Metals in the mud: Changes in surface sediment contamination in Long Island Sound

Zocher, Erika J.[1], Kenna, Tim[2], Nitsche, Frank[2]
[1]Northland College, Ashland, WI, [2]Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY

Long Island Sound is an elongate estuary of the Atlantic Ocean between Connecticut to the north and Long Island, NY, to the south. It is characterized by a general sedimentary trend of fine-grained material in the west with a gradual transition to coarse-grained material in the east. The study area for this research was between Port Jefferson, NY, and Bridgeport, CT, in the western center of the Sound. The predominance of deposition, heavily populated cities, and a high volume of industry along the shore contribute to the presence of metal contaminants in the sediment, which pose risks to human and environmental health. A series of metal contaminants was evaluated in surface sediment samples from the study area. Expeditions were carried out by a team from Lamont-Doherty Earth Observatory (LDEO) in June of 2013 on the R/V Seawolf and R/V Pritchard of Stony Brook University. Grab samples were collected using a modified Van Veen grab. University of Connecticut samples were also used as part of the analysis. These samples were collected in 2012 using the Seabed Observation and Sampling System (SEABOSS) of the Woods Hole Science Center. 91 samples from 2012-13 (44 LDEO and 47 UConn) were processed and analyzed at LDEO. X-Ray Fluorescence (XRF) Spectroscopy was used to determine light and heavy metal concentrations. 2012-13 sediment data was compared with data collected by the U.S. Geological Survey (USGS) in 1996 and 1997. Contaminant distribution maps were created for 1996-97 samples and 2012-13 samples within the study area. The majority of our samples contained chromium, copper, lead, and zinc concentrations below “Effects Range-Low” (ERL) guideline values, which are indicative of concentrations below which adverse effects rarely occur. Based on results from the 91 samples, concentrations of several metals of concern have decreased in the study area compared to the 1996-97 surveys. This may be due to changes in deposition or erosion, sources of sediment, or success in stricter environmental regulations. Processing and additional analyses of the remaining LDEO samples will yield more definitive conclusions on overall surface sediment contamination in this region of the Sound.