Hurricane Irene blasted into the Hudson Valley on Sunday, August 28th, dumping about 8-10 inches of rain. Based upon preliminary estimates of the amount of water that entered the Hudson River, Irene was one of the largest rainfall events ever recorded. When all of the stream gauge data are eventually analyzed, Irene may be found to be the largest event on record.

The HRECOS (Hudson River Environmental Conditions Observing System) provided an unprecedented opportunity to examine the effects of a major storm on the Hudson River. HRECOS stations at the lower end of the river at the George Washington Bridge and Castle Point (off Hoboken) show that the added freshwater from Irene pushed the salt front beyond the mouth of the river.

This was one of the rare times when the river was “fresh” from end to end.

Figure 1 shows how rapidly the salinity in the lower river dropped as Irene swept into the area.

And a week after the storm, freshwater still persists in the lower river at the George Washington Bridge.

At the northern end of the estuarine portion of the Hudson, HRECOS data stations at Albany...
and Schodack Island (15 miles south of Albany) show how the surge of flood waters overwhelmed the rise and fall of tides in these locations (Figure 2). River levels rose 5 and 10 feet, respectively, at Schodack Island and Albany, and the tides were nonexistent for several days.

The rising water levels were clearly related to Irene’s rainfall, however, a dramatic drop in atmospheric pressure may have enhanced this rise.

Figure 3 shows the drop in pressure as Irene passed over the Albany area.

Tributaries to the Hudson were severely flooded. Waters in Catskill Creek, in Greene County, rose more than ten feet. Figure 4 shows the rising water levels in the creek from a USGS (US Geological Survey) gauge.

The break in the record occurred when the shed that houses the gauge went completely underwater.
Gary Wall of the USGS was able to put the gauge back in operation the following day. And in Roundout Creek, water levels rose 20 feet! (Figure 5).

Figure 4.

Figure 5.

The tributary that has the greatest influence on the flow of water and sediments in the Hudson is the Mohawk River. The Mohawk’s watershed contains substantial amounts of agricultural land that erodes easily and contributes to a proportionately higher amount of sediment to the Hudson than most other tributaries. During Irene, the Mohawk River was sending water into the Hudson at a rate of about 110,000 cubic feet per second (cfs) (Figure 6). This is a near-record flow rate. At the Troy Lock and Dam, just south of where the Mohawk enters the Hudson, flow was about 140,000 cfs. Consequently, the Mohawk was contributing nearly 80% of the freshwater to the Hudson at this point in the Albany area.

Sediment discharge data for the various USGS gauges are still being processed and it will be sometime before firm estimates of sediment inputs can be made. However, some gross estimates can be made based upon past events.

During a severe rainfall in 2006, the Mohawk was discharging water to the Hudson at a peak...
rate of approximately 90,000 cfs.

The net effect of this event was a contribution of about 240,000 tons of sediment to the Hudson from the Mohawk over a four-day period.

Irene likely contributed a sediment load to the Hudson at least equivalent to the 2006 event. (Note:

There are several dramatic videos posted on YouTube that show the flow of the sediment-laden water in the Mohawk flowing over the falls in Cohoes (example)).

The combined discharges of the Mohawk River, Upper Hudson River and the streams in the Catskill region likely injected 300,000 tons or more of sediment into the tidal portion of the Hudson.

This amount equates to about 1 million cubic yards of sediment.

If all of this sediment was transported downriver and settled into navigation channels in New York Harbor, it would be equivalent to about one year’s worth of maintenance dredging by the Corps of Engineers.

Figure 6.

In the near future we will be able to assess how much sediment moved past Poughkeepsie on its way downriver. A special gauge was established in Poughkeepsie by the USGS during the Contamination Assessment and Reduction Project (CARP) to monitor ongoing sediment fluxes in the river. The gauge held up and recorded information through Irene, however, its onshore telemetry station was damaged and data from the gauge will have to be manually downloaded.

When that happens, we will have a much better idea of the sediment impacts of Irene.