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The Mississippi Mineral Resources Institute
University, Mississippi 38677

GEOGRAPHIC/GEOTECHNICAL DATA BASE AND INFORMATION SYSTEM FOR THE MISSISSIPPI GULF COAST FROM PASCAGOULA TO THE MISSISSIPPI-ALABAMA STATE LINE

by

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ABSTRACT

The results of the first year of a multi-year project to develop a geographic and geotechnical information system for the Mississippi Gulf Coast are presented. A land-use classification of the project area, based on the Ü.S.G.S. classification system, was completed but could not be digitized due to unforeseen delays in obtaining Landsat Thematic Mapper Data. Funds have been obtained for acquisition of TM data on magnetic tape during the second project year.

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INTRODUCTION

Geographic information systems (GIS) are the latest outgrowth of remote sensing and image processing technologies. Based on the capability of computers to assemble large quantities of data into hierarchical visual display files, GIS are widely used by federal, state, and local agencies for land-use planning and for allocation of community resources. Recently, GIS has been used to make technical decisions relative to construction site location, and in mineral resource evaluation and exploration. The objective of this research is to develop a geographic and geotechnical data base and information system of the Mississippi Gulf Coast which can be used in exploration for mineral resources and for environmental management. This report covers the first year of what is expected to be a multi-year effort. The objective of this first year was to assemble and digitize a land-use classification map of the project area.

DATA ASSEMBLY

Upon contract award, the search for data on the project area was continued. Black and white transparencies of Landsat Multi-Spectral Scanner (MSS) were known to be available in the files of MMRI and, initially, it was planned to use this data as the image base for the GIS project. Inquiries were made to the National Cartographic Information Center of the U. S. Geological Survey for air photo coverage of the project area. An order was

placed for low-altitude (large-scale) and high-altitude (small-scale) black and white air photos of the area for 1940 and 1985 respectively in conventional 9 X 9-inch prints. High-altitude false-color infra-red coverage was ordered for 1982 in 18 X 18-inch print format.

Map coverage of the project area was largely obtained from the files of the Department of Geology and Geological Engineering, although 1:100,000 scale coverage of the coastal region was ordered from the Mississippi Bureau of Geology. Geologic maps, at various scales, and special-purose maps, such as maps delineating hurricane flood damage in the project area, were also compiled in the project files, for future use.

As previously indicated, original planning for the project envisioned the use of black and white transparencies of MSS data from the files of MMRI as the basis for the GIS system. Initial efforts indicated that resolution adequate for the project could not be obtained utilizing these transparencies. Resolutions of approximately 200 metres were the best achievable with these transparencies and the Department's digital scanner. As the result of a search for minimum-cost methods of obtaining a high resolution image to serve as the base map for the project, an enlarged black and white print of Band 4 Thematic Mapper (TM) data was ordered from the Eosat Corp, in February. (Funds available during this phase of the grant were not sufficient to permit the purchase of TM data on diskette or magnetic tape.)

Unfortunately, the order was placed at approximately the same time as the printing equipment used by Eosat broke down. After repeated calls to Eosat, it was learned, at the end of the project period, that the equipment was considered to be permanently unrepairable and it was again necessary to examine alternative methods of obtaining the required satellite data.

Since that time, funds have been obtained to permit the purchase of TM data of the Mississippi-Alabama Gulf Coast, on magnetic tape, during the 1989-1990 funding period. Acquisition of the TM data on tape will provide the necessary resolution for the project.

LAND-USE CLASSIFICATION

The completion of a land-use classification of the project area was proposed as a useful and easily attainable first step in the establishment of a GIS system. The classification system used is the national land use and land cover system of the U.S. Geological Survey (Anderson, et al., 1976). This system is designed for utilization with remote sensor data and has a target of 85 percent accuracy in the identification of land use and land cover. Although three levels of classification are contained in the system, only the first level of classification is attainable with satellite imagery. Level I classifies all land into nine categories: (1) Urban or Built-up Land, (2) Agricultural Land, (3) Rangeland, (4) Forest Land, (5) Water, (6)

Wetland, (7) Barren Land, (8) Tundra, and (9) Perennial Snow or Ice.

The entire project area has been classified into the various Level I categories, based on high-altitude false-color infra red photography. In most areas, it has been possible to proceed to Level II classification. For instance, within Urban or Built-up Land it has generally been possible to distinguish among residential, commercial, industrial, and transportation and utility land uses. Areas in which it has been impossible to identify the Level II classification will be ground-truthed in the 1989-1990 project period.

SUMMARY

The project is approximately five months behind schedule due to the delay in obtaining Landsat data to serve as the base map for the project. The Landsat MSS data originally intended for use in this project proved unsuitable due to the lack of resolution obtainable with the Department's digital scanner. Funding limitations in this grant period, and the high cost of magnetic tape data ($3,600 per scene), necessitated the order of a lower-cost black and white print of Band 4 TM data. Eosat experienced equipment failure in the printing apparatus and, after four months delay, indicated that they would be unable to repair the apparatus within a reasonable time. Since the expiration of this initial grant, funds have been made available to

purchase a full scene of TM data on magnetic tape of the project area. Obtaining this data will permit rapid achievement of the objectives of the initial grant, developing a digital land-use classification of the project area, as well as the objectives of the second year's funding.

REFERENCES

Anderson, James R., Hardy, Ernest E., Roach, John T., and Witmer, Richard E., 1976 ,A Land Use and Land Cover Classification System for Use with Remote Sensor Data, U. S. Geological Survey Professional Paper 964, Washington, D.C., 28 pages.