CRUISE REPORT
R/V MARITIME EXPLORER
JUNE 13-16, 1989

1. Cruise Participants

John D. Milliman - WHOI
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Eben Franks - WHOI
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2. Scientific Objectives

The New Jersey continental shelf is one of the better studied shelves in terms of morphology and shallow structure. Surveys conducted with the Huntec Deep-Towed Seismic (DTS) system in 1987 and 1988 show that the New Jersey shelf is underlain by a number of prominent regional seismic reflectors, most notably a shallow reflector designated "R" which lies as much as 60 msec below the seafloor near the shelf break but appears to outcrop locally on the shelf. On Hudson Apron, reflector "R" represents the surface of an angular unconformity. "R" has been interpreted as an erosional surface formed during the last regression and low stand of sea level, overlain by younger sediments deposited during subsequent melting of the late-Wisconsin Laurentide ice sheet (Milliman and others, in press).

The objective of the cruise was to obtain piston and vibrocores of the sediments above and below "R"

(1) to determine the nature and properties of the sediments in order to better constrain future 3-D seismic experiments in the area
(2) to validate the above geologic interpretation and better constrain the age and origin of the sediments.

3. Narrative

R/V *Maritime Explorer* departed Woods Hole, MA, at approximately 2.00 am on June 13, 1989, in transit to the New Jersey shelf. New wire had been spooled onto the trawl winch immediately prior to the cruise, consequently, approximately 3 hours was spent streaming and respooling the wire over Hudson Canyon on the afternoon of June 13. However, since no time was subsequently lost due to bad weather, this did not impact the overall success of the cruise. Coring operations began at 8.15 pm on June 13 and proceeded throughout daylight hours until 12.15 pm on June 15. The remainder of the cruise was devoted to additional DTS surveys near Hudson Canyon, until transit back to Woods Hole began at approx. 8.30 pm on June 15. The ship returned to Woods Hole at 9.15 am on June 16.

Throughout the cruise the weather remained reasonably calm, although some strong squalls were encountered during the night of June 14-15.

4. Operations

Cores were collected in plastic liners, cut into 1.5 m sections and stored vertically for later splitting back on the beach. Other than cursory visual examination of catcher samples, no attempt was made to examine or describe the cores at sea.

In general, although the results were successful, coring operations were hampered by a couple of things: (1) the ship has a fixed A-frame, which complicated overside work, and (2) the trawl winch is very slow and has no tension monitor, a serious problem in anything more than continental shelf water depths.

The Woods Hole piston coring set-up worked flawlessly, thanks to cooperative weather and the able leadership of Eben Franks. The only problems encountered resulted from the extreme hardness of the sandy bottom which resulted in three bent core barrels, two slightly bowed and one, Core 6PC, a 30 degree bend from which the liner could not be extracted until return to Woods Hole.

The vibrocoring was not so successful. In terms of penetration and core recovery, the vibrocorer was no more successful than the piston corer. This was probably a consequence of the fact that only one of the twin power packs was functioning. Operationally the vibrocorer was a nightmare. On the first attempt the core barrel was bent and the base frame (built out of PVC pipe) was smashed against the A-frame on retrieval. After effecting repairs and modifying the overside handling procedures, on the second attempt the instrument appears to have operated satisfactorily, but the liner was firmly jammed into the core barrel and could not be removed at sea. The base frame also suffered further damage on retrieval. On the third attempt, with a shortened core barrel, simillar problems were encountered. The operational problems of the vibrocorer can be attributed to several factors: (1) handling was complicated by fantail arrangements which required that the instrument be lifted vertically overside by crane and moved around the outside of the fixed stern A-frame to be handed off to the trawl winch and by the fact that the electrical power cable had to be paid out and retrieved by hand; (2) the crane operators, though willing, had limited experience in this type of operation; (3) the design of the corer is inappropriate for the operating conditions of the open sea.

5. Results

10 cores (7 piston cores; 3 vibrocores) were collected at 9 locations. The longest core recovered was 4.7 m (Station 8, Core 6PC). The cores are grouped in two NW-SE transects centered at approximately 39 23'N; 72 33'W and 39 03'N; 73 08'W respectively (see Figure 1). Each transect sampled sediments above and below "R". In one case, Core PC1, and possibly a second (Core PC7), "R" was actually penetrated.

The cores were split, described and sampled in the core lab at Woods Hole immediately following the cruise. Essential data and brief core descriptions are summarized in Table 1, and Figures 2 and 3.

A composite, regional stratigraphy is summarized below. In every case the sediment below "R" was found to be a well-sorted medium to coarse sand with abundant shell fragments and some whole shells, at first glance a typical beach sand. The sediment above "R" is a smooth blue-gray or greenish gray clay, extremely stiff and compact at Station 5 (Core VC2) on the southern transect and with reddish patches in the upper 1.0 m on the northern transect. On the basis of pilot cores and the tops of piston cores, the uppermost 30 to 40 cm of sediment, immediately below the seafloor, consists of clayey sand and shell fragments, presumably a washed and reworked layer.

GENERALIZED REGIONAL STRATIGRAPHY

(3) Clayey sand with shell fragments and small pebbles, 30-40 cm thick

(2) Smooth gray clay, reddish in the upper 1 m and with sandy laminae increasing downwards; very compact and stiff at the shallower locations (less than 120 m present water depth); thickness varies from 0 to 50 m according to seismic profiles.

------------------------- Reflector R -------------------------------

(1) Medium to coarse, clean, well-sorted sand with abundant shell fragments and some whole shells; thickness unknown

6. Reference

Milliman, J.D., Jiezao, Z., Anchun, L., and Ewing, J.I. "Late Quaternary Sedimentation on the Outer and Middle New Jersey Continental Shelf: Result of Two Local Deglaciations?" J. Geology (in press)

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19 July 1989

Table 1: CORES COLLECTED ON ME 88-1

STA	CORE	Date	Time (local)	Corr. lat.	Corr. long.	Depth (uncorr. m)	Pilot core (m)	Core length (m)
1	1PC	13-Jun	21:37	39 24.0 N	72 32.0 W	135	0.77	2.91
2	2PC	14-Jun	7:30	39 23.0 N	72 34.0 W	125	0.30	1.76
3	VC1	14-Jun	9:58	39 26.8 N	72 36.0 W	100	-	0.64
4	3PC	14-Jun	16:12	39 00.6 N	73 07.2 W	92	0.26	1.63
5	VC2	14-Jun	18:58	39 00.9 N	73 07.3 W	80	-	2.40
6	VC3	14-Jun	21:35	39 03.2 N	73 07.9 W	78	-	0.99
6A	4PC	14-Jun	22:52	39 03.2 N	73 07.9 W	67	0.45	1.46
7	5PC	15-Jun	0:58	39 04.0 N	73 08.9 W	71	-	1.62
8	6PC	15-Jun	10:06	39 17.7 N	72 26.0 W	155	-	4.70
9	7PC	15-Jun	12:00	39 19.5 N	72 29.5 W	140	0.46	2.95

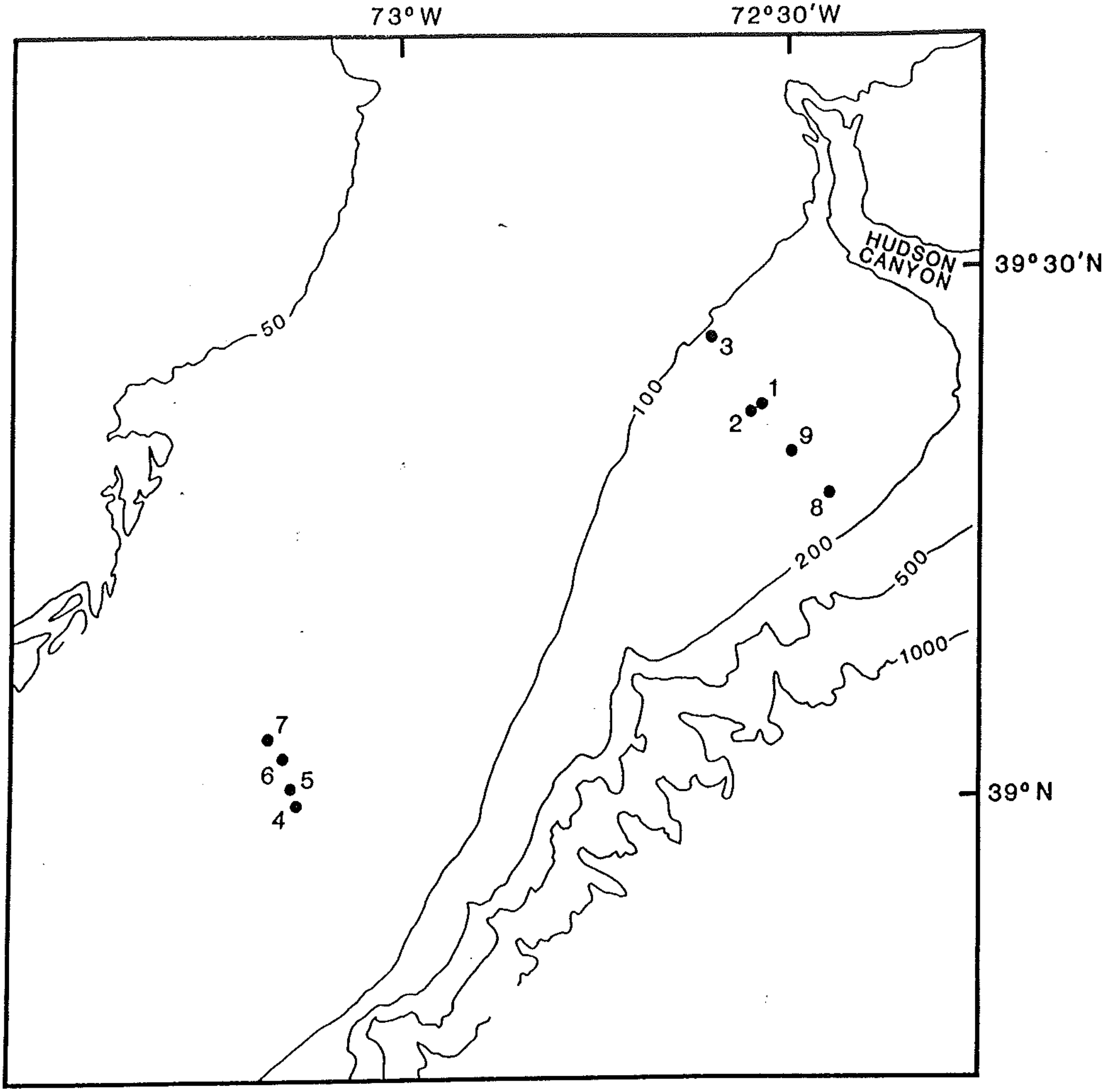

Figure 1. Location map.

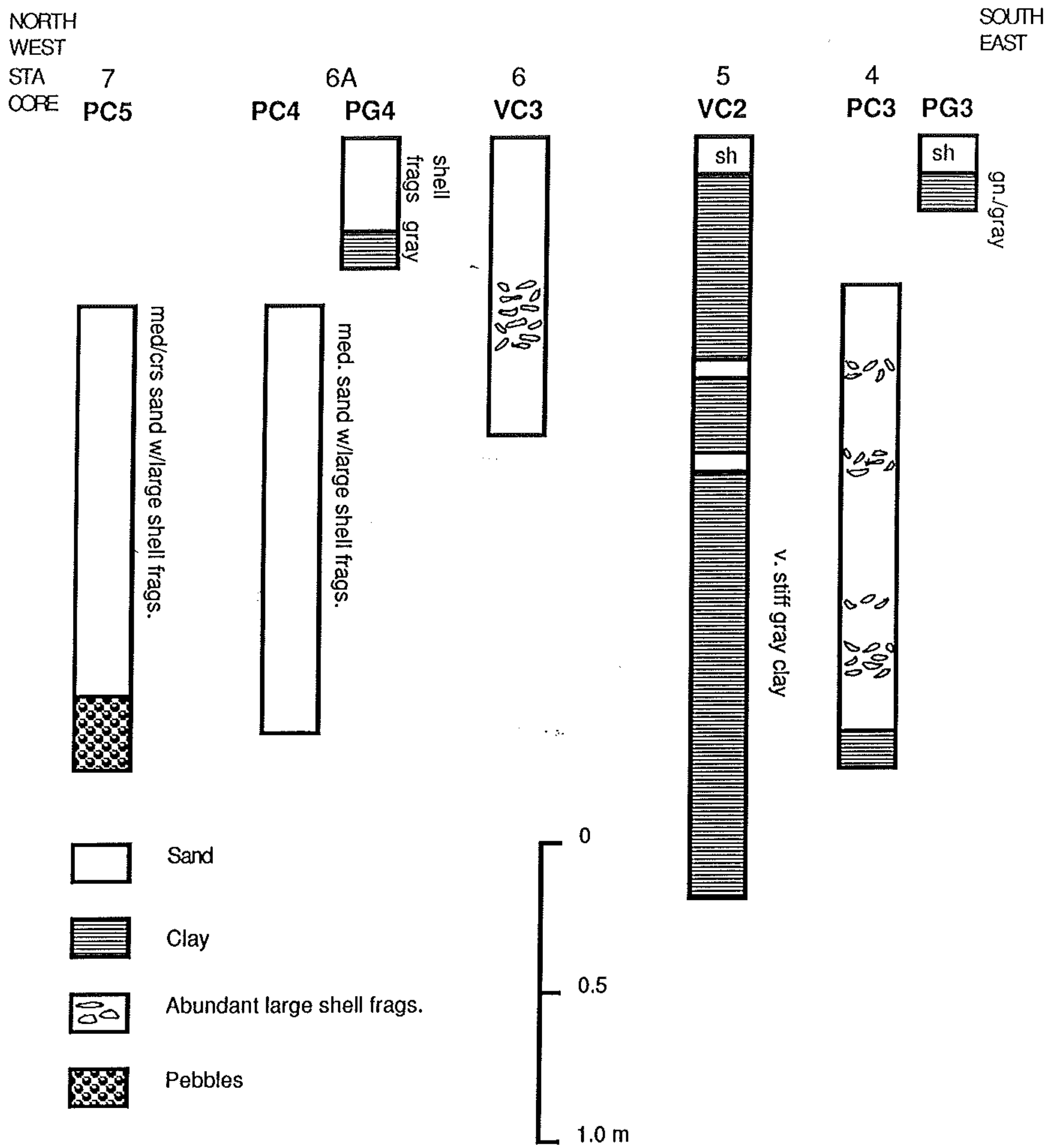

Figure 2A. Southern Transect.
NOTE: No precise correlation between pilot and piston core at each location is implied by their relative positions.

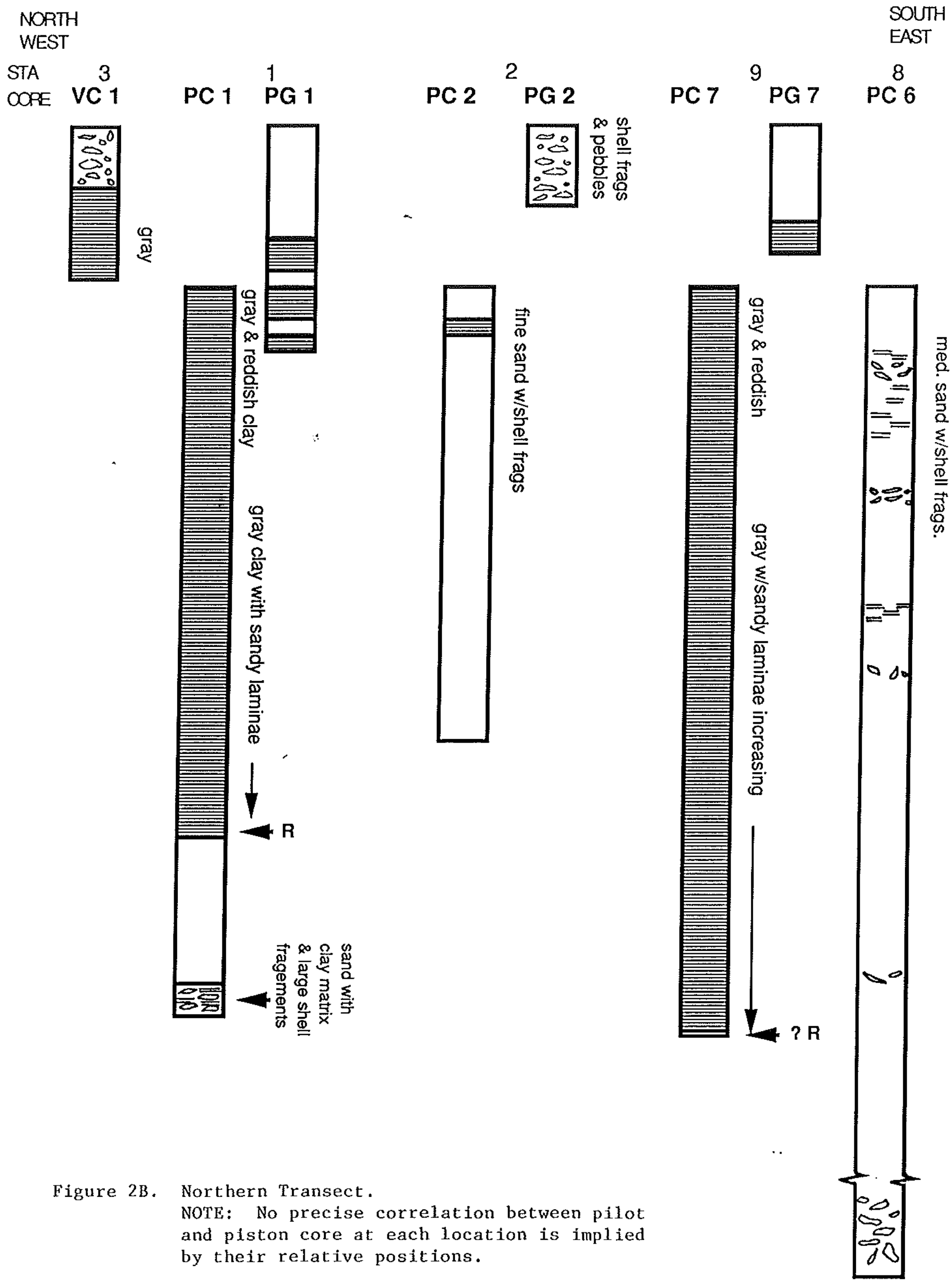

Figure 2B. Northern Transect.
NOTE: No precise correlation between pilot and piston core at each location is implied by their relative positions.