Lessons Learned from Recent Flood Deposits in the Northeast
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Here we will highlight recent advances in our understanding of landscape response to both fluvial and coastal flooding. Our studies utilize resultant deposition from Tropical Storm Irene (2011) and Hurricane Sandy (2012) to put these events in erosional context relative to earlier event deposits preserved in Northeastern depocenters. Irene results are primarily focused to the Connecticut and Hudson River watersheds while observation for Hurricane Sandy are from coastal systems internal to New York Harbor. Major conclusions include the following:

1. Tropical Storm Irene in 2011 caused more severe erosion in the Connecticut River watershed than any fluvial flood event of the historic record. Conditions that caused the event were unique not in terms of rainfall rate or totals, but rather occurrence during a period of anomalously wet background conditions, which increased the system’s vulnerability to landslides during Irene’s extreme precipitation. Thus more frequent destructive erosion is likely under future climate scenarios calling for wetter conditions, even in the absence of an increase in extreme precipitation.

2. In terms of their sedimentological imprints, deposits associated with Hurricane Sandy and a hurricane in 1821 clearly rank as the two largest floods to impact New York Harbor since 1800. Inversely modeled storm conditions are consistent with the 1821 Hurricane having a similar storm tide and a significantly larger storm surge. Results indicate the occurrence of additional flood events like Hurricane Sandy in recent centuries, and highlight the inadequacies of the instrumental record in estimating current flood risk by such extreme events.

3. Prior to 1800, a dramatic decline in the number and coarseness of storm-induced overwash deposits is observed in New York Harbor dating back to ~1600 CE. This is preceded by a near absence of overwash between 1600 and the development of the barrier-beach systems in the harbor around 3000 yrs Before Present (BP). The onset New York Harbor’s current barriers around 3000 yrs BP is due to a dramatic drop in rates of sea level rise, and the increase in storm overwash between 1600 and 1800 is linked to the decimation of oyster reefs following European colonization. Results highlight sea level change and human impact on living barriers as the two largest influences on New York Harbor’s shoreline in response to storm induced flooding.