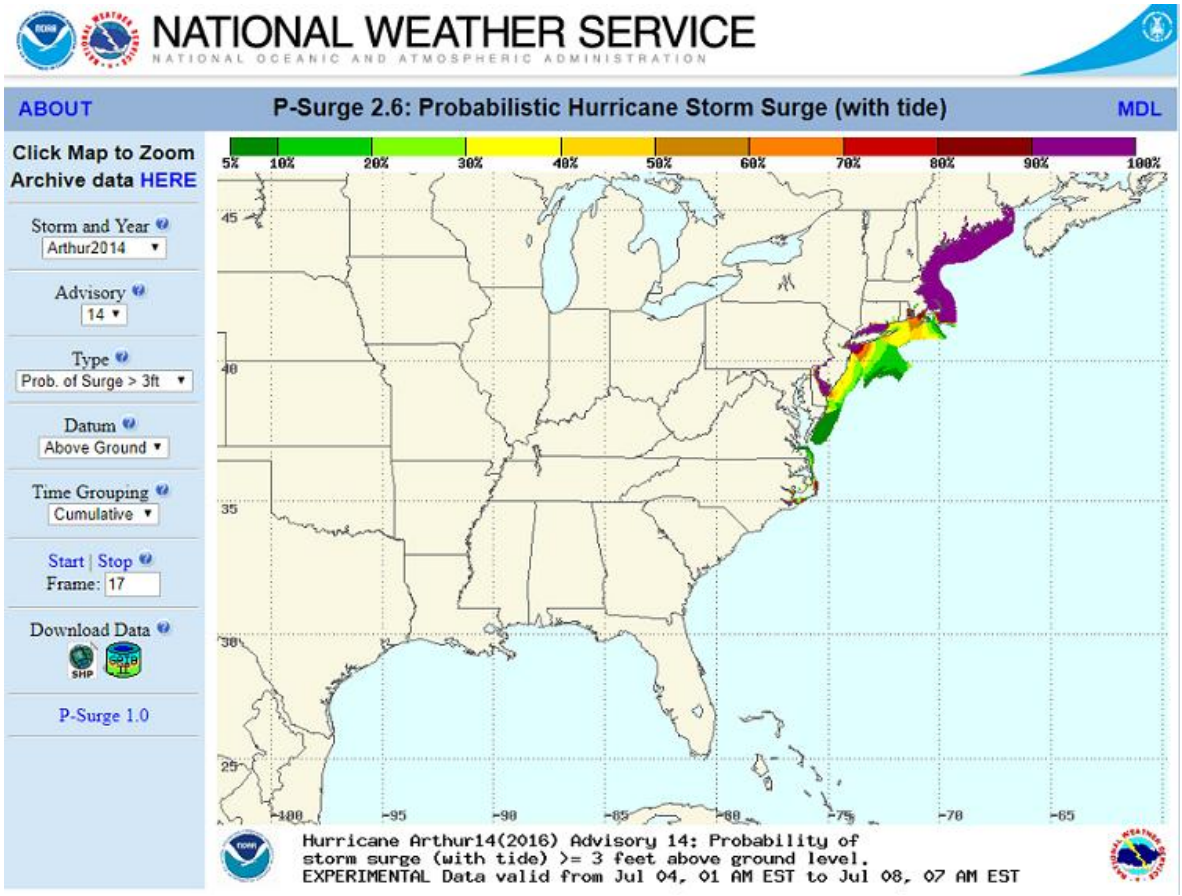
A sample SLOSH model display from Hurricane Ike (2008). The model uses a color code to illustrate how high storm surge levels will go in feet above ground level.

Since storms can be difficult to forecast, the model also takes into account historical storm surges from past storms and hypothetical storm surges, using many different factors that can change quickly during a storm such as size, intensity, track, etc. The model reports how high the storm surge inundation will be in feet above ground, so if the model predicts a 20 foot storm surge, that means the water will reach 20 feet above ground in that specific location. This is then used by emergency managers in different towns or areas to warn emergency responders and citizens about the storm surge

Since the factors that influence a hurricane's size, speed, intensity and landfall are difficult to predict this makes storm surge difficult to predict with absolute certainty using only one SLOSH model and one forecast. Forecasters often use an additional model called P- Surge or Probalistic Surge to determine the likelihood of a storm surge reaching different heights above ground level in different areas. P- Surge uses a collection of SLOSH model runs, which combine thousands of factors that influence a storm (speed, direction, size, pressure, tides and more) to make a prediction on the probability of storm surge reaching a certain height above ground level.

The map below illustrates P- Surge from Tropical Storm Arthur in 2014. Looking at the left hand key we can see the Storm and Year. This was the 14th advisory put out by the NWS. The Type shows the probability in a percentage of how high the surge could exceed a certain amount of feet above ground level around an entire area. For the period of July 4th through July 7th, 2014,

the map shows a 90-100% chance that storm surge will be above 3 feet along most of the coast of Massachusetts to the northern tip of Maine and the area surrounding the NY/NJ Harbor Estuary; further, there is a 30-40% chance of the surge exceeding 3 feet along most of the New Jersey shore, and a 5-20 % chance of the surge exceeding 3 feet along the coast of Delaware and Maryland..



People should realize that even if the probability of a surge reaching their area is low, (say only 5-10%), the report is a warning that an extreme event *could still* happen, and that even a small percentage of a chance happening or a low surge height poses considerable danger. People need to seriously consider the high risk involved to property and lives with a storm surge. Water will flood fast and furiously. While these models are mostly used by scientists, NWS forecasters and emergency management personnel use them when considering whether or not to issue warnings and mandate evacuations; these models are also available to the public at NWS within 48 hours of the onset of a tropical storm.

<http://slosh.nws.noaa.gov/psurge2.0/index.php?S=Arthur2014&Adv=14&Ty=gt3&Z=m1&D=agl&Ti=cum&Msg=17&Help=about>

For more computer modeling tools used to predict storm surge, see http://slosh.nws.noaa.gov/.