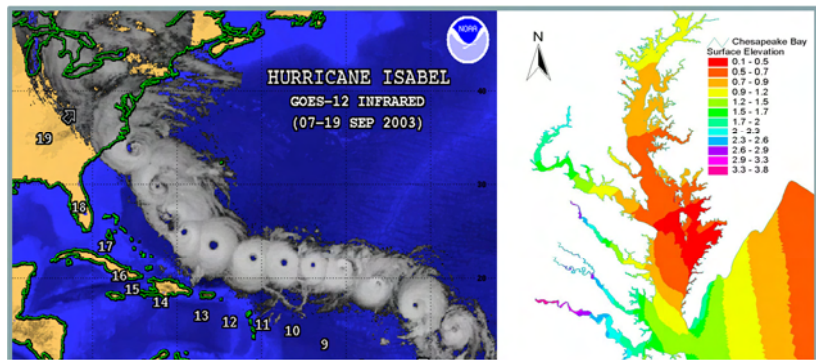


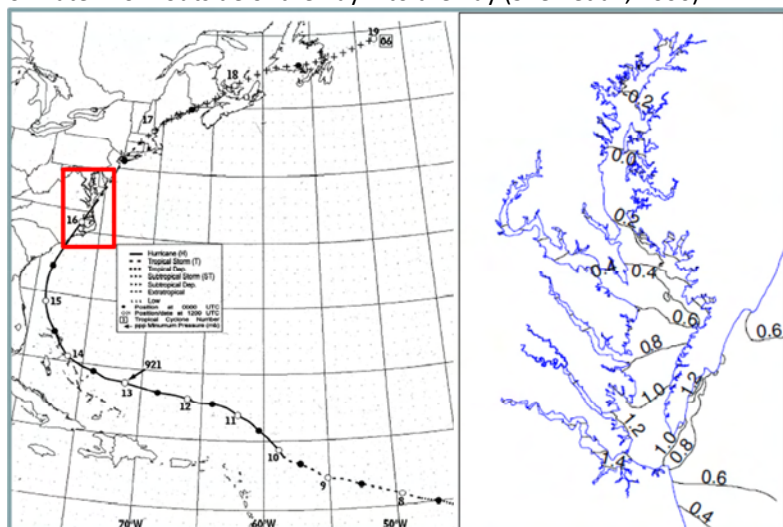
Background of Storm Surge in the Chesapeake Bay

Pore (1965) studied hurricane-generated storm surges in the Chesapeake Bay. The hurricanes in the Bay can be grouped into two categories, namely Type A and Type B storms. The Type A storms are those storms that approach the Bay from the east and pass to the north of the Bay. Type B storms are the storms that approach the Bay from the south quadrant and passes over south of the Bay. The representative hurricanes are Hurricane Isabel (2003) and Hurricane Floyd (1999), respectively. Besides hurricanes, the northeaster (or nor'easter) is another kind of storm that is less intense but more frequent, lasts longer, and impacts larger areas within the Chesapeake Bay.

The hurricane Isabel approached the Bay from the east and moved towards the northwest. It generated storm surge in both the lower Bay and upper Bay, which caused the largest damage in the Bay region.



The hurricane Floyd approached Bay from the south and moved toward the northeast. The hurricane generated a strong northeasterly wind, which caused set-down in the upper Bay region and storm surge in the lower Bay. A local high of surge occurred near Hampton Roads due to the local southerly wind and the Ekman transport that transported a large amount of water from outside of the Bay into the Bay (Shen et al., 2006).



Prepared by the Coastal SEES Research team.

References:

Pore N.A., 1965. Chesapeake Science 6 (3), 172-182.

Shen, J. Gong, W., Wang, H. 2006. Continental Shelf Res. 26. 2484-2502.

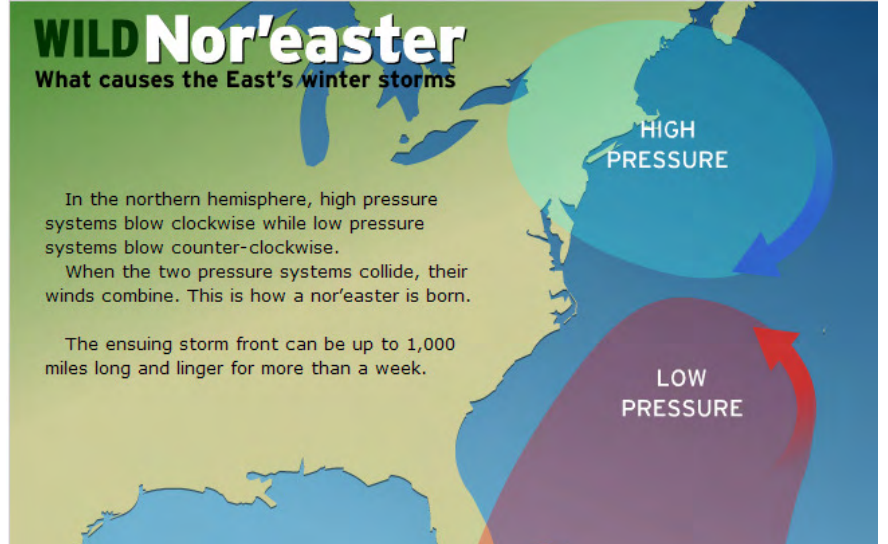
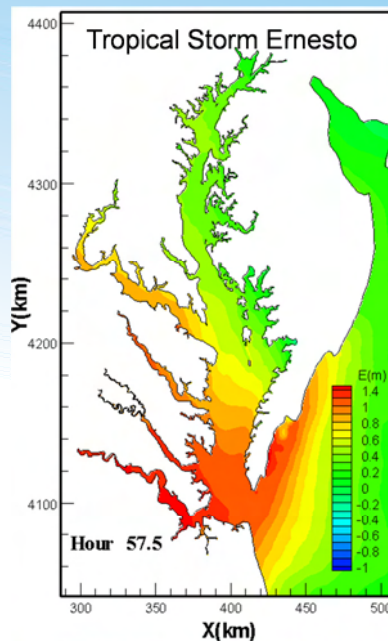
Shen, J., Gong, W. 2009. *Journal of Marine Systems*, 75, 198-215.

Background of Storm Surge in the Chesapeake Bay, cont'd

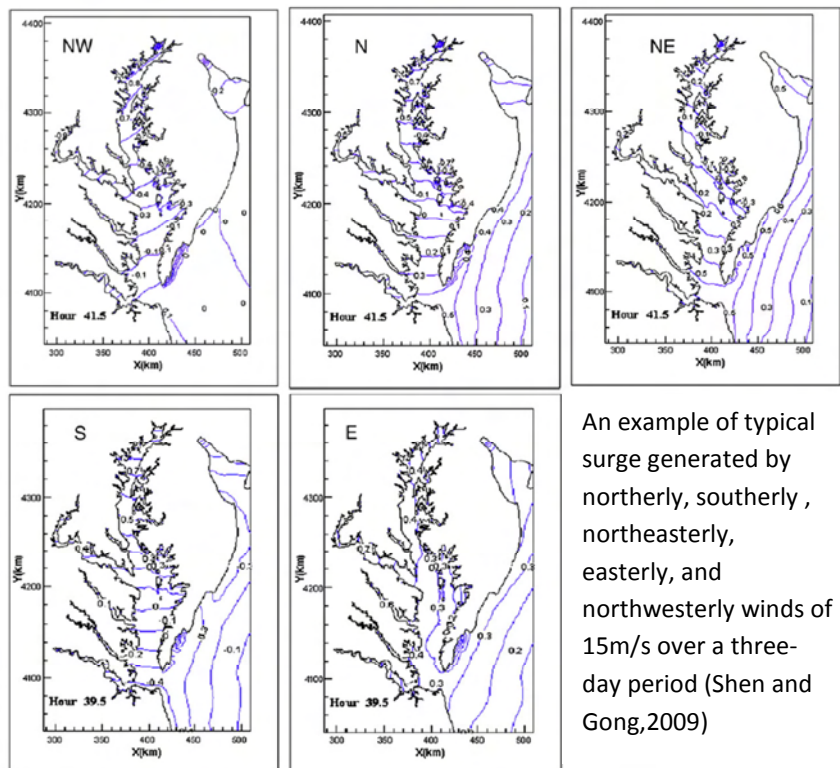
This study investigated the response of the Bay hydrodynamics to different types of storm surge barriers near the mouth. The typical storms we selected for the investigation are:

- Isabel (1993)
- Floyd (1999)
- Ernesto (2006)

Hurricane Isabel caused the largest damage in the Bay. Ernesto was a tropical storm that was similar to a Nor'easter in that it generated a strong northeasterly wind and caused large surge in the lower Bay region.



Wind from different directions can have different impacts on the Bay. The surge will be generated resulting from combined effects of local and remote winds. In general, southerly winds generate surge in the upper Bay and northerly winds generate surge in the lower Bay; northeasterly winds generate surge in the lower Bay, while westerly winds generate set-down inside the Bay.



An example of typical surge generated by northerly, southerly, northeasterly, easterly, and northwesterly winds of 15m/s over a three-day period (Shen and Gong, 2009)