The Environmental History of North Cinder Island Marsh in the Town of Hempstead, New York.

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Introduction

The purpose of this research is to provide an overview of the environmental history of North Cinder Island, which is located in the southwestern shores of Long Island in New York. This site was chosen because we wanted to investigate the reason behind high mercury content in marsh sparrows. The cores samples were analyzed for pollen content, radiocarbon, loss on ignition (LOI) trace metal and grain size. The lithology of the core is comprised of peats and sand that vary in color and texture.

Field Methods

A gravity core was used to drive a 2-meter aluminum core pipe into the sediment from which we were able to retrieve 1.8 meters of sediment. The UTM coordinates of the core site are 73.6092 W, 40.6097N.

Pollen Samples

The pollen samples were prepared by first screening the sediment samples with 150 micron and then 7 micron screens, HCl, HF overnight, HCL again, glacial acetic acid, acetolysis (mixture of acetic anhydride and sulfuric acid), glacial acetic, ethyl alcohol, TBA alcohol, and finally mounted in silicone oil. Counts were made to at least 300 pollen sums for each sample. Spores were counted in addition to the pollen sum. The data suggests pre-colonial deposition below 80.5cm because of an increase in ragweed (Ambrosia) pollen above that depth, signifying disturbance and human impact. There is also a mesic climate interval (wetter) in samples 83-84 and 84-85cm.

Radiocarbon sample preparation

The depths for the radiocarbon samples were chosen in an attempt to corroborate and extend the age model suggested by the pollen data. We sampled 78-79cm, 96-96cm, 98-99cm and 117-118cm. The samples were wet sieved using 150-micron mesh screens and deionized water. They were then dried in an oven at 100°C, after which they are pulverized with a mortar and pestle. Lastly, approximately 2.00 g aliquots of the prepared samples are sent to the National Ocean Sciences Accelerator Mass Spectrometry (NOSAMS) facility for AMS carbon-14 dating. The date at 78-79cm implies that the sediment age is much older that the pollen data at 80.5cm which does not match with our interpretation of the pollen data. This could have been the result of the limitations with measuring bulk sediment data.

Loss on ignition (LOI)

LOI analysis was carried out to determine how much organic matter was in the sediment sample. This was done by weighing the mass of the crucible, placing a few grams of the moist subsample in the crucible and measuring the combined mass. The sample was then dried completely in the over at 100°C until dry. The sample and the crucible were then reweighed. The difference yields the water content. We then keep the prepared samples in a muffle furnace for 8 hours. After allowing the crucibles to cool, the sample and the crucible are reweighed, and the difference from the dried sample yields the organic content.

Trace Metal

An inductively coupled plasma atomic emission spectroscopy (ICP-AES) analysis was conducted for every 5cm until a depth of 50cm in order to look for the concentration of lead, copper, zinc, iron and mercury. The procedure was carried out by cutting $1cm^3$ samples from the core and wet sieving them in 150 micron mesh. The coarse fraction and fine fractions are stored in separate beakers. The samples were then placed in an oven at 110°C and left to dry overnight. The dried samples are then pulverized with a mortar and pestle. 2.00g samples were sent to the ALS minerals laboratory in Reno, Nevada. The trace metal analysis indicated unusually high levels of heavy metals like lead and copper which corresponds to the industrial revolution. Therefore we can establish that the deposition of lead took place around the 1950's.