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SIMPLE BOUGUER ANOMALY REPRESENTATION OVER A PART OF THE ATLANTIC CONTINENTAL SHELF AND ADJACENT LAND AREAS OF GEORGIA, THE CAROLINAS AND NORTHERN FLORIDA

by

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A large part of the offshore work shown on this map was conducted by the USNS Keathley in the early 1970's using the most recent Bell Aerospace and LaCoste & Romberg gravimeters. These data have recently been made available for use in the form of free-air plots, computer printouts or magnetic tape. Compilations are being prepared that will show 10 mgl free-air or Bouguer contouring, the locations of track readout sites used for contouring, bathymetric contours and total magnetic intensity contour maps prepared by the Naval Oceanographic Office from Project Magnet (airborn) data.

The base map is used with the permission of the American Association of Petroleum Geologists. It is the northern half of sheet 2 of their U.S. bathymetric series (1970). It varies in contour interval; one fathom, in shallow water to a depth of 25 fathoms; 5 fathom interval to a depth of 100 fathoms and 25 fathom interval for water deeper than 100 fathoms. This chart was also used for interpolation of water depths in order to convert free-air to simple Bouguer. Land gravity, where shown in this map, has been taken from Woollard and Joesting (1963).

In the interest of clarity, land station locations and sea-readout sites have not been shown; such 'station locations' will be included — wherever

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such information is not restricted -- in future treatments of these same data. In this present chart it will be observed that isogal lines are either solid or else dashed. Solid contouring is employed wherever the (offshore) grid of gravity readings had a spacing less than 10 kilometers; where isogals are dashed, the data available to us was spaced at distances greater than 10 km. Wherever it was convenient to do so, isogal values were inscribed in dashed portions of contour lines.

In the area covered by this chart there are a few prominent gravity features found over the land; these lineaments or anomalies do not continue far offshore. One example is a large, well-formed 40-mgl low north and east of Pamlico Sound; it cannot be said to have an offshore flank or continuation. Similarly, large distinctive offshore Bouguer gravity anomalies are truncated before reaching the shoreline. A large (80 mgl) positive gravity lineament is mapped striking due north of 32^{o}N and along 78.7^{o}W. Although it lies beneath varied water depths from 25 fathoms to 250 fathoms, it has no obvious onshore geophysical continuation. From geomagnetic and CDP seismic data, this gravity high is thought to be due to a buried volcanic field formed of three separate volcanic edifices. Seismic reflection data show the top of this volcanic ridge to lie within a kilometer of the sea floor.

Offshore gravity lows may be seen to lie along the northeastern and southwestern boundaries of the aforementioned volcanic ridge. The northeastern low of about 50 milligal amplitude in the vicinity of Frying Pan Shoals is a mass deficiency of regional proportions. Another anomalous example is provided by a broad 30-mgl low which lies between the volcanic ridge and Cape Romain. As yet we lack other geological or geophysical clues to the nature of subsurface configurations at the seat of these gravity minima.

At 31°N and 78°W another well-formed, large-amplitude gravity minimum is centered. A single line of modern CDP seismic reflection data crosses the northwestern flank of this gravity low. There seem to be no reflectors that could serve to explain, confirm or deny any specific structural source for the observed anomaly. At one extreme, a model capable of yielding this anomaly could be that of a basement low overlain by a downwarped sedimentary section. This would give the observed results if such sediments had normal increase of density with depth. The other extreme would be a shallow basin model in which a large mass deficiency anomaly would derive from a high porosity and/or poorly consolidated, low-density basin fill.

The gravity features described above, would probably be slightly modified via complete Bouguer mapping. In the vicinity of Blake Spur and the Blake Escarpment, uncorrected terrain effect, the difficulty of interpolating water depths and, in general, the difficulty of contouring the distorted simple Bouguer gravity field dictated that we omit isogals in this region; in this and in other offshore areas of radical bottom topography, terrain corrections should be made for both Bouguer and free-air representations in order to free any resulting anomalies from extraneous effects unrelated to subsurface geology, structure and mineralogy.