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APPLICATION OF LANDSAT-2 DATA TO THE IMPLEMENTATION AND ENFORCEMENT OF  
THE PENNSYLVANIA SURFACE MINING CONSERVATION AND RECLAMATION ACT

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Principal Investigator:

ORVILLE R. RUSSELL  
EARTH SATELLITE CORPORATION  
7222 47th STREET  
WASHINGTON, D.C. 20015

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16. Abstract  TECHNIQUES FOR THE PROCESSING OF LANDSAT FOR MAXIMUM RETENTION OF RESOLUTION AT EXTREME ENLARGEMENTS, i.e. 1:24,000 SCALE, IS NEARLY COMPLETE. THE ASSESSMENT OF THE UTILITY OF LANDSAT IMAGERY TO THE IMPLEMENTATION OF THE PENNSYLVANIA MINING LAWS INDICATES THAT IT WILL BE OF MINIMAL VALUE FOR DAY-TO-DAY ENFORCEMENT BUT MAY HAVE USE ON AN ANNUAL BASIS.			
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## Problems

Pennsylvania Surface Mining Regulations require that a substantial bond be posted for every acre of land before a mining permit is issued. As a consequence, mining permits are rarely issued for more than a few tens of acres - often as little as five to ten acres. As mining progresses, state mining inspectors periodically check to see that environmentally compatible mining procedures are followed and that grading and revegetation are performed according to law. An inspection of reclamation activities after grading and after revegetation is performed at the request of the mining company when they believe they have met the requirements. Delays in these inspections can be costly to the industry and consequently they are normally performed promptly.

The requirement for prompt response and detailed evaluation of land areas of only a few acres minimizes the utility of LANDSAT imagery for day-to-day enforcement of the surface mining laws in Pennsylvania. These factors, combined with the fact that about one in twelve LANDSAT overpasses of western Pennsylvania acquire imagery of 10% or less cloud cover, suggest that the use of LANDSAT imagery for surface mining investigations in western Pennsylvania may be more practical on an annual or semi-annual basis.

## Accomplishments

The quality of LANDSAT imagery prepared from EROS Data Center film products deteriorates at extreme enlargements. Such imagery at enlargements greater than 1:125,000 normally are too diffuse for mapping mined lands in Pennsylvania and smaller scales do not permit the manual delineation of detail within mined areas. To circumvent this problem, various enhancement techniques of LANDSAT CCT data, both by computer

and by photographic color processing, have been tested. These tests have emphasized production of maximum detail in the surface mined areas at a cost that might be acceptable to states on an operational basis.

The photographic printing of the imagery has been directed at producing an acceptable and useful product for mine field inspectors and other people not generally familiar with remote sensing. This processing stressed the preservation of detail at extreme enlargement and a cosmetically pleasing appearance. To accomplish this the following steps have been taken:

- ° Linear stretch of the tonal character of mined lands;
- ° Detector response adjustment for scan line removal;
- ° Computer enlargement of the image by computation of new pixels;
- ° Photographic processing of bands 5 and 7 produced green vegetation and reddish mined lands.

The improvement of scene detail by the scan line removal and computer enlargement permits photographic enlargement to 1:24,000 with reasonably good resolution. The unique color rendition used provides a more natural appearing image which is more acceptable by personnel non-versed in remote sensing techniques.

Mined lands in 1975 LANDSAT imagery were manually classifiable into 11 different categories. This is, in fact, more detailed than can be derived from the 1975 U-2 color infrared photography which is of poor quality.

The next quarter's activities will include the completion of the imagery processing of the 1976 LANDSAT data. The imagery will be analyzed and compared to the results of the 1976 U-2 CIR photographic

interpretation. This photography is of excellent quality and will provide reliable "ground truth." Detection of changes between the 1975 and 1976 LANDSAT imagery will be evaluated for accuracy and a statistical assessment made.

State offices in the Pennsylvania Department of Environmental Resources will be visited to discuss the interest in and potential applications of LANDSAT derived data in their operational structure.

Significant Results

None

Publications

None

Recommendations

None