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COMPOSITION AND ASSEMBLY OF A SPECTRAL AND AGRONOMIC DATA BASE FOR 1980 SPRING SMALL GRAIN SEGMENTS

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A data set has been assembled which consolidates the Landsat spectral data, ground-truth observation data, and analyst cloud screening data for 28 spring small grain segments collected during the 1980 crop year.

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1. INTRODUCTION

A set of programs that extract spectral data of special fields along with their agronomic information have been developed. Using these programs, a data base of 1980 Spring Small Grains segments containing spectral, agronomic and analyst cloud cover information was assembled. The spectral information is available, both on a pixel by pixel basis for any given field, as well as on a field by field basis.

In this document, the composition and assembly for Landsat spectral data, analyst cloud screening data, and agronomic data for 28 spring small grains segments are described. This data base is available at the Johnson Space Center (JSC).

2. COMPILATION PROCEDURE

The 28 spring small grain segments contained in this data base met the following criteria:

1. Availability of observation field delineation for crop year 1980 from the Accuracy Assessment Cartographic Processing System.
2. Existence of special fields on which observations were made at regular intervals (agronomic data).
3. Minimum of three acquisition available for the 1980 crop year.

A list of the qualifying segments appears in Table 2-1.

The spectral data for each field was obtained from the Landsat image unload tapes located at JSC.

Software was developed to create the special fields data base. This software, utilizes the observation field delineation data and image tapes to compute the four-channel spectral means and standard deviations for each special field. It then utilizes the agronomic data tape to extract the periodic observations for the special fields. The analyst cloud screening data is input interactively. Descriptions of this software can be found in the document, User Guide for the Extraction of Landsat Spectral and Agronomic Data.

The flowchart for the software is found in Figure 2-1. The format for the data is found in Table 2-2.

The listing output of the software was developed to inform users of data problems and comments by the agricultural agent concerning special fields, if they were provided.

Each Landsat acquisiton was quality checked and flagged accordingly for clouds and/or shadows, haze, misregistration, and data problems. This was accomplished by visual screening of the production film converter (PFC) products. The flag codes appear in Table 2-3.

Computer listings of this data base appear in the appendix.

Table 2-1. - 1980 Spring Small Grains Segments

Segment	Location (County, State)	Number of Landsat Acquisitions	Number of Special Fields
1387	Ramsey, N. Dakota	7	28
1392	Benson, N. Dakota	6	23
1394	Burke, N. Dakota	6	30
1399	Richland, N. Dakota	9	29
1467	Towner, N. Dakota	10	28
1472	Barnes, N. Dakota	6	11
1485	Dewey, S. Dakota	12	28
1514	Marshall, Minnesota	10	29
1537	McCone, Montana	4	10
1566	Grant, Minnesota	5	30
1571	Dunn, N. Dakota	6	1
1611	Bottineau, N. Dakota	9	28
1617	Cavalier, N. Dakota	3	22
1619	Grand Forks, N. Dakota	8	27
1630	Mercer, N. Dakota	8	7
1636	Stutsman, N. Dakota	4	30
1656	Morton, N. Dakota	5	2
1661	McIntosh, N. Dakota	4	2
1664	Sargent, N. Dakota	7	29
1755	Jerauld, S. Dakota	6	20
1825	Norman, Minnesota	10	30
1835	Otter Tail, Minnesota	4	26
1909	Kidder N. Dakota	5	12
1920	Sioux, N. Dakota	9	28
1924	LaMoure, N. Dakota	4	29
1945	Valley, Montana	4	8
1948	Fergus, Montana	8	12
1974	Ransom, N. Dakota	8	23

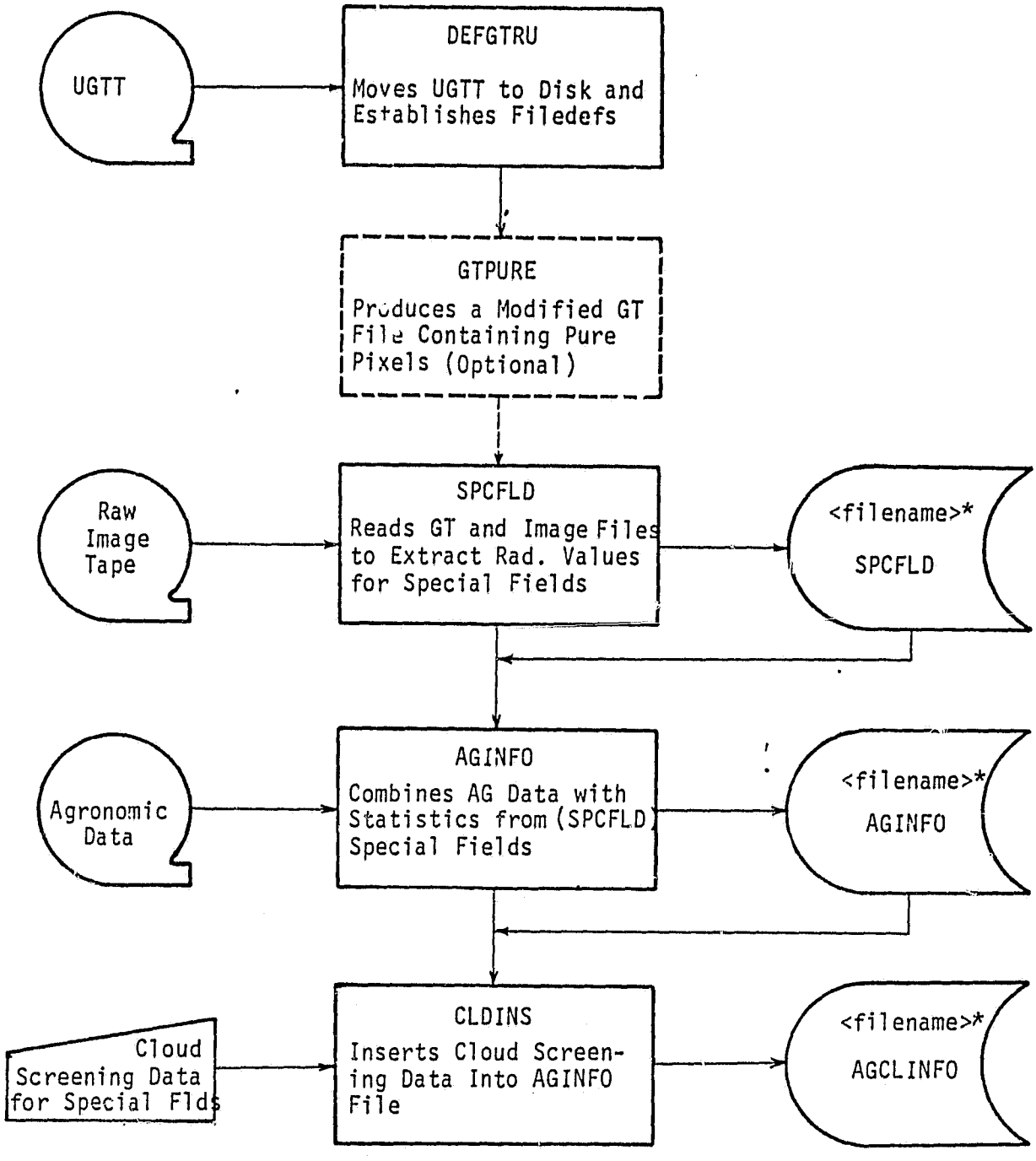

Figure 2-1. Flowchart of the Special Fields Extraction Programs Using Special Fields Data

*Four-digit segment number concatenated with two digits of crop year

Table 2-2. - Format of Data Base Files

Record	Columns	Format	Comments
1	1-4	I4	Segment number
	6-7	I2	Crop year
	9-10	I2	Number of acquisitons used
	13-14	I2	Number of special fields processed
	19-21	I3	X coordinate of first vertex of user defined field
	23-25	I3	Y coordinate of first vertex of user defined field
	30-32	I3	X coordinate of second vertex of user defined field
	34-36	I3	Y coordinate of second vertex of user defined field
	41-43	I3	X coordinate of third vertex
	45-47	I3	Y coordinate of third vetex
	52-54	I3	X coordinate of fourth vertex
	56-58	I3	Y coordinate of fourth vertex
2	13-17	I5	Sun angle for acquisition 1
	23-27	I5	Sun angle for acquisition 2
	.	.	.
	.	.	.
	.	.	.
	123-127	I5	Sun angle for acquisition 12
3	13-17	I5	Acquisition date 1
	23-27	I5	Acquisition date 2
	.	.	.
	.	.	.
	.	.	.
	123-127	I5	Acquisition date 12

Table 2-2. - (Continued)

Record	Columns	Format	Comments
4	13-17	I5	Landsat identification for acquisiton 1
	23-27	I5	Landsat identification for acquisiton 2
	.	.	.
	.	.	.
	.	.	.
	123-127	I5	Landsat identification for acquisition 12
5	1-2	I2	Field number of special field
	4-7	I4	Number of pure pixels in field
	10-17	F8.3	Mean of channel 1 of acquisition 1 for first field
	20-27	F8.3	Mean of channel 1 of acquisition 2 for first field
	.	.	.
	.	.	.
	.	.	.
	120-127	F8.3	Mean of channel 1 of acquisition 12 for first field
6	1-2	I2	Field number of special field
	4-7	I4	Number of pure pixels in field
	10-17	F8.3	Standard deviation of channel 1 of acquisition 1 for first field
	20-27	F8.3	Standard deviation of channel 1 of acquisition 1 for first field
	.	.	.
	.	.	.
	.	.	.
	120-127	F8.3	Standard deviation of channel 1 of acquisition 1 for first field

Table 2-2. - (Continued)

Record	Columns	Format	Comments
7	1-2	I2	Field number of special field
	4-7	I4	Number of pure pixels in field
	10-17	F8.3	Mean of channel 2 of acquisition 1 for first field
	20-27	F8.3	Mean of channel 2 of acquisition 2 for first field
	.	.	.
	.	.	.
	.	.	.
	120-127	F8.3	Mean of channel 2 of acquisition 12 for first field
8	1-2	I2	Field number of special field
	4-7	I4	Number of pure pixels in field
	10-17	F8.3	Standard deviation of channel 2 of acquisition 1 for first field
	20-27	F8.3	Standard deviation of channel 2 of acquisition 2 for first field
	.	.	.
	.	.	.
	.	.	.
	120-127	F8.3	Standard dev. of channel 2 of acquisition 12 for first field
9	1-2	I2	Field number of special field
	4-7	I4	Number of pure pixels in field
	10-17	F8.3	Mean of channel 3 of acquisition 1 for first field
	20-27	F8.3	Mean of channel 3 of acquisition 2 for first field
	.	.	.
	.	.	.
	.	.	.
	120-127	F8.3	Mean of channel 3 of acquisition 12 for first field

Table 2-2. - (Continued)

Record	Columns	Format	Comments
10	1-2	I2	Field number of special field
	4-7	I4	Number of pure pixels in field
	10-17	F8.3	Standard deviation of channel 3 of acquisition 1 for first field
	20-27	F8.3	Standard deviation of channel 3 of acquisition 2 for first field
	.	.	.
	.	.	.
	.	.	.
	120-127	F8.3	Standard deviation of channel 3 of acquisition 12 for first field
11	1-2	I2	Field number of special field
	4-7	I4	Number of pure pixels in field
	10-17	F8.3	Mean of channel 4 of acquisition 1 for first field
	20-27	F8.3	Mean of channel 4 of acquisition 2 for first field
	.	.	.
	.	.	.
	.	.	.
	120-127	F8.3	Mean of channel 4 of acquisition 12 for first field
12	1-2	I2	Field number of special field
	4-7	I4	Number of pure pixels in field
	10-17	F8.3	Standard deviation of channel 4 of acquisition 1 for first field
	20-27	F8.3	Standard deviation of channel 4 of acquisition 2 for first field
	.	.	.
	.	.	.
	.	.	.

Table 2-2. - (Continued)

Record	Columns	Format	Comments
	120-127	F8.3	Standard deviation of channel 5 of acquisition 12 for first field

Cards 5-12 are repeated for each special field processed for N fields

Record	Columns	Format	Comments
8N+5	1-2	I2	Field number
	17	I1	Analyst quality code - acq. 1
	27	I1	Analyst quality code - acq. 2
	37	I1	Analyst quality code - acq. 3
	.	.	.
	.	.	.
	.	.	.
	127	I1	Analyst quality code - acq 12

Card 8N+5 is repeated for each special field processed for N fields

Record	Columns	Format	Comments
9N+5	13-17	I5	Acq. date 1 from Ag. file
	23-17	I5	Acq. date 2 from Ag. file
	33-17	I5	Acq. date 3 from Ag. file
	.	.	.
	.	.	.
	.	.	.
	123-127	I5	Acq. date 12 from Ag. file

Table 2-2. - (Continued)

Record	Columns	Format	Comments
9N+6	1-2	I2	State code
	5-8	I4	Segment number
	10-12	I3	Field number
	14-15	A2	Crop code
	17-19	I3	Planting date
	21-23	I3	Emergence date
	25-27	I3	Contact date in field
	29-31	I3	Harvest date
	33-36	I4	Acres planted
	38-41	I4	Acres harvested
	43-47	I5	Seeding rate
	49	I1	Seeding unit
	51-54	I4	Production/acre
	56-60	I5	Production/field
	62	I1	Production unit
	64	I2	Irrigated (yes-no)
	66-67	I2	Percent moisture
	69-70	A2	Row direction
	72-73	I2	Row width
	75-76	A2	Harvest method
	78	I1	Pesticide used
	80-83	I4	Pounds fertilizer/Acre-First Application
	85-86	I2	% Nitrogen
	88-89	I2	% Phosphate
	91-92	I2	% Potash
	94-97	I4	Pounds fertilizer/Acre-Second Application
	99-100	I2	% Nitrogen
	102-103	I2	% Phosphate

Table 2-2. - (Continued)

Record	Columns	Format	Comments
	105-106	I2	% Potash
	108-109	A2	Previous use
	111	I1	Second crop in field
	113-114	A2	Second crop code
9N+7	15-17	I3	Observation date 1
	25-27	I3	Observation date 2
	35-37	I3	Observation date 3
	.	.	.
	.	.	.
	.	.	.
	125-127	I3	Observation date 12
9N+8	16-17	I2	Canopy height - observ. date 1
	26-27	I2	Canopy height - observ. date 2
	36-37	I2	Canopy height - observ. date 3
	.	.	.
	.	.	.
	.	.	.
	126-127	I2	Canopy height - observ. date 12
9N+9	16-17	I2	Ground cover code percentage - observ. 1
	26-27	I2	Ground cover code percentage - observ. 2
	36-37	I2	Ground cover code percentage - observ. 3
	.	.	.
	.	.	.
	.	.	.
	126-127	I2	Ground cover code percentage - observ. 12
9N+10	15-17	I3	Growth stage - observ. 1
	25-27	I3	Growth stage - observ. 2
	35-37	I3	Growth stage - observ. 3
	.	.	.
	.	.	.
	.	.	.
	125-127	I3	Growth stage - observ. 12

Table 2-2. - (Continued)

Record	Columns	Format	Comments
9N+11	16-17	I2	Canopy color code - observ. 1
	26-27	I2	Canopy color code - observ. 2
	36-37	I2	Canopy coler code - observ. 3
	.	.	.
	.	.	.
	.	.	.
	126-127	I2	Canopy color code - observ. 4
9N+12	17	I1	Surface moisture code - observ. 1
	27	I1	Surface moisture code - observ. 2
	37	I1	Surface moisture code - observ. 3
	.	.	.
	.	.	.
	.	.	.
	127	I1	Surface moisture code - observ. 12
9N+13	17	I1	Weediness code - observ. 1
	27	I1	Weediness code - observ. 2
	37	I1	Weediness code - observ. 3
	.	.	.
	.	.	.
	.	.	.
	127	I1	Weediness code - observ. 12
9N+14	17	I1	Disease damage code - observ. 1
	27	I1	Disease damage code - observ. 2
	37	I1	Disease damage code - observ. 3
	.	.	.
	.	.	.
	.	.	.
	127	I1	Disease damage code - observ. 12
9N+15	17	I1	Insect damage code - observ. 1
	27	I1	Insect damage code - observ. 2
	37	I1	Insect damage code - observ. 3
	.	.	.
	.	.	.
	.	.	.
	127	I1	Insect damage code - observ. 12

Table 2.2 - (Concluded)

Record	Columns	Format	Comments
9N+16	17	I1	Hail damage code - observ. 1
	27	I1	Hail damage code - observ. 2
	37	I1	Hail damage code - observ. 3
	.	.	.
	.	.	.
	.	.	.
	127	I1	Hail damage code - observ. 12
9N+17	17	I1	Lodging damage code - observ. 1
	27	I1	Lodging damage code - observ. 2
	37	I1	Lodging damage code - observ. 3
	.	.	.
	.	.	.
	.	.	.
	127	I1	Lodging damage code - observ. 12

Cards (9N+6) - (9N+17) are repeated for each special field processed for N fields.

Table 2-3. - Analyst Cloud Screening Codes

Code	Description
0	Good data
1	Thin haze, fields still visible
2	Misregistered
3	Heavy haze
4	Bad data
5	Clouds/shadows

APPENDIX

Appendix

The computer listings for the data base are presented in this appendix.

NOTE: Copies of this document that contain the Appendix (computer listings) are limited to those individuals whose names appear without an asterisk(*) on the Distribution List. The computer listings for the data base are available upon request to the Lyndon B. Johnson Space Center, SG3, Houston, Texas 77058