Hynes Brook, on the Port-au-Port peninsula, our data agree with previously published data indicating sea-level rise of during the late Holocene. At St. Paul's Inlet, the trend of recent sea-level change is different. We interpret preliminary data to constrain the transition from falling to rising sea level to between 1910 ± 100 to 1190 ± 120 ^{14}C years. Both index points are close to each other in elevation (approximately 0.5 m apart), suggesting that sea level has been close to present for an extended period. These data support the hypothesis of differential sea-level change resulting from migration of a collapsing marginal forebulge. The differences in these sea-level histories will help constrain the magnitude of sea-level change associated with long-term glacioisostatic adjustment.

11:10 AM Pendleton, Elizabeth A.

RESULTS OF INLET FORMATION AT NEW INLET, OUTER CAPE COD, MA

PENDLETON, Elizabeth A. and FITZGERALD, Duncan M., Boston Univ, Earth Sciences, 675 Commonwealth Ave, Boston, MA, 02215

New Inlet, located along outer Cape Cod, formed during a Northeast storm (2 January, 1987) separating South Beach from Nauset Spit. In the months following the breach, New Inlet grew to nearly 2km in width, effectively capturing the tidal prism of Pleasant Bay from Chatham Inlet. Enlargement of the inlet and erosion of the adjacent barriers provided sediment for growth of the flood tidal delta, formation of subtidal shoals, and construction of a spit attaching South Beach to the mainland. The breach also substantially changed the tidal hydraulics of the backbarrier causing the development of mutually evasive tidal channels.

Subsequent evolution of the inlet involved development of a spit platform, growth of the ebb-tidal delta, and a southerly deflection of the main ebb channel. The spit platform built 1 km to the south from Nauset Spit and was incised by a number of shallow channels. During this period the ebb-tidal delta grew from sand intercepted from the longshore transport system resulting in downdrift shoreline retreat and an overall thinning of South Beach barrier. Extension of the spit platform and enlargement of the ebb-tidal delta caused a southerly deflection of the main inlet channel, such that it impinged upon the northern end of South Beach. The circuitous path of the main channel produced an inefficient exchange of water between the backbarrier and the ocean, causing increased flow through one of the shallow secondary channels across the spit platform. Deepening of this new channel created a shorter and more efficient pathway for water to exit the inlet. Inlet sediment bypassing has been re-established and South Island is being nourished with sand derived from onshore bar migrations.

11:30 AM Thissen, JoAnn

SEDIMENT CHARACTERISTICS AND FACIES ANALYSIS IN THE HUDSON RIVER FROM KINGSTON TO SAUGERTIES

THISSEN, JoAnn, SUNY Stony Brook, Marine Sciences Research Center, Stony Brook, NY, 11974

Extensive data and analysis of bottom sediment facies in the Hudson River estuary is sparse owing to the large effort required for collection of samples. Yet understanding the sediment transport and final deposition of sediments is important in any attempt to protect the ecosystems of the river and in understanding the transport and fate of contaminants downriver and/or into the fringing wetlands and the possible habitats of invasive species such as zebra mussels.

This study proposes that a simple conceptual model of the Hudson as a one-way conduit from the headwaters to the sea is unrealistic and that the Hudson River is compartmentalized into discrete isolated sedimentary systems so that, in any given time, only a fraction of the sediment in a compartment is exchanged with its neighbors upstream or downstream. The remainder is deposited within individual compartments.

Surface grab samples were taken in the main stream of the Hudson River, in the fringing shallows between Kingston and Saugerties and within Tivoli South Bay and processed for grain size. Sediment analysis shows two distinct populations of coarse and fine-grained sediment with fines in the shallows and within Tivoli South Bay, local coarsening at the mouth of Rondout Creeks and deposits of coarse-grained sediment containing abundant zebra mussels scattered throughout.

The results of the sediment analysis were combined with acoustic images of the river bottom and a facies map was created. By both data sets, the facies map shows a definite compartmentalization of sediments. Within this section of the Hudson River is a transition area that marks the beginning of a general fining trend downriver south of Rondout Creek in the city of Kingston, N.Y.

SESSION 3, 8:30 AM

Monday, March 12, 2001

Quaternary Geology/Geomorphology

Sheraton Burlington Diamond Salon II

8:30 AM Markley, Barbara K.

TUNNEL VALLEYS OF THE MIAMI AND SCIOTO INTERLOBATE AREA, BELLEFONTAINE, OHIO: GENERAL IMPLICATIONS

LOWELL, Thomas V., Univ of Cincinnati, Department of Geology, Cincinnati, OH, 45221, MARKLEY, Barbara K., University of Cincinnati, Department of Geology, Cincinnati, OH, 45221

The interlobate area between the Miami and Scioto sublobes near the Bellefontaine Outlier, the topographic high of Ohio, has tunnel valleys reflecting multiple generations of meltwater discharge. These northwest to southeast trending drainage ways are generally linear, up to 3.8 km long, 0.42 km wide and 9 to 15 m deep, have steep-sided walls and may have a steep downstream end wall. A linear string of kettles typically marks the valley bottom. A discontinuous esker lies in the floor of one drainage way, another has pockmarks or small kettles downstream from the trunk drainage way, and several smaller pathways may splay from a main trunk. Regionally, an extensive till sheet and kettles developed on it are indicative of a re-advance, and therefore some of the drainage ways were re-occupied. In sum, these drainage ways fit the description of tunnel valleys reported elsewhere.

The pockmarks emanating from one of the tunnel valleys represent a single episodic high discharge event; whereas, the presence of multiple interconnecting splayed pathways indicates that the tunnel valleys developed during multiple drainage events. Preliminary observations suggest that similar tunnel valleys exist throughout the interlobate area of central Ohio, and that these constitute perhaps the southernmost tunnel valleys of the Laurentide Ice Sheet. A deglaciated radiocarbon age near one tunnel valley indicates formation after 15,000 14C yr BP making these features Late Wisconsin in age.

8:50 AM Caldwell, D.W.

THE SCARBOROUGH, MAINE MAMMOTH; WHAT WE MISSED DURING THE 1959 EXCAVATION

CALDWELL, D.W., Boston University, Department of Earth Science, 685 Commonwealth Avenue, Boston, MA, 02215

In 1959 a tusk of an elephant was discoverd by a man digging a pit in the Presumscot glacial-marine clay in Scarborough, Maine. Initial research indicated the tusk was either that of a modern elephant or a mammoth. After a few ribs were found, the possibility arose that the remains were those of Old Bet, a circus elephant shot in 1816, and further search was halted. The tusk and ribs were donated to the Portland Museum of Natural History. By 1990 the tusk, now broken, had found its way to Presue Isle, Maine and to the cellar of an eccentric collector. The tusk was subsequently acquired by the Maine State Museum in Augusta. An initial AMS carbon-14 age of 10,500 BP showed that the Scarborough tusk did not belong to a destroyed circus elephant, but to a mammoth. More recent dates are soon to be published by the Maine Museum and the Maine Geological Survey.

In the excitement and enthusiasm of discovering the remains of a huge creature from the Ice Age, the 1959 recovery team failed to look in the pile of debris taken from the pit, but instead poked around in the muddy hole. That pile was still beside the pit in the 1990's and of course contained the rest of the mammoth skeleton. The complete remains of the mammoth are now at the Maine State Museum.

The glacial-marine clay in which the mammoth was buried is typically covered by a few meters of sand. A channel-like depression over the tusk may have been a groundwater-sapping channel in which the mammoth became mired and died.

9:10 AM Nichols, Kyle K

BIRTH AND GROWTH PROCESSES OF THE MILLER BROOK GULLY, NORTHERN VERMONT

BIERMAN, Paul R., Univ Vermont, Perkins Hall, Burlington, VT, 05405-0122, NICHOLS, Kyle K, Univ of Vermont, School of Natural Resources and Department of Geology, Burlington, VT, 05405

Many surface processes in New England, such as lansliding and gully formation, are influenced by glacial sediments. Such sediments and the associated slope instability are commonly located in river valleys, such as the Miller Brook valley in northern Vermont. Here, glaciers are responsible for deposition of (from bedrock up) 1) till 2) esker or pro-glacial runoff deposits (sand and pebble gravel) 3) glaciolacustrine sediments (fine sand to clay) and 4) capping sands and gravels. Such common stratigraphies and the associated slope instabilities have major impacts on private and public land use in New England.

Aerial photographs suggest the Miller Brook gully first became active in the late 1960s or early 1970s. The gully is presently ~50 m x 8 m x 2.5 m. Eroded sediments are deposited as a small alluvial fan on an adjacent terrace. An adjacent gully, ~30 m south, is stable as indicated by the presence of gully bottom till, large trees on the gully slopes, and the well vegetated, undersized alluvial fan at the base of the gully.

Gully initiation processes at Miller Brook result from the differences in hydraulic conductivity of the esker/pro-glacial runoff deposits and the overlying lacustrine deposits. The lacustrine deposits are a low permeability cap above the higher permeable sands and gravels. Groundwater was thus focused in the sand and gravel layer which caused pipe erosion. Positive feedback between pipe void space and focused groundwater flow increased pipe erosion leading to roof collapse. Present retreat of gully walls is dominated by slumping and toppling of the near vertical walls where groundwater gradients are high; and by slumping of gentler sloping walls where the local groundwater table is lowered by the adjacent gully.

First order estimates of erosion rates of the gully suggest decades more of gully erosion before gully walls stabilize and the gully bottoms on till. Such long-term erosion impacts the land owner who cannot utilize this land for farming purposes.

9:30 AM Buyce, M. Raymond

LAKE ERIE BLUFF RECESSION AND SETBACK REGULATIONS FOR BUILDING - LITERALLY A ROLLER COASTER CHALLENGE

BUYCE, M.Raymond, Mercyhurst College, Geology, 501 E 38th St, Geology Dept., Mercyhurst College, Erie, PA, 16546

A theme park on the Lake Erie bluff at Erie, Pennsylvania is in the process of trying to get an exception from the Bluff Recession and Setback Act, P.S. 5201 to allow the building of a roller coaster over the face of the bluff. State officials have mixed reactions to the petition and at least two lawsuits have been filed in opposition. Aside from the political considerations that are present there may seem to be some valid considerations in favor of removing the site from the protection of the Act. The toe of the bluff is over 70 m (215 ft) from the armored shoreline of the lake and appears unlikely to be undercut by wave action any time soon. A brief inspection of the slope found no major signs of instability aside from some water seeps about halfway down the slope with tilting trees and minor sediment flows. The inspectors warned that the stratigraphy for the lower half of the slope was unknown to them and they could not in good faith recommend that the slope was stable for building but that did not deter the proponents. Strong scientific reasons exist in opposition to the removal of the bluff from legal protection, however. I have measured seventy meters of unprotected sand flat that was been removed in one season within a few miles of the site and the theme park has no control over the armor on the beach. The water seeps on the slope show that most likely ground water is being forced out of the slope face as springs or seeps because that is where impermeable diamict underlies the permeable sand of the upper slope just as occurs in many areas along the shore that I have mapped. These unconsolidated sediments are necessarily saturated much of the year and are inherently unstable. Add to these factors the shaking of the entire package every few minutes by the towers of a roller coaster and stability is further compromised.