UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY

Isopach and structure contour maps of the Miocene and post-Miocene sediments in the southeast Georgia Embayment, Florida-Hatteras Shelf, offshore Georgia

by

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The U. S. Geological Survey (USGS), in a cooperative program with the U.S. Bureau of Land Management (under functions now assumed by the Minerals Management Service), collected high-resolution seismic-reflection data in a network of traverses (fig. 1) across and along the Florida-Hatteras shelf and slope offshore of Georgia in 1976 (Edsall, 1978) and 1979 (Popenoe, 1983). Surveys were conducted as USGS cruises FAY 76-17 and FAY 76-18, during which sparker, 3.5-kHz, and airgun data were acquired, and GILLISS 79-6, during which airgun, 3.5-kHz and Uniboom data were taken. A seismic-stratigraphic interpretation of the airgun records from the FAY 76-17 and 76-18 cruises was published by Paull and Dillon (1980) and a preliminary interpretation of sparker profiles from the same data set was published by Edsall (1978).

In 1987, the U.S. Minerals Management Service convened a joint U.S. Department of Interior-State of Georgia Task Force to study the offshore mineral potential of the continental shelf off Georgia. It became apparent to the Task Force that more detailed data were needed on the thickness, extent, and depth of burial of the middle Miocene sedimentary unit, the landward extension of which is commercially mined for phosphate in Florida and North Carolina. The data were required in order to assess the unit's potential as an offshore commercial phosphorite mining resource.

The Task Force was also charged with assessing the commercial potential of heavy minerals found within near-surface shelf sands off Georgia. Heavy minerals are presently commercially mined in relict strand-line sand deposits onshore at Green Cove Springs, Florida (Pirkle, Pirkle, and Yoho, 1974). To meet the need for more detailed information on these two stratigraphic units, the first author reinterpreted those portions of the FAY and GILLISS sparker and airgun data that covered the continental shelf offshore Georgia. Only sparker and airgun records recorded with a half-second and quarter-second sweep rate were used. The reinterpretation used standard seismic-stratigraphic techniques (Payton, 1977) to subdivide Miocene and overlying units in more detail than had been done previously.

For the seismic-stratigraphic interpretation, reflections representing unconformities and intervening strata on seismic records were correlated with unconformities and chrono-stratigraphic units recognized in wells on the continental shelf. Wells used for these correlations by direct or near ties (fig. 1) include JOIDES 1, 2, and 5 (JOIDES, 1965), USGS 6002 (Hathaway and others, 1979), COST GE-1 (Scholle, 1979), and Savannah U.S. Coast Guard Tower (McCollum and Herrick, 1964). Seismic reflectors interpreted to represent key horizons in the wells were then traced around the network of profiles and interconnected.

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These interpreted profiles were digitized and computer contoured by the Zellars-Williams Company of Lakeland, Florida, under U.S. Minerals Management Contract No. 29-A-458-00. In constructing the isopach and structure contour maps shown in figs. 2-8, Zellars-Williams Company used an EAGLES-PC program, GRID, to produce a regular grid from randomly spaced data points that had been picked from the referenced well data and scaled from the interpreted seismic records. The resulting gridded data were then contoured assuming a seismic velocity of 1500 m/sec for both sediments and sea water. The majority of points data were from FAY lines 23, 24, 25, 26, and 28 but in the northernmost part of the study area GILLISS lines 1-P, 7-P, and 9-P were also used (fig. 1).

This report releases and makes publicly available the resulting isopach and structure contour maps. The maps should be considered preliminary because the stratigraphic interpretation is tied to the sparse set of published well data described above and the velocity used represents a minimum value.

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collected August 4-28, between Cape Hatteras and Cape Fear, North Carolina, and off Georgia and northern Florida: U.S. Geological Survey Open-File Report 83-512, 4 p.

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FIGURES

Figure 1: Map showing the location of seismic traverses and offshore wells used in producing the structure contour and isopach maps.

Figure 2: Isopach map of Quaternary sediments in meters. Contour interval = 10 m.

Figure 3: Isopach of Pliocene sediments in meters. Contour interval = 7 m.

Figure 4: Isopach of upper Miocene sediments in meters. Contour interval = 1 m.

Figure 5: Isopach of middle Miocene sediments in meters. Contour interval = 7 m.

Figure 6: Structure contour map on the top of the middle Miocene. Contour interval = 20 m. Depth in meters below sea level.

Figure 7: Structure contour map on the base of the middle Miocene. Contour interval = 15 m. Depth in meters below sea level.

Figure 8: Isopach of the total thickness of sediment overlying middle Miocene strata. Thickness in meters. Contour interval = 10 m.

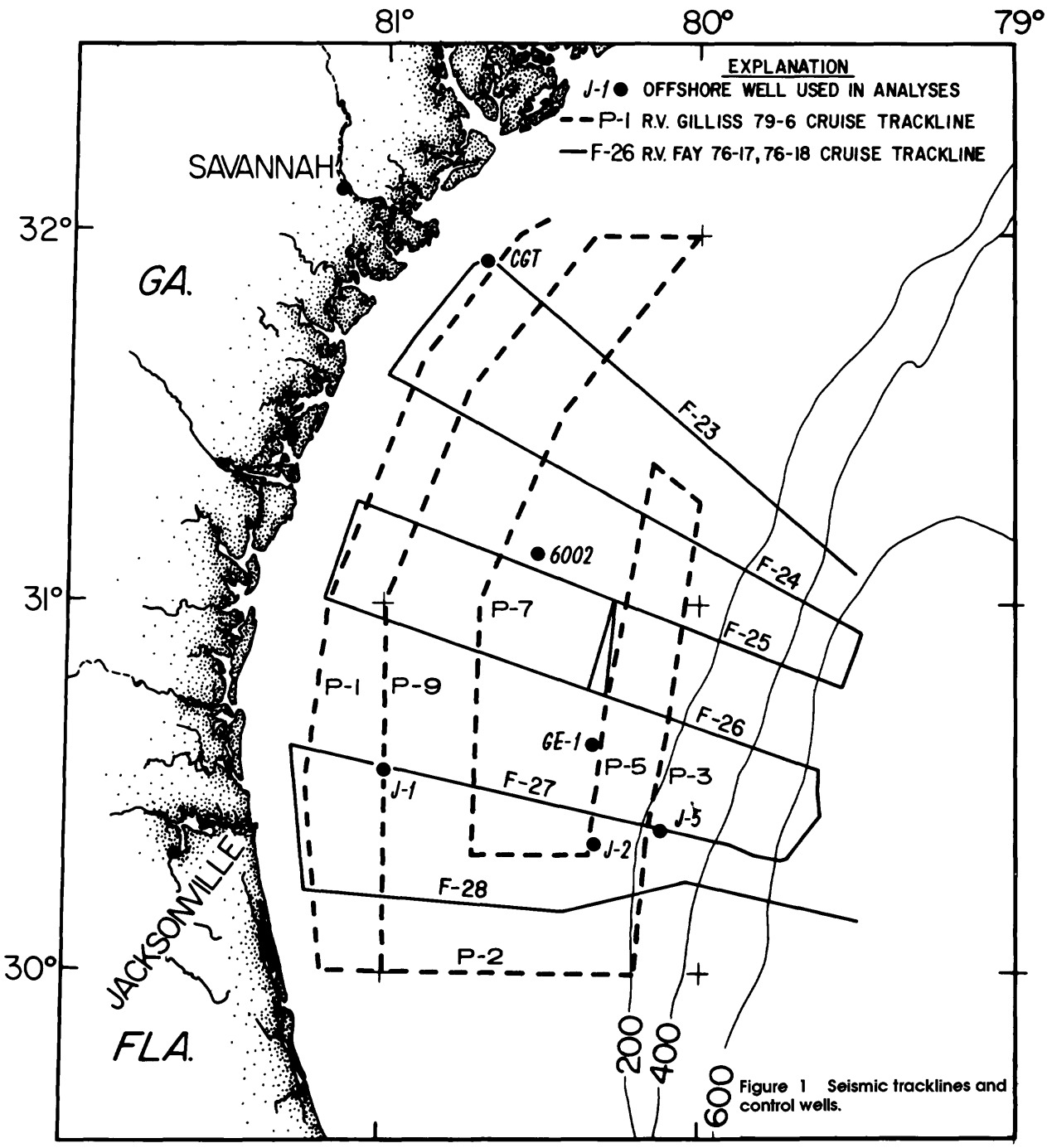

Figure 1 Seismic tracklines and control wells.

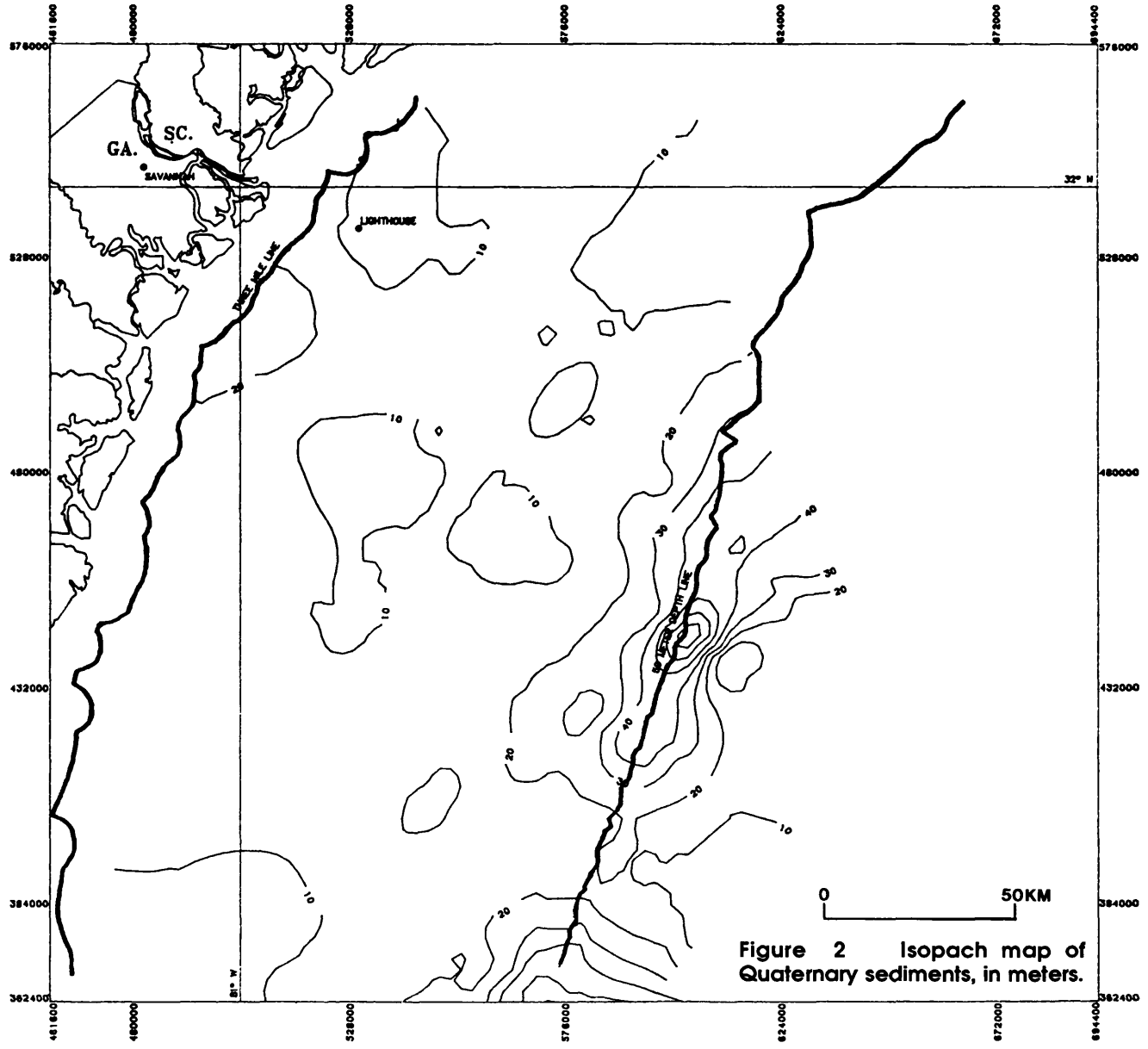

Figure 2 Isopach map of Quaternary sediments, in meters.

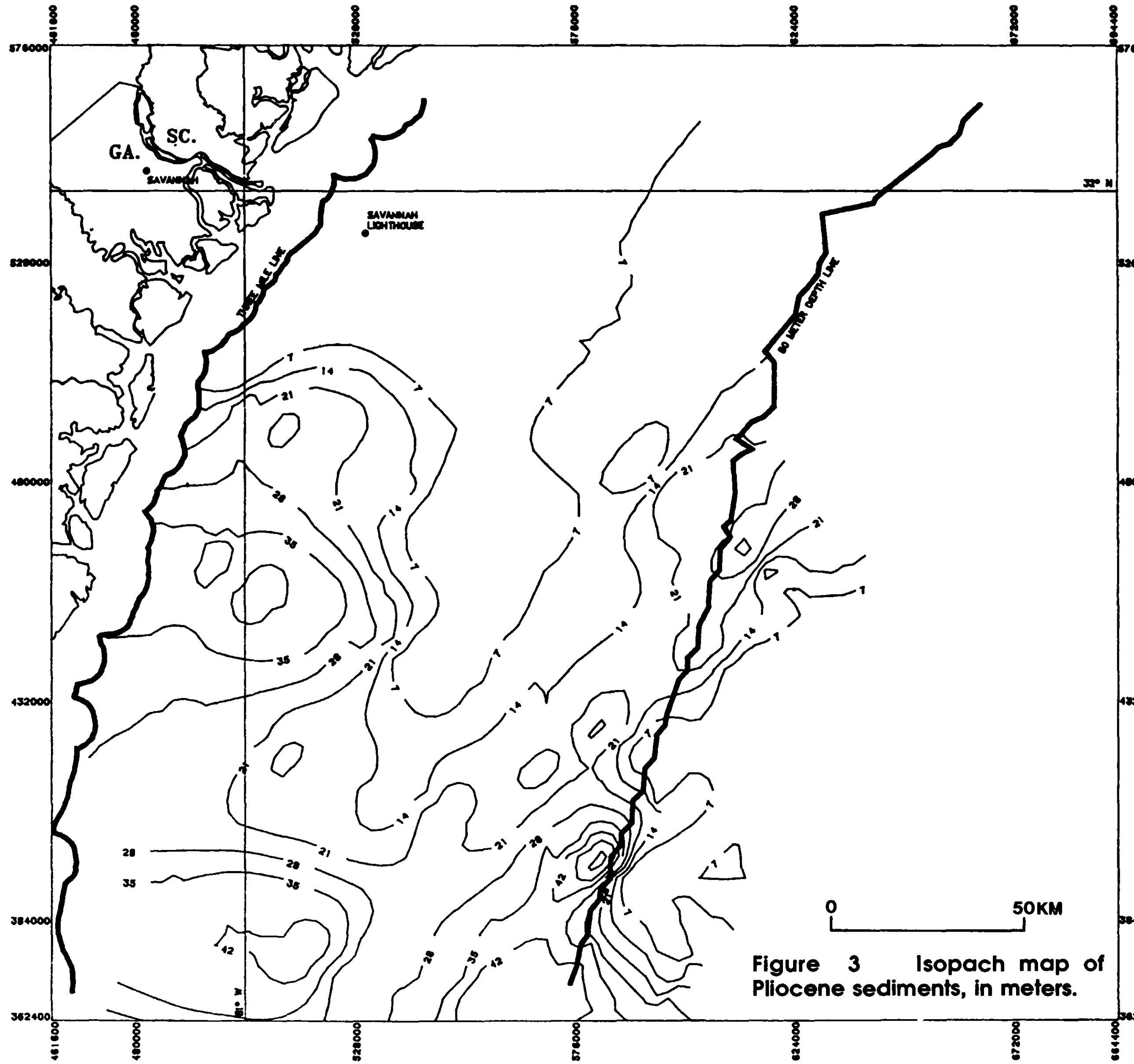

Figure 3 Isopach map of Pliocene sediments, in meters.

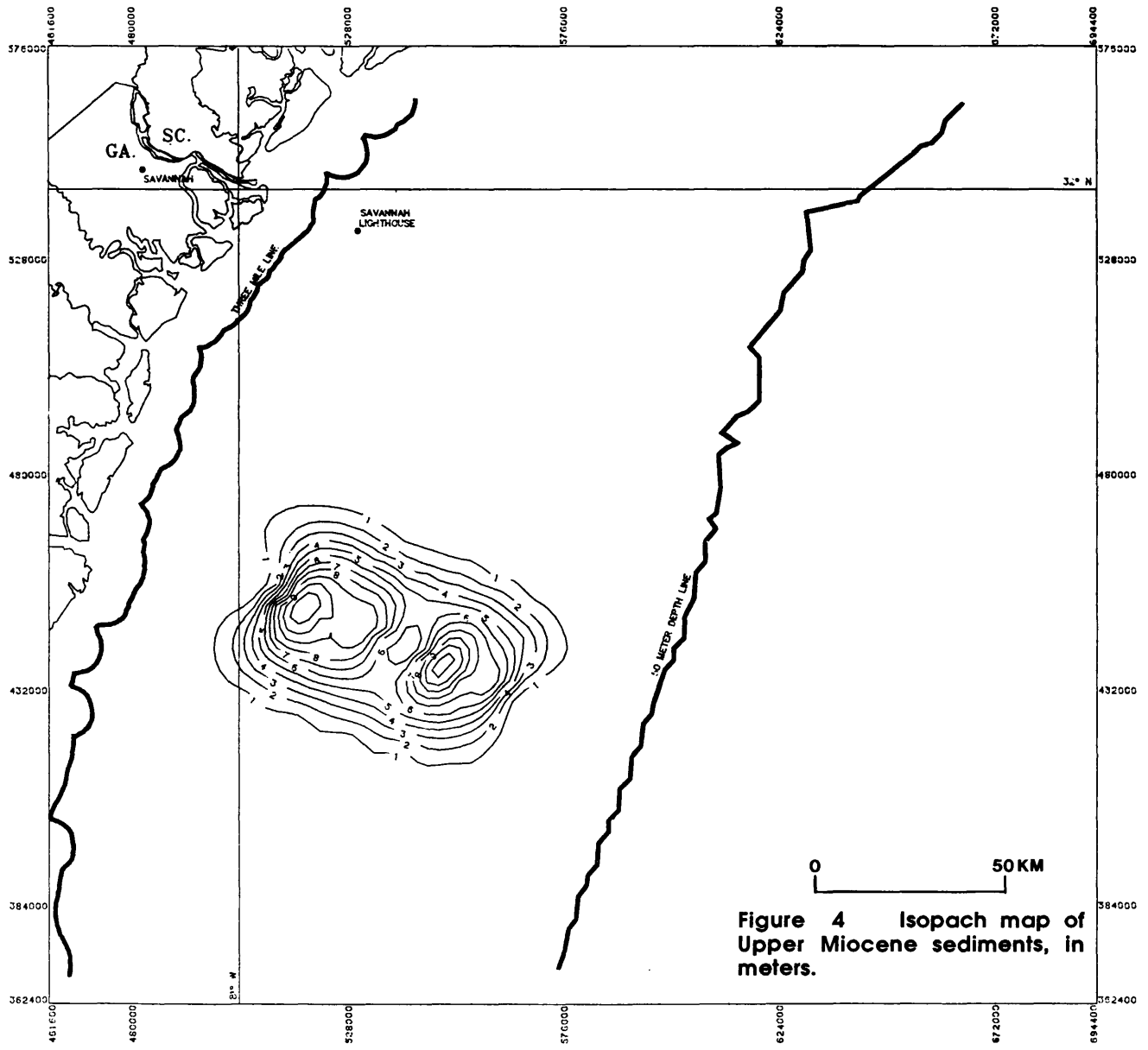

Figure 4 Isopach map of Upper Miocene sediments, in meters.

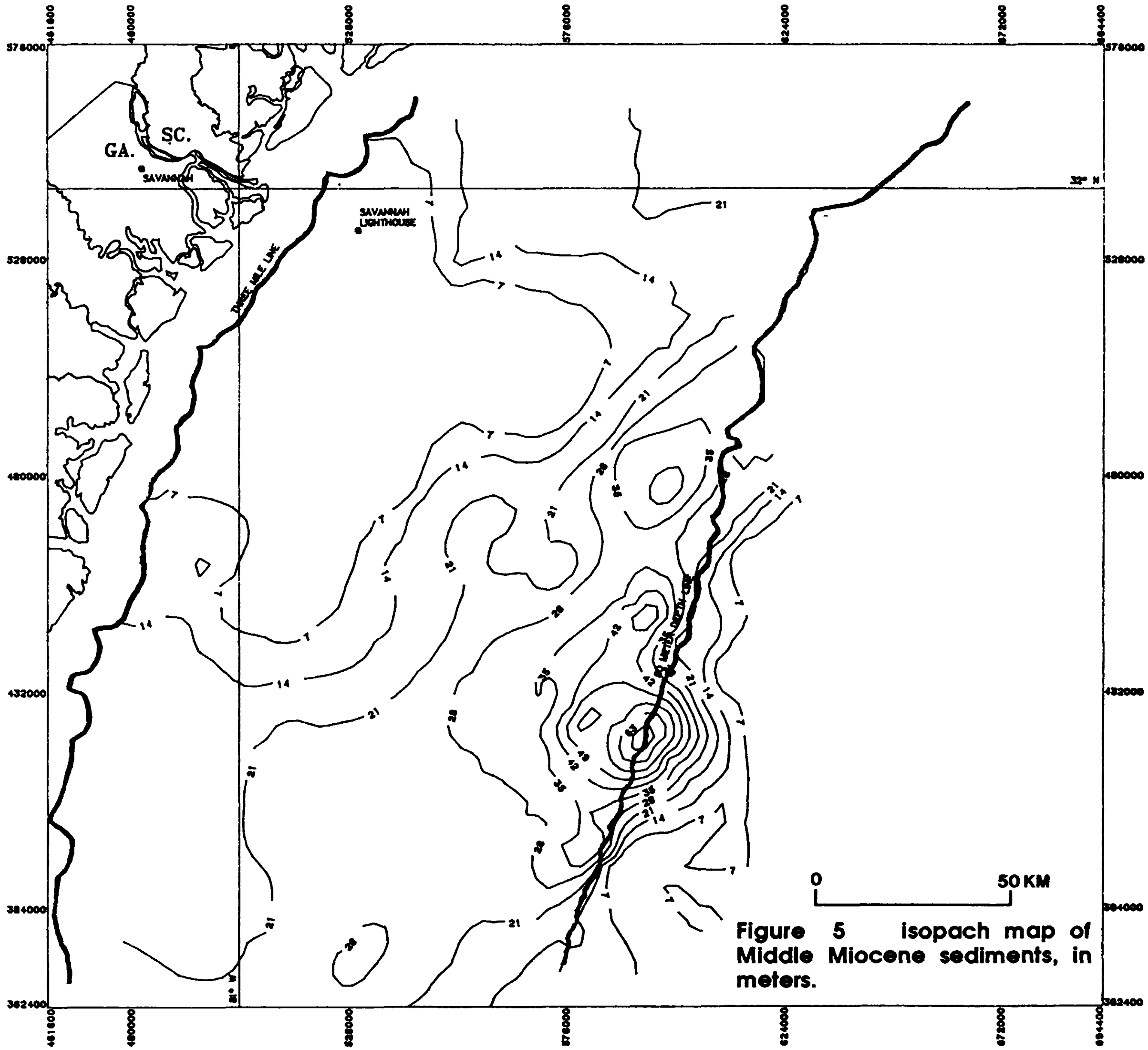

Figure 5 isopach map of Middle Miocene sediments, in meters.

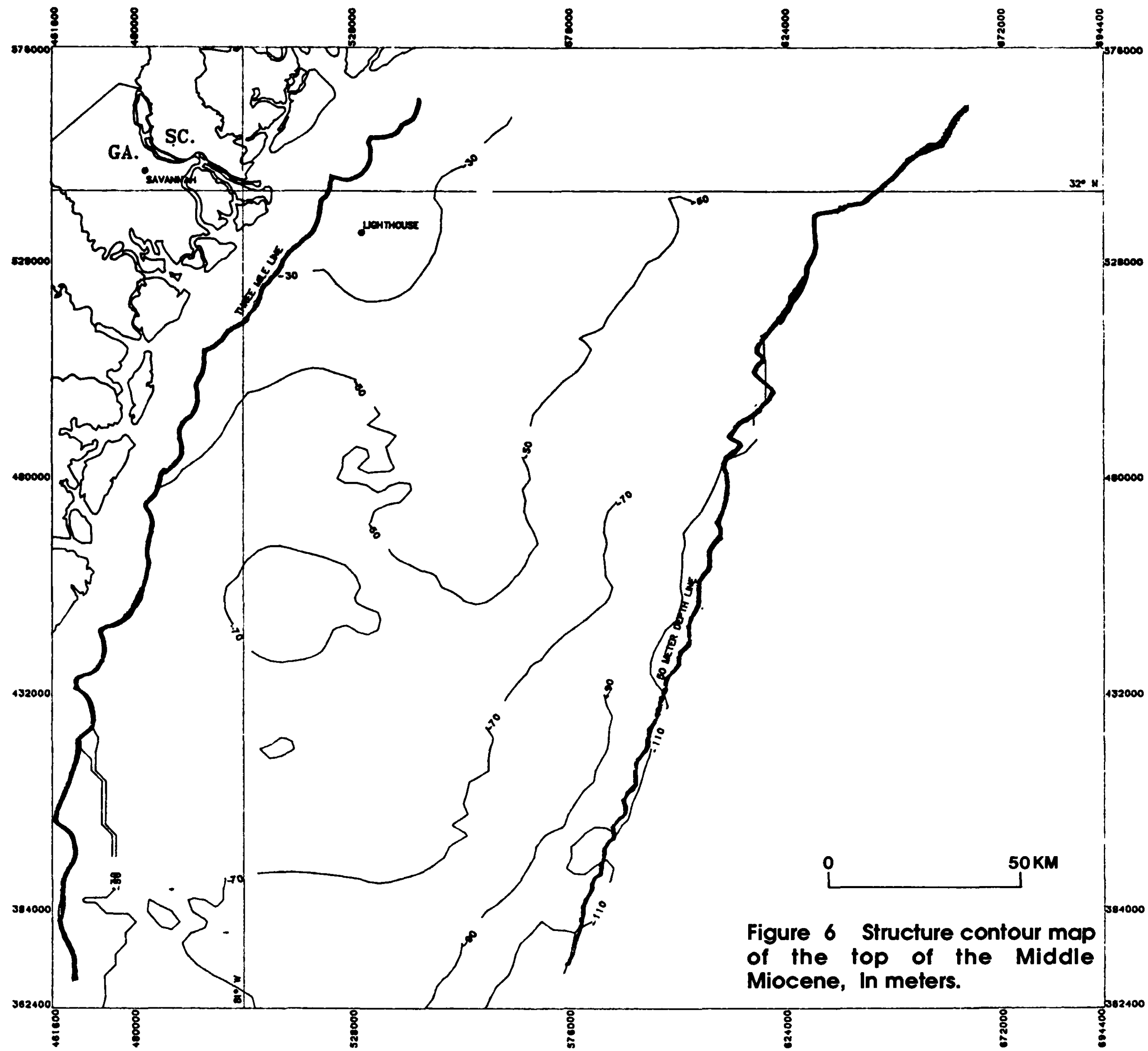

Figure 6 Structure contour map of the top of the Middle Miocene, In meters.

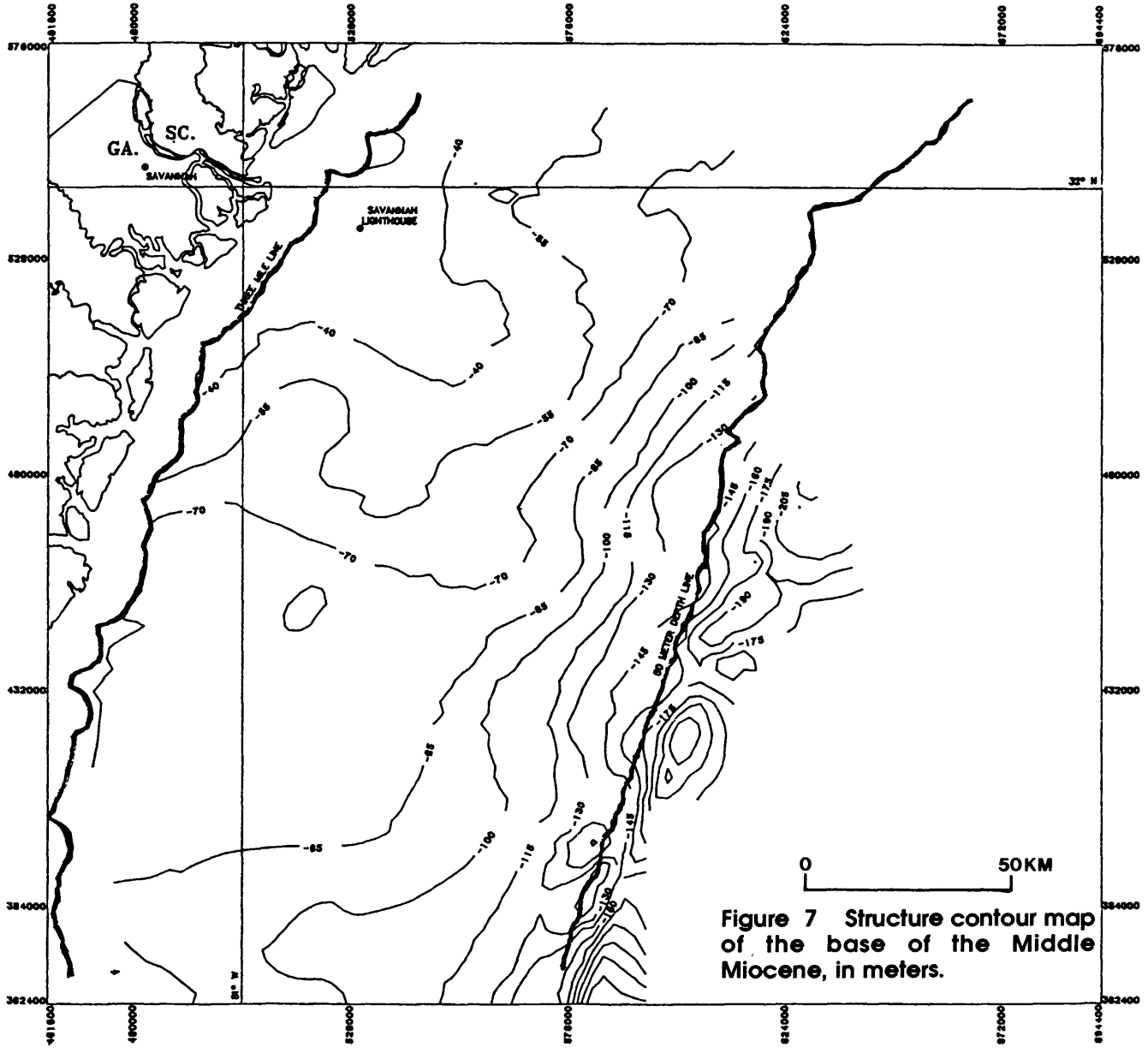

Figure 7 Structure contour map of the base of the Middle Miocene, in meters.

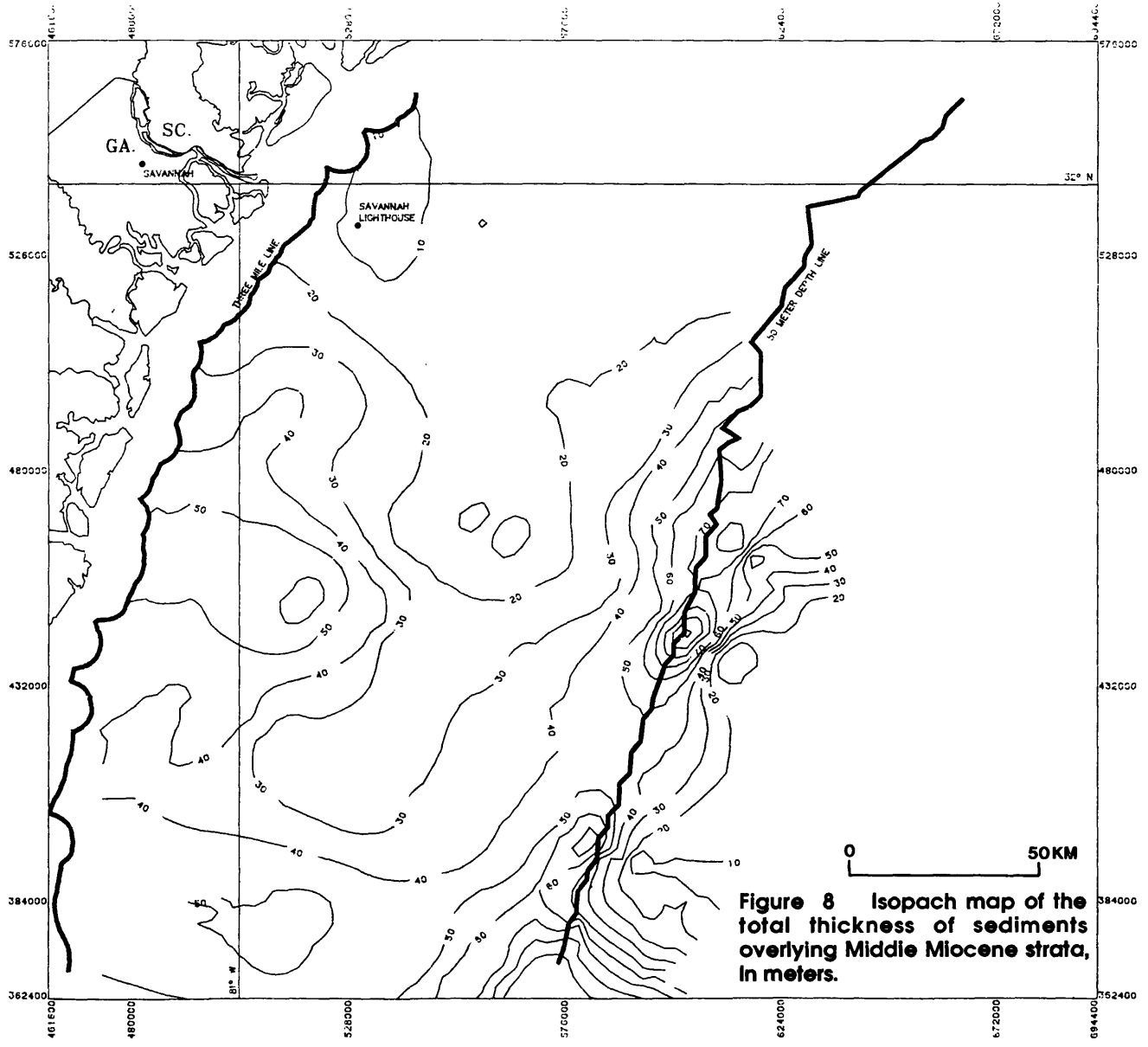

Figure 8 Isopach map of the total thickness of sediments overlying Middle Miocene strata, in meters.