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GEOLOGICAL SURVEY
EROS Data Center
Sioux Falls, South Dakota 57198

(AB also submitted Pohl's abstract -- see IC 10-229)

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October 30, 1986

Memorandum

(replies to IC 9-66)

To: Chief, Publications Liaison and Review

From: Chief, EROS Data Center

Subject: Call for Papers, Pecora XI Memorial Symposium

In response to Gary North's memorandum dated September 5, 1986, soliciting proposed abstracts for the Pecora XI Memorial Symposium, the attached abstracts from the EROS Data Center are submitted for consideration.

Author(s)	Abstract Title
Loveland, Moore, Howard, Ohlen, Gallo, Olson, and Krumpe	Regional Methods for Seasonal Mapping of Locust Habitat Conditions
Gallo, Tarpley, Howard, and Moore	A Joint NOAA/USGS Study to Evaluate Satellite Assessment of Land Surface Features and Climatic Variables
Meyer	Image Restoration Techniques as Applied to Landsat MSS and TM Data
Feuquay	Data Integration Using Color Space Transforms
Walker and Robinson	Multitemporal Aspects of Landsat Multispectral Scanner and Thematic Mapper Data of the Hubbard Glacier Region, Alaska

The abstracts by David Meyer and Jay Feuquay are intended to be poster papers at the symposium.

If you have any questions about any of these abstracts, please do not hesitate to give me a call.

AH Watkins

Allen H. Watkins

Attachments

bcc: D. Lauer
cc: EDC Chron
AHW Chron
DGO Chron DGO
TDAB Reading
TDAB Subject

DGOrr/cbj/10-30-86

REGIONAL METHODS FOR SEASONAL MAPPING OF LOCUST HABITAT CONDITIONS

By Thomas R. Loveland[1/], Donald G. Moore[2/], Stephen M. Howard[1/],
Donald O. Ohlen[1/], Kevin P. Gallo[3/], Jonathon Olson[4/],
and Paul Krumpe[4/]

ABSTRACT

Spectral data collected by NOAA 10 and rainfall estimates interpreted from Meteosat imagery were used in near real time to monitor regional conditions suitable for locust and grasshopper breeding and swarming over a 4.2-million square kilometer study area in Botswana and adjoining lands in southern Africa. The process involved preparing summary or composite maps every 10 days that: (1) identified potential locust breeding habitat based on the presence and condition of vegetation and rainfall, and (2) identified decreases in vegetation that may be associated with locust damage. Local Area Coverage (LAC) Advanced Very High Resolution Radiometer (AVHRR) data were collected daily, referenced to a geographic base, and screened to flag pixels contaminated by clouds. A normalized difference (ND) transformation was then used to calculate an index of greenness (the presence and vigor of

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1/ TGS Technology, Inc. Work performed under U.S. Geological Survey contract 14-08-0001-20129.

2/ U.S. Geological Survey (USGS).

3/ National Oceanic and Atmospheric Administration (NOAA).

4/ U.S. Agency for International Development (USAID).

vegetation). A compositing process designed to eliminate clouds and preserve areas with apparent stress was used to prepare a composite greenness condition map of the previous 10 day period. Satellite estimates of rainfall were integrated into the greenness map to produce a product that spatially summarized the key factors that contribute to changes in locust populations. In addition, data compositing was used to produce a map that identified areas where greenness increases and decreases have occurred since the previous reporting period. The resulting maps and statistics were air express mailed every 10 days to Botswana for use in monitoring locust and grasshopper habitat and damage and in planning eradication programs.

A JOINT NOAA/USGS STUDY TO EVALUATE SATELLITE ASSESSMENT OF LAND SURFACE FEATURES AND CLIMATIC VARIABLES

K. P. Gallo[1/], J. D. Tarpley[1/], S. M. Howard[2/], and D. G. Moore[3/]

ABSTRACT

Data collection and preliminary analyses have begun for a study that will evaluate the usefulness of satellite data for assessment of land surface features and climatic variables. The objective of this study is to determine if relationships can be developed between routinely available ground-based quantities, and satellite obtained information. The study area includes the Great Plains region (29° to 49°N and approximately 91° to 109°W) of the United States. Satellite data includes daily and weekly composites of Global Area Coverage data from the Advanced Very High Resolution Radiometer (AVHRR) on the NOAA-9 satellite. The satellite data includes visible, as well as near- and thermal-infrared wavebands. Ground-based information includes daily and weekly weather and climatic variables. Daily information includes air temperature, dew point temperature, wind speed, and cloud cover. Weekly variables include mean temperature, total precipitation, and a crop moisture index for climatic regions. Geographic information for the area includes political, topographic, climatic, and land resource data bases that will be

1/ National Oceanic and Atmospheric Administration (NOAA).

2/ TGS Technology, Inc. Work performed under U.S. Geological Survey contract 14-08-0001-20129.

3/ U.S. Geological Survey (USGS).

used to stratify the satellite and ground-based observations. The satellite and ground-based data sets are expected to contribute to the overall understanding of land surface climatology.

IMAGE RESTORATION TECHNIQUES AS APPLIED TO LANDSAT MSS AND TM DATA

By David J. Meyer[1/]

ABSTRACT

Two factors are primarily responsible for the loss of image sharpness in processing digital Landsat images. The first factor is inherent in the data because the sensor's optics and electronics, along with other sensor elements, blur and smear the data. Digital image restoration can be used to reduce this degradation. The second factor, which further degrades by blurring or aliasing, is the resampling performed during geometric correction.

An image restoration procedure, when used in place of typical resampling techniques, reduces sensor degradation without introducing the artifacts associated with resampling.

[1/] TGS Technology, Inc. Work performed under U.S. Geological Survey contract 14-08-0001-20129.

The EROS Data Center (EDC) has implemented the restoration procedure for Landsat multispectral scanner (MSS) and thematic mapper (TM) data. This capability, developed at the University of Arizona by Dr. Robert Schowengerdt and Lynnette Wood, combines restoration and resampling in a single step to produce geometrically corrected MSS and TM imagery. As with resampling, restoration demands a tradeoff be made between aliasing, which occurs when attempting to extract maximum sharpness from an image, and blurring, which reduces the aliasing problem but sacrifices image sharpness. The restoration procedure used at EDC minimizes these artifacts by being adaptive, tailoring the tradeoff to be optimal for individual images.

DATA INTEGRATION USING COLOR SPACE TRANSFORMS

By Jay W. Feuquay[1/]

ABSTRACT

The demand for increased spatial resolution without sacrificing spectral discrimination can be fulfilled by integration of data from different sensor systems and satellite programs. Data of higher spatial resolution are frequently available in panchromatic (black-and-white) form rather than multispectral. Techniques have been developed to combine the higher resolution panchromatic data with a multispectral data set of lower spatial resolution.

The standard method of integration modulates the intensity of the multispectral with the panchromatic data. A less subjective approach uses an algorithm that describes color in terms of intensity (I), hue (H), and saturation (S).

[1/] TGS Technology, Inc. Work performed under U.S. Geological Survey contract 14-08-0001-20129.

Combinations of high resolution panchromatic data (SPOT panchromatic) and lower resolution multispectral data [Landsat thematic mapper (TM), SPOT XS] have been developed. The SPOT data were acquired on April 3, 1986, and the Landsat TM data were acquired on April 5, 1986. The data sets were registered to each other and the multispectral data sets were contrast enhanced. The enhanced multispectral data sets were then transformed from red/green/blue (RGB) color space into IHS space. In each case (TM/SPOT panchromatic and SPOT XS/SPOT panchromatic), the SPOT panchromatic data were remapped on a cumulative histogram percentage basis to match the multispectral "I" data. These remapped SPOT panchromatic data were substituted for the original multispectral "I" and the hybrid IHS data transformed back into RGB space for display.

While this technique is experimental and still being refined, the results, to date, indicate that the IHS method will be valuable for generating improved images that effectively present both high resolution spatial digital data and multispectral data.

MULTITEMPORAL ASPECTS OF LANDSAT MULTISPECTRAL SCANNER AND THEMATIC MAPPER DATA OF THE HUBBARD GLACIER REGION, ALASKA

By Kim-Marie Walker[1/] and Mark Robinson[1/]

ABSTRACT

The glacial advance of the Hubbard Glacier located in southeast Alaska has been one of the more publicized glacial activities occurring in the State. The lower Hubbard Glacier was advancing at a rate of 14.3 meters, plus or minus 3 meters, per day in early June 1986 and at a rate of 10.0 meters per day by mid-August. In its advance, the glacier dammed the flow of Russell Fiord into Yakutat Bay, thereby creating a lake. In October 1986, the water from Russell Fiord broke through the dam. Glaciologists predict that the glacier will continue to advance and create an ice dam barring Russell Fiord's flow.

Landsat thematic mapper (TM) data of the Hubbard Glacier collected on August 7, 1985 and September 11, 1986, as well as multispectral scanner (MSS) data collected on July 11, 1977 were registered, enhanced, and reviewed to study the contrast between TM and MSS resolution. Techniques for determining the area of glacial ice change were investigated as was the quality of the two TM scenes.

[1/] TGS Technology, Inc. Work performed under U.S. Geological Survey contract 14-08-0001-20129.