Interpreting 'A Day in the Life of the Hudson River' Using Real-Time Data

Students from Tech Valley High School measured turbidity at the Rensselaer boat landing as part of "A Day in the Life of the Hudson River." Photo courtesy of Michael McCagg.

On October 8, 2009, over three thousand students stepped out of their classrooms and into the Hudson River Estuary. Students stood on boat ramps and docks from Troy to New York City, collecting water quality data. They wrote descriptions of their sites, collected mud, water and invertebrate samples, seined for fish, and examined water chemistry parameters. The purpose was to give participants the opportunity to observe "A Day in the Life of the Hudson River."

Sponsored by the Hudson River Estuary Program, "A Day in the Life of the Hudson River" is in its seventh year. With help from the Lamont-Doherty Earth Observatory of Columbia University, data from this and previous years are now being collected and synthesized for further analysis by participating classrooms.

In some instances, high frequency data sets provided by HRECOS, USGS, and NOAA can help participants interpret data collected during "A Day in the Life of the Hudson River." Three examples are described below.

How Were Parameters Changing at the Moment They Were Sampled?

The Hudson River is a constantly changing system. Many participants were unable to collect more than one water sample during their visit to the river. Using high frequency data from HRECOS, students are able to see how their point sample fits into daily and seasonal concentration fluctuations.

Students from Tech Valley High School use HRECOS data to examine how dissolved oxygen concentrations were changing during their sampling period.

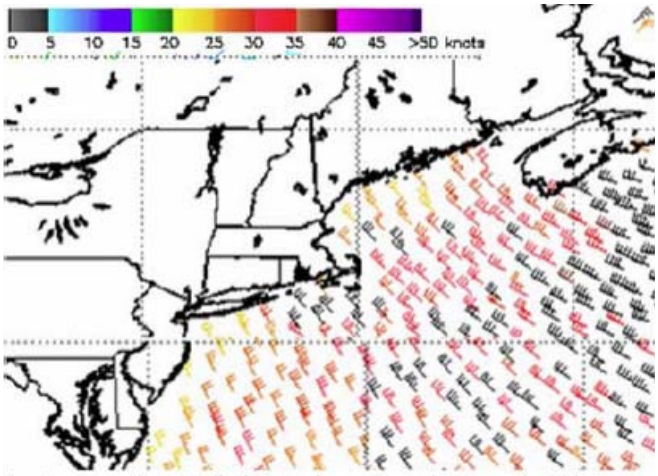
Students from Tech Valley High School examined HRECOS data from Schodack Island to see how dissolved oxygen concentrations were changing at the time they collected their sample in Rensselaer. In the continuous data set, they observed rising dissolved oxygen concentrations throughout the morning and afternoon and declining concentrations at night probably due to the influence of photosynthesis and respiration (for a more detailed description of this type of phenomenon, see the HRECOS Story Plant Breath in the Hudson River available at www.hrecos.org).

What Caused the Blowout Tide?

Students from Kingston's George Washington Elementary seine for fish during the blow out low tide at the Esopus Meadows Environmental Center.

Participants reported an exceptionally low tide and a low high-tide on October 8, 2009. A number of sites caught fewer fish than in previous years which may be attributable to the low water level. Students at Inwood Hill Park caught almost no fish, participants at Piermont reported fewer Atlantic Silversides, and Educators at Norrie Point Environmental Center reported fewer herring than in previous years.

Fishermen know that a strong northwest wind over two or three days can result in very low tides, called blowout tides. There was definitely a strong northwest wind on October 8, 2009. Hair blew wildly and papers flew out of our grasp. Looking at the HRECOS data set, we can see that wind blew from Schodack Island to Piermont Pier. This wind, however, was short lived. It began in the middle of the day October 7, only 1/2 day before the blowout tide was observed.



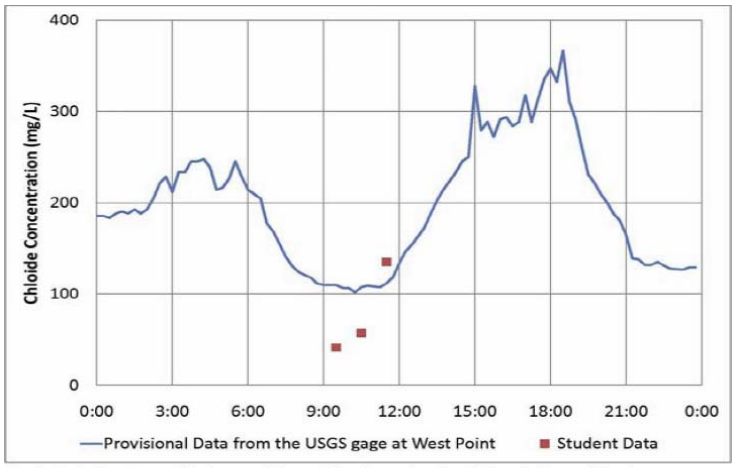
A strong northwest wind blew down the estuary and off the continental shelf on October 8, 2009. We can observe this wind in satellite data from the National Oceanic and Atmospheric Administration. The top of the flags point towards the direction the wind is blowing from.

If we step back even farther and examine satellite data from the National Oceanic Atmospheric Administration, we can see that stronger northwest winds extended out from the New York Harbor and beyond the continental shelf. These winds began on October 6 and blew strong through October 8, pushing Marine waters from Maine to Delaware away from shore. The blowout tides observed on the Hudson River Estuary were a response to this larger regional event.

Where's the Salt Front?

The salt front is the point in the river where the fresh water flowing downriver meets the salt water being pushed upriver. It is defined by a chloride concentration of 100 mg/L.

Students in Garrison, NY, measured chloride concentrations below 100 mg/L at 9:30 am and above 100 mg/L at 11:30 am. It appeared that the salt front had passed them by. This was puzzling since the predicted salt front for October 8, 2009 was at Beacon, eleven miles upriver.



Students in Garrison, NY observed the salt front passing by. Although the salt front was predicted to be near Beacon, NY, student observations and provisional data from West Point, NY indicate it was eleven miles to the south.

The U.S. Geological Survey maintains a gage at West Point, across the river from the students in Garrison, NY (see USGS Hudson River Salt Front website). This gage records specific conductivity every fifteen minutes which can be converted to chloride concentrations (see conversion chart). According to provisional data from this gage, chloride levels reached as low as 101.5 mg/L, very close to the 100mg/L definition of the salt front. For this reason, it is possible that the students in Garrison did indeed observe the salt front despite being eleven miles south of its predicted location.

The salt front prediction is based on previously collected data. Strong winds and rain events can affect the salt front location in ways not predicted. The blowout tide on October 8 probably explains why the salt front was so much farther down the river than predicted.

The fact that student data is so much lower than what was recorded at the USGS sonde could be the result of inputs of fresh water from Indian Brook via Constitution Marsh, or the less sensitive equipment used in the student data collection.

Students from Haldane High School and educators from the Hudson Highlands Land Trust studied the river at Little Stony Point, located between Garrison and Beacon. Photo by Stephanie Stanczak.

More Stories To Come

Student data are still flooding in from "A Day in the Life of the Hudson River." These data are rich with stories which students and educators are actively seeking out. As they sift through the numbers and anecdotes, the high frequency data sets provided by HRECOS, NOAA, and USGS can help to contextualize and translate the snapshot observations made on October 8.

To observe high frequency HRECOS data from October 8 or any date since April 2008, select "Current Conditions" in the menu on our home page: www.hrecos.org.