National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas
77058

Pecora file

NASA

Ic 7-236

Action BYRNES
Info Copies
Watkins ✓
Landis
Metz
Byrnes
Rohde
Admin.
DPS,DB
CSB
TDSAB
Alaska
Technicolor

Reply to Attn of: SC3/83-125

July 22, 1983

Mr. Allan H. Watkins
U.S. Dept. of Interior
EROS Data Center
Sioux Falls, SD 57198

(distributed 7-28-83)

Dear Al:

Thank you very much for the invitation to give a paper at the Eighth William T. Pecora Memorial Symposium. Enclosed is a copy of the abstract which you requested in your June 17, 1983, letter.

We are very excited with the results of this research and look forward to the opportunity to share our enthusiasm with you when we see you in October.

Sincerely,

David E. Pitts, Head
Biospheric Sciences Section

Enclosure

AGRICULTURAL APPLICATIONS OF TM DATA

by

David E. Pitts, R. Bizzell, K. Henderson,
and D. R. Thompson

NASA Johnson Space Center
Houston TX 77058

and

C. Sorensen and J. Carnes

Lockheed Engineering and Management Corp.
Houston TX 77058

ABSTRACT

Multitemporal Thematic Mapper, Thematic Mapper Simulator, and detailed ground truth data were collected for a 9- by 11-km sample segment in Webster County, Iowa, in the summer of 1982. Three dates were acquired each with Thematic Mapper Simulator (June 7, June 23, and July 31) and Thematic Mapper (August 2, September 3, and October 21). These data were analyzed to determine the effect of the additional TM spectral bands in the middle and thermal infrared and the increased TM quantization levels on corn/soybean separability. The measure of the separability used in this study was the Fisher information measure. The Fisher information measure was calculated using all 7 bands and with the 4 visible-near infrared bands. The middle infrared bands provided a separability on 7/31 comparable to that present on 9/3 (the best separability date using only the bands in the visible and near infrared). This result corroborates results by Ungar and Goward (1982) using helicopter spectrometer data collected in 1981 for this same sample segment. Moreover, early in the crop year (6/23) bands 1 and 3 (blue and red) were the best single bands. Later (8/2) bands 5 and 7 (mid-IR) were best; while, in early September both the mid-IR and near-IR (bands 4 and 5) were best. During harvest (10/21) the thermal (band 6) was the best single band.

To evaluate the effect of quantization, the Fisher information measure was calculated using individual bands as a function of the number of quantization levels. The results indicated that there was no significant change in separability when the 256 levels present in the Thematic Mapper data were reduced to 64 levels (as used on MSS).