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CR-135876

NORTH CAROLINA STATE UNIVERSITY

SCHOOL OF PHYSICAL AND MATHEMATICAL SCIENCES

DEPARTMENT OF GEOSCIENCES
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Investigation Title: Utilization of ERTS-A Data in Geological Evaluation, Regional Planning, Forest Management, and Water Management in North Carolina

Proposal No. 018

Contract No. NAS5-21732

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Date: November 30, 1973

The objective of the contract is to demonstrate the usefulness of ERTS-1 data to various state agencies.

The period September-October was spent in working with various state and local agencies regarding use of ERTS-1 data in their functions.

A proposal to the Office of Earth Resources was made to use ERTS-1 imagery in the study of geological features and landuse patterns in the Region J area. This proposal was funded in the amount of \$1,000 and work will commence on it in the latter part of December.

A second tentative proposal for additional funding has been prepared in cooperation with the Region J COG office and it is out for review with a possible funding agency.

It is apparent that the ERTS-1 imagery will be useful in studies of mass behavior in the Cape Fear area. This is an important matter in that a nuclear electrical generating plant is being constructed near Southport. The plant will discharge heated water about 9,000 feet offshore and at the present time there is a limited understanding of the water

E74-10035) UTILIZATION OF ERTS-A DATA IN GEOLOGICAL EVALUATION, REGIONAL PLANNING, FOREST MANAGEMENT, AND WATER MANAGEMENT IN NORTH CAROLINA State Univ.) 4 p HC \$3.00
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circulation patterns along this part of the North Carolina Coast.

Dr. Robert Butler of the University of North Carolina has examined the imagery given him earlier and has been able to extend some known lineaments and has been able to recognize some unsuspected ones in the piedmont portion of western North Carolina and South Carolina.

Preliminary investigations of the July 24 imagery of Currituck Sound and Albemarle Sound (Image No. 1366-15083) suggests that the presence of aquatic plants not recognized on earlier imagery has been recorded. Discussions with Office of Water and Air Resources personnel and with personnel of the Wilmington Office of the Corps of Engineers indicate that the plant may be milfoil. The ability of the satellite to image this growth may make possible the mapping of the extent of the infestation and aid the appropriate agencies in their aquatic plant control program. In particular, it is suggested that if the extent of the infestation is recorded on the ERTS imagery, then the necessity of an inventory with aircraft will have been eliminated. Use of the ERTS imagery will have effected a considerable cost saving to the agencies concerned, for they will have information from the ERTS data that could be obtained only at a much greater cost with aircraft. The Corps is to support the further investigation of the use of the imagery for the milfoil inventory.

The work on the geology and soils of the southeastern portion of the state (Wilmington test site) is continuing. The evaluation which comes from the study will include an evaluation of different scales of the imagery in terms of the information they provide for coastal plain geologic and geomorphic interpretations.

The ERTS-1 imagery, along with SKYLAB imagery will be utilized in a proposed investigation of the water quality problems along the Chowan River. This investigation team will include representatives from the Office of Water and Air Resources, the U. S. Geological Survey, the Environmental Protection Agency, and the University. The beginning steps of organization of the investigation team were held in October, and further meetings of the appropriate committees will be held in January.

One paper has been prepared in conjunction with this study during the reporting period. An abstract is attached.

The extension of the contract through August 1974 will permit us to work for a while longer with some of the local agencies. However, the funding for the work will be rather limited as the funds available under the contract were programmed on the basis of the contract's completion on December 31, 1973. In particular, the support of the graduate student will be limited, and thus his work on the project must of necessity be limited. It would seem to be in the best interest of NASA to provide some supplemental funds for graduate student support to this project.

SEDIMENT TRANSPORT IN NORTH CAROLINA SOUNDS AND OFFSHORE - A USE OF SPACE
IMAGERY

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Advent of ERTS-1 has provided a unique opportunity to obtain a repetitive synoptic view of the North Carolina coast at about monthly intervals between September, 1972, and June, 1973. Availability of daily meteorological and tidal information along with the imagery has made possible study of water masses and the sediment concentrations under a variety of weather and tidal conditions. Color additive viewing and density slicing techniques were used to study the patterns.

Boundary effects of the landward edges of the sounds and of the topographic irregularities of the bottoms cause different sediment transport patterns under various meteorological conditions. Distribution of floodtide waters behind the inlets and the northward and southward movement of sediment along the Outer Banks in response to different tidal and weather conditions are well shown. The Neuse River drops much of its load near New Bern in contrast to the Cape Fear whose load is discharged into the Atlantic south of Wilmington. Outlines of the delta forming at the mouth of the Cape Fear is seen on the ERTS imagery.

Shifting of the Gulf Stream and its effects upon sediment discharged through the inlets south and north of Cape Hatteras is documented. Sediment appears to be constantly streaming to the northeast from Cape Hatteras although local meteorological conditions control the exact pattern. The satellite imagery shows the near-shore circulation patterns as well as offshore counter-circulation in Raleigh and Onslow Bays. The imagery is an important tool in designing sediment and water sampling programs.

1973 Annual Meeting
Geological Society of America
Dallas, Texas