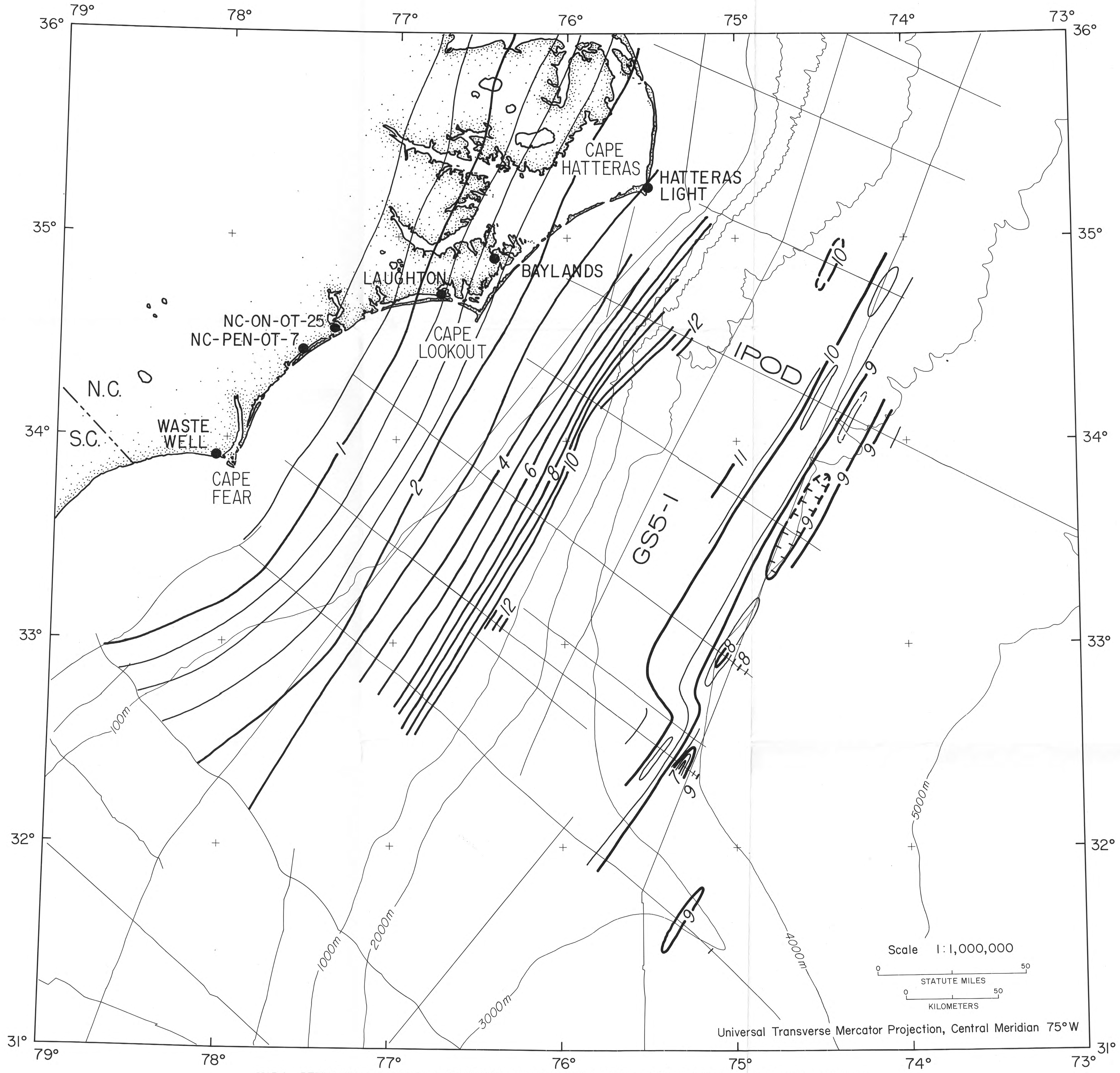
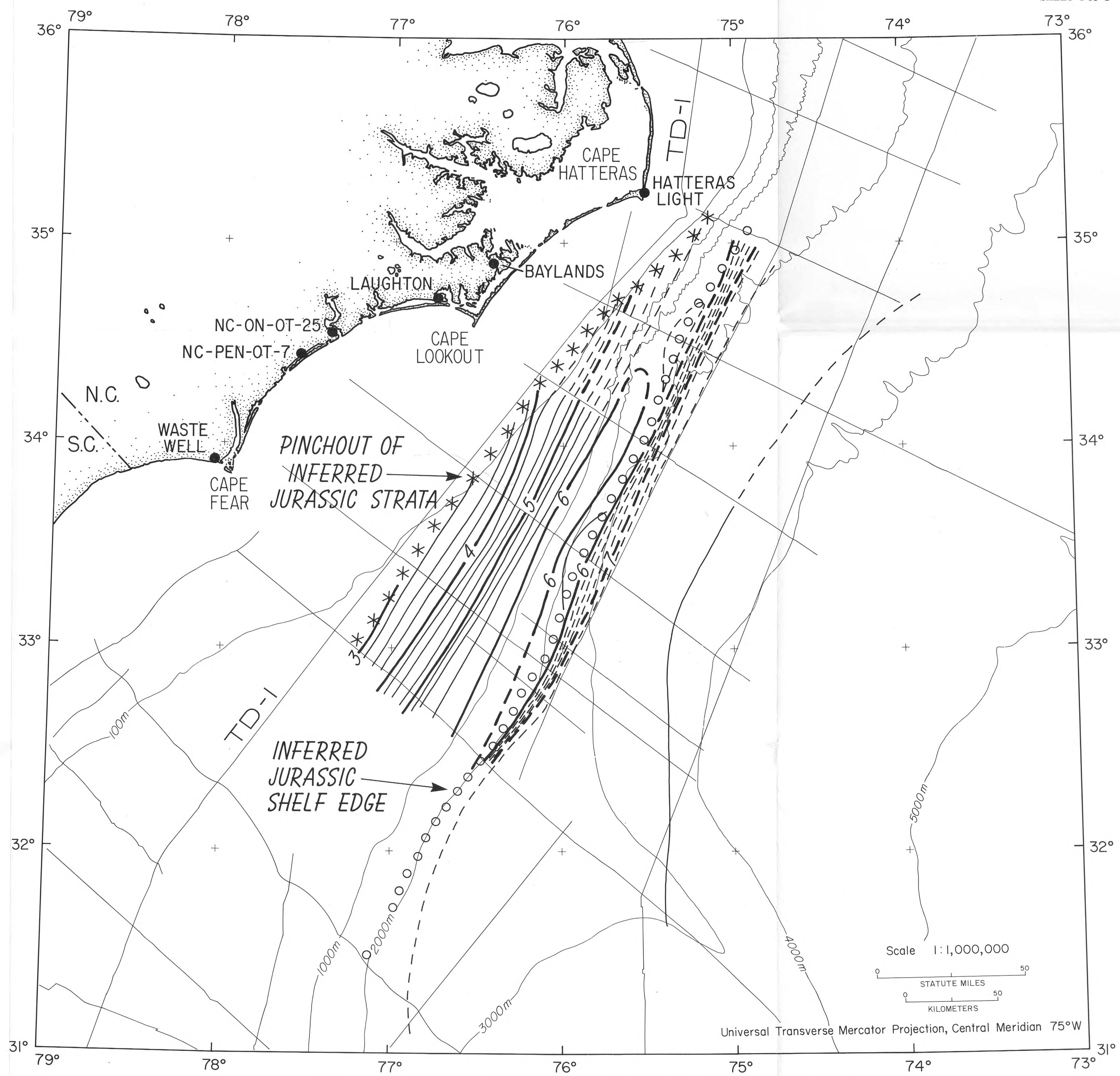


MAP A.—DEPTH, IN KILOMETERS, TO REFLECTOR IDENTIFIED AS THE POST-RIFT UNCONFORMITY (PRU) NORTHWEST OF PROFILE GS5-1 AND OCEANIC BASEMENT SOUTHEAST OF PROFILE GS5-1

Contour interval is 0.25 km, from 0.75 to 2 km, and 1 km, deeper than 2 km. Contours are dashed where approximately located; hachured contours indicate closed depressions. The PRU, which separates crystalline rocks or metamorphic rocks from the post-rift sediments, is seen in wells that penetrate basement onshore and can be traced as a strong reflector on seismic profiles. Onshore, contours of the PRU are adopted from the basement contours of Brown and others (1972). Under the shelf, the PRU is identified as the deepest continuous reflector. Scattered coherent reflections deeper than the PRU are observed on the shelf (particularly on the IPOD profile); they probably represent synrift sediments or reflections from pre-rift Paleozoic strata. Under the outer shelf, the PRU dips eastward into the Carolina Trough. Seaward of profile GS5-1, the top of oceanic basement (layer 2) is contoured. In the deepest part of the Carolina Trough (deeper than 10 km) we were not able to trace this reflector on our seismic records.



MAP B.—DEPTH, IN KILOMETERS, TO REFLECTOR INFERRED TO REPRESENT TOP OF JURASSIC SEDIMENTARY ROCKS

Contour interval is 0.25 km. Contours are dashed where approximately located. Although this age estimate is speculative, the horizon represents a depositional event, which caused a significant change in reflection character, that took place in about latest Jurassic time. The age was estimated by tracing reflection horizons on seismic profile TD-1 from the Blake Plateau where the post-Jurassic stratigraphy is known (Dillon and others, 1979b). The deepest horizon on TD-1 that does not pinch out on the basement of the Carolina Platform is correlated with Neocomian Age strata, implying that the Jurassic section in the Carolina Trough pinches out downdip of profile TD-1. A strong reflector that on other profiles pinches out on basement downdip from TD-1 was chosen as the Jurassic top; it is the shallowest major reflector that can be correlated between profiles on the basis of its acoustic character. The precise top of the Jurassic section is difficult to identify, but we know that it cannot be significantly shallower than our inferred top because the section that pinches out downdip from TD-1 is thin. Conversely, any significantly deeper reflectors would yield a Lower Cretaceous section that is unacceptably thicker than is indicated in the Baltimore Canyon Trough and Blake Plateau Basin (Schlee 1981; Dillon and others, 1979b). Jurassic sediments have been indentified in the basal 715-meter section of the Esso-Hatteras Light No. 1 well (Brown and others, 1972) which is inconsistent with the above map. This suggests that a thin veneer of Jurassic sedimentary rocks may overlie the PRU either locally or regionally, although it is not resolvable on seismic profiles. Our inferred Jurassic top extends seaward to a paleoshelf edge. Seaward of that paleoshelf edge the contours are on the unconformity that forms the eroded continental slope and that is continuous with the deep-sea reflecting horizon J-1. In the deep sea, this is identified as the top of the Jurassic section (Klitgord and Grow, 1980).

DISCUSSION

Four strong reflection horizons identified on multichannel seismic-reflection profiles of the U.S. continental margin east of the Carolinas have been traced and contoured (maps A-D). Depths, in kilometers, to the horizons were calculated by the method of Taner and Koehler (1969) using the reflection-time and RMS (root-mean-square) velocities from multichannel velocity analyses. The contoured horizons are continuous, traceable reflections on the profiles, indicating that they are surfaces of geological significance. A paleoshelf edge and slope exists on all profiles seaward of the present-day slope. Reflectors cannot be traced from the old shelf into the deep sea, and age estimates for the two areas are derived independently. As a result, the horizons contoured on each map cannot be shown to be synchronous, but they are interpreted to be approximately similar in age. The ages assigned to these horizons under the shelf were determined by projecting reflecting horizons to onshore wells (Brown and others, 1972) and, through a network of seismic profiles, to offshore wells north and south of the map area where units have been dated (Dillon and others, 1979a, b; Schlee, 1981; Paull and Dillon, 1980a) Ages of reflectors seaward of the paleoshelf edge were determined by tracing the deep-sea reflecting horizons to DSDP (Deep Sea Drilling Project) wells (Klitgord and Grow, 1980; Tucholke and Mountain, 1979; Paull and Dillon, 1980b).

REFERENCES CITED

Benson, W. E., Sheridan, R. E., and others, 1978, Initial Reports of the Deep Sea Drilling Project, v. 44: Washington, D.C., U.S. Government Printing Office, 1005 p.

Brown, P. M., Miller, J. A., and Swain, F. M., 1972, Structural and stratigraphic framework and spatial distribution of permeability of the Atlantic Coastal Plain, North Carolina to New York: U.S. Geological Survey Professional Paper 796, 79 p.

Dillon, W. P., Paull, C. K., Dahl, A. G., and Patterson, W. C., 1979a, Structure of the continental margin near the COST No. GE-1 drill site from a common depth-point seismic-reflection profile, *in* Scholle, P. A., ed., Geological studies of the COST GE-1 well, United States South Atlantic Outer Continental Shelf area: U.S. Geological Survey Circular 800, p. 97-114.

Dillon, W. P., Paull, C. K., Buffler, R. T., and Fail, Jean-Pierre, 1979b, Structure and development of the Southeast Georgia Embayment and northern Blake Plateau; Preliminary analysis, *in* Watkins, J. S., Montadert, Lucien, and Dickerson, P. W., eds., Geological and geophysical investigations of continental margins: American Association of Petroleum Geologists Memoir 29, p. 27-41.

Klitgord, K. D., and Grow, J. A., 1980, Jurassic seismic stratigraphy and basement structure of the western Atlantic magnetic quiet zone: American Association of Petroleum Geologists Bulletin, v. 64, no. 10, p. 1658-1680.

Paull, C. K., and Dillon, W. P., 1980a, Structure, Stratigraphy, and Geologic History of Florida-Hatteras Shelf and Inner Blake Plateau: American Association of Petroleum Geologists Bulletin, v. 64, no. 3, p. 339-358.

_____ 1980b, Erosional origin of the Blake Escarpment; An alternative hypothesis: Geology, v. 8, no. 11, p. 538-542.

Schlee, J. S., 1981, Seismic stratigraphy of Baltimore Canyon Trough: American Association of Petroleum Geologists Bulletin, v. 65., no. 1, p. 26-53.

Taner, M. T., and Koehler, Fulton, 1969, Velocity spectra—digital computer derivation and applications of velocity functions: Geophysics, v. 34, no. 6, p. 859-881.

Tucholke, B. E., and Mountain, G. S., 1979, Seismic stratigraphy, lithostratigraphy and paleosedimentation patterns in the North American Basin, *in* Talwani, Manik, and others, eds., Deep drilling results in the Atlantic Ocean; continental margins and paleoenvironment: American Geophysical Union Maurice Ewing Series Symposium, Proceedings, no. 3, p. 58-86.

CAROLINA TROUGH STRUCTURE CONTOUR MAPS

By
Charles K. Paull and William P. Dillon
1982

INTERIOR—GEOLOGICAL SURVEY, RESTON, VA.—1982

For sale by Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, VA 22202