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Mr. Allen H. Watkins
Chief, EROS Data Center
U.S. Geological Survey
Sioux Falls, SD 57198

(distributed 7-22-83)

Dear Mr. Watkins:

With reference to your invitation of June 17, I will be pleased to present a paper at the William T. Pecora Memorial Symposium. The title of my paper will be "Cartographic Quality of Landsat-4 TM and MSS Image Data." A brief abstract is enclosed.

Sincerely yours,

Roy Welch

Roy Welch
Research Professor

RW:mab

Enclosure

CARTOGRAPHIC QUALITY OF LANDSAT-4 MSS AND TM IMAGE DATA

R. Welch
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Landsat-4 MSS and TM image data in digital formats are being examined for geometric fidelity and image quality as related to mapping requirements. Root-mean-square errors ($RMSE_{xy}$) in whole scene MSS data sets after rectification with 1st degree polynomials yield values of approximately ± 80 m. This figure is reduced to less than ± 60 m when 20 or more GCPs are utilized in conjunction with 2nd or 3rd degree polynomials. Rectification of MSS subscene areas of 1024 X 1024 pixels or smaller with 1st degree polynomials and approximately 5 GCPs produced $RMSE_{xy}$ values of about ± 40 m.

Thematic mapper data sets of 1024 X 1024 pixels have been fitted to ground control by a simple scaling, rotation and translation of the image data. The residual errors of ± 20 m approximate National Map Accuracy Standards for 1:50,000 scale maps and reflect the advantages of the improved pointing accuracy and attitude control of the Landsat-4 system. The potential for integrating Landsat-4 digital images with other data sets and the possibilities for image and topographic mapping will be discussed.