Environmental Change In The Hudson Estuary Marshes

Abstract:

Wetlands are a useful proxy for understanding the changes within an environment over time. Because of the anoxic conditions, marshes preserve leaves, seeds, pollen, and elemental composition in its sediment, which can provide information about vegetational history, land use, climate and carbon storage over time. In order to obtain these preserved samples, cores must be taken in order to accurately study the sediments.

The depth of a core is an ecological timeline from top to bottom. Depending on the variety of organic matter, plant species, and elemental composition, we can determine what happened around each sampling interval representing a specific time period. We do this with methods such as Loss on Ignition (LOI) and X-Ray Fluorescence (XRF).

Methods:

- More than 20 light & heavy elements detected
- Heavy Metals: Pb, Cu, As, Zn, and Cr
- Lithogenic Tracers: i.e. Ti, K
- “Elemental markers” can indicate land use changes, pollution history, chronology, and climate changes

Results:

Project Focus:
A regional study of elemental composition and organic matter content in Hudson marsh and river cores.

Locations:
Focus wetlands are circled in red.

In the chart above, we can see an interesting upward trend in organic content in Big Egg (Jamaica Bay), Inwood (Manhattan), and Papscanee (Upstate New York). Spikes of organic content in previously thought to be very inorganic areas at the time were retested to eliminate as much human error as possible. However, the results were similar to the previous spikes in organic content. This shows that the organic percent in 3 very different wetlands have all increased over time, and that the organic content has increased or the inorganic content has declined.

Conclusion / Future Research:

Core samples indicate that LOI has increased in 3 different Hudson marshes through time. Using XRF (to be analyzed), we can provide a timeline of some of the pollution histories of the last 2 centuries and can document elemental changes through this time. They will provide a snapshot of the land use and possibly climate at the time they were taken. We hope to also measure carbon content of the marshes using the LOI data.