Changes in Depositional Setting In Latest Holocene Sediments of the Hudson River Estuary

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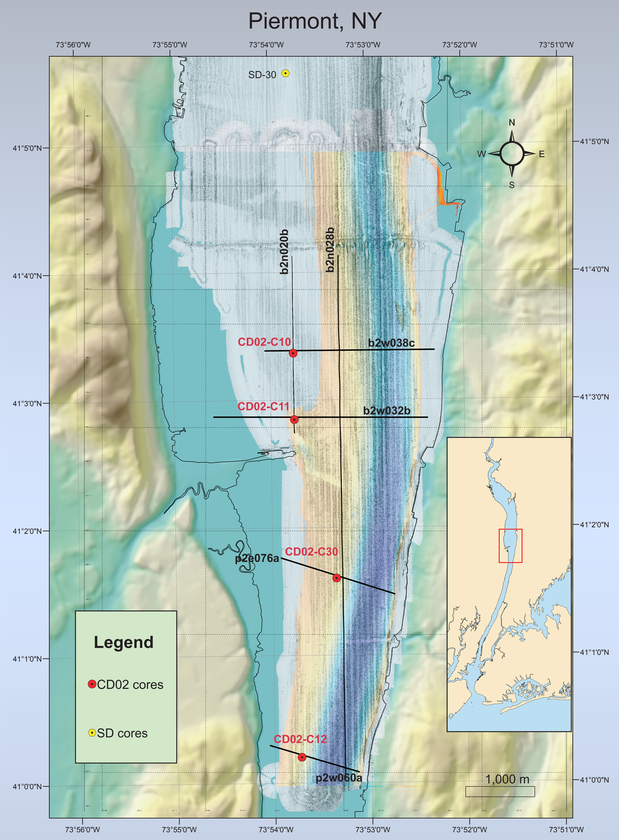

Fig. 1 - Basemap of Piermont, NY, showing multibeam bathymetry, sidescan sonar data, key seismic lines and sediment core sites.

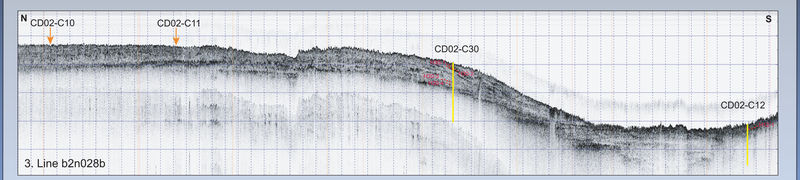

Fig. 3 - North-south seismic line b2n028b, showing cores CD02-C30 and CD02-C12, with prominent horizons labeled for each core. Northern cores are projected onto this line.

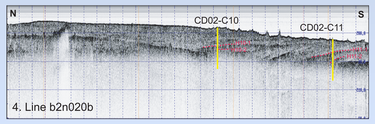

Fig. 4 - North-south seismic line b2n020b, showing relationship between core CD02-C10 and CD02-C11, with prominent horizons labeled for each core.

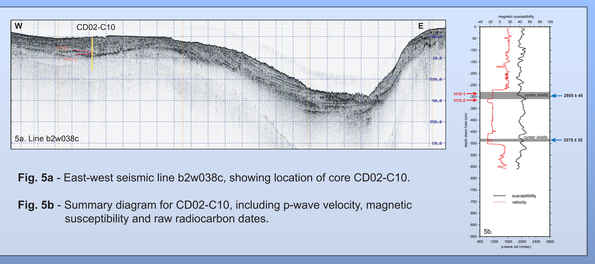

Fig. 5a - East-west seismic line b2w038c, showing location of core CD02-C10.

Fig. 5b - Summary diagram for CD02-C10, including p-wave velocity, magnetic susceptibility and raw radiocarbon dates.

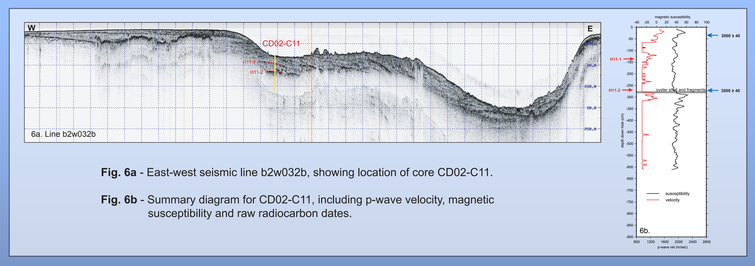

Fig. 6a - East-west seismic line b2w032b, showing location of core CD02-C11.

Fig. 6b - Summary diagram for CD02-C11, including p-wave velocity, magnetic susceptibility and raw radiocarbon dates.

PRELIMINARY RESULTS

Cores CD02-C10 and CD02-C11 are located north of the Sparkill Creek, on a broad marginal flat, similar to that in the Tappan Zee area. The upper 300 cm of cores CD02-C10 and CD02-C11 are delta deposits originating from the Sparkill Creek. Stratigraphically, the package of delta deposits in CD02-C11 sits lower and is, therefore, older than the delta deposits in CD02-C10. Radiocarbon dates from both cores are consistent with this relationship.

Core CD02-C30 is located south of the Sparkill Creek and east of Piermont Marsh, in channel bank sediments. The eroded upper surface and south-dipping reflectors in CD02-C30 indicate that the upper portion of the core may be younger than similar channel bank sediments further north. The top of this core may also be sampling deltaic sediments younger than those in core CD02-C11, but more investigation is needed to determine whether the channel bank sediments are conformable with those on the western flats.

The basal surface of the delta (a strong reflector in Chirp profiles) may be an unconformity, with packages of deltaic sediments prograding eastward through time.

Below the delta, cores may be sampling sediments contemporaneous with Lithofacies 2 of core SD-30. Magnetic susceptibility in cores CD02-C10, CD02-C11 and CD02-C30 are of similar values, although p-wave velocities are somewhat lower than in SD-30.

Core CD02-C12 is located in channel bank sediments that may be part of the southern edge of the Sparkill Creek delta deposit. Prominent reflectors in Chirp profiles have a different character than those of the delta deposits, being more discrete and less laterally continuous. Magnetic susceptibility values are lower than those of the more northern deltaic deposits and radiocarbon dating indicates a younger age near the top of the core.

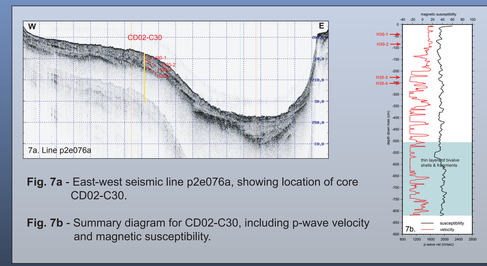

Fig. 7a - East-west seismic line p2e076a, showing location of core CD02-C30.

Fig. 7b - Summary diagram for CD02-C30, including p-wave velocity and magnetic susceptibility.

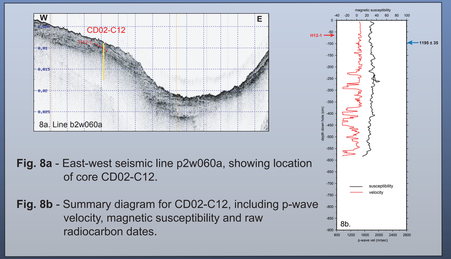

Fig. 8a - East-west seismic line p2w060a, showing location of core CD02-C12.

Fig. 8b - Summary diagram for CD02-C12, including p-wave velocity, magnetic susceptibility and raw radiocarbon dates.

PROJECT DESCRIPTION

An extensive database of geophysical and sampling data in the Hudson River Estuary has been obtained in ten study areas between the New York Harbor and the Troy Dam. These data include bathymetry, bank-to-bank coverage of side-looking sonar imagery, subbottom reflection profiles and sediment cores. Geophysical properties, including p-wave velocity and magnetic susceptibility, have been measured in a series of vibra-cores.

Three distinct sedimentary lithofacies have been identified in a 9.3m vibra-core (core SD-30) in the Tappan Zee area of the Hudson River, on the basis of changes in physical properties and lithology, as well as seismic reflections. A more recent series of vibra-cores has been collected in the Piermont area of the Hudson River, just south of the Tappan Zee region. Preliminary research presented here investigates the possibility of a similar genetic history in this area of the estuary.

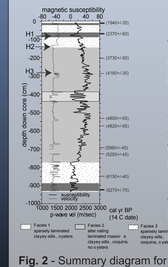

Fig. 2 - Summary diagram for core SD-30 (adapted from *Carbotte et al.*, in submission).

Core SD-30

The oldest lithofacies 3 is attributed to deposition in a restricted marine estuarine setting, following marine incursion of the region more than 6,000 calendar years BP. The more rapidly accumulating alternating laminated and massive clayey silts and bivalve layers of lithofacies 2, higher in the core, are associated with a hiatus in oyster presence documented within the region from approx. 2,500-4,000 calendar years BP. The return to sparsely laminated clayey silts with oyster shells and low sedimentation rates in lithofacies 1 is attributed to the onset of a wave-base dominated regime on the shallow (4.5 mbsl) and broad marginal flats of the Tappan Zee area.

ACKNOWLEDGEMENTS

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