GEOGRAPHIC APPLICATIONS OF THE EARTH RESOURCES TECHNOLOGY SATELLITE (ERTS-I) TO LANDSCAPE CHANGE

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NASA's Earth Resources Technology Satellite has been orbiting 560 miles above the earth's surface since July, 1972. Operational sensors on board include four channels in a multispectral scanner system which operate from .5 to 1.1 microns. Data gathered by these sensors are transmitted in digital format to Goddard Space Flight Center at Greenbelt, Maryland where the data are processed into photographic imagery and digital tapes. Two extremely useful capabilities offered by ERTS include repetitive coverage on an 18 day cycle and a regional view encompassing a 13,225 square mile view from each image. Because of such capabilities ERTS challenges us to the task of interpreting landscape change over time from a regional perspective.

Using techniques of comparison in a multi-stage, multi-date sampling experiment, the investigation focuses on the East Tennessee Test Site, a 20,000 square mile region which encompasses a variety of landscape surfaces and landuses. Although the test area is located in the United States, the surface signatures analyzed in the study have application to other parts of the world. Such landscape elements as: forest cover and its naturally and culturally caused alterations, reservoirs, streams, and flood conditions, urban and suburban growth, surface mining characteristics, and cyclic patterns of agricultural landuse are among those topics of the investigation and presentation.

The multistage sampling phase of the investigation demonstrates the use of low altitude (10,000') aircraft imagery, high altitude (60,000') aircraft imagery, and satellite imagery from an altitude of 560 miles. The temporal variable is examined from several selected dates: April 18, June 23, July 3 and 6, August 14, and every 18 days since August 22, 1972.

Using a densitometer analysis of the ERTS data, the investigation and presentation concludes with a comparison of frequency distributions of grey tones for applications in the detection of landscape change associated with surface mining.