TAMU Gulf of Mexico/NOAA Bathymetry (TGMNB) CD-ROM

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The most elemental parameter for describing the characteristics of the seafloor is its depth. The most elemental parameter for the description of a particular environment of an area is its bathymetry. The northwestern continental slope of the Gulf of Mexico has a very complex bathymetry and the topography and morphology of the slope and the distribution of sediments within these areas are dominated by halokinesis of allochthonous salt. Bathymetric charts of the continental slope of the northwestern Gulf of Mexico (Bryant, et al., 1990; Bouma and Bryant, 1994) reveal the presence of over 105 intraslope basins with relief in excess of 150 m, 28 mounds, and five major and three minor submarine canyons. These basins occupy much of the area of the continental slope. Intraslope-interlobal and intraslope-supralobal basins occupy the upper (100 m to 2000 m) and lower (2000 m to 3200 m) continental slope, respectively. Intraslope-interlobal are basins formed by the coalescing of salt canopies and the supralobal basins by downbuilding into a salt nappe. These basins are sediment depocenters. The very upper continental slope areas have fewer basins and contain, in general, lower angled slopes. The structure of the uppermost slope area is less affected by the action of salt, except on a local scale, and influenced mostly by the seaward progradation of low sea-level Pleistocene deltas. The lower continental slope contains seven submarine canyons and a large escarpment, each feature evolving from, in part, the coalescing and migration of salt canopies, an unusual process for the formation of submarine canyons.

The TGMNB CD-ROM is based on multibeam bathymetric data collected by National Oceanic and Atmospheric Administration (NOAA) in a 7-year period in the northwestern continental slope of the Gulf of Mexico. Previous released data had a space resolution of 250 m in UTM grid and 15 seconds in geographic grid (NOAA, 1992). The TGMNB CD-ROM uses subdivisioned universal kriging to minimize the error caused by interpolation. The gridded space is optimized according to water depth and has a resolution of 10 m in shallow water and 150 m in deep water (Fig. 1). The TGMNB CD-ROM also contains other properties generated from bathymetric data. The slope gradient is determined by the vertical distance drop as referenced to the horizontal displacement. A 3 x 3 shifting window is used to calculate the individual cell's slope gradient in degrees. The slope direction map assigns each cell's value according to the steepest downslope neighbors of each cell (Arc/Info, 1997). The dendritic drainage pattern, a representation of sediment paths, is generated from least-cost search algorithm and watershed basin analysis program (GRASS, 1993).

The TGMNB CD-ROM is built using HyperText Markup Language (HTML), Java, and Virtual Reality Modeling Language (VRML) and can be run on different computer platforms. The CD-ROM contains video "fly-by" in selected areas and allows the user to select his/her areas of interest from an index map and zoom-in on the specific areas, allow the use of different color schemes and scales in displaying the map and select the desired layers to be displayed (e.g., slope gradient over bathymetry). The user can send the map of interest area to a printer or download digital data to integrate with other geological or geophysical data. The detailed bathymetry and interactive CD-ROM helps us to understand the nature of the continental margin which is essential in evaluating slope instabilities, pipeline spanning, mass transport, fishery information, and physical modeling.

REFERENCES

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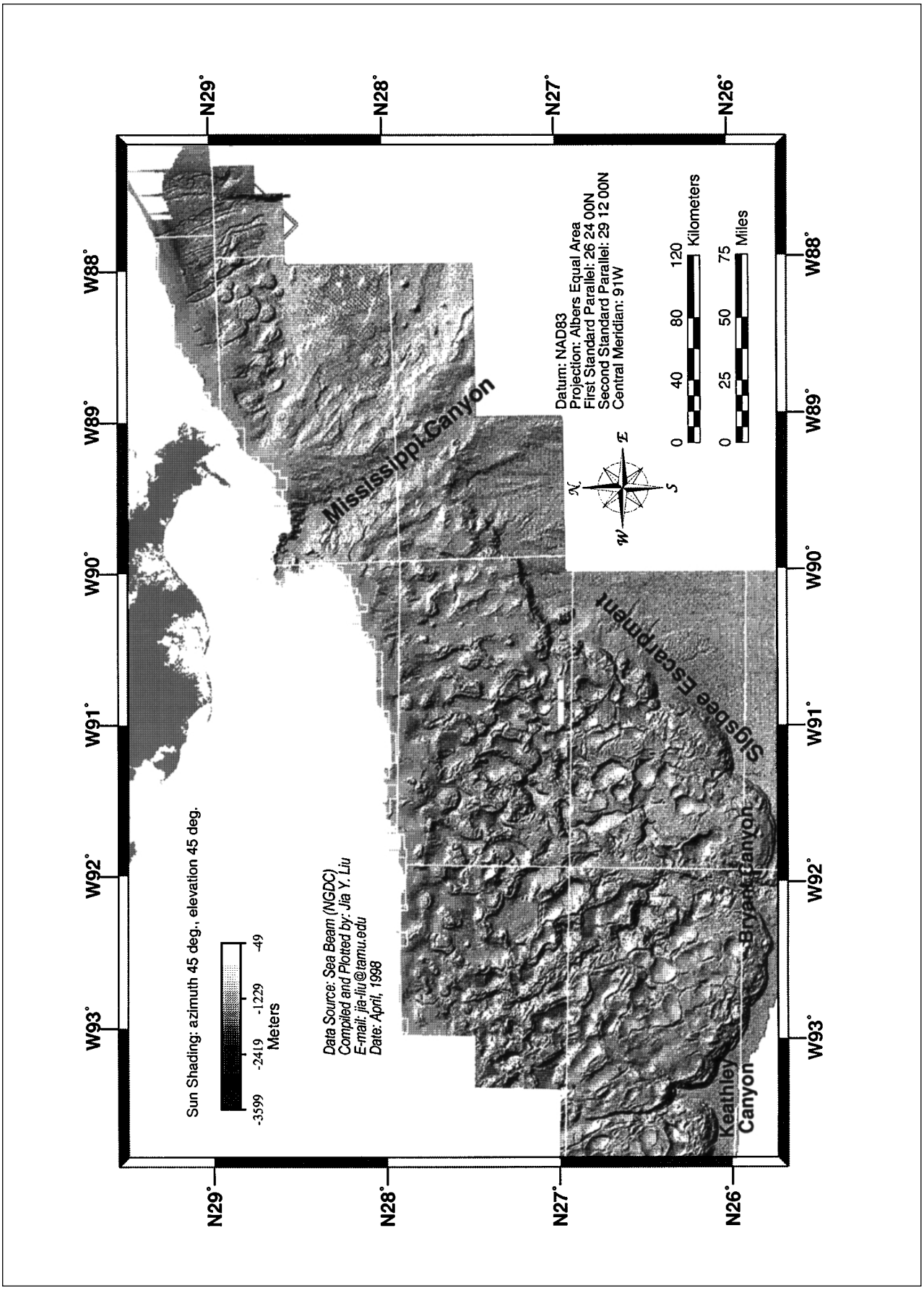

Figure 1. Bathymetric relief map of northern Gulf of Mexico.