SCAN LINES

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LARS PROJECT UPDATES

FULL-FRAME SAMPLING STUDY -- MARILYN HIXSON

During 1980, NASA sponsored a research project at LARS to assess the effect of separating the functions of sampling for training and sampling for area estimation.

A comparison of three methods for obtaining crop statistics over a large region was made. The first method used the statistics developed on one segment for classification; in the second method, pooled statistics for a stratum were used to classify all the segments within that stratum; and in the third method the pooled statistics from the sample segments in the stratum were used to classify a systematic sample of pixels in that stratum.

The sampling pixels throughout the region of interest provided the most accurate soybean estimates. This approach seems to merit further investigation using multitemporal data due to the potential variance reduction benefits. This activity is being pursued during the present contract year.

REMOTE SENSING APPLICATION OF RELAXATION TECHNIQUES -- DAVID LANDGREBE

Relaxation techniques are iterative calculation procedures which have been used in the picture processing field for noise removal (cleaning) in digital pictures. This is accomplished by utilization of expected

Prepared by the Laboratory for Applications of Remote Sensing for distribution at Purdue. Contact Susan Ferringer, SCAN LINES editor, to be placed on the mailing list (749-2052, ext. 290).

spatial consistency between neighboring pixels.

In the current work being conducted at LARS, under NASA sponsorship, relaxation techniques are being studied for use with remote sensing data. In addition to neighborhood spatial consistency they are being adapted to user pixel class likelihood and other ancillary data such as elevation as additional information sources for improving classification accuracy. So far they show considerable promise for utilizing information from such sources, whose information may typically contain ambiguity, and appear able to provide significant increases in accuracy over pixel classifiers by themselves.

DETERMINATION OF OPTIMAL LEVEL FOR COMBINING AREA AND YIELD ESTIMATES -- MARILYN HIXSON

The eventual aim of crop inventory studies is production estimation, not area or yield estimates alone. Production estimates can be made only at a level where area and yield strata intersect. The variance of the production estimates is dependent upon the means and variances of both area and yield in the stratum. Thus, it is important that the stratifications for area and yield estimation be coordinated, and that the levels for aggregation be selected so that acceptable variances are obtained.

The overall objective of a current research task at LARS, being sponsored by NASA, is to determine the optimal level for combining area and yield estimates of corn and soybeans. Production estimates and their variances are being computed for several levels of area and yield estimates. The estimates and their precisions will then be compared. This task should be completed early in the year.

TRAVEL LOG

MARION BAUMGARDNER met with officials from NOAA, USDA, and NASA in Washington D.C. on January 12-13.

From January 12 to February 6, LARS personnel were at Johnson Space Center (JSC) in Houston to help with the installation of Systems Software, to provide users training, and to train computer operators. Providing these services were ROSS GARMOE, PETER JOBUSCH, KAY HUNT, LUKE KRAEMER, JAMES COCHRAN and CAROL McKIEL.

On January 15-19, MARION BAUMGARDNER attended the Annual Winter Meeting for UMCOR in Port su Prince, Haiti.

ROGER HOFFER attended the ASAE Long Range Planning Conference in Chicago, January 18-20, to develop a better understanding of some of the key elements involved in long range planning and effective methodologies to use in the long range planning activity. Roger is present chairman of the National Long Range Planning Committee of ASP.

BARRETT ROBINSON attended a NASA sponsored meeting to discuss specifications for data loggers with manufacturers. The meeting was held in Logan, Utah on January 20-21.

ERIM hosted LARS staff MARVIN BAUER, CRAIG DAUGHTRY and VERN VANDERBILT on January 27-28 for discussion and planning toward the development of corn and soybean development stage data as input to crop identification by ERIM.

MARVIN BAUER met with representatives from Kansas State, Oregon State, South Dakota State and Pan American universities, as well as representatives from NASA/JSC, to plan small grains field research. The meetings were held on January 29-30 at JSC in Houston.

A NASA briefing on Landsat-D to be held in Washington on February 10-11 will be attended by DAVID LANDGREBE.

On February 12-13, NASA/JSC will host a Corn-Soybean Research presentation to be fiven by MARVIN BAUER, DON HOLT, MARILYN HIXSON, and VERN VANDERBILT.

A Thematic Mapper Workshop to be held in Silver Springs, Maryland on February 23 will include presentations by PHIL SWAIN and ROGER HOFFER.

VISITORS

Rick Kooi and Rich Holtje from Lockheed were at LARS from January 5-9 to gain experience in computer operations form MIKE COLLINS and CAROL McKIEL.

On January 13, George Foster and Jerry Nowlin from Agricultural Engineering visited LARS to discuss computational needs of the Soils Erosion Lab, and to tour the LARS facility.

Bill Phingston received an introduction to the LARS computer facility during his visit on January 14. Mr. Phingston is from the Indiana Department of Natural Resources.

Earl Merritt from Earth Satellite Corp. was hosted at LARS by MARVIN BAUER on February 3-4, to participate in an interchange of ideas and project development on use of spectral data as inputs to crop growth and yield predictions.

PAUL ANUTA will be hosting Murray Pierson from DMA in Washington, D.C. on February 10-11 for discussion of change detection evaluation.

VISITORS (CONT')

On January 22, participants in China's Proposed University Development Project visited LARS to discuss computer hardware for remote sensing applications. The project participants, hosted by MARION BAUMGARDNER, and DAVID LANDGREBE included:

Prof. Liu Ying	Vice President of Central China Institute of Technology
Prof. Peng Ze-min	Mechanical Engineering Dept. Tianjin University
Assoc. Prof. Shen Wu	Engineering Mechanics Dept. Dalian Institute of Technology
Mr. Yang Hong-sen	Lecturer of Metallic Materials Dept. Xian Jiaotong University
Mr. Sing-Zak Sung	Senior Technical Educator World Bank, Washington, D.C.
Mr. Xin Ye-Jiang	

Dan Kotter from NOAA will be at LARS on February 12 to discuss CORSE-81 plans with SHIRLEY DAVIS.

NEW PROJECTS FUNDED

Title: "Offering Training Courses in Remote Sensing"
Sponsor: Corp. of Engineers
P.I.: L. Bartolucci & S. Davis
Duration: 2/1/81 - 9/30/81

Title: "Computer Cupport for IDNR"
Sponsor: IDNR
P.I.: R.P. Mroczynski
Duration: 9/15/80 - 6/16/81

Title: "Elk River Landstat Data Set"
Sponsor: Lockheed
P.I.: B.C. Kozlowski
Duration: 12/10/80 - 3/1/81

SYSTEM SERVICES February 16, 1981

CMS SHORT COURSE AT JSC BY KAY HUNT

Purdue/LARS will be conducting a CMS Training Course at JSC late in the first quarter of 1981. Tentatively the topics to be covered include: CMS commands, CP commands, EDIT commands, EXEC writing, SAS, RT&E data base, SCRIPT commands, IMSL, Graphics, and Programming considerations. Users should contact Jimmy Gilbert at JSC to request specific subjects to be presented and to sign up for the course.

RT&E DATA BASE BY LUKE KRAEMER

The RT&E Data Base and its associated software were successfully installed on the new AS/3000 at JSC. All software on the AS/3000 is identical to the LARS version. Three new capabilities added to the data base will enhance the dual system:

1) The data base software will detect which system (JSC or LARS) the user is on and will return and/or request the proper tape number for that site. If data is requested that resides at the other installation then the negative of that tape location is returned.

2) The Subset query processor now can search on the JSC tape number. That variable is defined as 'JTAPE'. For example, to find all acquisitions on JSC tape number 78051, the proper Subset query would be:

```
JTAPE .EQ. 78051
```

3) Subset also enables a user to query on the location or site of data. The variable is 'SITE' and the options are 'JSC', 'LARS', or 'BOTH'. If a user is only interested in data on the JSC machine then the proper query would be:

```
SITE .EQ. JSC
```

As on the LARS computer, the Image, Dot, and Ground Truth portion of the RT&E Data Base is stored on the JSCDISK 19A. The Subset query processor is located on the JSCDISK 19B. The documentation found in the LARS CMS Short Course Manual and the LARS RT&E Data Base tape/slide module are valid for the AS/3000 system. Periodically check SRTNEWS for updates to this documentation. All questions concerning the RT&E Data Base should be directed to LUKE KRAEMER or JIM COCHRAN (LARS) at 317-749-2052.

OPERATIONS NEWS BY CAROL McKIEL

TAPE PURCHASES

Any persons requesting a purchase of tape in quantities of 40 or more should submit such requests 60 days in advance of need. This should insure that operations will be able to fill the request. Please submit requests to either MIKE COLLINS or CAROL McKIEL.

PRINT FILES

Any print files larger than 20,000 lines and which are being printed during the first shift may be saved and printed during the second or third shift if there are several other print files. If there is a large, important file that needs to be printed immediately, check with Mike or Carol to make arrangements.

CREDIT FOR COMPUTER TIME LOSS DUE TO SYSTEM OR OPERATOR FAILURE

Users requesting credit for computer time because of a system failure or operator failure must turn the request in within 2 working days of the failure.

The request must contain the exact date and time of the problem, the user's ID, the product times (i.e. Computer Services, Priority Services), and the account which needs to be given credit. If this information is not accurate the credit will not be successfully processed through the accounting system.

Requests for credit received later than 2 days from the time of failure may not be processed due to the increased difficulty in obtaining the needed information.

SPECIAL INSTRUCTIONS FOR NIGHT BATCH JOBS

If a user has special instructions for a job that will run in a night batch machine, the instructions must be left at the operator's console or given to MIKE COLLINS or CAROL McKIEL in written form.

The night machines may be brought up as soon as 18:00 if the system is slow. For this reason instructions must be made available to both the second and third shift.

DATA 100 OUTPUT

The operators in Flexlab 2 are now filing into user's boxes any output found in the box on the DATA100 at noon and 5:00 p.m. daily. Output will continue to be filed during the midnight shift.

It has also been requested that people using the DATA100 in Flexlab 2 separate output and place it in the box provided on the DATA100, rather than leave the output in the basket behind the machine.

SAS TAPE/SLIDE MODULE BY KAY HUNT

The SAS tape slide module has been distributed and is available for use. Users should contact the following designated people for access of the tape, slides, and notes.

User Location	Contact
JSC	Jimmy Gilbert
ERIM	Dan Rice
ISU	Paul Mausel
Alabama A&M	Oscar Montgomery
Flexlab I	Carol Jobusch
Flexlab II	Joan Buis

COMTAL NEWS BY DAVE FREEMAN AND SHIRLEY DAVIS

The Second Comtal User's Conference is scheduled for Friday, March 3, 1981 at 11:00 a.m. during the Friday technical discussion time. All who now use or hope to use the Comtal are encouraged to attend to hear about project developments and plans, exchange information with other users, and help prioritize future developments. Instructions to help new users get on the system will be available, and new system capabilities will be demonstrated. Plan to attend this meeting in Flex II.

In case you missed it in the holiday frenzy, last month's Scanlines contained a "quick-reference page" for Comtal Condensed Command Language, a listing in alphabetical order of the commands (and related parameters) that are implemented in the LARS system. Other vital information for users is also there in quick-reference format, such as operations assigned to function switches and function keys, the graphic colors available and how to request them.

Numerous system upgrades have been underway during this quarter:

1. Tape drive bids have been returned and a drive was selected -- a Cipher 900X dual density (800/1600 bpi) with a Western Peripherals TC 131 single board controller. While price was important, the favorable reputation of Cipher equipment, its gentle, intelligent hardware tape handling characteristics, and the recommendation and knowledge of hardware engineer GARY BRAMMER determined its selection. The drive is due to arrive during February 1981.

2. A plan for generating an updated operating system for the PDP, RSX-11M V3.2, has been made and carried out. This system generation is required in order to integrate the tape drive hardware and HASP software with the PDP. Tape-driver software being implemented includes PDP versions of TAPOP,

GADLIN, GADRUN, and CTLWRD. Tape mount messages will be sent directly to the IBM operator's console. JEFF WELCH is carrying out these programming tasks. The tape drive and PDP mini-computer is scheduled to be moved into the computer room by April 1981.

3. DAVE FREEMAN is now working on acquiring the FORTRAN IV PLUS compiler, which will make more complete use of the PDP hardware, will allow more flexible implementation of FORTRAN IV PLUS programs. An example of this is the recently acquired software for displaying classification results on the COMTAL.

4. HASP software to improve data link access has been ordered. Functional specification for its implementation was made in January and installation should be completed during February.

5. The installation of HASP and the refinement of existing software will dramatically improve users' ability to create files of field boundaries and check points. An initial program, L12, was designed and will be revised to operational standards by the end of February. L12 allows users to generate field boundary cards, per LARSYS USER DOCUMENTATION, and to edit them during an interactive display session. This initial program will be revised to take advantage of HASP so that files may be sent directly to the IBM upon completion of the COMTAL session.

6. The ability to display LARSYS classification results files will be closer to reality once the FORTRAN IV PLUS compiler is installed. Software acquired from St. Regis and written in FORTRAN IV PLUS will form the basis of this capability. Documentation efforts will begin as soon as conversion is complete.

7. A camera hood has been fabricated by VIC FLETCHER to help in taking slides of the screen. This hood, approximately 5 feet long, fits tightly on the COMTAL case and extends to receive a tripod-mounted camera. It is no longer necessary to close the curtains to reduce glare when making photographs.

8. Creating Varian output from COMTAL image files is being investigated, in particular, use of the COMTAL array processors to generate these Varian files. Implementation and documentation will begin during the third quarter and be completed during the following quarter.

9. PHIL SWAIN and a student from EE are investigating ways to implement image processing (such as a simplified clustering algorithm) on the PDP as a complement to the COMTAL.

As new techniques are developed, user documentation will be prepared and distributed to users. Currently a series of Technical Memoranda are scheduled to complement the notes in Scanlines. In addition, Users' Meetings will be scheduled as needed.

One final new development is word of acceptance of our proposal to COMTAL to fund the development of an educational module designed to intro-

duce new users to the system. The module, which will be used by students in a hands-on mode, will combine slides, printed materials, and a cassette tape to lead students through basic image manipulation on the COMTAL VISION ONE/20. Work will begin on this project in early March with a completion date of the end of July.

SEND AND RECEIVE EXECS TO TRANSMIT FILES TO/FROM JSC AND LARS

The send exec is used to transfer CMS disk files to userid's at the other system in the network (e.g. from LARS to EODL). The format of the send command is:

SEND USERID LISTFILE-OPTIONS

where 'USERID' is the userid at the other node to receive the files and 'LISTFILE-OPTIONS' is any set of parameters for the listfile command compatable with 'EXEC PRE 2 SUFF 0 FMODE'. If none are given, the currently accessed 'A' disk will be transferred. Users unfamiliar with the listfile command should type 'HELP LISTFILE' for an explanation of possible parameter lists for use in the send command. The left parenthesis is not entered.

Upon completion of the execution of the send command, the user's virtual card punch (00D) will have been remote'd to the site indicated by the where command. The routing of the virtual printer is not altered.

The receive command is used to receive files sent from other users in the network via either the 'DISK DUMP' or 'SEND' commands. The format of the receive command is:

RECEIVE SPOOL-FILE-NUMBER MINI-DISK-ADDRESS

where 'SPOOL-FILE-NUMBER' is the number of the file in the user's virtual card reader (as determined by, e.g., the 'QUERY READER' command) and 'MINI-DISK-ADDRESS is the address (e.g. 191, not the access mode letter 'A') of the mini-disk on which the user wishes to place the files being received. Any selection of a subset of CMS files to be placed on separate mini-disks should be made either when the files are sent with the 'SEND' or 'DISK DUMP' commands, or after having been received to one disk and copied to another.

Upon completion of the receive command the user's virtual card reader (00C) is spooled nohold, class '*'. The mini-disk specified will be accessed as the 'A' disk.

FLEX I USER CONSULTING

In the past, System Services has provided a user consultant in the Flex I User's Area every Tuesday morning from 10:00 a.m. to noon. A survey was taken recently to determine the optimal time for this consulting activity and the results indicate that this service should continue on Tuesdays at the same time. In addition to the Tuesday consultant, JIM COCHRAN will be stationed at Flex I on Mondays, Wednesdays and Thursdays from 8:30 a.m. to noon. He is available to help with user problems and can be reached at Ext. 245.

SUMMARY OF 3031 COMPUTER USAGE FOR DECEMBER 1980

OVERALL USAGE

Basic Rate CPU Time Used	46.43
Priority Rate CPU Time Used	133.23
Total CPU Time Used	179.66
Terminal Sessions	7128
Batch Jobs	827

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	35.65	21
Mon-Fri 8AM-4PM	77.91	47
Mon-Fri 4PM-midnite	43.09	28
Weekend	23.01	19

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	129	0.12	0.03
BATSHORT	60	23.54	0.89
BATMED	52	16.65	2.30
BATONITE	208	36.07	2.20
BATLONG	46	53.73	9.28
TAPTRAN	4	36.47	0.82
BATEOD	64	34.79	5.54
BATJSC	211	44.83	8.33

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	GTX	281	130.91	0.47
	31	GTX	243	154.92	0.64
	32	GTX	135	56.64	0.42
	33	GTX	277	151.61	0.55
	34	GTX	177	136.89	0.77
	35	GTX	309	196.99	0.64
	36	GTX	322	144.73	0.45
	37	DECwriter	137	82.45	0.60
	38	Tektronix	201	99.17	0.49
	39	CRT	193	75.65	0.39
	3A	GTX	12	1.28	0.11
Flexlab1	40	GTX	197	137.79	0.70
	41	GTX	207	180.79	0.87
	42	GTX	181	132.22	0.73
	43	DECwriter	156	98.59	0.63
Dial-Up	50	1st in Use	102	117.51	1.15
	51	2nd in Use	23	34.50	1.50
	52	3rd in Use	4	4.18	1.04
	53	4th in Use	1	0.20	0.20
	54	5th in Use			
	55	In-House-1	56	40.19	0.72
	56	In-House-2	57	36.01	0.63
St. Regis	4A	DECwriter			
Alabama	4B	DECwriter	3	0.48	0.16
	4C	GTX	6	9.11	1.52
	4D	GTX	11	10.69	0.97
ISU	4E	(various)	24	17.11	0.71
	4F	(various)	114	51.12	0.45
Houston	60	CRT	220	163.26	0.74
	61	CRT	257	162.65	0.63
	62	Trenddata	263	208.50	0.79
	63	Trenddata	220	147.09	0.67
	64	CRT	169	120.98	0.72
	65	CRT	241	187.09	0.78
	66	CRT	292	215.25	0.74
	67	CRT	237	88.80	0.37
	68	CRT	257	185.28	0.72
	69	CRT	183	154.74	0.85
	6A	Dial-up	180	148.58	0.83
	6B	Dial-up	148	109.08	0.74
	6C	Dial-up	193	181.70	0.94
	6D	Dial-up	177	117.61	0.66
	6E	Dial-up	117	102.29	0.87
	6F	Dial-up	103	85.89	0.83

SUMMARY OF 3031 COMPUTER USAGE FOR JANUARY 1981

OVERALL USAGE

Basic Rate CPU Time Used	60.82
Priority Rate CPU Time Used	158.65
Total CPU Time Used	219.47
Terminal Sessions	8036
Batch Jobs	812

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	44.19	28
Mon-Fri 8AM-4PM	86.03	54
Mon-Fri 4PM-midnite	62.55	39
Weekend	26.69	16

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	90	0.28	0.04
BATSHORT	48	12.31	0.55
BATMED	43	21.00	1.26
BATONITE	158	30.77	2.05
BATLONG	19	90.48	45.81
TAPTRAN	15	16.42	0.81
BATEOD	77	17.35	2.28
BATJSC	237	50.08	9.33

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	GTX	213	72.20	0.34
	31	GTX	245	167.70	0.68
	32	GTX	138	35.46	0.26
	33	GTX	270	170.29	0.63
	34	GTX	256	190.47	0.74
	35	GTX	288	184.75	0.64
	36	GTX	269	187.34	0.70
	37	DECwriter	94	46.89	0.50
	38	Tektronix	177	140.26	0.79
	39	CRT	226	89.55	0.40
	3A	GTX	5	2.82	0.56
Flexlab1	40	GTX	234	168.19	0.72
	41	GTX	189	153.66	0.44
	42	GTX	246	146.14	0.59
	43	DECwriter	184	101.99	0.81
Dial-Up	50	1st in Use	99	73.42	0.74
	51	2nd in Use	20	13.55	0.68
	52	3rd in Use	5	3.73	0.74
	53	4th in Use	3	1.45	0.48
	54	5th in Use			
	55	In-House-1	76	31.79	0.42
	56	In-House-2	70	40.14	0.57
St. Regis	4A	DECwriter			
Alabama	4B	DECwriter	29	7.10	0.24
	4C	GTX	76	84.92	1.12
	4D	GTX	59	67.52	1.14
ISU	4E	(various)	77	16.38	0.21
	4F	(various)	62	37.93	0.61
Houston	60	CRT	296	221.97	0.75
	61	CRT	315	219.80	0.70
	62	Trenddata	231	144.84	0.63
	63	Trenddata	272	182.61	0.67
	64	CRT	303	143.45	0.47
	65	CRT	294	140.58	0.48
	66	CRT	245	126.42	0.52
	67	CRT	282	113.93	0.40
	68	CRT	224	215.47	0.96
	69	CRT	177	168.28	0.95
	6A	Dial-up	169	140.31	0.83
	6B	Dial-up	131	126.49	0.97
	6C	Dial-up	204	161.41	0.79
	6D	Dial-up	151	148.57	0.98
	6E	Dial-up	169	125.18	0.74
	6F	Dial-up	138	100.16	0.73

INTRALAB NOTES

PERSONNEL CHANGES

STEVE HOLLINGER joined our LARS staff as an Agronomy Research Associate. Steve will be working under MARVIN BAUER's supervision in the Crop Inventory Research Group. He will be working on research and development of the utilization of remotely sensed data for estimating crop growth, development and yield.

MARILYN HIXSON, who joined LARS in 1967, has been promoted to Senior Research Analyst. She is responsible for crop inventory sampling research and the large area test and evaluation component of our corn-soybean project. Marilyn previously served as project manager for the Landsat Crop Inventory project.

GLENDA BAUER, secretary for the Director's Office, was recently promoted to Secretary IV.

RONG-JEN PAN joined LARS staff as a Software Analyst in January. She will be working under PETER JOBUSCH's supervision.

ROSS AIKEN recently accepted a Application Programmer I position at LARS, and will be working under ROSS GARMOE's supervision.

MINI-LARSIANS

Congratulations and best wishes are extended to Donna and LARRY BIEHL who recently became parents of yet another son. Steven Lee was born on February 3, 1981 and weighed 9 lbs., 11 oz.

Best wishes and congratulations are also extended to Jim and SUE FERRINGER, who are now parents of a daughter. Morgan Elizabeth was born on February 6, 1981, and weighed 7 lbs., 12 oz.

JSC OPERATIONS BULLETIN

For informational purposes and notification of major DTL operational events, JSC has begun publishing an "Operations Bulletin" by exception or notification on such items as operational events and procedures, System Management notifications, and scheduled Facility and Systems impacts. LARS personnel currently receiving this publication are M. Collins, R. Garmoe, P. Jobusch, J. Kast and L. Kraemer.

PROPOSALS SENT OUT

Title: "Integration & Analysis Techniques for Multi-type Geophysical Remote Sensing Data"
Sponsor: Sun Corporation
P.I.: P. Anuta & D. Levandowski
Duration: 6/1/81 - 5/31/83

Title: "Pattern Recognition Techniques for Exploration Seismic Signals"
Sponsor: NSF
P.I.: P. Anuta
Duration: 9/1/81 - 8/30/82

Title: "The Relationship of Sensor Parameters to Applications Data Analysis"
Sponsor: NASA
P.I.: D. Landgrebe
Duration: 1/1/81 - 12/31/81

Title: "Evaluation of SLAR and Simulated Thematic Mapper MSS Data for Forest Cover Mapping Using Computer-Aided Analysis Techniques"
Sponsor: NASA
P.I.: R. Hoffer
Duration: 3/1/81 - 11/30/81

SPECIAL AWARDS AND HONORS

Dr. STEVAN J. KRISTOF, research agronomist, was recently informed of his acceptance as a member of the council for Remote Sensing and Photo-interpretation of the Yugoslav Academy of Sciences and Arts. Dr. Kristof was unanimously accepted into membership at the Academy's meeting of October 16, 1980.

RICHARD MROCZYNSKI has been awarded the Johnson Space Center Certificate of Appreciation for his technical leadership in both the developmental and implementation activities of the Forest Resource Information System for the St. Regis Paper Company. He was presented with the certificate on January 9, 1981 by DAVE LANDGREBE on behalf of Christopher C. Kraft Jr., Director of JSC.

RECENT JOURNALS IN THE LARS LIBRARY

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLVI December 1980 *Number 12*

COVER PHOTO — This airborne scanner image shows Anasazi Indian Pueblo ruins in Chaco Canyon National Monument in northwestern New Mexico. The Pueblo Bonito ruin, outlined in white on the right-hand side, has been digitally enlarged and displayed at the left. The image, recorded by a Bendix MSS multispectral scanner, shows many individual rooms and circular kivas (ceremonial structures within the ruin). Submitted by the Technology Application Center, University of New Mexico, Albuquerque.

TECHNICAL ARTICLES

SOCIETY AFFAIRS

JOURNAL AFFAIRS

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLVII January 1981 *Number 1*

COVER PHOTO — Aerial photograph of Washington, D.C., provided by the National Ocean Survey. The gull-wing shaped building in the upper left of the photograph is the Washington Hilton, site of the 1981 ASP-ACSM Annual Convention. North is diagonal to the upper left. The photograph, taken with a 6-inch focal length Wild RC 8 camera from a flying height of 17,000 feet, has been enlarged to a scale of approximately 1:12,000.

TECHNICAL ARTICLES

SOCIETY AFFAIRS

JOURNAL AFFAIRS

IBM Journal of research and development

Vol. 25, No. 1, pp. 1-104, January 1981

ISSN 18 8646. Printed in U.S.A.

SCAN LINES

LARS • Purdue University • Vol. 7 • No. 2 • March 27, 1981

SPRING CONFERENCES PLANNED

The Laboratory for Applications of Remote Sensing is playing a major role in the coordination and presentation of several conferences to be offered this spring. Some of them are summarized below.

Many of these conferences are tailored for specific groups, such as educators, managers, or scientists and engineers, and the level of information they are designed to communicate ranges from general introductions to advanced training in specific subjects. But these diverse meetings maintain a common goal: to provide education in an effort to advance and promote remote sensing technology and its applications.

REMOTE SENSING MANAGERS COURSE

On April 14-16, LARS will be hosting a Remote Sensing Managers course designed for the U.S. Army Corps of Engineers.

According to SHIRLEY DAVIS, Course Coordinator, the course is designed for managerial personnel who are, or will be, associated with the applications of remote sensing in areas where they have a decision-making responsibility.

Its objective is to familiarize the 19 participating managers with the language of remote sensing technology and to provide them with an understanding of the fundamental aspects of remote sensing, sensors, and application techniques.

Prepared by the Laboratory for Applications of Remote Sensing for distribution at Purdue. Contact Susan Ferringer, SCAN LINES editor, to be placed on the mailing list (749-2052, ext. 290).

ADVANCED DIGITAL PROCESSING COURSE

An Advanced Digital Processing course, designed for the U.S. Army Corps of Engineers is being presented by LARS, May 4-8, with JOAN BUIS as Course Coordinator.

The course will provide advanced training and "hands-on" experience in processing and analyzing multispectral scanner data.

The 17 participants will receive detailed instruction in hardware, software, and procedures for their use. They will work in a hands-on environment on subjects including: statistical analysis of Landsat data, image processing, geographic referencing, data base development and applications, and interactive analysis.

CONFERENCE ON REMOTE SENSING EDUCATION (CORSE-81)

The 1981 Conference on Remote Sensing Education (CORSE-81) will be hosted by the Laboratory for Application of Remote Sensing, May 18-22.

It is being co-sponsored by the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA).

The conference will bring together remote sensing educators from across the country, for the fruitful exchange of information, and experience, in establishing and enhancing remote sensing instruction in institutions of higher education.

Presentations and panel discussions will focus on the concerns of remote sensing educators, including such topics as: Resources and Strategies for Teaching Remote Sensing, Low-Cost Digital Image Processing for Instruction, and The NASA/NOAA Role in Remote Sensing Education.

Tutorial workshops, to be held before and after the conference, will enable participants to increase their own understanding of the technology, and, in addition, to obtain materials and observe educational approaches that may be appropriate for their own courses.

For information about submitting papers and technical content of the conference or workshops, please contact: SHIRLEY DAVIS, Conference Co-Chairman, Laboratory for Applications of Remote Sensing, 1220 Potter Drive, West Lafayette, IN 47906 (317) 749-2052.

For information concerning registration and facilities, please contact: Linda Couchon, Conference Coordinator, Conference Administration, Stewart Center, Purdue University, West Lafayette, IN 47907 (317) 749-2533.

INTERNATIONAL SYMPOSIUM ON MACHINE PROCESSING OF REMOTELY SENSED DATA

The Seventh International Symposium on Machine Processing of Remotely Sensed Data will be held June 23-26 at Stewart Center, Purdue University.

This symposium, co-sponsored by LARS, Purdue University and several other organizations, will explore the state-of-the-art of machine processing of remotely sensed data, particularly as related to forest, range and wetland assessment.

Invited and contributing investigators from various universities, government agencies, and industries -- both domestic and international -- will present their findings in areas including: Forest Cover Classification, Agronomic, Geologic, and Rangeland and Land Use Applications of Remote Sensing, Forest Resource Information, Image Data Modeling and Analysis, and Georeference Information Systems.

While the Technical Sessions of the symposium have been filled by those responding to the Call for Papers, additional Poster presentations are still welcome. Investigators who feel their subject is related to the areas under consideration, but whose work was not completed at the earlier Call, may contact DOUG MORRISON for details at LARS, 1220 Potter Drive, West Lafayette, IN 47906 (317) 749-2052.

KEY ISSUES IN THE MACHINE ANALYSIS OF REMOTE SENSING DATA WORKSHOP

A workshop on "Key Issues in the Machine Analysis of Remote Sensing Data" will be held at Purdue University, June 22-23, 1981, in conjunction with the Purdue/LARS sponsored symposium on machine processing of remotely sensed data.

The objectives of this workshop are:

1. To assemble experts in remote sensing and related information-processing and image-processing technologies for the purpose of making an up-to-date assessment of the state-of-the-art of machine analysis of remote sensing data.
2. To determine the nature of the key research problems remaining as barriers to broader and more effective use of machine analysis of remote sensing data.
3. To produce a report for use by interested researchers and potential research sponsors detailing the findings and recommendations of the workshop participants.

Invitations to participate in the workshop will be extended to fifteen-to-twenty well-established scientists and engineers in remote sensing from universities, research institutions, industry and government. Additional registrants will be accepted up to a total of forty. Emphasis will be on interactive discussion of key issues concerning the current state of the technology and its future advancement.

More information about the workshop will be contained in the preliminary program of the machine processing symposium. In the meantime, inquiries may be addressed to the workshop organizer, PHIL SWAIN, or the workshop coordinator, SHIRLEY DAVIS, at LARS, 1220 Potter Drive, West Lafayette, IN 47906 (317) 749-2052.

VISITORS

Fifteen students from the Schools of Engineering visited LARS in February for a tour and briefing as a part of an Open House of Engineering Laboratories, on the occasion of National Engineers Week. Professor LEROY SILVA and DAVE LANDGREBE conducted the tour.

DOUG MORRISON hosted twenty-six students from Sue Kupka's Agricultural course on Landscape Architecture, on February 16.

Several Corps of Engineers employees were hosted by SHIRLEY DAVIS and DOUG MORRISON on March 23-27 to attend the Short Course and visit LARS.

C. G. Borg, head of the Swedish Remote Sensing Program for Swedish Space Corporation, visited LARS on March 23 to discuss remote sensing research topics for Landsat D.

DICK MROCZYNSKI hosted G. R. Barker at LARS on March 24-25 for St. Regis Conference planning.

Jean-Pierre Rogala from IBM in Paris was at LARS on March 25 for technical discussions with PHIL SWAIN and RICHARD WEISMILLER.

TRAVEL LOG

CAROL JOBUSCH attended the 6th Annual Statistical Analysis System (SAS) Users Group International conference on February 8-11. SAS users presented papers on a wide variety of topics including: statistics, graphics, interactive techniques, information systems, statistical consulting, and training and support.

On February 25, in Washington D.C., PAUL ANUTA and Professor Ed Mikhail co-chaired a meeting of the International Society of Photogrammetry (ISP) Working Group III, on Image Registration, Rectification and Enhancement. Goals of the group, and plans for a symposium in Helsinki in August, 1982, were discussed.

TRAVEL LOG (CONT')

LUIS BARTOLUCCI, SHIRLEY DAVIS and JOAN BUIS met with Jim Willis (Training Division, Huntsville, Alabama) and Ike McKim (Technical Monitor, Ft. Belvoir) of the U.S. Army Corps of Engineers, February 26-27. Plans for presenting three courses were reviewed during these meetings in Ft. Belvoir, Virginia.

DAVE FREEMAN and SHIRLEY DAVIS were in Altadena, California on March 3 to meet with Ron Clouthier, Harvey Raider and Harry Andrews of COMTAL. Plans for developing an instructional module for introducing new users to COMTAL VISION ONE/20 functions.

MARVIN BAUER, DON HOLT and STEVEN HOLLINGER attended a Biological Simulation Workshop in Gainesville, Florida on March 3-5.

SHIRLEY DAVIS attended the Professional Symposium on Technical Communications, organized by the Chicago Chapter of the Society for Technical Communication, in St. Charles, Illinois, March 14.

On March 16-20, PHILIP SWAIN was in Mexico City to present a portion of a short course on remote sensing data processing methods at the IBM Scientific Center.

PAUL ANUTA, MARVIN BAUER, MARILYN HIXSON and VERN VANDERBILT traveled to Johnson Space Center in Houston, Texas, to present LARS Quarterly Review for the National Aeronautics and Space Administration (NASA) on March 23-26.

MARION BAUMGARDNER traveled to Ferris State University in North Bend, Michigan on March 24, to speak at the University Convocation on World Hunger.

NEW PROJECTS FUNDED

Title:	"Develop an Instructional Module on Interactive Image Processing"
Sponsor:	Comtal/3M
Duration:	1/1/81-4/31/81
P.I.:	D. Freeman and S. Davis

SYSTEM SERVICES March 27, 1981

STATISTICAL SERVICES RATE CHANGE BY KAY HUNT

Effective April 1, 1981, the rate charged for the use of SPSS, SAS and SAS/GRAPH routines on the LARS computer will be reduced. New rates are indicated below. Questions or problems regarding Statistical Services should be directed to CAROL JOBUSCH.

TYPE OF USER	NEW RATE PER CPU HOUR
Internal	$ 150
Non-Profit Org.	210
Profit Org.	300

LARSYS NEWS BY KAY HUNT

Work continues on the converison of LARSYS and LARSYSDV to FORTRAN H. This work should be completed early in the fourth quarter of this year.

A "bug" was discovered in CHANNELTRANSFORMATION with using the algebraic equation cards. This has been fixed. Questions or problems with LARSYS or LARSYSDV should be directed to CHING LUE or KAY HUNT.

NEW BATCH SYSTEM AVAILABLE FOR TESTING BY TOM WILSON

For the past year, Basic Systems has been developing a new batch system to replace our current batch facilities. The new system is ready for user testing, and will be available around the end of April.

This batch system is a complete redesign, and offers many advantages over the system it will replace:

(1) Users will not have to know how to write EXEC's in order to run jobs in the new system. Instead, CMS commands, CP commands, and data will be placed in the job stream exactly as they would be typed at a console. This also means that character strings longer than eight characters will not be tokenized.

(2) Programs that were difficult or impossible to run in the old batch system will run in the new system. These include SAS, FORTRAN H Extended compiles, extensive editing sessions, and anything else that depends on the interval timer or non-tokenized data.

(3) Users will not have to know operational details of the batch system, such as how much memory each batch machine has, what its charge rate is, when it runs, etc. Memory size, time limit, charge rate, and other job characteristics are specified on job cards, and the batch system takes care of selecting a batch machine that meets your needs.

(4) An extensive user interface program, called "BATCH", will assist you you in creating and controlling your batch jobs. Its services include automatic generation of job cards (based on data you provide), verification that job cards contain valid data for the batch system before accepting your job, allowing you to use the CMS Editor to insert your own commands into the job, and insuring that the job has been accepted into the batch system before returning control to CMS. The BATCH command also allows you to change job card parameters after submitting a job, place a job on jold (as well as release the jold), and cancel a job before or during execution.

(5) The BATCH command is also a tutorial program. Although it will accept parameter lists in the command line, you may initiate almost any batch function just by typing "BATCH". BATCH will then prompt you for all the information it needs, beginning with which BATCH function you want to execute. Each time BATCH prompts you for input you may respond with "HELP" or "?" to obtain up to 20 lines of explanation telling what kind of information it would like you to enter.

A preliminary user's guide for the batch system is available in the file "NEWBATCH LISTING Y". Print a copy of this file for a complete explanation of the new system's currently implemented features.

WORD PROCESSING BY KAY HUNT

Efforts to increase the efficiency of work processing at LARS are underway. A Diablo printer has been ordered and will be placed in Flex Lab 1. This should alleviate the load on the Flex Lab 2 Diablo and produce better turnaround time for users from Flex 1.

Users should remember that it is the responsibility of the computer operator to change ribbons and print wheels. Carbon ribbons should only be used on final copies. It is not the responsibility of the computer operator to "babysit" the Diablo printer. If you need an operator to monitor your job, please contact MIKE COLLINS or CAROL McKIEL to request those services, which will be charged. Also, please remember that the Diablo is to be used as a printer, not a terminal.

SYLVIA JOHNSTON will be handling the printing of the Flex 1 secretarial and clerical staff printouts until the new Diablo for Flex 1 arrives.

SAS RELEASE 79.5 BY CAROL JOBUSCH

A test version of SAS 79.5 is now available on LARS' computer. To access the disk which contains the new version, use the command

GETDISK SAS795 .

New procedures include:

PROC REG - linear regression with many options. PROC REG:

* handles multiple MODEL statements,
* can use either correlations or crossproducts for input,
* prints predicted values, residuals, studentized residuals, and confidence limits, and can output these items to an output SAS data set,
* prints special influence statistics,
* produces partial regression leverage plots,
* estimates parameters subject to linear restrictions,
* tests linear hypotheses,
* tests multivariate hypotheses,
* writes estimates to an output data set,
* writes the crossproducts matrix to an output SAS data set,
* computes special collinearity diagnostics.

PROC FASTCLSU - disjoint clustering of large data sets using Hartigan's leader algorithm and MacQueen's k-mean algorithm.

PROC PRINCOMP - principal components analysis. PRINCOMP is faster and more convenient than PROC FACTOR and handles singular correlation matrices.

PROC RSREG - quadratic response surface regression.

PROC STEPDISC - discriminant analysis by forward selection, backward elimination, or stepwise selection.

PROC TRANSPOSE - transposition of a SAS data set.

PROC GCONTOUR - high resolution graphics contour maps.

PROC GMAP - high resolution graphics maps, including map data sets for the U.S. and Canada.

Documentation of these and other new features is in:

SAS 79.5 Changes and Enhancements, SAS Technical Report P-115

SAS/GRAPH User's Guide, 1981 Edition

Both books are available in the Flex 2 terminal area and in Carol Jobusch's office in Flex 1. We encourage everyone to use the new version. Please report any problems to CAROL JOBUSCH. We plan to make 79.5 the default version of SAS in April.

COMTAL USER NOTES BY DAVE FREEMAN AND SHIRLEY DAVIS

Required Format Changes in Image Files -- All COMTAL image files created before March 17, 1981 will need to be reformatted before they can be displayed on the COMTAL. This change is a result of developments in the file manager and the concomitant requirement that files going to the COMTAL be in the same format as files created by the COMTAL.

To reformat existing files, follow the instructions on PDP log message and run REIMGE (re-image). You will need to supply the input file name (and the device where it is stored, e.g. DBO of DB1) and the 9-character name of the output file (with its device). When multiple versions of the input file exist, the number of the version desired can be supplied; version numbers can not be assigned for the output file -- they are assigned by the processor. See the PDP log-in message for details. As example follows.

SAMPLE SYNTAX		ACTUAL EXAMPLE	
PROMPT	USER REPLY	PROMPT	USER REPLY
>	RUN DBO [4,41] REIMGE	>	RUN DBO [4,41] REIMGE
INPUT FILE:	DB1:Filename.Filetype; Version	INPUT FILE:	DB1:TOPO.FT;2
OUTPUT FILE:	DB1:Filename.Filetype	OUTPUT FILE:	DB1:TOPO.CM

Establishment of "Open" Account -- A PDP account has been established for first-time users of the COMTAL. The ID is VIS and there is no password. User Identification Code for VIS is [300,300]. Files brought to the COMTAL or created by the COMTAL under this ID will be considered temporary and will be automatically removed from the system three days after creation. See JEFF WELCH if you need assistance.

You may set up your own PDP ID through MIKE COLLINS. COMTAL access will automatically be included on your PDP ID. @VIS may then be used to transfer files to the COMTAL from your PDP ID disk area. The command will be @VIS. The files on your ID disk area may be listed by utilizing:

PIP DB1:/LI .

SUMMARY OF 3031 COMPUTER USAGE FOR FEBRUARY

OVERALL USAGE

Basic Rate CPU Time Used	50.61
Priority Rate CPU Time Used	190.30
Total CPU Time Used	240.91
Terminal Sessions	8076
Batch Jobs	1013

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	44.82	28
Mon-Fri 8AM-4PM	90.25	57
Mon-Fri 4PM-midnite	74.70	47
Weekend	31.14	29

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	0	0.0	0.0
BATSHORT	65	10.99	0.62
BATMED	44	21.21	1.65
BATONITE	121	36.37	3.08
BATLONG	163	27.74	4.53
TAPTRAN	1	101.07	13.28
BATEOD	156	14.34	2.00
BATJSC	310	33.94	5.54

KEYBOARD TERMINALS

LOCATION	PORT	TERMINAL TYPE	LOGINS	TOTAL TIME IN USE	AVERAGE PER.SESSION
COMPUTER ROOM	01	Ops Console	499	591.314	1.185
FLEX2	11	3277	263	72.527	0.276
	12	3277	300	172.040	0.573
	13	3277	344	188.530	0.548
	30	CRT	63	34.762	0.552
	31	CRT	270	127.166	0.471
	32	CRT	181	30.545	0.169
	33	CRT	288	170.810	0.593
	34	CRT	248	193.123	0.779
	35	CRT	287	178.701	0.623
	36	CRT	325	182.598	0.562
	37	DECwriter	62	61.541	0.993
	38	Tektronics	216	142.592	0.660
	39	Diablo	183	64.611	0.353
	3C	CRT	227	106.809	0.471
COMPUTER TECH	3E	CRT	2	0.911	0.456
U CAL RIVERSIDE	3F	Dial up	15	15.874	1.058
FLEX1	40	CRT	211	163.746	0.776
	41	CRT	213	182.441	0.857
	42	CRT	288	135.911	0.472
	43	DECwriter	113	53.517	0.474
ALABAMA A&M	4A	CRT			
	4B	DECwriter	26	6.982	0.269
	4C	CRT	74	108.907	1.472
	4D	CRT	97	104.646	1.079
ISU	4E	(various)	64	29.920	0.468
	4F	(various)	93	110.244	1.185
DIAL UP	50	1st in use	144	110.405	0.767
	51	2nd in use	52	43.811	0.843
	52	3rd in use	26	15.267	0.587
	53	4th in use	6	4.900	0.817
	54	5th in use			
	55	In-house #1	52	29.846	0.574
	56	In-house #2	52	27.510	0.529
ERIM	58	(various)	45	51.009	1.134
	59	(various)	158	189.527	1.200
	5A	(various)	11	16.358	1.487
	5B	(various)	19	15.350	0.808
HOUSTON	60	CRT	263	161.048	0.612
	61	CRT	347	207.367	0.598
	62	Trendwriter			
	63	Trendwriter	262	204.045	0.779
	64	CRT	344	216.157	0.628
	65	CRT	347	234.473	0.676
	66	CRT			
	67	CRT	469	165.849	0.354
	68	Dial Up	281	244.021	0.868
	69	Dial Up	274	219.380	0.801
	6A	Dial Up	185	136.879	0.740
	6B	Dial Up	172	131.385	0.764
	6C	Dial Up	238	189.409	0.796
	6D	Dial Up	164	144.267	0.880
	6E	Dial Up	162	132.122	0.816
	6F	Dial Up	50	45.221	0.904

INTRALAB NOTES

GRADUATE STUDENTS SUMMER SESSION REGISTRATION

All graduate students with staff appointments must be registered for the summer session in order to continue receiving their payroll checks during the summer months.

CORRECTION

In last month's issue of SCANLINES, MARILYN HIXSON was incorrectly represented in regard to her recent promotion. She is now Senior Research Statistician, and has been with the LARS staff since 1976.

PROPOSALS SENT OUT

Title:	"Evaluation of SLAR & Simulated Thematic Mapper MSS Data for Forest Cover Mapping USing Computer-Aided Analysis Techniques"
Sponsor:	NASA
Duration:	3/1/81 - 11/31/81
P.I.:	R. Hoffer

RECENT ADDITIONS TO LARS LIBRARY

Due to the large number of journals added to the LARS library during the past month, the following pages contain a summary of journals, listed categorically.

JOURNAL SUMMARY

- FOOD AND NUTRITION

FOOD FOR BILLIONS, ASA Special Publication Number 11: Papers presented at the annual meeting of the American Society of Agronomy in Washington, D.C., Nov., 1967.

THE WORLD FOOD PROBLEM AND U.S. FOOD POLITICS AND POLICIES: 1972-1976, Ross B. Talbot, Iowa State University Press.

THE WORLD FOOD PROBLEM, A Report of the President's Science Advisory Committee, Volume 1: The White House, May, 1967.

WORLD FOOD AND NUTRITION STUDY, Interim Report: Prepared by the Steering Committee NRC Study on World Food and Nutrition of the Commission on International Relations National Research Council, 1975.

WORLD FOOD AND NUTRITION STUDY, Enhancement of Food Production for the United States: A Report of the Board on Agriculture and Renewable Resources Commission on Natural Resources National Research Council, 1975.

AGRONOMISTS AND FOOD: CONTRIBUTIONS AND CHALLENGES, ASA Special Publication Number 30: Papers presented at the annual meeting of the American Society of Agronomy in Houston, Texas, Nov., 1977.

WORLD FOOD AND NUTRITION STUDY, The Potential Contributions of Research: Prepared by the Steering Committee NRC Study on World Food and Nutrition of the Commission on International Relations National Research Council, 1977.

THE MAN/FOOD EQUATION: Proceedings of a Symposium held at the Royal Institution London, Sept., 1973.

FOOD CROPS IN THE LOW-INCOME COUNTRIES: THE STATE OF PRESENT AND EXPECTED AGRICULTURAL RESEARCH AND TECHNOLOGY, Ralph W. Cummings, Jr. The Rockefeller Foundation, May, 1976.

THE ROLE OF ANIMALS IN THE WORLD FOOD SITUATION: A Conference held at The Rockefeller Foundation, 1975.

PROBLEMS IN GOVERNMENT PLANNING OF NUTRITION POLICY: A Conference held at The Rockefeller Foundation, Dec., 1974.

- LAND AND WATER

THE FELTON-HERRON CREEK, MILL CREEK PILOT WATERSHED STUDIES, Thomas M. Burton, Institute of Water Research: Conducted as part of the Task C-Pilot Watershed Program for the International Reference Group on Pollution from Land Use Activities, Great Lakes Regional Office.

MORE WATER FOR ARID LANDS PROMISING TECHNOLOGIES AND RESEARCH OPPORTUNITIES Report of an Ad Hoc Panel of the Advisory Committee on Technology Innovation, National Academy of Sciences, 1974.

NEW DIRECTIONS IN CENTURY THREE: STRATEGIES FOR LAND AND WATER USE, Proceedings of the 32nd annual meeting, Soil Conservation Society of America, 1977.

PLANNING AND URBAN GROWTH: AN ANGLO-AMERICAN COMPARISON, Marion Clawson and Peter Hall, Published for Resources for the Future, Inc., by The Johns Hopkins University Press.

LAND USE STUDIES BY REMOTE SENSING, Edited by W.G. Collins and J.L. Van Genderen, Published for the Remote Sensing Society, 1976.

THE CONTRIBUTION OF SPACE OBSERVATIONS TO WATER RESOURCES MANAGEMENT, Edited by V.V. Salomonson and P.D. Bhavsar: Proceedings of a Symposium on the Contribution of Space Observations to Water Resources Studies and the Management of These Resources of the 22nd Meeting of the Committee on Space Research, 1979.

- AGRICULTURE

CHALLENGE TO AGRONOMY FOR THE FUTURE, ASA Special Publication Number 10: Symposium papers presented at the annual meeting of the American Society of Agronomy in Stillwater, Oklahoma, 1966.

AGRONOMY IN TODAY'S SOCIETY, ASA Special Publication Number 33: Papers presented at the annual meeting of the American Society of Agronomy in Los Angeles, California, 1977.

PRESENT AND PROSPECTIVE TECHNOLOGY FOR PREDICTING SEDIMENT YIELDS AND SOURCES, Proceedings of the Sediment-Yield Workshop, USDA Sedimentation Laboratory.

A MANUAL OF GHANA GRASSES, R. Rose Innes, Ministry of Overseas Development, Land Resources Division.

AGRICULTURE (cont')

FORM AND FUNCTION IN PLANTS, John D. Dodd, Iowa State University Press.

WEEDS AND THEIR SEEDLINGS, Martin Hanf, Published by BASF United Kingdom Limited, Agricultural Division.

SEEDS OF CHANGE THE GREEN REVOLUTION AND DEVELOPMENT IN THE 1970, Lester R. Brown, Published for the Overseas Development Council by Praeger Publishers.

CROP GROWTH AND CULTURE, Roger L. Mitchell, The Iowa State University Press.

SOIL MICROMORPHOLOGY, Proceedings of the Third International Working-Meeting on Soil Micromorphology, Wrocław, Poland, 1969.

WORKING TOGETHER--FOR MORE EFFECTIVE AGRICULTURAL RESEARCH, Proceedings and Minutes from the 25th annual meeting of the Agricultural Research Institute, 1976.

AGRONOMY ABSTRACTS, 1969 to 1979 Annual Meetings, American Society of Agronomy, Crop Science Society of America, Soil Science Society of America.

SOILS OF THE NORTH CENTRAL REGION OF THE UNITED STATES, North Central Regional Publication No. 76, Agricultural Experiment Station, University of Wisconsin, Madison, 1960.

RESOURCE ALLOCATION AND PRODUCTIVITY IN NATIONAL AND INTERNATIONAL AGRICULTURAL RESEARCH, T.M. Arndt, D.G. Dalrymple and V.W. Ruttan, Editors, University of Minnesota Press.

- INTERNATIONAL

SUDAN IN AFRICA, Studies presented to the First International Conference sponsored by The Sudan Research Unit 7-12, 1968, Khartoum University Press.

INDIA A GENERAL SURVEY, George Kuriyan, National Book Trust, India New Delhi.

THAILAND AN INTRODUCTION TO MODERN SIAM, Noel F. Busch, D. Van Nostrand Company, Inc.

DEVELOPMENT ASSISTANCE PROGRAM FY 1975 UPPER VOLTA AND NIGER, Agency for International Development.

INTERNATION (cont')

APPROPRIATE TECHNOLOGIES FOR DEVELOPING COUNTRIES, Prepared by R.S. Eckaus for the Panel on Appropriate Technologies for Developing Countries, Board on Science and Technology for International Development, National Research Council, 1977.

REACHING THE DEVELOPING WORLD'S SMALL FARMERS, by Carroll P. Streeter, A Special Report from The Rockefeller Foundation.

- OTHER TOPICS

AN INTRODUCTION TO REMOTE SENSING OF NATURE RESEÑA TECHNICAL DOCUMENTS LIBRARY AND ITS USE, Prepared by L.D. Miller and M.L. Mathews, for the RESEÑA Group, 1980.

SUMMARY OF AWARDS FISCAL YEAR 1980, From the Computer Science Section of the National Science Foundation, Directorate for Mathematical and Physical Sciences.

RESOLVING THE PRECENTAGE OF COMPONENT TERRAINS WITHIN SINGLE RESOLUTION ELEMENTS, S.E. Marsh, P. Switzer, W.S. Kowalik, R.J.P. Lyons, "Photogrammetric Engineering and Remote Sensing", Vol. 46, No. 8, Aug. 1980, pp. 1079-1086.

AN ESSAY ON THE ARCHITECTURE AND DYNAMICS OF GROWTH OF TROPICAL TREES, R. Halle and R.A.A. Oldeman, Penerbit Universiti Malaya, 1975.

INTERNATIONAL SYMPOSIUM ON RESOURCES ENGINEERING AND TECHNOLOGY, Proceedings 1979

SCAN LINES

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REMOTE SENSING TECHNOLOGY TRANSFERRED THROUGH VISITING SCIENTIST PROGRAM

The Visiting Scientist Program is a technology transfer activity of the Laboratory for Applications of Remote Sensing (LARS) at Purdue University. It has been developed to meet the specialized needs of scientists who wish to become acquainted with the remote sensing technology developed at Purdue.

Anyone interested in learning about computer-assisted analysis and interpretation of remotely sensed data is eligible to apply to the program. Participants' experience in remote sensing has ranged from virtually none to extensive photo interpretation experience, to use of other systems of numerical analysis of remotely sensed data. Educational backgrounds have also covered a wide spectrum. The main criterion for participation in the program is a desire to learn about the capabilities and limitations of the technology.

The program is very flexible both in terms of duration, number of participants and content. Individual programs are designed to meet the background and goals of each applicant (or group of applicants). Visiting scientists document their work in the form of a report, which serves as a written record for LARS, as well as for the visiting scientists' sponsoring organizations.

Prepared by the Laboratory for Applications of Remote Sensing for distribution at Purdue. Contact Susan Ferringer, SCAN LINES editor, to be placed on the mailing list (749-2052, ext. 290).

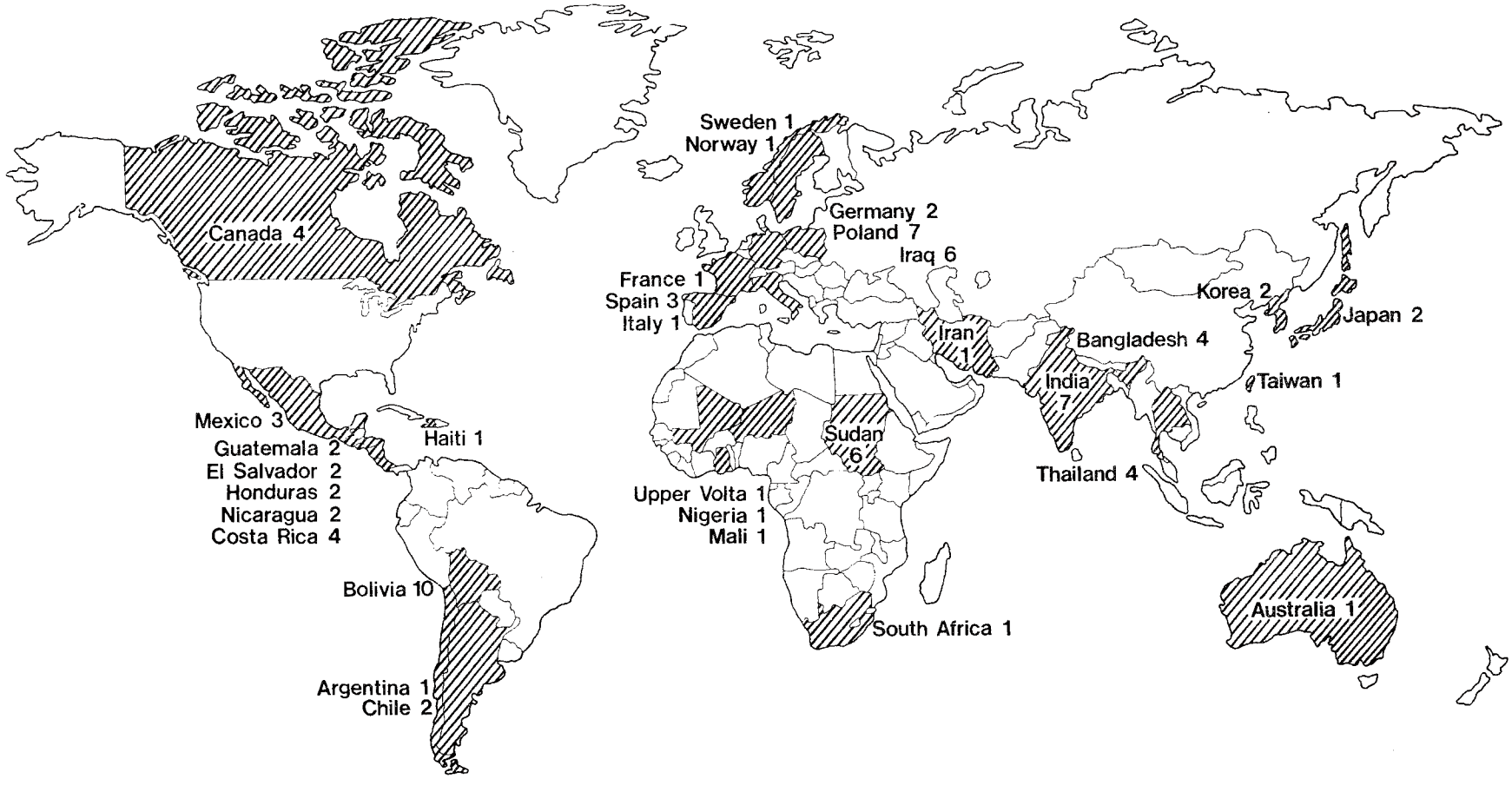
One of the present participants in this program is MINORU AKIYAMA. He joined the LARS staff in October, 1980, and has been investigating pattern recognition theories, and advanced computer processing techniques and their application methods for land cover map making. His studies here are being sponsored by Japan International Cooperation Agency, and Mr. Akiyama is working under the technical advisement of PHILIP SWAIN.

Three visiting scientists from Argentina also participated in this program recently. JUAN SABALAIN, president of BIANSA, a consulting firm in Buenos Aires, his wife CHRISTINA KLIMSZA SABALAIN, and MAGADELENA KOUHARSKY, a geologist for the firm, completed their two months of research at LARS in March. During this period, they analyzed several Landsat frames for application in mineral exploration. They are expected to return for another period of research in June, 1981.

During April, three additional visiting scientists arrived at LARS from Bolivia. OSCAR TORREZ, specialist in photogrammetry and cartography, and PERCY GRUNDY and LEONARDO PREUDENCIO, specialists in computer science, are all associated with the Bolivian Earth Resources Technology Satellite (ERTS) Program. During their stay they will be working with the Bolivian Geographic Information System Project, which is already underway.

Since 1972 there has been a total of 100 visiting scientists involved in applying remote sensing technology to problems in the 32 different countries which they represent.

The Visiting Scientist Program is administered by DOUGLAS B. MORRISON, Education and Training Coordinator for LARS. He may be contacted at Purdue University, 1220 Potter Drive, West Lafayette, IN 47906 (317) 749-2052.



Foreign visiting scientists from 1973 through June 1980 (87 total).

SPECIAL AWARDS AND HONORS

DAVID LANDGREBE has been awarded the D. D. Ewing Award by the Department of Electrical Engineering at Purdue University. The Ewing Award is given to the "Outstanding Instructor in Electrical Engineering" each year, based upon an election held among the seniors in Electrical Engineering.

PHILIP SWAIN recently attained the rank of Senior Member in the Institute of Electrical and Electronics Engineers (IEEE). IEEE is a transnational organization of individuals dedicated to improving the understanding of electrical and electronics engineering, and its applications, to the needs of society. Several LARS staff members are associated with this organization through its technical societies, especially in the areas of Computer Science, or Geoscience and Remote Sensing.

REMOTE SENSING APPLICATIONS IN CHILE TO BE EXPLORED

LUIS BARTOLUCCI, Program Leader for the Technology Transfer area at LARS, and Dr. DON LEVANDOWSKI, Head of Purdue's Geosciences Department, will be traveling to Santiago, Chile May 17 through 29. They will be studying the possibility of transferring remote sensing digital analysis technology to Chile, and determining the feasibility of using this technology for applications in the area of mineral exploration.

VISITORS

Mr. Tom Haas from Triton College visited LARS on April 3 and was given an orientation to remote sensing by DOUG MORRISON.

On April 4, eight Geology Club members from Ball State University received an orientation to remote sensing at LARS from DOUG MORRISON.

Sixteen participants from the Corps of Engineers were at LARS to attend a short course on "Remote Sensing for Managers", April 14-16. The course was held at the Sheraton Inn, and a tour of LARS was conducted on April 14.

VISITORS (CONT')

Earl Merritt and Kevin Marcus from Earth Satellite Corp. were here April 13-15 for work with MARILYN HIXSON, DON HOLT, STEVE HOLLINGER and CRAIG DAUGHTRY on the design of a project to evaluate spectral inputs to crop yield prediction models.

LARS TRAVEL LOG

PAUL ANUTA was in Atlanta, Georgia, March 31 - April 1, to attend an Institute of Electrical and Electronics Engineers conference on Acoustics, Speech and Signal Processing, and presented a paper entitled: "Analytic Signal Representation in the Synthetic Seismogram of Bright Spots."

JAMES KAST traveled to Johnson Space Center in Houston, March 31 through April 2 to present the Earth Resources Applications Data System (ADS) Networking Plan.

On April 6-10, PHILIP SWAIN taught a short course with Fred Billingsley from NASA's Jet Propulsion Lab, and Ralph Bernstein from IBM on "Digital Image Processing of Earth." The course was presented at George Washington University, Washington, D.C.

ROGER HOFFER was in Woods Hole, Massachusetts, on April 13 for discussions on vegetation mapping.

STEVAN J. KRISTOF, LARS Research Consultant, attended the Indiana Academy of Science Spring Meeting, April 17 and 18.

BARRETT ROBINSON traveled to Manhattan, Kansas, on April 23 and 24, to discuss data acquisition procedures with the Kansas State University Field Measurement team headed by Ed Kanamasu.

NEW PROJECTS FUNDED

Title: "Evaluation of Change Detection Techniques"
Sponsor: Defense Mapping Agency / U.S. Dept. of Defense
P.I.: Paul Anuta
Duration: 5/1/81 - 7/31/81

Title: "Evaluation of SLAR and Simulated Thematic Mapper MSS Data for Forest Cover Mapping Using Computer-Aided Analysis Techniques"
Sponsor: NASA
P.I.: Roger Hoffer
Duration: 3/1/81 - 11/30/81

NEW LARS TECHNICAL REPORTS

051181 Sensors in Perspective by D. A. Landgrebe

This paper presents a generally applicable framework for the design of earth observational information systems to provide a perspective against which to judge and visualize just how the further development of such technology could take place. The tremendous economic, sociological and humanitarian value of such information gathering technology requires that we proceed with the maximum speed that resources will permit to develop this potential.

121280 Overcoming Accuracy Deterioration in Pixel Relaxation Labeling by J. A. Richards, D. A. Landgrebe, and P. H. Swain.

In this paper the common relaxation labeling algorithm is analyzed whereby the technique is shown to degenerate to a mechanism of weighted averaging in the vicinity of fixed points. When uncontrolled, it is demonstrated that this averaging can lead to the deterioration of labeling accuracy observed in practice. However, it is also shown that the parameters in relaxation algorithms can be appropriately chosen to control the averaging and thus circumvent the accuracy deterioration problem. Examples are presented to support the analytical results derived. Furthermore, it is suggested that the parameters in the algorithm can be chosen a priori, based upon foreknowledge of image geometry.

The work described in this paper was sponsored by NASA under Contract No. NAS9-15466.

021881 Evaluation of Several Schemes for Classification of Remotely Sensed Data by M. Hixson, D. Scholz, N. Fuhs, and T. Akiyama.

The overall objective of this study was to apply and evaluate several classification schemes for crop identification. Five classifiers were examined on each of sevel agricultural data sets. The classification accuracy of small grains was affected by the classifier, but neither accuracies for corn and soybeans nor overall accuracies differed significantly when the same training method was used. A different training method used with one of the classifiers, however, did produce results of significantly lower accuracy.

The research described in this report was sponsored by NASA under Contract No. NAS9-15466.

SYSTEM SERVICES April 30, 1981

LOCAL TERMINAL NEWS BY LUKE KRAEMER

Our new Printronix Printers have arrived and have been installed. These replacements for the DATA-100's offer many new capabilities such as upper/lower case, double print rate, and line drawing. In fact, SAS/GRAPH plots have already been generated and GCS interfaced software is anticipated for the near future. The DATA 100 lease was cancelled effective March 31 and those devices will be removed by Northern Telecom sometime during April.

A second Diablo was obtained in late March and was installed temporarily in the FLEX 1 User's Area. This word processing output unit will be relocated in another FLEX 1 area following a building survey.

Also during March, the IBM 4507 digital display was taken off of maintenance and two of our three general use keypunches were sold. The remaining keypunch will be available in the FLEX 2 User's Area.

In conjunction with the move of the PDP 11 into the computer room, Local Terminal plans to convert the vacant office C123 (CATHY KOZLOWSKI and JIM COCHRAN's old office) to a COMTAL User's Area. This office will hold the COMTAL, a switchable IBM/PDP terminal, a work table and a book shelf. This room will be reserved for COMTAL related activities. The FLEX 2 User's Area will certainly be less congested with the COMTAL and most PDP equipment being relocated.

The following list of devices is the revised Local Terminal plan for future equipment acquisitions:

FLEX 1 - 3 Full Screen Terminals
1 Portable TI
1 Diablo

FLEX 2 - 2 Full Screen Terminals
1 ASCII Terminal
1 Portable TI

These terminals will be additions to the equipment that is already in operation at both buildings. If you have any questions or comments please contact LUKE KRAEMER.

One final note for users of dial-up equipment: It is no longer necessary to type an 'N' at your terminal after the carrier light comes on. The computer will type "VM/370 ONLINE' without any user input. After the message appears, log on as you normally do.

LARSPEC BY JERRY MAJKOWSKI

During the previous two months various minor updates where made to the LARSPEC system. On February 24, and March 9, updates were made to facilitate software development. These updates would have no effect on normal processing. On April 1 corrections were made so that the PUNCH *BINARY (DSLE) control card worked properly. Also an error was corrected so the a function of bands specified by the *RDATA control card in GSPEC worked properly.

Work is currently in progress on the new wavelength calibrator of the airborne FSS data obtained prior to 1980 and expansion of GSPEC graphics to add the capability to plot response/wavelength data from instruments with differing wavelengths on a single graph. Also an update to the LARSPEC User's Manual to document the cost year's changes should be in progress soon. Until this update is complete user's can refer to the Scan Lines issue (Volume 6, 1980) listed below for documentation on use of new developments.

DECwriter Graphics	No. 5, May 15
Expanded PUNCH Control Card	No. 6, June 30
	No. 7, August 7
USET BRIGHTNESS	No. 8, September 17
Tektronix 4045 Graphics	No. 9, November 4
Error Code E0065	No. 10, December 31

TRILOG PRINTER DEVELOPMENT BY JOAN BUIS

Software development for the Trilog printers has begun. The development plan includes 1)*Printresults with six color option, 2)*GRESULTS with choice of six colors for symbols, 3)*GRESULTS with choice of 35 shades for patterns, 4)*GDATA and GRESULTS with choice of 16 gray levels, 5)*SAS-GRAPH and GCS in color. Any suggestions should be brought to the attention of JOAN BUIS or PAUL GOLICK.

COMPUTER SCHEDULE BY MIKE COLLINS

Starting Saturday, May 9, the system will be down from 17:00 Saturday to 06:00 Monday, This is a new, permanent schedule for the weekend shutdown of the computer.

RT&E DATA BASE UPDATE BY JIM COCHRAN

The capability to map the states of the U.S. and their particular site locations has been upgraded. The following location plotting is now available:

RT&E Landsat Image Sites
RT&E Ground Truth Sites
NOAA Synoptic Weather Stations
Indiana CO-OP Weather Stations

The plotting is done in Fortran-H, with GCS, allowing for multiple output devices including the Tektronic (T54), the line printer (PRT), the terminal (TER), the DECwriter (DEC), and the Varian plotter (VAR).

A new querying capability has been added to the RT&E data base subroutine 'SUBSET', allowing for direct queries according to state postal abbreviations. For example, a query such as 'STATE .EQ. IN .OR. STATE .EQ. IA' would return all Landsat sites for the states of Indiana and Iowa within the RT&E data base. This change has been incorporated into the mapping subroutines, where 'SUBSET' queries for Landsat and Ground Truth will implicitly include all selected states to be graphically displayed. In addition, the user may add to that query any attributes already available in 'SUBSET'.

The following are the subroutine calls available to search for location sites and locations:

```
Call GETSEG (LATLON, PLOTK, STATE, NSTATE)  Landsat Images
Call GETGT  (LATLON, PLOTK, STATE, NSTATE)  Ground Truth
Call GETWX  (LATLON, PLOTK, STATE, NSTATE)  NOAA Weather
Call COOP   (LATLON, PLOTK)                 Indiana CO-OP
```

In addition a call to define the plotting symbols, titles, and location types, and a call to plot the political boundaries and interior locations are needed.

```
Call PLTDEF (STATE, NSTATE, SYMBOL, NSYM, TITLE)
Call PSTATE (LATLON, PLOTK, STATE, NSTATE, SYMBOL, NSYM, TITLE)
```

A fortran driver program is used to supervise the calls to the previously mentioned subroutines. A driver named 'SDRIVE Fortran' resides on the JSCDISK 19A, and may be used as a supervisor. Included in the comments is an explanation and definition of all parameters for the various subroutines.

The exec to set up the plotting environment is named 'STATESET', and resides on the JSCDISK 19A. To access the mapping system type:

```
GETDISK JSCDISK 19A
STATESET dev driver
```

For example, to use the general driver names 'SDRIVE' and the printer as the output device, type:

STATESET PRT SDRIVE

If there problems or suggestions, contact JIM COCHRAN (LARS).

GCS BY JERRY MAJKOWSKI

Two updates on the GCS system were completed during the last quarter to correct minor problems and expand 3D capabilities. On January 12, corrections were made for the proper construction of log axes labelling when less than two full cycles are displayed on the screen and error situations caused by performing a draw to the current pen position. New routines obtained from Westinghouse were added to the 3D GCS system on February 23, to allow for proper axis scaling when graphs are rotated in 30 space. Also an update to the GCS documentation for the Purdue/LARS system was completed and distributed to those having GCS manuals and terminal areas.

Anyone having a manual who did not receive this version (dated December 1980) should contact JERRY MAJKOWSKI.

The next expansion of GCS will involve the addition of more 30 routines developed by Westinghouse. This will include additional software character fonts.

Another update was made to the 20 system on Tuesday April 21, to include the Printronix Printer as a graphics output device with the 3D system soon to follow. Users having Printronix printers at there sight can type:

GCS PRX filename options

to send output there.

The default UDAREA is a square of about 9 5/8 inches on each side. The positive X direction runs down the page from top to bottom with a resolution of 72 dots/inch and the Y direction runs across the page from left to right with a resolution of 60 dots/inch. Stripping capabilities are available using UDIMEN to maximum of 455 inches in the X direction and 41 pages in the Y direction.

Consult a GCS users manual for more details on writing GCS routines and using the system. Hats off to ROSS AIKEN and GARY BRAMMER for their fine work in converting the Varian software to the Printronix.

TAPE TRANSFERS BETWEEN LARS AND JSC BY JIM COCHRAN

LARS and JSC now have the capability to transfer information contained on an entire magnetic tape through the computer networking system. The two execs needed to accomplish this task, "TSEND" and "TRECEIVE", reside on the system disks of the host machines. To send a tape, type:

TSEND TAPENO ID

Where TAPENO is the number of the tape to be sent, and ID is the account identifier where the spooled punch file be sent.

To receive the tape information onto a new tape, type:

TRECEIVE TAPENO SPID

Where TAPENO is the receiving tape to be written on, and SPID is the spool identification number of the tape file which was sent to the receiving ID's reader. The punch file will be listed as a class 'B' file, so as to distinguish it from other reader file. If there are questions, contact JIM COCHRAN (LARS).

COMTAL NEWS BY DAVE FREEMAN AND SHIRLEY DAVIS

PUT YOUR LARSYS DATA ON THE COMTAL -- IT's EASY AND FUN

"Entering and Displaying Digital Image Data" is the title of the first COMTAL User's Note. DAVE FREEMAN and SHIRLEY DAVIS have produced a document guaranteed to put any user in view of his data within no more time than the old digital display. That's just over 15 minutes depending on IBM tape drive availability. How's that for openers!

Only two user-initiated processors are needed to enter data on the COMTAL from an IBM-based LARSYS tape. Data or classification results may be entered. The IBM processor, known as *CDISPLAY, in LARSYSDV, is run from an IBM terminal or batch. (A reference file is printed on the next page.) This processor moves data from the tape across the data link to a PDP disk for transfer to the COMTAL. The user logs onto a PDP terminal and types the command @VIS. With only two questions to answer, the user transfers his data to the COMTAL and is ready to interact visually with his data. (Sample commands for running @VIS follow.) Total time needed may be as little as 15 minutes for three image files, 512-by-512 pixels.

Obtain a copy of the COMTAL USER'S NOTE No. 1 for a detailed explanation. This succinct document explains the basic COMTAL system components, the structure of images as seen on the COMTAL, the movement of image data to the COMTAL and the details of using the COMTAL for initial image display and manipulation. There are two tables, ten figures and five brief appendices to make your reading and data entering a painless (even exciting!) experience. Try it, and let us know of your successes as well as your problems. Shirley and Dave, as well as JEFF WELCH, will be more than happy to answer

your questions and provide one-to-one hands-on assistance. If you don't have the COMTAL user's note, get your copy today from SHIRLEY DAVIS or DAVE FREEMAN!

RUNNING @VIS TO TRANSFER IMAGE FILES FROM PDP TO COMTAL

Data stored on the PDP large disks must be transferred to the COMTAL for each user session. The processor @VIS is used to transfer PDP files to the COMTAL. (The same processor can also transfer files created on the COMTAL to the PDP for storage for future analysis). @VIS is run entirely from a PDP terminal.

Procedure

1. Log in on a PDP terminal
2. Run @VIS supplying:
   a. Names and locations of image data files (up to 3)*
   b. Image plane that is to receive each file (up to 3)
3. Log off PDP

Sample Commands	Comments
1. HELLO (ID) (PASSWORD)	You may set up an ID on the PDP through MIKE COLLINS. (A limited use account with the ID name "VIS" is available; no password is required. The UIC (User Identification Code) associated with this ID is [300,300]).
2. @VIS	Start the PDP processor that transfers data to the COMTAL. (Alternate command example: @[120,1]VIS The UIC indicates where the VIS program is stored if it is not already on your UIC).
3. N	"Do you want to retrieve an image from the COMTAL?" The default "no" is used for sending files to the COMTAL.

Sample Commands	Comments
4. COAT.CH1	"Enter your image filename. When requested, supply filename and filetype of image to be transferred." (Alternate command example: DB1:[111,111] COAT.CH1 - DB1 is the device where image file COAT.CH1 is stored. Image file default DB1. - [111,111] is the UIC of the person who originally created the image file. Default is your own UIC. - COAT.CH1 is the name given to an image file currently residing on a disk area of the given UIC)
5. 1	"Enter your image number 1, 2, or 3." When requested, supply the physical COMTAL image plane number that will store each image file. The numbers 1, 2, or 3 may be used. Default is 1.
6. Repeat steps 4 and 5 for each file	
7. <ESC>	Use "escape" to exit program
8. BYE	Log off PDP (Users on the VIS account will be logged off by the processor)

At the conclusion of running @VIS, the data will be stored in the three COMTAL image planes for display and processing.

---

* To list names of existing files on [300,300] UIC type:
PIP DB1:[300,300]/LI

LARSYSDV CONTROL CARDS

CONTAL DATA TRANSFER FUNCTION

REQ	KEY WORD(COL 1)	CONTROL PARAMETER	FUNCTION	DEFAULT
+	*CDISPLAY	(NONE)	SELECT CONTAL DATA TRANSFER FUNCTION.	(NONE)
	CHANNELS	1,2,3,...30	THE CHANNELS OF INFORMATION TO BE SENT TO THE PDP. (NOT NECESSARY IF YOU ARE SENDING A CLASSIFICATION TAPE.)	CHAN 1
	DEVICE	DB0 OR DB1	PDP DISK YOUR ID'S STORAGE IS ON.	DB1
	GROUP	XXX	PDP GROUP NUMBER (MUST BE THREE DIGITS, EX. 002)	300
	MEMBER	XXX	USER IDENTIFICATION CODE ON THE PDP-- 3 DIGITS	300
+	NAME	XXXXXXXXX	NAME THE PDP FILE IS TO BE CALLED (UP TO 9 CHAR LONG)	(NONE)
	CLASSIFY	TAPE(XXXX)	CLASSIFICATION TAPE NUMBER	DATA TAPE
		FILE(XXXX)	FILE NUMBER	(NONE)
	TRANSLATE	(NONE)	PROGRAM WILL ASK USER TO SPECIFY NEW TRANSLATION VALUES. (ONLY VALID FOR CLASSIFICATION TAPES.)	CURRENT TRANSLATION VALUES WILL BE USED.
+	DISPLAY	RUN(X)XXXXXXX)	RUN NUMBER (RUN NUMBER ISN'T NECESSARY WITH A CLASSIFICATION TAPE.)	(NONE)
		LINES(X,Y,Z)	DATA FROM LINE X TO Y WITH INTERVAL Z	(NONE)
		COLS(X,Y,Z)	DATA FROM COL X TO Y WITH INTERVAL Z	(NONE)
+	END	(NONE)	END OF FUNCTION	(NONE)

NOTE...THE PDP FILETYPES OF THE FILES SENT ARE ASSIGNED BY THE PROGRAM AND DEPEND ON WHAT CHANNEL WAS SENT. FOR EXAMPLE CHANNEL 1'S FILETYPE WILL BE CH1, CHANNEL 2'S FILETYPE WILL BE CH2 AND SO ON UNTIL CHANNEL 10 WHEN THE FILETYPES WILL BE C10,C11,C12... TO C30 FOR CHANNEL 30.

NOTE...THE PDP FILETYPE FOR A CLASSIFICATION FILE WILL BE CLS.

NOTE...IF YOU USE THE DEFAULT MEMBER AND GROUP NUMBERS, YOUR FILES WILL BE ON THE PDP ACCOUNT VIS. THERE IS NO PASSWORD FOR THIS ACCOUNT AND YOU MAY ONLY TRANSFER FILES TO THE CONTAL ON IT. THESE ARE CONSIDERED TEMPORARY FILES AND WILL BE REMOVED AFTER A SHORT PERIOD OF TIME.

NOTE...IF YOU SPECIFY 'TRANSLATE' YOU MUST BE IN INTERACTIVE MODE. YOU WILL BE PROMPTED FOR INPUT TRANSLATE VALUES. IF TRANSLATE IS NOT SPECIFIED YOU MAY RUN INTERACTIVE, BATCH, OR DISCONNECTED.

SUMMARY OF 3031 COMPUTER USAGE FOR MARCH

OVERALL USAGE

Basic Rate CPU Time Used	43.30
Priority Rate CPU Time Used	183.26
Total CPU Time Used	226.56
Terminal Sessions	7803
Batch Jobs	1014

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	36.81	21
Mon-Fri 8AM-4PM	94.79	55
Mon-Fri 4PM-midnite	68.64	39
Weekend	26.32	20

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	216	0.54	0.05
BATSHORT	122	11.27	0.47
BATMED	71	16.13	0.62
BATONITE	78	23.25	2.09
BATLONG	176	23.09	6.39
TAPTRAN	3	24.16	7.59
BATEOD	171	12.17	1.66
BATJSC	108	36.10	10.27

KEYBOARD TERMINALS

LOCATION	PORT	TERMINAL TYPE	LOGINS	TOTAL TIME IN USE	AVERAGE PER.SESSION
COMPUTER ROOM	01	Ops Consoles	516	701.78	1.36
FLEX2	11	3277	292	142.83	0.49
	12	3277	288	175.36	0.61
	13	3277	303	192.03	0.63
	30	CRT	261	144.58	0.55
	31	CRT	38	16.07	0.42
	32	CRT	108	25.16	0.23
	33	CRT	248	163.81	0.66
	34	CRT	268	181.81	0.68
	35	CRT	270	182.11	0.67
	36	CRT	341	208.69	0.61
	37	DECwriter	33	40.91	1.24
	38	Tektronics	216	139.59	0.65
	39	Diablo	252	93.96	0.37
	3C	CRT	247	108.25	0.44
COMPUTER TECH	3E	CRT	5	5.02	1.00
U CAL RIVERSIDE	3F	Dial up	2	1.03	0.52
FLEX1	40	CRT	276	196.03	0.71
	41	CRT	292	231.57	0.79
	42	CRT	323	218.94	0.68
	43	DECwriter	236	148.48	0.63
ALABAMA A&M	4A	CRT	.	.	.
	4B	DECwriter	23	35.86	1.56
	4C	CRT	56	141.87	2.53
	4D	CRT	84	88.29	1.05
ISU	4E	(various)	48	25.31	0.53
	4F	(various)	86	64.20	0.75
DIAL UP	50	1st in use	174	147.01	0.84
	51	2nd in use	81	72.85	0.90
	52	3rd in use	23	23.12	1.01
	53	4th in use	8	11.47	1.43
	54	5th in use	1	0.01	0.01
	55	In-house #1	63	37.61	0.60
	56	In-house #2	81	44.99	0.56
ERIM	58	(various)	26	38.73	1.49
	59	(various)	104	146.20	1.41
	5A	(various)	29	136.16	0.51
	5B	(various)	34	21.01	0.62
HOUSTON	60	CRT	267	136.18	0.51
	61	CRT	323	179.04	0.55
	62	Trendwriter	1	0.00	0.00
	63	Trendwriter	231	176.97	0.77
	64	CRT	254	131.49	0.52
	65	CRT	250	137.16	0.55
	66	CRT	.	.	.
	67	CRT	201	78.65	0.39
	68	Dial up	308	220.62	0.72
	69	Dial up	170	168.69	0.99
	6A	Dial up	153	133.71	0.87
	6B	Dial up	139	102.80	0.74
	6C	Dial up	202	165.02	0.82
	6D	Dial up	188	164.71	0.88
	6E	Dial up	152	131.84	0.87
	6F	Dial up			

INTRALAB NOTES

NEW CIP FORMS

Beginning in May change in personnel forms will have a new format. Our LARS Administrative Information System (LAIS) format is being updated and the new CIP forms are a part of the new LAIS. Watch for it! Feedback from users on these changes would be appreciated, and should be directed to CHING-NUE LUE, ext-298.

PERSONNEL CHANGES

SANDY ADAMS joined our LARS staff on April 20. She is replacing STACIE ELDRIDGE as the Technical Typist/Secretary for the Crops Inventory area. Sandy is married (husband's name is Tim), and has a little boy named Joseph. Let's help her to become familiar with the names and faces in Flex 1 and 2.

DONATIONS TO PURDUE/LARS

Please notify GLORIA PETERSON in the Business Office if you have made a donation to LARS or have authorized payroll deductions. She will make sure these funds get credited to the correct LARS account.

LARS BOWLING TEAM

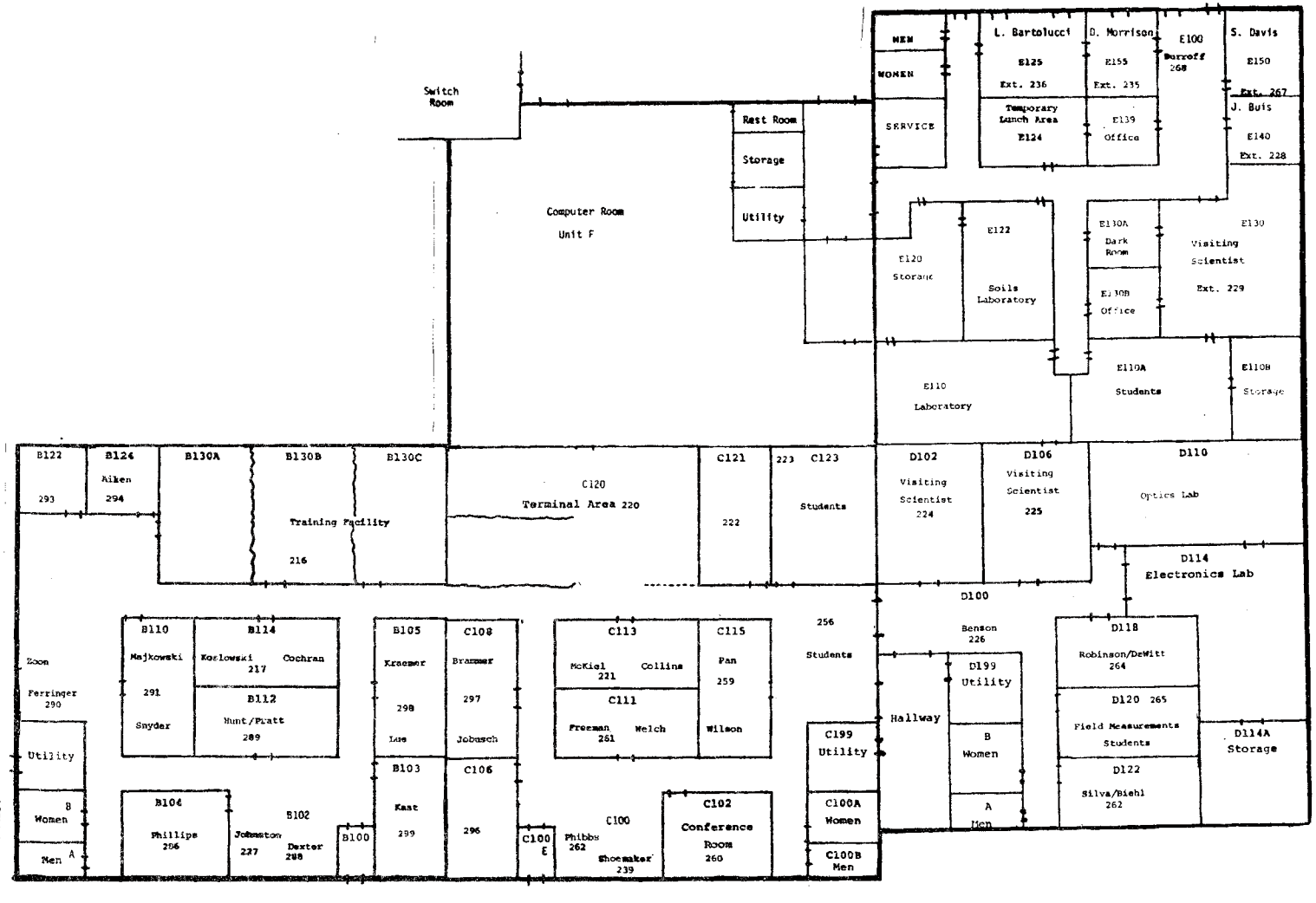
The LARS Bowling Team consisting of MIKE COLLINS, Bob Hunt (Kay's husband), John Kozlowski (Cathy's husband), LUKE KRAEMER, JERRY MAJKOWSKI, DOUG MORRISON and PHIL SWAIN finished the season in 3rd place in the New Additions League.

FLEXLAB 2 HAS BEEN ON THE MOVE

If you've been in FLX 2 recently, you may have experienced the adventure of trying to find the Technology Transfer group. To help you find your way around the building, use the floor plan (shown on the following page), which includes office locations and extension numbers of FLX 2 personnel.

4/30/81

FLEXLAB 2



PROPOSALS SENT OUT

Title: "Provide Technical Assistance to the Indiana Division of Reclamation for Developing First Year Work Plans for Rehabilitating Abandoned Mine Lands"
Sponsor: Indiana Deaprtment of Natural Resources
P.I.: R. P. Mroczynski
Duration: 6/1/81 - 6/30/81

Title: "The Application of Remote Sensing Techniques for Waterfowl Habitat Inventory"
Sponsor: Ducks Unlimited
P.I.: R. P. Mroczynski
Duration: 3/1/81 - 1/31/82

Title: "Development of a Low-Cost Earth Resources Processing Capability for the University of California at Riverside" (Supplemental proposal)
Sponsor: University of California
P.I.: Luis Bartolucci
Duration: 10/1/80 - 9/30/81

Title: "An Addendum to The Development of a Forest Resource Information System"
Sponsor: NASA
P.I.: R. P. Mroczynski
Duration: 5/1/81 - 5/31/81

SCAN LINES

LARS · Purdue University · Vol. 8 · No. 1 · July 16, 1981

SHORT COURSE USES FUTURE DATA

Training materials were developed to present participants of the special LARS Short Course, June 15-19, with a preview of machine processing of future remote sensing data. Simulated Thematic Mapper multispectral scanner data was used throughout the workshop activities. JOAN BUIS and LUIS BARTOLUCCI prepared a classification which was used along with other educational materials to present computer-aided techniques for remote sensing applications to forestry. DOUG KNOWLTON gave a special seminar on Radar Interpretation. ROGER HOFFER and ELLEN DEAN also participated in the course instruction.

SEVENTH SYMPOSIUM SUCCESSFUL

The Purdue University/LARS symposium on Machine Processing of Remotely Sensed Data with Special Emphasis on Range, Forest, and Wetlands Assessment was held on June 23-26, 1981.

Two-hundred thirty-five participants, representing 34 states, including 40 from 14 foreign countries, made this symposium very international in scope. The Opening and Closing Plenary Sessions presented a worldwide view of "where we are and where we are going" according to co-chairman ROGER HOFFER.

Three parallel Technical Sessions featured Forestry - Machine Processing and Analysis - Other Discipline Applications - and included approximately 30% invited papers. A poster session was added this year with 18 presentations.

Prepared by the Laboratory for Applications of Remote Sensing for distribution at Purdue. Contact Susan Ferringer, SCAN LINES editor, to be placed on the mailing list (749-2052, ext. 290).

Two special report/discussion sessions focused on recent national workshops. They were:

Landsat Classification Accuracy Assessment Procedures: An Account of a National Working Conference

Remote Sensing Education: A Special Report on the Conference of Remote Sensing Educators (CORSE-81)

A chicken barbecue was held at the 18th Century French Fort Ouiatenon. Entertainment included the Voyageurs' Fife and Drum Corps and demonstrations of early American traditional crafts by the Tippicanoe County Historical Association. LARS also hosted an Open House at the close of the Symposium.

Co-chairman ROGER HOFFER and DICK MROCZYNSKI wish to thank the following organizations and committee members for their valuable assistance in making this years symposium successful.

Cosponsors: American Society of Agronomy
Crop Science Society of America
Institute of Electrical and Electronics Engineers, Inc.
- Computer Society
- Geoscience and Remote Sensing Society
Society of American Foresters
- Working Group on Remote Sensing and Photogrammetry
Soil Science Society of America

In Cooperation with: American Society of Photogrammetry
National Aeronautics and Space Administration
National Oceanic and Atmospheric Administration
U.S. Department of Agriculture

Program Committee

Marion F. Baumgardner
Nevin Bryant
Lisette Dottavio
David G. Goodenough
Roy A. Mead
Frank Sadowski

Symposium Coordination Committee

Paul E. Anuta
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Marvin E. Bauer
Marion F. Baumgardner
Pamela G. Burroff
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CALL FOR PAPERS

Eighth International Symposium
on
MACHINE PROCESSING OF REMOTELY SENSED DATA
With Special Emphasis On
CROP INVENTORY

Purdue University **July 7-9, 1982** **West Lafayette, Indiana USA**

General Symposium Themes

Presentations on research results in three areas are requested:

1. Digital representation and modeling of remotely sensed scenes.
2. Extraction of information from digital remotely sensed and ancillary data related to earth resources.
3. Utilization of digitally processed data related to earth resources.

The program will provide an opportunity for scientists working in these areas to present current research results and to describe new technological developments and applications. Crop inventory techniques including spectral characterization, species identification, area estimation, condition assessment and yield prediction will be emphasized.

Special Topical Areas

Examples of topics supportive of the symposium theme include:

- Observation, empirical characterization and modeling of earth resources phenomena
- Scene simulation and modeling
- Geometric and radiometric preprocessing
- Stratification and sampling
- Feature extraction and classifier training
- Classification algorithms
- Merging radiometric and ancillary data
- Digital geographic information systems
- Inventory and monitoring of land, soils, crop, forest, range, and water resources
- Transfer of remote sensing technology

Contributed Papers

The symposium will feature invited and contributed papers. Authors desiring to contribute papers should submit a 1,000-word summary by January 15, 1982. Selection of papers will be made on the basis of originality, usefulness to others in the field and clarity of presentation.

Authors will be notified of paper acceptance by March 1, 1982.

Full papers in reproducible format are required by May 1, 1982 in order to be included in the symposium proceedings.

A limited number of short and poster papers describing recent results will be accepted for presentation. These papers will be selected on the basis of a one-page abstract which must be received by April 1, 1982. Accepted abstracts will appear in the proceedings as submitted by the author(s).

Four copies of each 1,000-word summary or short paper abstract should be sent to:

D.B. Morrison, Symposium Coordinator
Purdue University/LARS
1220 Potter Drive
West Lafayette, IN 47906 USA

Telephone: (317)749-2052

Inquiries on technical content of the symposium should be referred to Dr. Marvin Bauer, Symposium Chairman.

Calendar for Contributed Papers 1982

1,000-word paper summary due.....January 15

Authors notification of paper selection...March 1

Short and poster paper abstracts due.....April 1

Full-length papers in reproducible format due.....May 1

BIBLIOGRAPHY AVAILABLE

An updated Bibliography of selected LARS Technical Reports and Educational Publications from recent years is now available. For a copy, please contact:

Ms. Davida Parks
LARS/Purdue University
1220 Potter Drive
W. Lafayette, IN 47906 USA
(317) 749-2052 ext. 244

YEARBOOK INCLUDES CHAPTER BY PETERSON

The 1981 McGraw-Hill Yearbook of Science and Technology is divided into three sections: feature articles on timely subjects of special interest, photographic highlights, and a comprehensive review of the past year. "Agronomists and the Food Chain" is a feature article authored by JOHN PETERSON.

Dr. Peterson was engaged in research and teaching in the Iowa State University Agronomy Department from 1928-1948, when he became head of the Agronomy Department at Purdue University. From 1971-1980 he was associate director of LARS; currently he is research consultant on the Water Resources Project at LARS. Author of numerous technical papers in soil science, he is a fellow and past president of the American Society of Agronomy.

PETERSON ASSISTS SEED IMPROVEMENT PROGRAM

JOHN PETERSON assumed duties on May 11, 1981 as assistant to the president of the Board of Directors, for the Agricultural Alumni Seed Improvement Program, Purdue University. He will be responsible for helping the president coordinate the research, production and marketing activities. The program is responsible for developing foundation seed, as a link in the channelling of the results of plant genetic research to the farming public.

NEW DIRECTOR SOUGHT

DAVID LANDGREBE has resigned the directorship of LARS effective July 1, 1981. He has accepted the position of Associate Dean of Engineering and Director of the Engineering Experiment Station of Purdue University effective August 1, 1981. Dr. Landgrebe will replace Gene Goodson, who resigned to become Vice-President, Hoover Universal Corporation of Ann Arbor, Michigan.

MARION BAUMGARDNER has been appointed acting director. A search committee is being formed with Bill Baumgardt, Director of the Agricultural Experiment Station, as chairman. If there are recommendations for candidates to be considered for the LARS directorship, please notify Bill Baumgardt (317) 749-6005.

VISITORS

Dr. Mickey Steib, from Johnson Space Center, was at LARS during April 30 - May 1, to develop an Earth Resource Pilot Plan for the Applications Data Service (ADS). Dr. Steib was hosted by JIM KAST, PETER JOBUSCH, and DAVE FREEMAN, Bill Simmons from Purdue's Electrical Engineering Department, and Earl Nay, from Purdue's Agriculture Department.

On May 4, LUIS BARTOLUCCI and ROGER HOFFER hosted a visit from Dr. Mehl, Commissioner of European ISPRA, Germany, to discuss data processing techniques for applications to SAR data.

Austine Yumata met with PAUL ANUTA at LARS on May 5, to discuss the details of the Defense Mapping Agency Change Detection contract.

SHIRLEY DAVIS and DAVE FREEMAN hosted Ron Clouthier from Comtal on May 11.

Paul Pinton, from the USDA Water Conservation Laboratory in Phoenix, AZ, visited LARS on May 21.

Two representatives from the Peoples Republic of China visited LARS on June 18-19, to discuss remote sensing applications in agriculture with MARION BAUMGARDNER and DICK WEISMILLER. They spent one day in the field in Jasper County, Indiana, investigating how digital analysis of Landsat data has aided the Soil Conservation Service (SCS) in soil survey. In addition to Indiana, the Chinese met with SCS personnel in Pennsylvania, Mississippi, Texas, Arizona and California.

The Chinese team consisted of Chen Deji, chief engineer, Survey and Exploration Department, Yangtze Valley Planning Office in Wuhan; and Yang Jicheng, deputy chief of remote sensing, Application Center, Ministry of Water Conservancy, Beijing, China.

VISITING SCIENTISTS

Dr. L.E. Giddings, Jr. and Mr. Fabian Lozano, from the Instituto Nacional de Investigaciones Sobre Recursos Bioticos, Mexico, were at LARS during the last two weeks of June. They learned about implementation of preprocessing software - reformatting and geometric correction - from CATHY KOZLOWSKI and LUIS BARTOLUCCI. This knowledge will be used to add these capabilities to the LARSYS Version 3.1 processing system already in use at their institute.

Cap. Ing. Antonio Perez, director of the ERTS/GEOBOL Remote Sensing Program, joined the other Bolivian visiting scientists from June 19-July 2. He was at LARS to assess the progress of the data base concept being developed for use in the Bolivian Digital Geographic Information System.

LARS TRAVEL LOG

During April 27-29, VERN VANDERBILT attended a workshop on Plant Canopy Structure held in Knoxville, Tennessee.

DAVE LANDGREBE presented a paper providing the general characteristics of Modern Remote Sensing Technology, at the "Conference on Space Technology and Industrial Forest Management", held in Jacksonville, Florida, on May 7. LARS staff members ROGER HOFFER and DICK MROCZYNSKI also attended the conference.

On May 13 and 14, DAVE LANDGREBE was in Long Beach, California attending the annual meeting for the American Institute of Aeronautics and Astronautics. He presented a paper entitled: "Earth Observational Sensors in Perspective", in a session which reviewed the development of all types of aerospace information systems.

MARILYN HIXSON and STEVE HOLLINGER were in Washington, D.C., May 20-22, to design experiments on Landsat Spectral Inputs to crop condition and yield models.

During May 26-29, GARY BRAMMER, DAVE FREEMAN, and LUKE KRAEMER attended an Application Data Service (ADS) Standards Workshop, held at Goddard Space Flight Center in Greenbelt, Maryland.

PHIL SWAIN presented a paper on "Applications of Remote Sensing: Present and Future Trends", at a seminar on Remote Sensing in Caracas, Venezuela, May 26-28. The seminar was sponsored by the IBM Scientific Group in Venezuela Institute for Scientific Research.

MARVIN BAUER met with Johnson Space Center personnel to plan corn-soybean scene radiation research on May 27 and 28.

LUKE KRAEMER traveled to Houston June 7-12, to train Johnson Space Center personnel in the use and maintenance of the RT&E Data Base. The MET Data Base progress was also reviewed.

Four LARS staff members attended the 1981 International Geoscience and Remote Sensing Symposium (IGARSS '81), sponsored by the IEEE Geoscience and Remote Sensing Society, on June 8-10, in Washington, D.C. MARION BAUMGARDNER chaired a technical session on Soils and Land Use; DAVE LANDGREBE presented a featured paper on "Status and Directions for Analysis Technology for Land Remote Sensing" and chaired a technical session on Data Analysis Support. JIM TILTON and VERN VANDERBILT also attended and presented the following papers:

"A Quantitative Applications Oriented Evaluation of Thematic Mapper Design Specifications" by P.H. SWAIN, V.C. VANDERBILT and C.D. JOBUSCH

"Application of Computer Axial Tomography (CAT) to Measuring Crop Canopy Geometry" by V.C. VANDERBILT and R.W. KILGORE

"Contextual Classification of Multispectral Image Data" by J.C. TILTON and P.H. SWAIN

While in Washington, D.C. Dr. Baumgardner also attended a committee meeting of the American Association for the Advancement of Science (AAAS). The AAAS recently signed a subcontract with the National Park Service for a project funded by USAID to study what kind of inventory and monitoring systems should be used in developing countries. Five study panels have been set up - soils, vegetation, water, animal and cultural - with Dr. Baumgardner serving as chairman of the Soils panel.

NEW PROJECTS FUNDED

Title: "Application of Remote Sensing Techniques for Waterfowl Habitat Inventory"
Sponsor: Ducks Unlimited
P.I.: R. Mroczynski
Duration: 3/1/81 - 12/31/81

Title: "For Development of a Low-Cost Earth Resources Processing Capability for the University of California at Riverside"
Sponsor: University of California
P.I.: L. Bartolucci
Duration: 10/1/80 - 9/30/81

Title: "The Relationship of Sensor Parameters to Applications Data Analysis"
Sponsor: NASA
P.I.: D. Landgrebe
Duration: 1/1/81 - 12/31/81

NEW LARS TECHNICAL REPORTS

030181 Pixel Labeling by Supervised Probabilistic Relaxation by J.A. Richards, D.A. LANDGREBE and P.H. SWAIN.

A simple modification to existing probabilistic relaxation procedures is suggested which allows the information contained in initial labels to exert an influence on the direction of relaxation throughout the process. In this manner, the initial labels assume more importance than with conventional algorithms and are used in combination with the outcome of relaxation at each iteration to produce a cooperative estimate for the correct label for a particular object. Pixel labeling examples are presented which show the performance that can be obtained with the modified algorithm. The procedure is readily generalized to allow other data to influence the process.

The work was supported in part by NASA under Contract No. NAS9-15466.

040181 Analytic Signal Representation of the Synthetic Seismogram of Bright Spots by K.Y. Huang, C.D. McGillem and P.E. ANUTA.

Transformation of seismic signals into their analytic signal representation permits the unique separation of envelope, instantaneous phase, instantaneous frequency and apparent polarity. These parameters are useful in extracting the physical properties of a seismic signal and help in geophysical and geological interpretation. Deconvolution methods can improve the quality of the analytic seismic signal representation. From simulation studies, it is found that time and space adaptive deconvolution significantly improves the quality of the analytic signal representation.

The work described in this paper was sponsored by NSF under Grant No. ENG7820466.

041381 Computer-Aided Analysis of Remote Sensor Data -- Magic, Mystery, or Myth? by R.M. HOFFER

This paper addresses some of the mysteries and the myths which have often been associated with computer-aided analysis of remote sensor data. Results of several studies involving aircraft, Landsat, and Skylab MSS data are examined. The value of using topographic, soils, or other data sources in addition to MSS spectral data is discussed, as are the potentials for utilizing Synthetic Aperture Radar (SAR) and Thematic Mapper (TM) MSS data sources.

040981 Design and Evaluation of a Pick-Up Truck Mounted Boom for Elevation of a Multiband Radiometer System by R. Tsuchida.

This report describes the design process for developing the boom required for support of a multiband radiometer. Three concepts were considered for the boom design: A one-piece boom with a troley, a folding boom, and a telescoping boom. The telescoping boom was selected over the other two concepts because of its easy manual operation. The boom is designed to mount on the bed of a pick-up truck and elevate the radiometer system 8 meters above the ground and 4 meters away from the truck. The selection of the boom components is discussed with justification of the final choice. Results of performance tests and one season's operation of the completed boom are reported.

The research described in this report was sponsored by NASA under Contract No. NAS9-15466.

041581 Waveband Evaluation of Proposed Thematic Mapper in Forest Cover Classification by R.S. LATTY and R.M. HOFFER

This study involved the evaluation of the characteristics of multispectral scanner data relative to forest cover type mapping, using NASA's NS-001 multispectral scanner to simulate the proposed Thematic Mapper (TM). The objectives were to determine: (1) the optimum number of wavebands to utilize in computer classifications of TM data; (2) which channel combinations provide the highest expected classification accuracy; and (3) the relative merit of each channel in the context of the cover classes examined. Transformed divergence was used as a measure of statistical distance between spectral class densities associated with each of twelve cover classes. The maximum overall mean pairwise transformed divergence was used as the basis for evaluating all possible waveband combinations available for use in computer-assisted forest cover classifications.

The work described in this paper was sponsored by NASA under Contract No. NAS9-15889.

060880 Procedure 1 and Forestland Classification Using Landsat Data by R.F. Nelson and R.M. HOFFER

Procedure 1 approaches to developing land cover classifications were compared with the Multicluster Blocks process on a 15,000 hectare forested area in southwestern Colorado. Results showed that P-1 (using the clustering processor in an unseeded, iterative mode) performed as well as the Multicluster Blocks approach on rugged study area.

The research described in this report was sponsored by NASA under Contract No. NAS9-15508.

100180 LARSFRIS User's Manuals by LARS Staff, R.P. MROCZYNSKI ed.

100280 These documents contain user instructions for the proper use
100380 of the software which comprises the LARSFRIS package. LARSFRIS
100480 represents a compilation of software developed over a number of
100580 years by the staff at Purdue University's Laboratory for Applications of Remote Sensing. The software packages are designed to help the user analyze digital image data such as that collected by the Landsat multispectral scanner. These five documents comprise the LARSFRIS package.

SYSTEM SERVICES July 16, 1981

SHORT TERM TAPE STORAGE BY CAROL MCKIEL

Beginning June 16, the operations staff will start filing temporary user tapes in the racks in the computer room. The tapes will be placed in a specially designated slot for a temporary period of time.

Labels for each slot will be generated. The label will resemble the following example:

Purdue LARS Tape No. 5371 (or appropriate number)
Temporary LARS Tape
Assigned Owner (to be written in)
Ring-in - (to be written in)

The history file for each slot will be updated as tapes are submitted and eventually returned to the user. Included in each history entry will be the date of entry of the tape, the owner's name, and an indicated period of time that the tape will need to be kept in the racks.

To facilitate this check-in effort, all tapes must be checked in through one of the full-time operators during the evening shifts, or through CAROL McKIEL or MIKE COLLINS during the day shift. When the tape is checked in, a slot number will be assigned to the user's tape (that slot number will be used to request the tape), the appropriate LARS tape labels will be placed on the tape, and the history entry for that tape slot will be updated. Every Friday afternoon Carol will check to see which tapes have been in the rack for the designated period of time. Any tapes that have run out of time will be returned to the user. Tapes can be re-submitted if, upon receiving the tape, the owner determines he needs to work with the tape further.

LOCAL TERMINAL UPDATE BY LUKE KRAEMER

The local terminal group has been very busy this past month ordering new terminals and reorganizing the Flexlab 2 User's Area. The terminals which have been ordered include 5 full-screen display stations, 2 TI785 portable terminals, 5 Ampex Dialog 30 ASCII terminals, and 1 IBM 3101 terminal with block mode. These terminals should be arriving soon.

Special thanks are extended to MIKE COLLINS, DAVE FREEMAN, JEFF WELCH, and WALTER SHUMAKER for doing a great job with the Flexlab 2 equipment move. They relocated the PDP, Comtal, and user terminals with a minimal amount of down time, and have sharpened up the area.

CONVERSION OF SOFTWARE TO FORTRAN H BY KAY HUNT

On June 12, 1981, the supported FORTRAN H versions of LARSYS, LARSYSDV and reformatting software became the standard versions available. That is, using GETDISK LARSYS, IPL REFORM, etc., will automatically retrieve the FORTRAN H versions of those products.

Users wishing to use the FORTRAN G versions of LARSYS and LARSYSDV after June 12 may do so by using the following links:

```
LINK VMGEN 400 12A R RLSYS          (LARSYS text)
LINK VMGEN 401 19B R RLSOR          (LARSYS source)
LINK VMGEN 402 19C R RDSYS          (LARSYSDV text)
LINK VMGEN 403 19D $ RDSOR          (LARSYSDV source)
```

Then access the disk:

ACCESS 19x mode

After June 12, the FORTRAN G versions of the LARSYS and LARSYSDV software will no longer be supported and will be available on disk only temporarily. The G version of the reformatting software will be available only from tape after June 12. As of September, 1981, the G versions of LARSYS and LARSYSDV will then only be available from tape.

Questions or problems regarding this update may be referred to CATHY KOZLOWSKI or KAY HUNT.

NEW BATCH SYSTEM AVAILABLE FOR TESTING BY TOM WILSON

For the past year, Basic Systems has been developing a new batch system to replace our current batch facilities. The new system is ready for user testing, and will be available around the end of June.

This batch system is a complete redesign, and offers many advantages over the system it will replace:

1) Users will not have to know how to write EXEC's in order to run jobs in the new system. Instead, CMS commands, CP commands, and data will be placed in the job stream exactly as they would be typed at a console. This also means that character strings longer than eight characters will not be tokenized.

2) Programs that were difficult or impossible to run in the old batch system will run in the new system. These include SAS, FORTRAN H Extended compiles, extensive editing sessions, and anything else that depends on the interval timer or non-tokenized data.

3) Users will not have to know operational details of the batch system, such as how much memory each batch machine has, what its charge rate is, when it runs, etc. Memory size, time limit, charge rate, and other job characteristics are specified on job cards, and the batch system takes charge of selecting a batch machine the meets your needs.

4) An extensive user interface program, called "BATCH", will assist you in creating and controlling your batch jobs. Its services include automatic generation of job cards (based on data you provide), verification that job cards contain valid data for the batch system before accepting your job, allowing you to use the CMS Editor to insert your own commands into the job, and insuring that the job has been accepted into the batch system before returning control to CMS. The BATCH command also allows you to change job card parameters after submitting a job, place a job on hold (as well as release the hold), and cancel a job before or during execution.

5) The BATCH command is also a tutorial program. Although it will accept parameter lists in the command line, you may initiate almost any batch function just by typing "BATCH". BATCH will then prompt you for all the information it needs,beginning with which BATCH function you want to execute. Each time BATCH prompts you for input, you may respond with "HELP" or "?" to obtain up to 20 lines of explanation telling what kind of information it would like you to enter.

A preliminary user's guide for the batch system is available in the file "NEWBATCH LISTING Y". Print a copy of this file for a complete explanation of the new system's features.

LARSPEC NEWS BY JERRY MAJKOWSKI

In order to make room for new PRINTRONIX software on the LARSPEC disk, plans are being made to discontinue support of the DECwriter as a graphics device in GSPEC. The software will still be available in GCS, and on tape for LARSPEC. This change is expected to occur by the end of July; no definite date has been set. Users should contact JERRY MAJKOWSKI if this will cause any problems.

Future expansion for LARSPEC includes FSS data calibration software and the capability to plot data with differing wavelength resolutions on a single graph. This software is currently in the testing stage. Interface to the PRINTRONIX will follow the completion of this expansion.

LANDSAT FLIGHTLINE CODE BY CATHY KOZLOWSKI

When the reformatting group processes Landsat data, a flightline code is assigned to the data set. This code is determined by which satellite collected the data, when the data was collected, and where the scene is located.

In the past this code has been in the form of:

lddd hhmms nn

Where:

l is the Landsat satellite number (1, 2, or3)

ddd is the days since launch. If the days since launch is greater than 999, the thousands digit is encoded in the satellite number as

5 - Landsat 1
6 - Landsat 2
7 - Landsat 3

hhmms is the time of day in GMT when the data was collected in hours, minutes, and tenths of minutes

nn is the postal abbreviation of the state in which the frame center is located. If the data is located outside the U.S., the country is used

For example:

512317354 IL

means the data was collected by Landsat 1 in the 1132nd day since it was launched at 17:35.4 GMT over Illinois.

Since Landsat 2 has been in operation over 2,000 days, this coding scheme for satellite number and days since launch does not work well. As of June 1st, a new method for assigning flightline codes has been established and implemented:

lddd d-hhmms nn

Where:

l is the satellite number (without any encoded thousands digit)

dddd is the days since launch

\- is added to easily distinguish this type of flightline code from the earlier ones.

hhmms is the same as before

nn is the same as before

The example above, under this new scheme, would have been assigned a code of:

11132-17354 IL

The flightline codes of data that have already been processed will not be converted to this new scheme, so Landsat data in LARSYS format might have either type of code.

GRAPHICS COMPATIBILITY SYSTEM (GCS) BY JERRY MAJKOWSKI

A new version of the 2-dimensional and 3-dimensional GCS system is available for use. The new system includes several expansions developed at the Vicksburg Waterways Experiment Station and the Westinghouse Corporation. The new system includes:

1) Additional control over graph size and page layout
   -- UASPCT
   -- UDIMEN
   -- UFORMT

2) Additional test capabilities
   -- String justification
   -- String underlining
   -- 19 additional font types

3) Contour plotting routines
   -- UCONTR
   -- UCONTL
   -- UCONT2

4) Surface plotting
   -- USURF

5) Create regularly gridded surface from irregularly distributed points (UGRID1)

6) Polygonal shading (USHADG)

7) Negative windowing for legends, etc. (UDBLNK)

8) Additional 3-D axis generation and viewing routines
   -- U3EYE
   -- U3DEF
   -- U3APLT

9) Additional options:
   -- Major and minor tic marks for axes
   -- Stop distortion of graphs such as polar plots

The new GCS system may be accessed by

```
GETDISK EXOSYS 10B 10B Z PASS RPTL
```

The new GCS system will become the operational system on July 29. Anyone who has software using GCS should try the new system before July 29, and report any problems to JERRY MAJKOWSKI. For additional information contract JERRY MAJKOWSKI or LARRY BIEHL.

NEW SAS PROCEDURE BY CAROL JOBUSCH

A new SAS procedure has been added to SAS test release 79.5 on LARS VM/CMS system, which is made available by typing

```
GETDISK SAS795
```

before using the SAS command.

PROC TAPERD reads a LARSYS or UNIVERSAL format data tape and outputs specified data values to a SAS data set.

```
PROC TAPERD   LARSYS
              UNIVERSAL   TAPE=tapeno FILE=fileno   options;
```

Either LARSYS or UNIVERSAL must be specified; the TAPE= and FILE= options must also appear. The options below may appear in the PROC TAPERD statement.

OUT= data set name
Use the OUT= option to give the name of the new SAS data set. If OUT= is omitted, TAPERD names the new data set as if OUT= __DATA__ had been specified.

The following statements are required:

```
PARMCARDS:
LINE XXXX YYYY ZZZZ
COLS XXXX YYYY ZZZZ
CHAN C1
CHAN C2       one line for each channel selected
  ...
;
```

Where:

XXXX is the first line or column - right justified in cols 6-9
YYYY is the last line or column - right justified in cols 11-14
ZZZZ is the line or column increment - right justified in cols 16-19
C1 C2 ... C30 specify channels to be included in the SAS data set
- right justified in cols 6-7

The SAS data set contains an observation for each channel for each pixel specified. It has four variables: LINE, COLUMN, CHANNEL, and VALUE (which is normally a reflectance value, but could be a ground truth code or other information coded to look like a reflectance value).

Please contact LOUIS LANG or CAROL JOBUSCH for any questions, comments, or problems.

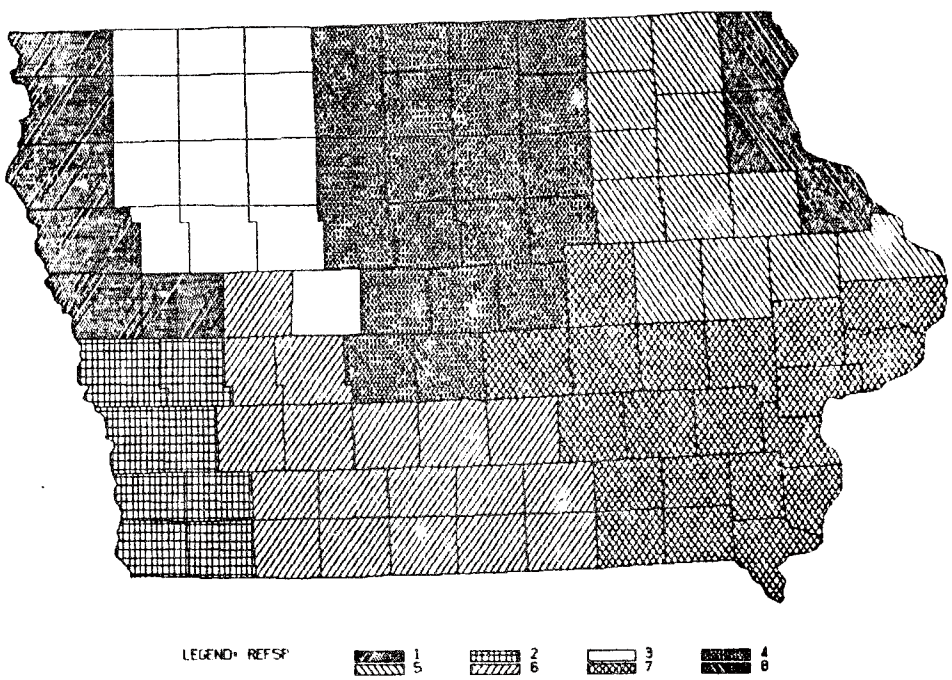
SAS/GRAPH NEWS BY CAROL JOBUSCH

SAS/GRAPH has been interfaced with the Printronix and Trilog matrix printers. The device driver was written in FORTRAN by GARY BRAMMER and ROSS AIKEN at LARS. Now that we know that it works, RONG-JEN PAN is converting some of the FORTRAN routines into Assembler to increase efficiency. The FORTRAN version is currently on the SAS795 disk; a more efficient device driver will replace it as soon as possible.

Below is a sample SAS program that uses PROC GMAP to create a map of Iowa on the Printronix, along with a reduced-size copy of the map. Directions for using the device driver are on the following page.

```
GOPTIONS DEVICE=PRNTRX COLORS=(BLACK) VSIZE=11 HSIZE=13 ROTATE;
PROC GMAP DATA=IOWA.STRATA MAP=MAPDATA.IOWA;
  ID STATE COUNTY;
   CHORO REFSP / DISCRETE ;
  PATTERN1 V=M5N45  C=BLACK;
  PATTERN2 V=M1X90 C=BLACK ;
  PATTERN3 V=EMPTY C=BLACK ;
  PATTERN4 V=M4X45 C=BLACK ;
  PATTERN5 V=M2N135 C=BLACK ;
  PATTERN6 V=M2N45 C=BLACK ;
  PATTERN7 V=M2X45 C=BLACK ;
  PATTERN8 V=M5N135 C=BLACK ;
TITLE IOWA REFINED/SPLIT STRATA ;
```

IOWA REFINED/SPLIT STRATA



USING THE PRINTRONIX WITH SAS/GRAPH

* GETDISK SAS795

* GETDISK TEMP 1M CLEAR

  Note -- you must have a R/W disk at filemode D

* The SAS plot file will be written to Unit 6. If you want it to go directly to the printer use

  FI 6 PRINTER (PERM

  If you want it to go to disk use

  FI 6 DISK filename filetype (PERM

  You can then use PR filename filetype (CC to print a copy of the disk file.

  If you do not specify a FILEDEF for Unit 6, SAS will write FILE FT06F001 on your A disk.

* The first (non CMS) statement of your SAS program should be

  GOPTIONS DEVICE=PRNTRX COLORS=(BLACK) HSIZE=13 VSIZE=11 ROTATE:

graphics output device is Printronix.	default color is black -- which is single thickness lines.	horizontal size in inches.	vertical size in inches.	rotate 90^{o} from normal -- "normal" is a 90^{o} rotation from usual printed page orientation.

  COLORS=(BLACK,RED) allows you to use single and double width lines. Be careful with this -- you may get unexpected wide lines.

SUMMARY OF 3031 COMPUTER USAGE FOR APRIL 1981

OVERALL USAGE

Basic Rate CPU Time Used	53.50
Priority Rate CPU Time Used	147.65
Total CPU Time Used	201.16
Terminal Sessions	5744 (86 PCT)
Batch Jobs	946 (14 PCT)

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	44.86	26
Mon-Fri 8AM-4PM	82.04	47
Mon-Fri 4PM-midnite	58.32	33
Weekend	15.93	12

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	157	0.23	0.03
BATSHORT	62	8.88	0.26
BATMED	32	9.47	1.34
BATONITE	45	31.78	1.86
BATLONG	112	63.20	19.15
TAPTRAN	0	0.0	0.0
BATEOD	399	11.30	2.00
BATJSC	71	38.80	11.25

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	GTX	276	120.85	0.44
	31	GTX			
	32	GTX	118	19.07	0.16
	33	GTX	275	175.11	0.64
	34	GTX	276	150.05	0.54
	35	GTX	306	191.82	0.63
	36	GTX	492	176.04	0.36
	37	DECwriter	25	10.12	0.40
	38	Tektronix	4	1.16	0.29
	39	CRT	168	49.70	0.30
	3A	GTX			
Flexlab1	40	GTX	222	132.70	0.60
	41	GTX	264	184.90	0.70
	42	GTX	309	187.19	0.61
	43	DECwriter	185	143.87	0.78
Dial-Up	50	1st in Use	172	130.45	0.76
	51	2nd in Use	64	42.64	0.67
	52	3rd in Use	18	18.98	1.05
	53	4th in Use	4	8.55	2.14
	54	5th in Use			
	55	In-House-1	35	22.80	0.65
	56	In-House-2	23	7.16	0.31
St. Regis	4A	DECwriter			
Alabama	4B	DECwriter	25	60.13	2.41
	4C	GTX	4	2.65	0.66
	4D	GTX	62	90.70	1.46
ISU	4E	(various)	46	63.65	1.38
	4F	(various)	71	39.01	0.55
Houston	60	CRT	148	113.09	0.76
	61	CRT	257	165.63	0.64
	62	Trenddata			
	63	Trenddata	214	131.93	0.62
	64	CRT			
	65	CRT			
	66	CRT			
	67	CRT			
	68	CRT	162	158.81	0.98
	69	CRT	137	110.26	0.80
	6A	Dial-up	118	173.69	1.47
	6B	Dial-up	91	81.36	0.89
	6C	Dial-up			
	6D	Dial-up			
	6E	Dial-up			
	6F	Dial-up			

SUMMARY OF 3031 COMPUTER USAGE FOR MAY 1981

OVERALL USAGE

Basic Rate CPU Time Used	19.58
Priority Rate CPU Time Used	131.46
Total CPU Time Used	151.04
Terminal Sessions	5608 (88 PCT)
Batch Jobs	781 (12 PCT)

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	16.36	11
Mon-Fri 8AM-4PM	80.16	50
Mon-Fri 4PM-midnite	38.30	24
Weekend	16.23	16

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	127	1.06	0.09
BATSHORT	88	13.34	0.97
BATMED	70	17.21	0.98
BATONITE	123	19.51	0.94
BATLONG	41	42.85	21.75
TAPTRAN	0	0.0	0.0
BATEOD	264	12.04	1.15
BATJSC	65	16.67	2.58

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	GTX	240	134.64	0.56
	31	GTX			
	32	GTX	151	52.40	0.35
	33	GTX	268	166.80	0.62
	34	GTX	286	174.72	0.61
	35	GTX	301	200.40	0.67
	36	GTX	326	176.91	0.54
	37	DECwriter	1	0.01	0.01
	38	Tektronix	34	30.00	0.88
	39	CRT	210	75.66	0.36
	3A	GTX			
Flexlab1	40	GTX	207	98.45	0.48
	41	GTX	184	103.42	0.56
	42	GTX	221	121.46	0.55
	43	DECwriter	94	46.06	0.49
Dial-Up	50	1st in Use	148	160.50	1.08
	51	2nd in Use	81	47.17	0.58
	52	3rd in Use	23	18.65	0.81
	53	4th in Use	5	4.46	0.89
	54	5th in Use	1	2.86	2.86
	55	In-House-1	89	48.67	0.55
	56	In-House-2	51	30.08	0.59
St. Regis	4A	DECwriter			
Alabama	4B	DECwriter	32	63.49	1.98
	4C	GTX	52	45.15	0.87
	4D	GTX	28	110.42	3.94
ISU	4E	(various)	12	9.18	0.77
	4F	(various)	28	12.29	0.44
Houston	60	CRT	117	68.20	0.58
	61	CRT	247	161.69	0.65
	62	Trenddata			
	63	Trenddata	195	98.88	0.51
	64	CRT			
	65	CRT			
	66	CRT			
	67	CRT			
	68	CRT	178	139.99	0.79
	69	CRT	117	89.33	0.76
	6A	Dial-up	98	130.02	1.33
	6B	Dial-up	87	53.45	0.61
	6C	Dial-up			
	6D	Dial-up			
	6E	Dial-up			
	6F	Dial-up			

INTRALAB NOTES

PERSONNEL CHANGES

PAT SHOEMAKER has recently been promoted to Account Clerk 5 -- the highest level attainable. Pat began working at LARS in 1975, and has served as LARS System Services Account Clerk.

Her duties include taking applications for and monitoring accounts, preparing billings and financial reports, inputting data for LARS Administrative Information System (LAIS), and originating all purchasing and travel requests for the LARS 70-fund operations.

SYLVIA JOHNSTON left LARS June 11, after working for almost a year as Secretary to the Deputy Director, and Secretarial Supervisor in Flexlab 2.

LINDA LITTLE is working as overload secretary in Flex 2 this summer. She is a native of Lafayette, Indiana.

ENTERING THE GRADUATE PROGRAM SCENE . . .

J. P. DOLAN has been accepted in the Computer Science Master's of Science program at Purdue. J. P. has been a student programmer at LARS since 1978, working with the Local Terminal group, and will continue working at LARS under a Graduate Assistantship.

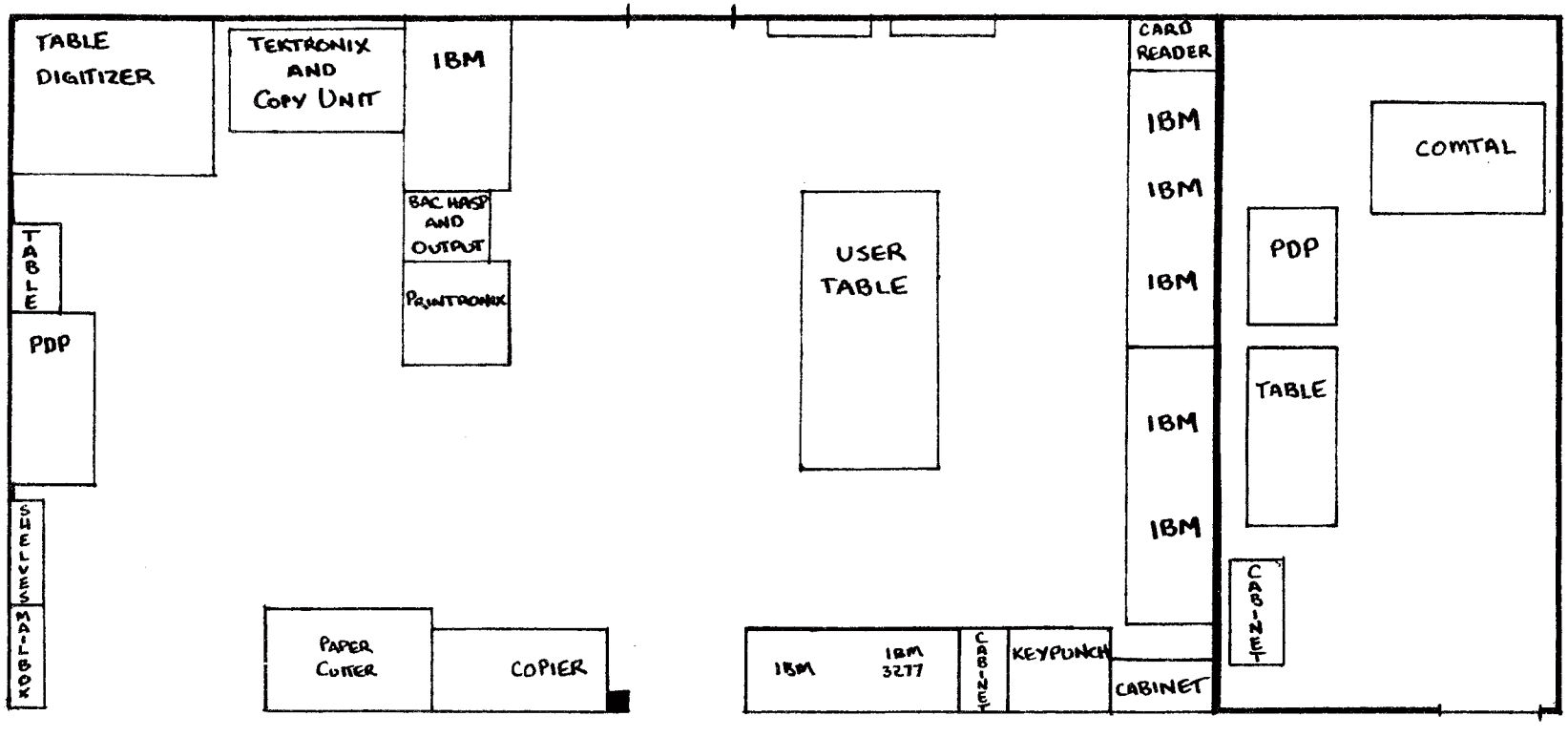
AND EXITING THE GRADUATE PROGRAM SCENE . . .

LARRY HINZMAN completed his Master of Science degree in Agronomy this May. His thesis topic was "Influence of Mitrogen Fertilization and Leaf Rust on the Reflectance Characteristics of Winter Wheat Canopies."

NEED A TERMINAL???

According to LUKE KRAEMER, the LARS summer terminal crunch is well under way. Please be considerate to other users by logging off or disconnecting your terminal whenever possible -- this will help to avoid the implementation of a sign-up system.

INTRODUCING: THE NEW FLEXLAB 2 USER AREA LAYOUT



NEW LARS WORK ORDER

Effective immediately, work to be done by VIC FLETCHER should be requested by completing a LARS Work Order form. These forms are available from Nancy Kline in Flexlab 1, and PAT SHOEMAKER in Flexlab 2. The forms should then be turned in to the Business Office for processing.

MINI-LARSIANS

Congratulations and best wishes are extended to Pam and RAY MANDICH who recently became parents of a daughter. Mindy Michele was born on June 7, 1981, and weighed 8 lbs., 10 oz.

Congratulations also go out to Sue and JIM KAST on the birth of their daughter Anastasia Rachel on June 22. She weighed in at 7 lbs., 10 oz. and was 20 inches long.

PROPOSALS SENT OUT

Title: "Research on Remote Sampling for Septic System Failure"
Sponsor: Environmental Protection Agency
P.I.: R. P. MROCZYNSKI
Duration: 10/1/81 - 9/30/81

Title: "The Continued Support of the Ball State University Earth Resources Data Processing Capability"
Sponsor: Ball State University
P.I.: L. BARTOLUCCI
Duration: 7/1/81 - 6/30/82

Title: "Assessment of Soil Erosion on Agricultural Lands"
Sponsor: Environmental Protection Agency
P.I.: R. WEISMILLER
Duration: 10/1/81 - 9/30/83

Title: "Indiana State University Remote Terminal"
Sponsor: Indiana State University
P.I.: L. BARTOLUCCI
Duration: 7/1/81 - 6/30/82

THANK-YOU

The following staff members have made contributions to LARS via the Purdue Plan for the '80s: Mr. and Mrs. David Hodge, Dr. and Mrs. LeRoy Silva, Mr. and Mrs. Terry Phillips, Mrs. Mary Rice and Mrs. Barbara Pratt Francis. Including those who have previously contributed this brings the total number of contributors to eight.

ANOTHER GREAT PICNIC

The LARS Annual Picnic was held on Saturday, June 6 at Happy Hollow Park. The weather was beautiful and everyone was in a festive mood. Hot barbecue sandwiches were served to around 95 people along with many delicious salads, baked beans, desserts of all kinds and lemonade and iced tea.

There was a lot of socializing that took place and the annual volleyball battle was on until the park closed at 8 p.m. A good time was had by all.

A special thank you to this year's committee: LARRY BIEHL, ELLEN DEAN, and STEPHANIE STILES.

RECENT ADDITIONS TO THE LIBRARY

The following AgRISTARS reports are now available in the LARS library.

From Lockheed Engineering and Management Services Company:

"Some Approaches to Optimal Cluster Labeling of Aerospace Imagery," by C. B. Chittineni.

"The Multicategory Case of the Sequential Bayesian Pixel Selection and Estimation Procedure," by M. D. Pore and T. B. Dennis.

"Investigation of Boundary Pixel Handling Procedures," by T. B. Dennis.

"Spatial/Color Sequence Proportion Estimation Techniques," by T. B. Dennis.

"Maximum Likelihood Clustering with Dependent Feature Trees," by C. B. Chittineni.

"Australian Transition Year Special Studies," by R. W. Payne and T. E. Armstrong.

"Analysis of U. S. Spring Wheat and Spring Barley Periodic Ground Truth," by T. Hodges.

"Estimation of Proportions in Mixed Pixels Through Their Region Characterization," by C. B. Chittineni.

"A Temporal/Spectral Analysis of Small Grain Crops and Confusion Crops." by W. R. Johnson.

"An Analysis of Haze Effects on Landsat Multispectral Scanner Data," by W. R. Johnson and M. L. Sestak.

From NASA/Johnson Space Center:

"U. S./Canada Wheat and Barley Crop Calendar Exploratory Experiment Implementation Plan," by

"A Semi-Automatic Technique for Multitemporal Classification of a Given Crop of a Landsat Scene," by G. D. Badhwar, W. W. Austin and J. F. Carnes.

"Weighted Ratio Estimation of Large Area Crop Production," by Alan H. Feiveson.

"A Comparative Study of the Thematic Mapper and Landsat Spectral Bands from Field Measurement Data," by G. D. Badhwar and K. E. Henderson.

From Elogic:

"Assembly Language Coding for Classy," by M. E. Rassbach.

"Maximum Likelihood Labeling," by M. E. Rassbach.

"New Output Improvements for Classy," by M. E. Rassbach.

"Improved Version of the Split Routine for Classy," by M. E. Rassbach.

From Remote Sensing Laboratory, University of Kansas Center for Research:

"Crop Classification Using Airborne Radar and Landsat Data," by F. T. Ulaby, R. Y. Li and K. S. Shanmugam.

Other publications which are new to the library include:

"Plant Cover, Soil Temperature, Freeze, Water Stress, and Evapotranspiration Conditions," by Craig L. Wiegand, Paul R. Nixson, Harold W. Gausman, L. Neal Namken, Ross W. Leamer, and Arthur J. Richardson.

"Remote Sensing Techniques and Methodologies for Monitoring Ecological Conditions for Desert Locust Population Development," (final technical report from FAO/USAID).

"United States Government Manual 1980-1981."

"Remote Sensing in Geology," edited by Barry S. Siegal and Alan R. Gillespie.

"Remote Sensing Optics and Optical Systems," by Philip N. Slater.

SCAN LINES

LARS • Purdue University • Vol. 8 • No. 2 • August 28, 1981

ST. REGIS - SPACE AGE PIONEER IN MANAGING EARTH'S RENEWABLE RESOURCES

St. Regis Paper Company owns or manages over 2½ million acres of timberland, scattered from east Texas to the Atlantic Coast. It is vital that the company keep an accurate inventory of these timberlands. Traditionally, the company has used air photos and ground sampling to inventory these forests. Repetitive ground sampling of such a vast area is expensive and time-consuming. Although ground surveys will always be necessary, St. Regis wondered if Landsat could increase their efficiency by giving them some idea of which areas have changed and require a closer look, and which are stable and do not.

To find out if Landsat could do this, St. Regis approached NASA in June 1975 with an unsolicited proposal: to conduct a joint project to demonstrate Landsat's use in forest inventorying. NASA agreed, and Purdue University's Laboratory for Applications of Remote Sensing (LARS) was placed under contract in October 1977 to provide technical support during the project.

The project began with a 16 month demonstration of Landsat's usefulness to St. Regis, using the Purdue-developed LARSYS system. This involved incorporating Landsat data with other data into a digital map base. The combined data in digital form became the system known as FRIS.

Scan Lines is prepared 10 times a year for distribution at Purdue University, Laboratory for Applications of Remote Sensing (LARS), 1220 Potter Drive, West Lafayette, Indiana 47906 USA. Persons external to Purdue who wish to receive one year of *Scan Lines* should send $7.50, payable to Purdue University, to *Scan Lines* at the above address.

At the end of the demonstration, St. Regis decided that Landsat could help the company. Bob Barker, manager of FRIS, says that "it was the interactive graphics that sold it."

As part of the project, St. Regis invested heavily in an extensive interactive graphics system, including a PDP 11/70 computer with an interactive graphics work station consisting of two Tektronix CRTs and a 48 x 62 Talos digitizing table, as well as the appropriate software. They also have a Comtal color display.

Their data base management system allows them to bring tabular data in hierarchical form into the mapping system so they can access maps from tabular data and vice versa. The software was written by Intergraph Corporation which also wrote software allowing them to transform gridded Landsat data into vectored map data and vice versa. This is crucial; planners can view Landsat classifications and change detections in the map format they are used to.

The system cost St. Regis over $350,000, not counting the $500,000 cost of carrying out the project. Inventorying traditionally costs them over $1 million a year. St. Regis estimates that over the long haul, FRIS will cost slightly less to gather and maintain its data base than it now costs. For example, while there are now ten ground sampling crews, FRIS will allow a reduction to eight - at $40,000 per year per crew, a saving of $80,000 per year. St. Regis estimates it will take eight years to pay off the new equipment, after which their inventories will cost much less than now. Bob Barker adds that the system may justify itself in added capabilities as well as savings. "Already we've been called on to use the system in ways we hadn't planned on."

WATERFOWL HABITAT INVENTORY - DUCKS UNLIMITED PROJECT

Bob MacFarlane, Regional Biologist Ducks Unlimited (DU) from Regina, Saskatchewan and Ray Schmidt and Jerry Jacobson, Interdisciplinary Systems Ltd. (consultants to DU), Winnipeg, Manitoba visited LARS from July 20-30 for the purpose of classifying DU test sites in Saskatchewan. Twenty-five Digitally Corrected Image Subscenes (DICS), or the equivalent of five complete Landsat scenes, were classified during this period.

The group worked with JOAN BUIS, JEFF MADDEN and STEVE KRISTOF during their stay.

Results of this classification session will be produced as 1:250,000 scale TRACE maps showing the distribution of marsh lands 25 acres and larger. Each marsh will be identified by its VTM coordinate and acreage statistics for shallow marsh, deep marsh, and open water will be included.

DUbiologists will use the Landsat derived information to prepare plans for future DU wetland protection programs.

EDUCATORS CONFERENCE EVALUATION

The 1981 Conference on Remote Sensing Education held May 18-22, at Purdue University attracted 189 participants from across the country. The conference was designed to foster exchange of information and ideas among remote-sensing educators in the colleges and universities of the United States. In all 43 such institutions were represented, with participants from all but 10 of the 50 states.

Evaluations returned by attendees strongly urged the continuation of these conferences. CORSE-81 was the second in the series; the first, for educators in the western states only, was held at Stanford University in 1978. NASA has sponsored both of these conferences but is now looking to the academic community to find ways for the conference to perpetuate.

Participants who returned the evaluations stated frequently the benefits to themselves of attending a conference solely directed toward education; they felt it gave them an unusual opportunity both to discuss issues related to improving teaching programs and to increase their own understanding of the technology.

Co-chairmen for the conference were SHIRLEY DAVIS and JOHN LINDENLAUB. Both MARION BAUMGARDNER and ROGER HOFFER were on the Planning Committee.

AMERICAN SOCIETY OF PHOTOGRAMMETRY NEWS RELEASES

PHOTOGRAMMETRIC FELLOWSHIP INCREASED TO $4,000

The Wild Heerbrugg Photogrammetric Fellowship of the American Society of Photogrammetry will be awarded in March 1982 for graduate study in photogrammetry at an accredited school. H. P. Tanner, Executive Vice President of Wild Heerbrugg Instruments, Inc., has announced that the fellowship is increased to $4,000 per year.

Competition is open to any member or student member of ASP provided at least one undergraduate course in surveying or photogrammetry is completed prior to receipt of the award.

Criteria for judging includes the applicant's previous academic record, a statement of study objectives, applicability of previous courses to graduate work in photogrammetry, recommendation of a faculty member, and financial need.

Complete information appears in the July 1981 issue of Photogrammetric Engineering and Remote Sensing.

The required application forms may be requested from the Wild Heerbrugg Photogrammetric Fellowship Committee, ASP, 105 N. Virginia Ave., Falls Church, VA. 22046.

Deadline for applications is January 15, 1982.

PHOTOGRAMMETRY STUDENT AWARDS AVAILABLE

The Bausch & Lomb Photogrammetric Award Committee of the American Society of Photogrammetry announces the availability of both a graduate and an undergraduate award for the best student papers in photogrammetry.

Each award consists of

*$250 cash

*A round trip to the ASP Convention in Denver where the award will be presented

*A three-year paid up membership in ASP

*A scroll suitable for framing

To be considered, papers must describe a new use, or an adaptation or improvement in the use, of photogrammetry of or photogrammetric equipment in any field of study.

Complete information appears in the July 1981 issue of Photogrammetric Engineering and Remote Sensing. This information may also be requested from the Bausch & Lomb Photogrammetric Award Committee, ASP, 105 N. Virginia Ave., Falls Church, VA. 22046.

Deadline for entry is January 15, 1982.

REMOTE SENSING TRAINING FILMS PREMIERE

The American Society of Photogrammetry Foundation will premiere two remote sensing training films at the ASP/ACSM Fall Technical Meeting at the San Francisco Hilton Hotel on Thursday afternoon, September 10.

The films are entitled "Vegetation Mapping Using Remotely Sensed Data" and "Mineral Exploration Using Remotely Sensed Data." With case examples, they illustrate the use of satellite imagery, aerial photography, computer-assisted analysis, and new ground sampling methods in solving resource problems.

The films will be available on loan from the U.S. Geological Survey. However, the ASP Foundation will offer a limited number of prints as well as video cassettes for sale.

For more information, write to ASP Foundation, 105 N. Virginia Ave., Falls Church, VA. 22046.

VISITORS

On July 28, Mrs. Alice Arthur, Guidance Counselor from West Lafayette High School, visited LARS and Flex 2 staff. In an effort to increase service to her students, she was investigating career opportunities at Purdue. She sought information regarding high school and college course selections based upon actual experiences of interviewees and asked such questions as "What factors influenced your choice of occupation?" and "What path led you to your current position?"

Mrs. Arthur, who visited a number of Purdue departments this summer, hopes that many of the Purdue staff she spoke with will be available to present career seminars to the WLHS students. Her intent is to increase knowledge of Purdue University, inform the students of occupations available in this locale and to broaden student contact with Purdue and Purdue staff.

Further contact will be made with Mrs. Arthur regarding the possibility of teaching remote sensing on the high school level.

Three groups of high school seniors visited LARS during July as part of Purdue University's Summer Engineering Seminar Series and the Minority Engineering programs. Seventy-four students from midwest high schools attended presentations on remote sensing by DOUG MORRISON, CAROL MCKIEL, LARRY BIEHL and KAY HUNT.

Mr. James Barber, assistant Fire Chief, Victoria, Australia, met with BARRETT ROBINSON, DICK MROCZYNSKI and DOUG MORRISON to see how remote sensing might help monitor brush fires in Australia.

LARS TRAVEL LOG

"Contextual Classification on PASM," by H. J. SIEGEL and PHIL SWAIN, was presented at the IEEE Conference on Pattern Recognition held August 3-5, at Dallas, Texas. Siegel also chaired a session on computer architectures for image processing.

Dave Landgrebe, MARVIN BAUER, CRAIG DAUGHTRY, VERN VANDERBILT and PHIL SWAIN attended the Gordon Research Conference, August 10-14, at New London, New Hampshire. Swain presented a paper on future needs relative to "scene inference" - i.e. extracting information from remote sensing data. During the meetings, Dr. Swain was elected chairman of the next Gordon Research Conference to be held in August 1983. Swain commented, "This will be approximately one year after the launch of Landsat D and the Thematic Mapper, which should make for a particularly interesting research conference."

MARION BAUMGARDNER and STEVE KRISTOF attended the Soil Conservation Society of America annual meetings in Spokane, Washington, August 1-5. Dr. Baumgardner presented an invited paper on "World Food Supply and Land Resource Base" and participated in planning sessions of the Program Committee for 1982 and 1983 upcoming annual meetings of the SCSA. Baumgardner will serve as chairman of the Program Committee for the 1983 meeting to be held in Hartford, Connecticut.

STEVE KRISTOF presented two poster papers at the SCSA meetings titled: "Waterfowl Habitat Inventory: A Conservation Management Application of Aerospace Technology" and "Spectral Reflectance of Selected Eroded Soils of Indiana in Relationship to their Chemical and Physical Properties."

MARION BAUMGARDNER travelled to Africa July 20-31 to lead a 3-person team in evaluation of an integrated development project for the village of Tara, state of Doss, Niger. The project was begun in 1976 under funding from a Lilly Endowment. Its main thrust has been irrigated rice, poultry improvement, domestic water supply and education. More recent financial support of these projects has been provided by private donations (church) and USAID.

TERRY PHILLIPS participated in two workshops recently. He attended one at EROS Data Center, Sioux Falls, South Dakota, on the Digital Mosaic of the North American Plate and one at NASA/JSC, Houston, Texas, on Data Management Systems for Remote Sensing Data.

NEW PROJECTS FUNDED

Title: "Proved Technical Assistance to the Indiana Division of Reclamation for Developing First Year Plans for Rehabilitating Abandoned Mine Lands"
Sponsor: Indiana Department of Natural Resources
P.I.: R. P. Mroczynski
Duration: 6/1/81 - 6/30/81

Title: "Demonstration of an Operational Forest Resource Information System"
Sponsor: NASA
P.I.: R. P. Mroczynski
Duration: 5/1/81 - 5/31/81

NEW LARS TECHNICAL REPORTS

052680 Extension of Laboratory-Measured Soil Spectra to Field Conditions by E.R. Stoner, M.F. Baumgardner, R.A. Weismiller, L.L. Biehl and B.F. Robinson.

Spectral responses of two glaciated soils were measured both in the laboratory under controlled moisture equilibria, and in the field under various moisture and crop residue conditions. An Exotech Model 20C spectroradiometer was used to obtain spectral data in the laboratory under artificial illumination. Reflectance measurements ranged from 0.52 to 2.32μm in 0.01μm increments. Asbestos tension tables were used to maintain a 0.10-bar moisture equilibrium following saturation of crushed, sieved soil samples. The same spectroradiometer was used outdoors under solar illumination to obtain spectral response from dry and moistened field plots with and without corn residue cover, representing the two different soils. Results indicate that laboratory-measured spectra of moist soil are directly proportional to the spectral response of that same field-measured moist bare soil over the 0.52 to 1.75μm wavelength range.

101880 Evaluation of Landsat Data Analysis for Forest Survey by R.P. Mroczynski, R.M. Hoffer and R.F. Nelson.

Various approaches were used to classify Landsat data from Carlton County, Minnesota. The purpose of this study was to determine if satellite remote sensor data could be used for Forest Survey.

Traditional classification techniques were compared to the Procedure-1 approach developed during LACIE. In addition to classification accuracy comparisons, costs of the various training and classification were evaluated.

Finally, a non-classification, spectral comparison approach using radioed data was proposed. This approach may be both economically and operationally attractive to the ongoing Forest Survey effort.

The research described in this report was sponsored by Cooperative Agreement No. 13-571 with the U.S.D.A. Forest Service, North Central Forest Experiment Station.

122080 Aerial Survey Techniques for Locating Abandoned Strip Mine Land by C.L. Dottavio, R.P. Mroczynski and R.A. Weismiller.

The Surface Mining Control and Reclamation Act requires that states develop regulatory programs and reclamation plans for surface mining activities. Prior to passage of this law, the Indiana legislature required Indiana Dept. of Natural Resources (IDNR) to survey abandoned mine lands not under the control of state reclamation laws. IDNR then contacted the Laboratory for Applications of Remote Sensing (LARS) at Purdue University to conduct a preliminary survey of these lands. Photointerpretation techniques of medium scale color infrared photography enabled the LARS staff to identify partially reclaimed and nonreclaimed sites within a 20-county area in southwestern Indiana. Over 4,700 ha of abandoned lands were located and classified on the aerial photography. This information is currently being used by IDNR to develop reclamation plans to revegetate the abandoned lands. The results of this survey clearly indicate that photointerpretation is an effective technique to complete initial inventories of nonreclaimed mine lands.

The work described in this paper was sponsored by the Indiana Department of Natural Resources under Contract No. 0088-55.

021081 Spectral Characteristics of Wetland Habitats by C.L. Ernst-Dottavio, R.M. Hoffer and R.P. Mroczynski.

Spectral characteristics of the six major wetland types found in northeastern Indiana were measured during the summer of 1978 using an EXOTECH-100 radiometer mounted in a helicopter. The spectral measurements were compared to a computer classification of Landsat multispectral scanner data. Analysis of the spectral characteristics indicated that deep marshes and open water can be separated based on spectral reflectance. In contrast, shallow marshes, shrub swamps, and hardwood swamps were spectrally similar to each other and to upland cover types and were therefore difficult to separate using spectral responses alone. Discriminant analysis of EXOTECH-100 measurements of spectral response and the Landsat computer classification showed similar results. The field spectral measurements offered an excellent means to examine the spectral characteristics of wetland cover types and to predict Landsat classification results.

The research described in this report was sponsored by NASA/ Office of University Affairs under Grant No. NGL 15-005-186.

042081 On the Accuracy of Pixel Relaxation Labeling by J.A. Richards, D.A. Landgrebe and P.H. Swain.

An analysis of pixel labeling by probabilistic relaxation techniques is presented to demonstrate that these labeling procedures degenerate to weighted averages in the vicinity of fixed prints. A consequence of this is that undesired label conversions can occur, leading to a deterioration of labeling accuracy at a stage after an improvement has already been achieved. Means for overcoming the accuracy deterioration are suggested and used as the basis for a possible design strategy for using probabilistic relaxation procedures. The results obtained are illustrated using simple data sets in which labeling on individual pixels can be examined and also using Landsat imagery to show application to data typical of that encountered in remote sensing applications.

The work described in this report was sponsored by NASA under Contract No. NAS9-15466.

050181 Analysis Technology for Land Remote Sensing by D.A. Landgrebe.

This paper provides a brief overview of the development to the present time of the ability to analyze vertical views of the earth's surface by machine. It provides a historical perspective and discusses three representative application examples in some detail. The paper concludes with a general discussion of analysis techniques based upon exploiting information contained in spectral, spatial, and temporal variations and in ancillary data.

SYSTEM SERVICES August 28, 1981

4341 INSTALLATION BY ROSS GARMOE

On August 6, 1981 we replaced the IBM 3031 with an IBM 4341. The 4341 has four megabytes of real memory and is approximately 85% as fast as the 3031. The increase in memory and the decrease in processor power balance out and users should receive about the same response times and service levels. The lower cost of the 4341 has allowed us to reduce rates for Priority and Computer Service to $160/hr. each. This 33% reduction went into effect with the installation of the 4341. Downtime was limited to five hours and the user community has otherwise been unaffected by the change.

NEW BATCH SYSTEM BY ROSS GARMOE

The new LARS batch system was made available to users during the first part of July. User experience has been favorable and the few encountered errors were easily corrected. No known errors exist in the batch system and we are encouraging all users to use it instead of the old one. To this end, we are announcing the following schedule for shutting down the old system and discontinuing its support. If your project cannot meet this schedule please notify ROSS GARMOE as soon as possible.

September 15	The batch machines BATSHORT, BATMED, TAPTRAN and TAPERIM will no longer be available. Jobs submitted to these machines will be returned to the submittor.
October 1	The batch machines BATQUICK, BATONITE and BATHOUST will no longer be available to run jobs. Jobs submitted to these machines will be returned to the submittor.
October 15	The batch machines BATEOD, BATJSC and BTREF will no longer be available to run jobs. Jobs submitted to these machines will be returned to the submittor.
November 1	The remaining batch machine BATLONG and the batch monitor will be removed from the system. All support of the old batch system will be terminated on the LARS system.

TERMINATION OF 7-TRACK TAPE SERVICE BY ROSS GARMOE

The 7-track tape service supplied by LARS will be discontinued on October 14, 1981. After this date, only 9-track tapes can be read or written on the LARS computer system. The service has been supplied to meet the needs of the LARS user community. The amount of usage has decreased over the past few years and a poll of the current users indicates that usage will be minimal during the next year. Since the projected income from the service will not meet the expenses of providing the equipment, the decision was made to discontinue the 7-track tape. If you have any data stored in the LARS tape library in 7-track format, be sure to copy the data to 9-track format before October 14.

SRT NEWS BY JIM COCHRAN

The latest update of the IMSL routines have been received, and the changes have been made to the level 8.1 load module library.

The new updated version of IMSL has been placed on the JSC Disk 39B, replacing the level 8.0 library.

Beginning July 29, 1981, the updated level 8.1 library will reside on the JSC Disk 29B, with the original 8.1 level library being placed on the JSC Disk 39B.

On August 20, 1981, the updated level 8.1 library will be installed at the JSC computer site.

LOCAL TERMINAL NEWS BY LUKE KRAEMER

Many offices and student areas have been wired for possible terminal installation. As our ordered terminals arrive, some of these areas will be identified and devices installed. Usage of the terminals plus user comments will be reviewed before additional terminals are installed.

The Flex-1 full-screen display stations have arrived, however, operating system problems exist which prevent their immediate installation. We will try to make them available as soon as possible.

Finally, the five AMPEX Dialogue 30 terminals have arrived. Two of them will be loaned to Agronomy for LARS usage; the remaining three will be for in-house usage. I would appreciate any comments concerning these terminals and, if your response is favorable, then this model will serve as the replacement for the GTX's as they become irreparable.

VARIAN OUTPUT BY JEFF WELCH

To print files on varian, type: REMOTE E TO VARIAN. Larspec and GData/GResults are not affected. Users who make use of the standard GCS exec will not be affected by this change. GCS users who do not utilize the standard exec should replace "REMOTE E TO LITER" to "REMOTE E TO VARIAN."

If you have questions, see KAY HUNT (GData/GResults), or JERRY MAJKOWSKI (LARSPEC and GCS).

NOTE FROM MIKE COLLINS

The computer will come up as scheduled at 6:00 a.m. on Monday, September 7 (Labor Day).

SYSTEM SERVICES RATE CHANGES BY MIKE COLLINS

Effective July 1, 1981, LARS System Services product codes and rates changed for FY82. Products identified with an asterisk to the left are ones which went into effect Friday, August 7th with the installation of the IBM 4341.

PURDUE UNIVERSITY/LARS
System Services Products and Rates
July 1, 1981 - June 30, 1982

DEPT. REF.	ITEM	UNIT	RATE UNIT	PROFIT RATE
COMPUTER PRODUCTS				
* 02000	Computer Service	1 hour	$160.00	$224.00
* 02005	Priority Service	1 hour	160.00	224.00
02010	Disk Storage Space	1 meg mo	3.50	4.90
02015	7-Track Tape Drive	1 hour	50.00	70.00
02065	Professional Assistant Staff	1 hour	26.60	***
02075	Service Staff	1 hour	15.85	***
02085	Student Staff	1 hour	10.25	***
REFORMATTING PRODUCTS				
02101	Reformatting Software Prod.	1 min.	30.00	42.00
02165	Professional Assistant Staff	1 hour	26.60	***
02185	Student Staff	1 hour	10.25	***
SUPPORT PRODUCTS				
02200	Design Service	1 hour	23.00	***
02205	Scan Lines Subscriptions	1 year	7.50	***
02215	Printed Material	1 page	.08	***
02220	Slides	1 slide	2.50	***
02225	Transparencies	1 trans.	.85	***
02265	Professional Assistant Staff	1 hour	26.60	***
02270	Technical Assistant Staff	1 hour	20.35	***
02275	Service Staff	1 hour	15.85	***
02280	Clerical Staff	1 hour	14.85	***

DEPT. REF.	ITEM	UNIT	RATE UNIT	PROFIT RATE
APPLICATIONS SOFTWARE PRODUCTS				
02400	Statistical Service	1 hour	150.00	210.00
02405	LARSYS	1 hour	375.00	525.00
02410	LARSPEC	1 min.	10.00	14.00
02465	Professional Assistant Staff	1 hour	26.60	***
02485	Student Staff	1 hour	10.25	***
LOCAL TERMINAL PRODUCTS				
02500	Local Terminal	1 hour	8.00	11.20
02505	Computer Tapes	1 tape	17.50	24.50
02510	Varian Plotter Output	1 foot	.75	1.05
02515	Table Digitizer	1 hour	20.00	28.00
02560	Professional Staff	1 hour	53.60	***
02565	Professional Assistant Staff	1 hour	26.60	***
02585	Student Staff	1 hour	10.25	***
COMPUTER SERVICE PRODUCTS				
02801	Computer Service	1 hour	275.00	385.00
02806	Priority Service	1 hour	200.00	280.00

COMTAL CLUSTERING BY PHIL SWAIN

JEFF WELCH has written a clustering program, according to specifications by PHIL SWAIN, which runs on the COMTAL (yes, on the COMTAL, not the PDP-11/34). It will cluster a full 512 x 512 array of Landsat data (2 channels, up to 20 clusters) in a FLASH (relatively speaking). Interested in trying it? Contact Phil (NOT Jeff - he's too busy, according to Phil).

LARSPEC BY JERRY MAJKOWSKI

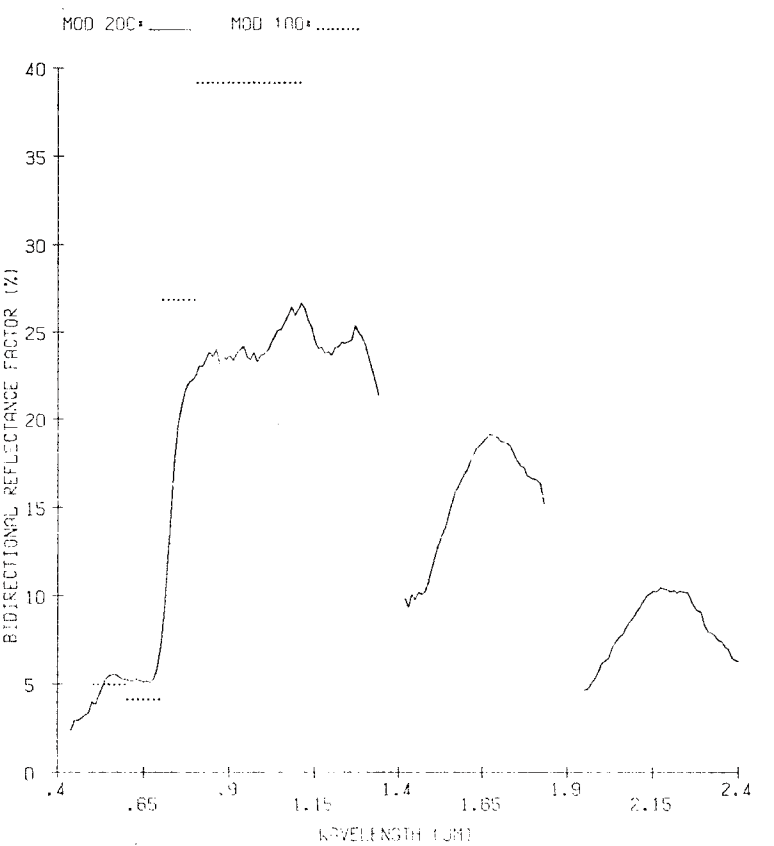
On Wednesday July 22, 1981, LARSPEC was updated for the following purposes:

1. A new capability was added to allow plotting of observations with differing wavelength resolutions on a single graph. For example, a user could have one class containing ESS data and another containing radiometer data plotted together. (See example below). There are no new cards needed for this feature; such plotting will be done automatically in GSPEC.

2. LARSPEC software was upgraded to allow for correction of ESS wavelength calibration errors occurring in the .69 micrometer region. These changes will also give LARSPEC greater flexibility by allowing analysis and graphing of any type of wavelength data using tables. Formerly wavelength data was generated using a linear equation.

3. Use of the 'output varian' option in GSPEC will now send graphs to the newly established varian 'site' instead of liter. This means that plot files will be plotted automatically rather than needing to notify PDP staff that a plot file has been sent.

4. A correction was made in DSFL for use of the 'punch all' option so that ID header information will be properly punched.



The next LARSPEC update will include an enhancement to the printing of run identification information to list 10 parameters in 2 columns down the page rather than across.

GRAPHICS COMPATABILITY SYSTEM (GCS) BY JERRY MAJKOWSKI

A new version of the two- and three-dimensional GCS system was installed on July 29. This system contains several expansions made by the Vicksburg Waterways Experiment Station and the Westinghouse Corporation. A more complete listing of the options available is contained in the July 16, 1981 SCANLINES (Vol. 8. No. 1). Detailed documentation is currently being prepared.

The new system is upward compatable to the old system. Users who create their own EXEC routines to load GCS, rather than using the GCS EXEC, should use the following libraries:

```
GCSLIB
GCS2DLIB or GCS3DLIB (for 2D or 3D versions)
GCSdev where dev =      PRT for line printers
                        PRX for PRINTRONIX
                        TTY for alphanumeric terminals
                        T54 for TEK 4054
                        VAR for varian plotter
devLIB where dev =      PRX for PRINTRONIX
                        VAR for varian
```

Also, users must be sure to use the CMS LOAD or include statements to load the GCS common block named 'GCS'.

An interface for the DECwriter does not currently exist for the new system. The old system is still available if any users need this interface. Those with questions or problems should contact JERRY MAJKOWSKI Also, additional information on the new system can be obtained from LARRY BIEHL

REMOTE TERMINAL NEWS BY JOAN BUIS

Dr. Barry Haack of Ball State University, will be spending September 1, 1981 - August 31, 1982 as image analyst specialist at the AID Regional Remote Sensing facility in Nairobi, Africa. The Center is responsible for 1) training, 2) user services and 3) demonstration projects for 19 African countries. We're sorry to lose Barry as a remote terminal user, but our sincerest congratulations and best wishes on his venture. The Ball State Geography Department is presently searching for someone to teach remote sensing, making use of the remote terminal at LARS.

Indiana State University Remote Sensing Lab (ISURSL) staff have had a very productive summer. They have recently completed land use mapping for northern Kentucky. Kam Lulla spent 2½ months abroad, working at ITC in Holland, presenting a paper at the Structure and Dynamics of Woodlands Symposium in Germany, and visiting the Space Applications Center in India. Mausel, Lulla, and Howe presented "Parametric and Non-Parametric Classification of Abandoned Coal Mines Using Multi-Oriented Landsat Data" at the ERIM Symposium.

Mausel and Lulla co-authored the chapter Applications of Remote Sensing in Ecology in "Introduction to Remote Sensing of Environment" edited by Ben Richardson. Mausel and Lulla also coauthored the chapter Selected Applications of Computer Processed Landsat Data in "The Surveillant Science" edited by Robert Holz.

The ISURSL staff is looking forward to three remote sensing courses and one advanced seminar course in numerical analysis this fall.

SUPPORT PRODUCTS NEWS BY BARBARA P. FRANCIS

Clerical and Service Staff support are the newest services provided by the Support Products Group. These products were established with the beginning of the new fiscal year in July and are designed to provide day-to-day secretarial, typing, machinist, carpentry and other specialized support for the laboratory.

To request Service Staff Support, a special work order must be completed and submitted to the LARS Flex 1 Business Office. This enables VIC FLETCHER, and his supervisor to better evaluate the work requested, have necessary supplies available, group similar tasks and better schedule the workload. The request forms are available in both LARS' business offices.

The Clerical Support is varied but is generally divided into typing, wordprocessing, and general office routine. Clerical support, as in the past, is provided to each program area with the clerical supervisors being responsible for balancing the workload.

The charge for each of these new services is based on an hourly rate: $15.85 for Service Staff and $14.85 for Clerical Staff.

As this is a new service, the manner of submitting and reporting charges is still being considered. Included in these methods being evaluated are detailed daily logs, detailed weekly logs, compiled monthly records per category of work done, or compiled monthly records per account. Standardized entries are being considered as well. All ideas from staff are welcome and will be taken under advisement.

SUMMARY OF 3031 COMPUTER USAGE FOR JULY 1981

OVERALL USAGE

Basic Rate CPU Time Used	57.19
Priority Rate CPU Time Used	153.16
Total CPU Time Used	210.35
Terminal Sessions	6835
Batch Jobs	2260

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	56.16	35
Mon-Fri 8AM-4PM	91.02	52
Mon-Fri 4PM-midnite	47.10	27
Weekend	16.06	31

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	194	0.30	0.04
BATSHORT	17	15.26	0.88
BATMED	72	13.46	1.25
BATONITE	161	10.50	1.43
BATLONG	1093	9.16	0.59
TAPTRAN	0	0.00	0.00
BATEOD	543	13.37	1.08
BATJSC	103	59.81	9.48

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Computer Room	01	3277	---	-----	----
Flexlab 2	11	3277	---	-----	----
	12	3277	---	-----	----
	30		---	-----	----
	31	Hazeltine	---	-----	----
	32	GTX	285	112.18	0.39
	33	GTX	340	211.71	0.62
	34	GTX	380	227.67	0.60
	35	GTX	344	228.36	0.66
	36	GTX	433	232.38	0.54

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab 2	37	Tektronix	259	147.67	0.57
	38	Apple II	36	39.19	1.09
	39		---	------	----
	3A		---	------	----
	3B	GTX	179	112.23	0.63
	3C	GTX	288	140.74	0.49
	3D	Diablo	169	46.51	0.28
	3E	DECwriter	---	------	----
Computer Tech	3F	GTX	---	------	----
Flexlab 1	40	GTX	336	172.19	0.51
	41	GTX	215	213.37	0.99
	42	GTX	325	216.64	0.67
	43	DECwriter	163	104.27	0.64
	44	Diablo	82	50.32	0.61
Alabama A & M	4A	GTX	---	------	----
	4B	DECwriter	21	21.29	1.01
	4C	GTX	69	173.41	2.51
	4D	GTX	78	90.54	1.16
ISU	4E	(various)	37	11.66	0.32
	4F	(various)	88	38.25	0.43
Dial-Up	50	1st in use	246	175.90	0.72
	51	2nd in use	125	106.28	0.85
	52	3rd in use	62	55.19	0.89
	53	4th in use	31	25.24	0.81
	54	5th in use	110	39.29	0.36
	55	In-house-1	126	80.58	0.64
	56	In-house-2	107	66.53	0.62
U. of Cal-Riverside	57	Dial-Up	1	0.01	0.01
ERIM	58	(various)	46	20.43	0.44
Houston	59	(various)	37	38.77	1.05
	5A	(various)	88	79.51	0.90
	5B	(various)	144	156.72	1.09
	60	CRT	202	159.72	0.79
	61	CRT	188	109.41	0.58
	62	Trendwriter	---	------	----
	63	Trendwriter	258	142.93	0.55
	64	CRT	---	------	----
	65	CRT	---	------	----
	66	CRT	---	------	----
	67	CRT	---	------	----
	68	CRT	178	171.65	0.96
	69	CRT	125	150.20	1.20
	6A	Dial-Up	124	133.18	1.07
	6B	Dial-Up	99	133.38	1.35
	6C	Dial-Up	---	------	----
	6D	Dial-Up	---	------	----
	6E	Dial-Up	---	------	----
	6F	Dial-Up	---	------	----

INTRALAB NOTES

PERSONNEL CHANGES

DAVE FREEMAN has accepted a position with SUNMARK Corporation, a subsidiary of Sun Oil Company. His responsibilities at the Dallas, Texas site will be to set up a remote sensing data processing center for geologic applications. He will be in charge of the software development of their newly installed ESL system. His last day at LARS is August 21. Good luck, Dave, in Texas.

EXIT . . .PAM BURROFF, Technology Transfer secretary, who is entering the ranks of the student population. Pam will be working towards her master's degree in visual design. She is particularly interested in computer graphics as a career goal and will undertake an independent study in that area this fall. Pam will continue at LARS as a part-time clerical student worker.

AND ENTER . . .DARLYS MCDONALD as the new Technology Transfer secretary. Darlys joined the LARS group August 12, 1981. She is a former music teacher and has lived in Lafayette for two years.

PAT WHATLEY joined LARS on July 13, 1981 as Secretary to the Deputy Director and Clerical Supervisor. She is a transplanted Southerner who has lived in Lafayette for the past four years.

Welcome back to MARTA DZIUBINSKYJ who is filling in temporarily for Nancy Kline. Marta is acting as the travel and purchasing account clerk in Flex 1.

ADVANCE DEGREE GRANTED

JIM TILTON, formerly a Ph.D. student working with Phil Swain, passed his final exam* on July 29 and is now Doctor Tilton! He has accepted a position as Postdoctoral Research Associate in Purdue's EE school and will continue his research and technology transfer activities at LARS through next July. CONGRATULATIONS, JIM!

*Thesis Title: Incorporating Spatial Context into Statistical Classification of Multi-dimensional Image Data.

MINI-LARSIANS

Congratulations and best wishes to Debbie and LUIS BARTOLUCCI on the birth of their daughter. Tatiana Elisa was born August 2, 1981. She weighed 7 lbs., 13 oz. and was 20 inches long.

PROPOSALS SENT OUT

Title : "Improve Capability to Acquire, Preprocess and Analyze Field Research Data"
Sponsor: Kansas State University
P.I.: M. Bauer
Duration: 9/1/81 - 11/30/81

Title: "Radiometry and Data Base Support for Scene Radiation Research on Small Grains"
Sponsor: NASA
P.I.: M. Bauer
Duration: 9/1/81 - 10/30/81

Title: "Develop First Year Work Plans for Rehabilitating Abandoned Mine Land"
Sponsor: Indiana Department of Natural Resources
P.I.: R. P. Mroczynski
Duration: 7/1/81 - 6/30/82

Title: "Research in Remote Sensing of Agriculture"
Sponsor: NASA
P.I.: M. Bauer
Duration: 6/1/81 - 9/30/81

SCAN LINES

LARS · Purdue University · Vol. 8 · No. 3 · Sept. 30, 1981

SHORT COURSE TO FEATURE PETROLEUM AND MINERAL EXPLORATION

The next Numerical Analysis of Remote Sensing Data short course, on October 19-23, 1981, will have special emphasis on Petroleum and Mineral Exploration. According to SHIRLEY DAVIS, course coordinator, presentations will be made by DON LEVANDOWSKI, chairman of Geosciences at Purdue, CARLOS BROCKMANN, adjunct professor of Geosciences at Purdue from Bolivia, and LUIS BARTOLUCCI, technical director of training at LARS.

These special presentations will address the theory and use of enhancements for exploration, geologic mapping, integration of data from different sources, geographic information systems, petroleum exploration, lithium exploration (a case study), and models for mineral and petroleum exploration.

Laboratory exercises on data enhancement and data overlay will be conducted by DAVE L'HEUREUX, Ph.D. candidate in Geosciences, and CARLOS VALENZUELA, visiting scientist from Bolivia. The LARSYS-based workshop series taught by JOAN BUIS will focus on specifically selected data from an area of geologic interest in Colorado. JIM TILTON, post-doctoral at Purdue, is preparing tutorial documentation of this special workshop series.

This course will bring together for the first time some outstanding scientists working in the area of petroleum and mineral exploration. People wishing to attend the course should contact DOUGLAS MORRISON at LARS.

Scan Lines is prepared 10 times a year for distribution at Purdue University, Laboratory for Applications of Remote Sensing (LARS), 1220 Potter Drive, West Lafayette, Indiana 47906 USA. Persons external to Purdue who wish to receive one year of *Scan Lines* should send $7.50, payable to Purdue University, to *Scan Lines* at the above address.

COMTAL EDUCATIONAL MODULES TESTED

SHIRLEY DAVIS hosted a visit from Ron Clouthier from COMTAL, Inc. on September 10, 1981, to review three educational modules prepared under COMTAL support, and to discuss future projects. The three modules are designed to introduce a new user to the COMTAL Vision One/20:

Unit I. The Monochrome Image
Unit II. The Graphics Planes
Unit III. Combining Images and Graphics

SHIRLEY DAVIS and PHIL SWAIN, co-authors of the modules, visited St. Paul, Minnesota, and Wonewok, Minnesota, on September 28, to October 2, to demonstrate and "field test" these educational materials.

VISITORS

LUIS BARTOLUCCI hosted a visit from Dr. Juan Valera, director of environmental studies of Solar America, Inc. of Austin, Texas, during August 30, to September 4, to discuss the possibility of LARS providing technical assistance in remote sensing to Latin American countries.

Two remote terminal sites sent representatives to LARS on September 10, to attend a seminar on the new batch system. Dr. Kam Lulla, Indiana State University Remote Sensing Laboratory (ISURSL), and Dr. Oscar Montgomery, Alabama A&M University Center for Applications of Remote Sensing (ACARS), will both teach their respective staffs how to use the new batch system. Dr. Montgomery also spent a day working with JOAN BUIS on the Layered Classifier.

Dr. F. Tom Sparrow, associate director of the Institute for Interdisciplinary Engineering Studies, Purdue University's Engineering Experiment Station, visited LARS on September 11, 1981. Dr. MARION BAUMGARDNER hosted him at a briefing about personnel, facilities, activities, and funding.

DISTINGUISHED BOLIVIAN SCIENTIST JOINS PURDUE UNIVERSITY STAFF

Dr. CARLOS BROCKMANN is an adjunct professor in Geosciences and a visiting fellow at LARS from August 15, 1981, to August 15, 1982. He will conduct research in Geographic Information Systems and applications of remote sensing to Geology. He is at Purdue with his family; wife Maria Eugenia, and four children.

SPECTRAL SIGNATURES FEATURED AT INTERNATIONAL SOCIETY OF PHOTOGRAMMETRY COLLOQUIUM

MARVIN BAUER and VERN VANDERBILT attended and presented three papers at the International Society of Photogrammetry Colloquim on "Spectral Signatures of Remotely Sensed Objects" in Avignon, France, from September 8-12, 1981. Dr. Bauer commented that the quality of the presentations was high, especially those from France and The Netherlands. Eleven plenary papers were given, including the following two from LARS:

"Spectral Agronomic Relationship of Maize, Soybean and Wheat Canopies" by M.E. BAUER, C.S.T. DAUGHTRY, and V.C. VANDERBILT, and

"Diurnal Changes in Reflectance Factor due to Sun Row Direction Interaction" by V.C. VANDERBILT, J.C. KOLLENKARK, L.L. BIEHL, B.F. ROBINSON, M.E. BAUER, and K.J. RANSON.

Forty-nine poster presentation were also given, including the following one by LARS: "Linear Polarization of Light by Two Wheat Canopies Measured at Many View Angles" by V.C. VANDERBILT, L.L. BIEHL, B.F. ROBINSON, M.E. BAUER, and A.J. VANDERBILT.

ASP CONVENTION HIGHLIGHTS

JOAN BUIS was invited to present a paper concerning educational uses of the remote terminal network at the American Society of Photogrammetry (ASP)-American Congress on Surveying and Mapping (ACSM) Fall Technical Meeting in San Francisco, California, September 9-11, 1981. The paper, "Educational Earth Resources Digital Data Analysis Network," was written by JOAN BUIS and LUIS BARTOLUCCI, and was presented at the meeting by DOUG KNOWLTON.

Dr. ROGER HOFFER also attended the meetings, where he reviewed two 30-minute films designed as introductory materials for college freshman: "Use of Remote Sensing in Geologic Mapping" and "Use of Remote Sensing in Vegetation Mapping."

The American Society of Photogrammetry (ASP) and the American Congress on Surveying and Mapping (ACSM) have agreed to join in close association in order to represent more effectively the interrelated professions of surveying, cartography, photogrammetry and remote sensing. The respective Boards of Direction approved the affiliation at their meetings on September 8, 1981. Details of the affiliation were provided in a news release from ASP:

"The two societies have held their annual conventions jointly and successfully since 1955. The coordinating mechanism for the conventions was a joint committee called COMPAS, the Committee of Mapping, Photogrammetry and Surveying Societies. ASP and ACSM have also jointly sponsored other technical meetings and worked together at the management level, their respective headquarters being only two blocks apart in Falls Church, Virginia.

"ASP was formed in 1934 and has about 7,500 members, mostly photogrammetrists and remote sensing specialists. A majority of ASP members work in fields related to surveying and mapping. ACSM was formed in 1941 and has about 11,000 members, almost all of whom work in the surveying and mapping field. About a thousand individual belong to both ASP and ACSM.

"The terms of affiliation are spelled out in a document signed by ASP President George J.M. Zarzycki and ACSM President Joel L. Morrison. In making the announcement, they said that 'This is a great day for both societies. Such a joint operation has been discussed for years. Now it is a reality.' In a note of reassurance to their respective memberships they said 'There is no question in our minds but what these moves will be of great long-term benefit to individual members and the professions they are engaged in.' They also invited members to express their opinions about the agreement."

SHORT COURSE HELD IN PANAMA

From September 26, to October 11, LUIS BARTOLUCCI and JOAN BUIS will be in Fort Clayton, Panama, teaching a short course on "Numerical Analysis of Remote Sensing Data" with hands-on computer experience using a remote terminal link to LARS through an AUTOVON Communications Satellite connection. There will be approximately 25 participants from all over Latin America. This project is sponsored by the SMA/IAGS Cartographic School.

NOAA SATELLITE PROGRAMS

The following information has been released by the United States Department of Commerce, National Oceanic and Atmospheric Administration, National Earth Satellite Service, as an update for users of NOAA/NESS satellite data.

STATUS OF NOAA'S ENVIRONMENTAL SATELLITES

NOAA-7, the latest polar orbiting satellite, was launched on June 23, 1981. NOAA-6, which has been in orbit for over a year, and NOAA-7 are providing global operational atmospheric observations.

The latest launch of a geostationary satellite, GOES-5, took place on May 22, 1981. Operational observations from geostationary orbit are being provided by GOES-5, located at 75° West longitude, and GOES-4, located at 135° West longitude. Both spacecraft carry the new Visible-Infrared Spin Scan Radiometer Atmospheric Sounder (VAS) instrument, which provides multi-spectral imagery of the earth's surface and cloud cover, as well as infrared sea surface temperature data and atmospheric temperature/moisture sounding information. GOES-2 is in geostationary orbit at 107° West longitude and is being used for additional WEFAX broadcasts. The two fully operational geosynchronous satellites normally provide images on a half-hourly basis. However, they can be scheduled to image at more frequent intervals for concentrated viewing of severe weather and hurricanes.

Retrospective digital or image data from both satellite programs can be procured from the Environmental Data and Information Service (EDIS) of NOAA by writing to the Satellite Data Services Division, EDIS, National Climatic Center, Room 100, World Weather Building, Washington, D.C. 20233.

OPENING OF NEW SATELLITE FIELD SERVICES STATION (SFSS) AT SLIDELL, LOUISIANA

This new SFSS became fully operational on August 22. The station is collocated with the National Weather Service's New Orleans area WSFO and is physically located in Slidell, Louisiana. Mr. Richard M. Clark will manage the station, assisted by a staff of six professionals.

PROGRAM BOARD FOR LANDSAT ACTIVITIES ESTABLISHED

The Program Board for Civil Operational Land Remote Sensing from Space is being established under a charter approved by Commerce Secretary Baldrige on June 24, 1981. The Board is being instituted to provide the continuing Federal coordination and regulation needed by Commerce to manage the operational Landsat system to be implemented by NOAA in 1983. Board members will be Federal officials at the Assistant Secretary level, representing their agencies and assisting in the formulation of program goals and requirements from a national viewpoint.

FORMATION OF LAND REMOTE SENSING SATELLITE ADVISORY COMMITTEE APPROVED

On August 12, 1981, Secretary Baldrige authorized the establishment of the Land Remote Sensing Satellite Advisory Committee. The Committee will advise the Secretary on matters pertinent to the implementation and management of the operational Landsat program. It will be called upon to provide advice and make recommendations in such Landsat areas as those having to do with data requirements, priorities, data and product pricing, and proposals for private sector ownership.

The 15-member Committee will be appointed by the Secretary. Appointments will be made so as to assure balanced representation among the interested domestic non-Federal communities, including state and local governments, data users, the value-added service industry, the academic community, the aerospace industry, and potential commercial owners and investors in the program. If you wish to recommend an individual for appointment to this Committee, you should contact: Ms. Peggy Harwood, User Affairs Division (Sx32), NOAA/NESS, Washington, D.C. 20233.

LANDSAT D SYSTEM SCHEDULE

The launch of Landsat-D is still expected to take place in the third quarter of 1982. The second spacecraft in this series, Landsat-D', will be available about 15 months later and will be launched following the failure of Landsat-D. Spacecraft lifetimes are projected to be three years.

In January 1983, NOAA will become the operator and manager of the operational Landsat-D program, responsible for spacecraft control, the preprocessing of Landsat-D MSS data, and for archived and real time Landsat data services. NOAA, NASA, and the EROS Data Center have programmed their individual and joint Landsat activities to meet this schedule. NOAA's recently established Landsat operations activity group is engaged in projects leading to the January 1983 transfer of system management to NOAA. The group is working with NASA on system implementation tasks. The group is also helping to establish with EDC the agreements needed to place Landsat product and service functions under NOAA direction and is developing plans for NOAA's operation and maintenance of the system.

LAND REMOTE SENSING CONGRESSIONAL HEARINGS

The Senate Subcommittee on Science, Technology, and Space and the House Subcommittee on Space, Science and Applications held a joint hearing on United States plans for civil land remote sensing satellite systems on July 22 and 23, 1981. Mr. Joseph R. Wright, Jr., deputy secretary of Commerce, and Mr. James M. Beggs, administrator of NASA, testified on the U.S. Government's plans for Landsat-D and for the transfer of the Landsat program to the private sector. Representatives of state and local governments, user groups, experts on U.S. remote sensing activities and representatives of private industry also testified on their respective activities and interests in this area.

During the hearings, the Senate Subcommittee Chairman, Senator Harrison H. Schmitt, indicated that he planned to pursue legislation on the operational land remote sensing program in the near future. Concurrently, NOAA, and other Federal agencies are working with the President's Office of Management and Budget as it develops a legislative proposal for presenting the Administration's views on these issues to the Congress.

LATIN AMERICAN REGIONAL REMOTE SENSING USERS SYMPOSIUM

Brazil's Institute for Space Research (INPE) will host this symposium in Sao Jose dos Campos, Brazil, November 30-December 2, 1981. For information contact: Dr. Nelson de Jesus Parada, director general, INPE, or Ms. Jennifer Clapp, International Affairs Division, NOAA/NESS, 301/763-7820.

CONTRACTS

Title: The Continued Support of the Ball State University Earth Resources Data Processing Capability
Sponsor: Ball State University
P.I.: L. Bartolucci
Duration: 7/1/81 - 6/30/82

Title: Indiana State University Remote Terminal
Sponsor: Indiana State University
P.I.: L. Bartolucci
Duration: 7/1/81 - 6/30/82

Title: Developing First Year Work Plans for Rehabilitating Abandoned Mine Lands
Sponsor: IDNR
P.I.: R. Mroczynski
Duration: 7/1/81 - 6/30/82

Title: Computer Services for Analysis of Wildlife Research and Survey Data
Sponsor: IDNR
P.I.: R. Mroczynski
Duration: 7/1/81 - 6/30/82

Title: Additional Funds for Panama Remote Sensing Course
Sponsor: DMA/IAGS
P.I.: L. Bartolucci
Duration: 9/28/81 - 10/9/81

NEW LARS TECHNICAL REPORTS

021681 Canopy Reflectance as Influenced by Solar Illumination Angle by J.C. Kollenkark, V.E. Vanderbilt, C.S.T. Daughtry, and M.E. Bauer.

Remotely sensed spectral measurements taken over croplands are influenced not only by the cover type and condition, cultural practices, and environmental factors, but also by the solar illumination angle in relation to the scene. The reflectances of soybean canopies of differing row directions were measured at 15-minute intervals during three clear days with a Landsat-band radiometer to determine the interaction of the solar illumination angle and row azimuth angle on the measured reflectance factor of soybean canopies. Diurnal reflectance changes of as much as 140% which were related to the fraction of shadow were observed in the red wavelength region. As soil cover approached 100%, the diurnal changes diminished. A function that describes the solar illumination angle with respect to the row azimuth explained most of the diurnal variation in the measured reflectance. Variation in near infrared reflectance was much less and did not appear to be as strongly related to sun-row angle interactions as the visible region.

The research described in this paper was sponsored by NASA under Contract No. NAS9-15466.

030381 Effects of Nitrogen Nutrition on the Growth, Yield and Reflectance Characteristics of Corn Canopies by G. Walburg, M.E. Bauer, and C.S.T. Daughtry.

An experiment was conducted in which spectral and agronomic measurements were collected from corn (Zea may L.) canopies under four nitrogen treatment levels (0, 67, 134, and 202 kg/ha) at the Purdue Agronomy Farm, W. Lafayette, IN, on 11 dates during 1978 and 12 dates during 1979. Spectral measurements over the 0.4 to 2.4 μm wavelength region were acquired with a spectroradiometer and used to compute reflectance factor. Agronomic data collected included biomass, leaf area index, plant height, crop development stage, and percent soil cover. Data were analyzed to determine: (1) the relationship between the spectral responses of canopies and their agronomic characteristics, and (2) the spectral separability of the four treatments.

Red reflectance was increased, while the near infrared reflectance was decreased for canopies under nitrogen deprivation. Spectral differences between treatments were seen throughout each growing season. The near infrared/red reflectance ratio increased spectral treatment differences over those shown by single band reflectance measures. The spectra of the four nitrogen treatments were significantly different on August dates; however, early and late in the season, only two spectral classes were resolved. Of the spectral variables examined, the near infrared/red reflectance ratio most effectively separated the treatments. Differences in spectral response between treatments were attributed to varying soil cover, leaf area

index, and leaf pigmentation values, all of which changed with N treatment. The results further confirm the potential of remote sensing for monitoring the growth and condition of crops.

The research described in this report was sponsored by NASA under Contract No. NAS9-15466.

052081 Computer-Based Forest Cover Classification Using Multispectral Scanner Data of Different Spatial Resolutions by R.S. Latty.

The objectives of this study were to: (1) Compare the classification accuracies obtained with data from four different spatial resolutions, and (2) to compare the classification accuracies obtained using the per-point classifier with accuracies achieved using a per-field classifier (i.e., the LARSYS *SECHO classifier). Data used were obtained on May 2, 1979 with the NASA NS-001 Thematic Mapper Simulator (TMS) over an area in Northeastern South Carolina from a height of 19,500 feet above ground. Data sets having 15x15, 30x30, 45x45, and 60x75 meter spatial resolutions were generated and compared. Classification accuracies were assessed using both training and test areas.

The results show that the use of successively higher spatial resolution data resulted in lower overall classification performance (i.e., 15x15 meter spatial resolution resulted in significantly lower classification accuracy than Landsat spatial resolution). Differences in classification accuracies for data of different spatial resolutions were not significant among cover classes having relatively low levels of spectral variability across adjacent pixels (i.e., pasture, crops, bare soil or water). However, statistically different classification performances were found for forest cover classes which had relatively large amounts of spectral variability across adjacent pixels. Statistically higher classification accuracies were achieved using *SECHO classifier than were achieved using the per-point GML classifier.

The research described in this report was sponsored by NASA under Contract No. NAS9-15889.

060881 Application of Computer Axial Tomography (CAT) to Measuring Crop Canopy Geometry by V.C. Vanderbilt and R.W. Kilgore. Proceedings of the 1981 International Geoscience and Remote Sensing Symposium (IGARSS'81), June 8-10, 1981, Washington, D.C., pp. 1162-1167.

Accurate and extensive geometric data of plant canopy structure -- the location and orientation of the foliage -- is surprisingly difficult to obtain but remains a key input to canopy reflectance models. These models are exercised in parameter studies to gain understanding of the potential information in remotely sensed satellite data and thereby address the larger problems of discriminating crops, determining their areal extent, and assessing their physiological condition. Such information is needed to better monitor and manage the worldwide production of several key, economically important crops. Lack of accurate and extensive geometric data has retarded the development and testing of these physically based canopy reflectance models.

To better appreciate the problem of acquiring canopy geometry information, consider the convoluted and time-varying structure of a typical vegetative canopy plus the data requirements of canopy reflectance models. These preclude the adequate measurement of canopy geometric characteristics in a short time period (minutes) using simple measuring tools (meter stick and protractor). To minimally satisfy current modeling requirements, the geometric data are needed as a function of at least two canopy variables, height and the angle from vertical. An additional position variable must be considered to realistically model the reflectance of row crops. The time, azimuth angle, and/or horizontal position are additional variables needed to examine and model the effects of moisture stress, phototropism, and wind upon the canopy reflectance. In summary, there are six variables (x,y,z,0,0,t) needed to describe the position-orientation with time of a small piece of canopy foliage.

The research described in this paper was sponsored by NASA under Contract No. NAS9-15466.

062381 Evaluation of a Segment-Based Landsat Full-Frame Approach to Crop Area Estimation by M.M. Hixson, S.M. Davis and M.E. Bauer. Proceedings of the Seventh International Symposium on Machine Processing of Remotely Sensed Data, Purdue University, June 22-23, 1981, pp. 36-44.

As the registration of Landsat full frames enters the realm of current technology, sampling methods which utilize other than segment data should be examined. The objective of this study was to assess the effect of separating the functions of sampling for training and sampling for area estimation. Two classification and area estimation procedures were compared: (1) statistics developed on one segment were used to classify that segment, and (2) pooled statistics from the segments were used to classify a systematic sample of pixels in the stratum. Comparisons to USDA/ESCS estimates illustrate the potential of using a full-frame sampling approach.

The research described in this paper was sponsored by NASA under Contract No. NAS9-15466.

070181 The Design and Construction of a Special Purpose Data Logger by M.K. Stabenfeldt.

A data logger for field data acquisition, utilizing CMOS technology, was designed and constructed. The logger is part of a spectral data acquisition system used in remote sensing field research. The Data Logger was designed for field use with a Barnes Engineering model 12-1000, multiband radiometer. The unit was functionally tested and evaluated. Preliminary designs for a second generation instrument were also completed.

082181 A Study of the Spectral Reflectance of Selected Eroded Soils of Indiana in Relationship to Their Chemical and Physical Properties by K. Latz, R.A. Weismiller, and G.E. Van Scoyoc.

A study of eroded soils collected from different locations in Indiana was conducted to investigate the relationship between the chemical and physical properties and the spectral reflectance of these soils. Soil samples included six eroded toposequences (topographic sequences) with varying degrees of erosion and representing the three primary soil orders common in Indiana, i.e., Mollisol, Alfisol and Ultisol. Another series of soil samples was collected by depth from an Alfisol profile. These samples were used to compare an assimilated erosional condition to the naturally eroded toposequences. All soil samples were prepared and analyzed under similar laboratory conditions. Analysis included organic carbon, total and amorphous iron oxide, particle size, moisture content, and continuous scan spectral reflectance measurements. Three curve types were identifiable from the spectral reflectance.

The most important chemical properties affecting the spectral reflectance of these soils appeared to be the organic matter and iron oxide contents. It was observed that lower amounts of organic matter may have allowed the iron oxide to strongly influence the shape of the spectral curves of the eroded soils. Evidence of the eroded soils was most clearly seen around the 0.8 μm wavelength of the spectrum (bands 3 to 4 in the simulated Landsat graphs) by a distinct leveling off of the spectral curve. This decrease in slope was often prevalent where the degree of erosion was more severe.

A definite relationship between the laboratory spectral reflectance scan and the simulated Landsat graphs was apparent, suggesting that satellite data of eroded soil could provide useful information for the identification and detection of eroded soils.

The research described in this report was sponsored by the Purdue University Agricultural Experiment Station under Project No. 50020.

090881 Diurnal Changes in Reflectance Factor Due to Sun-Row Direction Interactions by V.C. Vanderbilt, J.C. Kollenkark, L.L. Biehl, B.F. Robinson, M.E. Bauer, and K.J. Ranson. Proceedings of the International Colloquium on Spectral Signatures of Objects in Remote Sensing, Avignon, France, September 8-11, 1980.

To investigate the changes in the spectral reflectance factor related to row direction, sun direction, soil background, and crop development stage, Purdue/LARS collected two years of data of row crop canopies of soybeans grown in planter boxes and placed on a turntable. The results demonstrate that the direction of rows in a soybean canopy can affect the reflectance factor of the canopy by as much as 230%. The results for the red spectral region tend to support the validity of canopy reflectance models; results for the infrared spectral region do not.

The research described in this paper was sponsored by NASA under Contract No. NAS9-15466.

090981 Linear Polarization of Light by Two Wheat Canopies Measured at Many View Angles by V.C. Vanderbilt, L.L. Biehl, B.F. Robinson, M.E. Bauer, and A.S. Vanderbilt.

This paper describes research to understand how visible light is linearly polarized and reflected by wheat as a function of sun-view directions, crop development stage, and wavelength. The analysis is based on 200 spectra taken continuously in wavelength from 0.45 to 0.72 μm in 33 view directions using an Exotech Model 20c spectroradiometer six meters above two wheat canopies in the boot and fully headed maturity stages. The analysis results show that the amount of linearly polarized light from the canopies is generally greatest in the azimuth direction of the sun and tends toward zero as the view direction tends toward the direction of the hot spot or anti-solar point. The results demonstrate that the single angle, angle of incidence of sunlight on the leaf, explains almost all of the variation of the amount of polarized light with sun-view direction.

The research described in this paper was sponsored by NASA under Contract No. NAS9-15466.

SYSTEM SERVICES September 30, 1981

LARSPEC BY JERRY MAJKOWSKI

The LARSPEC Batch Command was upgraded on Tuesday September 15, 1981. The major purpose of this upgrade was to make use of the new LARS Batch System. The syntax of the command will remain the same so that users still have the opportunity to specify the backup option on the command line. All the options within the command environment are still available with the following additions and minor changes.

1) Since the various batch machines will no longer be available in the new batch system this has also been removed from the LARSPEC Batch Command. Batch users have control over the same parameters determined by the old batch machines by changing the rate, time limit, and size. In LARSPEC default rate is 'PRIORITY' which means that the job will be run as soon as possible. User's have the option of switching to 'BASIC' rate at a lower cost and having their jobs run during low usage hours (evenings, etc). The time limit default is 15 minutes. The size default is 1 megabyte. The size should never need to be changed for any LARSPEC job and users are not given this option.

2) The capability to change the maximum number of lines to be printed and cards to be punched was added. Default for lines is 20,000 and for cards is 1,500.

3) The capability to enable or disable the backup option and/or to change the tape and file number has been added to the options given within the command environment. The backup option gives users the ability to have the batch machine's D-Disk backed up to a specified tape and optional file number. The D-Disk will contain any output punch files if this option is chosen so that any punch output will go to tape rather than the specified punch site. Previously this option could only be invoked at the time the batch command was entered.

4) An option was included to query the user's batch jobs using the 'BATCH QUERY JOB *' command. After these jobs are displayed users can request the history of particular jobs if desired.

5) An option to execute any CMS batch command from within the LARSPEC batch environment was also included. Users may cancel, hold or change queued jobs without leaving the command environment by using this option. When this option is selected, batch options should be entered without including the word 'BATCH'. (eg. 'CANCEL 524', NOT 'BATCH CANCEL 524')

Users should consult the Batch User's Guide for more details on limits, querying, holding, canceling and changing jobs using the batch command. The LARSPEC batch command environment is invoked by typing 'BATCH' while in the LARSPEC environment.

Upcoming LARSPEC enhancements include the printing of run identification parameters down the page rather than across and the interface of LARSPEC to the new GCS system.

GCS BY JERRY MAJKOWSKI

On Tuesday, September 22, an interface for the Tektronix 4002A Graphics Terminal was added to the LARS GCS system. Currently the only terminal of this type available to the LARS computer is at the Johnson Space Center in Texas. Those desiring to use this interface may consult the 'LARS Usage Notes' Section of the 'GCS User's Manual'. For specific information on using the 4002A the Tektronix 4054 specification on page 3-16 (Dec. 1980 Version) may be used with the following exceptions:

1) Point 2. Plotting surface is 8.267 inches in the X-direction and 6.378 inches in the Y-direction. Default UDAREA is 1.89 to 8.267 inches for X and 0 to 6.378 inches for Y.

2) Point 3. Resolution is 123.8 dots/inch in the X direction and 119.1 dots/inch in the Y direction.

3) Point 6. There is only one hardware character size which has a height of 0.159 inches and a width of 0.0969 inches.

4) Point 7. Should be ignored.

New documentation for GCS is currently being prepared.

The 4002A interface can be used via the 'GCS EXEC' on the PLTDSK disk by specifying 'TØ2' for 'DEVICE' as described in Section 2 of the usage notes or by loading the following text libraries in the order shown:

GCSLIB
GCS2DLIB or GCS3LIB
GCSTØ2

and by using the name 'GCS' on the load statement along with the user's own files.

Problems and questions concerning the interface should be directed to JERRY MAJKOWSKI or to the ID 'GCS' via the 'MAIL' command. This interface will be included on the EODL System at the end of October.

SYNAGRAPHIC MAPPING SYSTEM (SYMAP) BY LARRY BIEHL

SYMAP has been implemented on the Purdue/LARS Computer System through the help of the Bolivian scientists. SYMAP is a computer mapping program using a standard line printer as its output device. This program was written by the Laboratory for Computer Graphics and Spatial Analysis, Harvard University. The program was specifically designed to be used by geographers, planners, geologists, meteorologists and others who have a professional interest in analyzing spatial data.

The inputs to the program include a vector file defining the area of interest and optional information about locations within the area, i.e., weather data. Outputs include conformant, proximal, contour, trend surface, and residual maps, and other information.

One can access the SYMAP system by entering (in CMS): GETDISK PLTDSK at the terminal. PLTDSK will be attached as a Z-disk. To start execution type: SYMAP. The exec will prompt the user for the 'filename' of the input file. The 'filetype' of the input file should be SYMAP.

Manuals are available in the Flex Lab 1 and Flex Lab 2 terminal areas. See JIM COCHRAN if you have any questions.

CAMPUS CONTRIBUTIONS BY KAY HUNT

DAVE SNYDER and JEFF WELCH are currently representing LARS, with a 50% time commitment each, at the Agronomy Department, working on their Plato system. Dave and Jeff's work is under the direction of DON HOLT and will continue for an eight month period.

SUMMARY OF 3031 COMPUTER USAGE FOR AUGUST 1981

OVERALL USAGE

Basic Rate CPU Time Used	43.70
Priority Rate CPU Time Used	150.90
Total CPU Time Used	194.60
Terminal Sessions	5294
Batch Jobs	1760

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM		
Mon-Fri 8AM-4PM		
Mon-Fri 4PM-midnite		
Weekend		

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	80	0.12	0.03
BATSHORT	42	9.73	0.63
BATMED	8	16.00	0.50
BATONITE	66	18.93	1.02
BATLONG	302	8.44	0.68
TAPTRAN	0	0.0	0.0
BATEOD	470	11.71	1.44
BATJSC	72	31.48	4.58

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Computer Room	01	3277	--	--	--
Flexlab 2	11	3277	--	--	--
	12	3277	--	--	--
	30		--	--	--
	31	Hazeltine	--	--	--
	32	GTX	239	136.80	0.57
	33	GTX	260	137.01	0.53
	34	GTX	285	160.06	0.56
	35	GTX	278	167.91	0.60
	36	GTX	337	153.95	0.46

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab 2	37	Tektronix	174	94.13	0.54
	38	Apple II	133	48.95	0.37
	39		--	--	--
	3A		--	--	--
	3B	GTX	245	64.60	0.26
	3C	GTX	163	80.37	0.49
	3D	Diablo	188	53.24	0.28
	3E	DECwriter	--	--	--
Computer Tech	3F	GTX	--	--	--
Flexlab 1	40	GTX	162	99.56	0.61
	41	GTX	146	166.39	1.14
	42	GTX	240	146.21	0.61
	43	DECwriter	110	61.02	0.55
	44	Diablo	59	17.51	0.30
Alabama A & M	4A	GTX	--	--	--
	4B	DECwriter	3	1.41	0.47
	4C	GTX	24	20.04	0.83
	4D	GTX	42	25.53	0.61
ISU	4E	(various)	16	4.00	0.25
	4F	(various)	74	42.67	0.58
Dial-Up	50	1st in use	118	116.32	0.99
	51	2nd in use	53	51.35	0.97
	52	3rd in use	15	12.28	0.82
	53	4th in use	16	9.91	0.62
	54	5th in use	35	18.56	0.53
	55	In-house-1	136	74.83	0.55
	56	In-house-2	76	49.72	0.65
U. of Cal-Riverside	57	Dial-Up	--	--	--
ERIM	58	(various)	95	35.37	0.37
Houston	59	(various)	49	96.63	1.97
	5A	(various)	147	102.14	0.69
	5B	(various)	199	182.73	0.92
	60	CRT	180	95.30	0.53
	61	CRT	138	147.49	1.07
	62	Trendwriter	--	--	--
	63	Trendwriter	173	86.71	0.50
	64	CRT	1	0.06	0.06
	65	CRT	--	--	--
	66	CRT	--	--	--
	67	CRT	--	--	--
	68	CRT	133	142.31	1.07
	69	CRT	136	116.32	0.86
	6A	Dial-Up	97	108.63	1.12
	6B	Dial-Up	53	41.58	0.78
	6C	Dial-Up	--	--	--
	6D	Dial-Up	--	--	--
	6E	Dial-Up	--	--	--
	6F	Dial-Up	--	--	--

INTRALAB NOTES

PERSONNEL CHANGES

PETER and CAROL JOBUSCH are leaving LARS to move South; both have taken jobs at the SAS Institute in Cary, North Carolina. Pete will be a Systems Programmer for CMS/SAS development and will start work November 2. Carol will be a Training and Education Specialist beginning November 9. They have already bought a beautiful, modern home in Cary, complete with a train room for their HO layout. We wish them lots of luck in their new location.

CAROL MCKIEL, day shift computer operator, has left LARS to move to South Bend, Indiana, where her hsband Allen has accepted a position in computer systems for the South Bend area school corporation. Carol has been with LARS for a year and a half.

BEVERLY SANDERS joined LARS on August 24, 1981 as Computer Operator on the 4pm - midnight shift. She presently lives in Monticello, where she has been working in real estate for the past five years.

MINI-LARSIANS

On May 14, 1981, Vera and GETULIO BATISTA presented their son, Tulio, with a baby brother. New brother, Bruno weighed in at 6 lbs. 1 oz. and now weighs over 15 lbs! Congratulations to the growing family.

Congratulations and best wishes are extended to Allen and CAROL MCKIEL, who recently became proud parents of a daughter. Erin Tahirih was born on September 10, 1981, at 2:04pm and weighed in at 9 lbs. 1 oz.

PROPOSALS SENT OUT

Title: An Addendum to the Alabama A&M University Earth Resources Data Processing Remote Terminal Support Proposal
Sponsor: Alabama A&M University
P.I.: L. Bartolucci
Duration: 10/1/81 - 9/30/82

Title: Progress Towards Data Shaping Capability
Sponsor: NASA
P.I.: J. Kast
Duration: 10/1/81 - 11/30/81

Title: Technical Support to ONERN, Lima, Peru
Sponsor: USAID/Peru
P.I.: L. Bartolucci
Duration: 10/1/81 - 9/30/82

Title: A Proposal to Initiate Development of a COMTAL Vision One/20 System for Remote Sensing
Sponsor: COMTAL
P.I.: S. Davis and P. Swain
Duration: 10/1/81 - 12/31/81

Title: Inventory of Stream Corridors in the Pacific Northwest to Identify Areas of High Value for Fish and Wildlife
Sponsor: U.S. Fish and Wildlife Service
P.I.: R. Mroczynski
Duration: 10/1/81 - 11/30/83

Title: Low Altitude Photo Interpretation Manual
Sponsor: U.S. Geological Survey
P.I.: R. Mroczynski
Duration: 10/1/81 - 11/30/82

SCAN LINES

LARS · Purdue University · Vol. 8 · No. 4 · November 3, 1981

COMTAL EDUCATIONAL MODULE RECEIVES RAVE REVIEWS

The COMTAL/3M Technical Conference held in late September in Wonewok, Minnesota, gave SHIRLEY DAVIS and PHIL SWAIN an excellent opportunity to describe to other COMTAL users the development design for the COMTAL Educational Module and to solicit both experienced and inexperienced users to try out and evaluate the materials.

The module was developed under contract to COMTAL and will be available from them as soon as the production tasks are complete. The module is made up of three units, each addressing concepts of increasing complexity. Unit I focuses on displaying single images, in black-and-white and in pseudo-color; Unit II introduces graphics, including tracing and labeling; and in Unit III the student learns to overlay multiple images to create a truecolor image and to add graphics to images.

The student is led through the activities by an audio tape, with slides or colored prints used to verify the appearance of the screen at key points during the sessions. A study guide, also a part of the module, contains activities to enforce the learning, additional information, and references.

An innovative aspect of the module design is that the concepts of image processing are presented using system generated data. This allows for broader use of the module among people working with many different types of data. Advanced exercises based on data more typical of actual applications, e.g., Landsat data or x-rays, correspond to each basic unit.

Scan Lines is prepared 10 times a year for distribution at Purdue University, Laboratory for Applications of Remote Sensing (LARS), 1220 Potter Drive, West Lafayette, Indiana 47906 USA. Persons external to Purdue who wish to receive one year of *Scan Lines* should send $7.50, payable to Purdue University, to *Scan Lines* at the above address.

Conference participants who tried out the module were unanimous in judging it a significant help to new COMTAL users who need to learn quickly how to use the system. Several very good suggestions for minor modifications were made, many of which have been incorporated in the final version.

The developers wish to thank again the staff members at LARS who helped by trying out earlier versions of the module. A complete set of final materials will be placed in the COMTAL room as soon as possible.

WORKSHOP FEATURES FIELD RESEARCH, INSTRUMENT SYSTEM DEVELOPED AT LARS

A workshop in remote sensing field research was hosted by Purdue University at the Laboratory for Applications of Remote Sensing on October 14-16, 1981. Twenty-five people attended, including representatives from universities and governmental agencies in Kansas, Nebraska, North Dakota, South Dakota, Oregon, Texas, Minnesota, Canada and Mexico.

MARVIN BAUER, BARRETT ROBINSON, LARRY BIEHL and CRAIG DAUGHTRY made presentations during the workshop. The fundamentals of radiometric measurements were reviewed; agronomic measurements and experiment design were discussed. Field measurement projects of all participating organizations were discussed informally to allow for an exchange of success stories, problems and their possible solutions, and future plans. Ed Kanemasu, Evapotranspiration Lab, and Blain Blad, Center for Agricultural Meteorology & Climatology, Kansas State University; Donald Dusek, USDA-ARS; and Jim Heilman, Remote Sensing Center, Texas A&M University; made presentations during these discussions.

Demonstration of the multiband radiometer system developed at Purdue University/LARS formed a large part of the workshop's activities. In this system the radiometric instrument is a multiband radiometer with eight bands between 0.4 and 12.5 micrometers; the data acquisition system records data from the multiband radiometer and ancillary sources. The radiometer and data logger are adaptable to helicopter, truck or tripod platforms. The system is also suitable for portable hand-held operation. The system is comparatively inexpensive to acquire, maintain and operate; simple to operate and calibrate; complete with the data handling software and well documented for use by researchers.

Additional information on the radiometer system was presented at the workshop, including design specifications, and performance evaluation of the multiband radiometer and data recording modules, programming, the truck-mounted boom configuration and data handling software.

Most participating organizations at the workshop are currently, or soon to be, using the multiband radiometer system in their field research activities. Pickup truck-mounted instrument boom and calibration systems were installed at South Dakota State University, Kansas State University and the University of Nebraska this summer. Plans call for similar installations this fall at Oregon State University, Texas A&M University and CIMMYT, Mexico.

NEW DIRECTOR SEARCH BEING CONDUCTED

Purdue University is searching for a Director of the Laboratory for Applications of Remote Sensing (LARS). The former Director, Dr. David Landgrebe, has been appointed Director of the Engineering Experiment Station at Purdue.

The Director is responsible for all activities of LARS, an interdisciplinary research unit. Duties include: leader and technical advisor for both fundamental and application research programs in remote sensing; coordination of programs with other departments, the scientific community, and with potential user agencies; overall direction of laboratory; research (25%) in remote sensing. Eligible applicants must hold a Ph.D. in one of the natural or physical science disciplines associated with remote sensing and must have demonstrated excellence in research. Administrative experience and background in remote sensing is highly desirable. Letters of nomination, interest or inquiry should be sent by December 1, 1981 to: B. R. Baumgardt, Director of the Agricultural Experiment Station, AGAD, Purdue University, West Lafayette, IN 47907. Purdue University is an Equal Opportunity/Affirmative Action Employer.

CORSE-81 PROCEEDINGS

The proceedings from the 1981 Conference on Remote Sensing Education, held at Purdue last May, are now available. Copies may be obtained from Davida Parks at $4.00 to cover postage and handling.

Copies are also available from Shirley Davis, Conference Co-Chairman; from NOAA; EROS Data Center; and NASA's three Regional Applications Centers.

The 383-page publication contains summaries of the formal presentations as submitted by the authors, notes that capture the discussion topics in all plenary and parallel sessions, outlines of the nine tutorial workshops, and lists of participants and exhibitors.

DEPUTY DIRECTOR ELECTED TO OFFICE

Terry L. Phillips, deputy director of LARS, has been elected president of the Sagamore Chapter of the Data Processing Management Association (DPMA).

The DPMA is composed of all levels of management personnel who have an interest in the field of information processing. Its primary purpose is to develop and offer programs for the self-improvement of individual members.

The Sagamore Chapter of the DPMA has been active for a year.

VISITORS

Earl Merritt, of Earth Satellite Corporation, visited LARS September 24. He was here to work with STEVE HOLLINGER, DON HOLT and MARVIN BAUER on a joint EarthSat-LARS project on evaluation of Landsat spectral inputs to crop growth and yield models.

NEW PROJECT ON ABANDONED MINED LANDS

DICK MROCZYNSKI is working with the Division of Reclamation, Indiana Department of Natural Resources, on a project to reclaim abandoned mined lands. The first step of the project is to develop a first year grant application for reclamation of abandoned mined lands (AML's) as required by the Surface Mining and Control Act of 1977. Other Purdue staff members working on the project are: W. L. Miller (Agricultural Economics), D. A. Caputo (Political Science), J. T. O'Leary (Forestry and Natural Resources), W. N. Melhorn and T. R. West (Geosciences), Ed Koehn and D. Hancher (Civil Engineering), and W. McFee (Agronomy).

RECENT TRAVEL BY LARS STAFF

MARVIN BAUER, CRAIG DAUGHTRY, MARILYN HIXSON, STEVE HOLLINGER, LARRY BIEHL, PAUL ANUTA and JIM TILTON attended the quarterly technical interchange at NASA's Johnson Space Center October 6-9. Presentations were made by Bauer, Daughtry, Hollinger and Anuta. A highlight of the meeting was a 1½-day workshop on spectral inputs to crop growth and yield models, with participants from NASA, USDA and several universities. The LARS' research on spectral estimation of leaf area index and solar radiation interception of corn and soybean canopies was presented at the workshop.

DICK MROCZYNSKI attended the 7th Canadian Remote Sensing Society Symposium, sponsored by Ducks Unlimited, in Winnipeg, Manitoba September 8-11. Ducks Unlimited presented a plenary session paper and a poster presentation at the meeting.

LUIS BARTOLUCCI and JOAN BUIS journeyed to Fort Clayton, Panama, September 28-October 9 to teach a short course. The course, "Digital Analysis of Remote Sensing Data", was sponsored by the U.S. Defense Mapping Agency/Inter-American Geodetic Survey (DMA/IAGS) and attended by 20 Latin American scientists and two U.S. scientists. As part of the course, a "Hands-On" computer experience was conducted through a telephone line connection to LARS.

MARION BAUMGARDNER traveled to Washington, D.C. recently for two meetings. On October 14-15, he chaired a meeting of the Soils Study Panel for AAAS/ National Park Service/USAID Project to assess resource inventory methods in developing countries. On October 16, he met with the Planning Committee for the 1982 Annual Meeting of Soil Conservation Society of America that will be held in New Orleans.

CONTRACTS

Title: "Progress Toward Data Sharing Capability"
Sponsor: NASA
Duration: 9/28/81 - 11/30/81
P.I.: M. Bauer

Title: "Modification of Contract NAS9-15466 on Research in Remote Sensing of Agriculture"
Sponsor: NASA
Duration: 12/1/80 - 11/30/81
P.I.: M. Bauer

DEGREES AWARDED

Recently, two of our graduate students defended their dissertations courageously and were awarded Ph.D.'s for their endeavors. Congratulations to: MARWAN MUASHER, who gave his defense on October 13, and GETULIO BATISTA, whose defense was October 19.

Getulio's dissertation is entitled "Study of Corn and Soybean Landsat MSS Data Classification Performance as a Function of Scene Characteristics." He is returning to Brazil in November to a position at the Instituto de Pesquisas Espaciais (INPE) to do research in crop inventory.

Marwan is still interviewing for positions and would like to remain in the U.S. for a while. He wants to work in the field of computer communications. The title of his dissertation is "Multistate Classification of Multispectral Earth Observational Data: A Design Approach.

NEW LARS TECHNICAL REPORTS

021781 Soybean Canopy Reflectance as Influenced by Cultural Practices by J.C. Kollenkark, C.S.T. Daughtry, and M.E. Bauer..

Experiments were conducted at West Lafayette in 1978 and 1979 to study the reflectance factor of soybean canopies as affected by differences in row width, population, planting date, cultivar, and soil type. Reflectance factor data were acquired throughout the growing season with a Landsat-band radiometer. Agronomic data included plant height, leaf area index, development stage, total fresh and dry biomass, percent soil cover, and grain yield. The results indicated that row width, planting date, and cultivar influence the percent soil cover, leaf area index, and biomass present, which were in turn related to the multispectral reflectance. Additionally, the reflectance data were quite sensitive to the onset of senescence. Soil color and moisture were found to be important factors influencing the reflectance in single Landsat bands, but the near infrared/red reflectance ratio and the greenness transformation were less sensitive than the single bands to the soil background present.

The research described in this report was sponosred by NASA under Contract No. NAS9-15466.

062181 Radar Imagery for Forest Cover Mapping by D.J. Knowlton and R.M. Hoffer. Proc. of the Seventh Intl. Symp. on Machine Processing of Remotely Sensed Data, Purdue University, pp. 626-632.

Dual-polarized, x-band Synthetic Aperture Radar (SAR) imagery was obtained from an altitude of 60,000 feet over a test area near Camden, South Carolina on June 30, 1980. The objective of this study was to determine, qualitatively, the value of the SAR imagery for identifying various forest cover types. In analyzing the HH and HV polarization images, particular attention was given to the tonal and textural characteristics of the cover types involved.

The analysis of the dual-polarized SAR imagery has shown that certain forest cover features are more easily identified in one polarization than the other, while some features look very similar in both polarizations. In general, the results for this data set have shown that the overall tonal contrast between features was greater on the HH image. Neither polarization was consistently better for identifying the various forest cover types examined. These results suggest the usefulness of a dual-polarized SAR system for mapping forest cover.

The research described in this report was sponsored by NASA under Contract No. NAS9-15889.

062281 Computer-Based Classification Accuracy Due to the Spatial Resolution Using Per-Point Versus Per-Field Classification Techniques by R.S. Latty and R.M. Hoffer. Proc. Seventh Intl. Symp. on Machine Processing of Remotely Sensed Data, Purdue University, pp. 384-392.

This study determined the classification accuracies achieved with MSS data of four different spatial resolutions using two different types of classifiers. The data were obtained on May 2, 1979 with the NASA NS-001 Thematic Mapper Simulator (TMS) over an area in northeastern South Carolina from a height above ground of 5945 meters. Data sets simulating three different spatial resolutions were computed from the original 15 meter nominal spatial resolution data. The classification accuracies achieved with data of each of the four different spatial resolutions using a "per-point" GML classifier were compared to the accuracies achieved with a "per-field" classification approach (i.e., the *SECHO, Supervised Extraction and Classification of Homogeneous Objects, classifier). The "pure field," or "field-center pixel," classification accuracies were determined using training fields and test fields. Accuracy comparisons were conducted with the Newman-Kuels' Range Test on the arcs in transformed proportions. The use of successively higher spatial resolution data resulted in lower overall ("field-center pixel") classification accuracy. This trend was observed particularly in forest cover types, which are associated with relatively large levels of spectral variability across adjacent pixels. The use of the *SECHO classifier resulted in a higher overall ("field-center pixel") classification accuracy than was obtained with the per-point GML classifier using the simulated 30 meter spatial resolution data.

The research described in this report was sponsored by NASA under Contract No. NAS9-15889.

091881 Sampling Landsat Classifications for Crop Area Estimation by M.M. Hixson, B.J. Davis, and M.E. Bauer. Photogrammetric Engineering and Remote Sensing, 47(9):1343-1348, September 1981.

The objective of this investigation was to evaluate the effect of several sampling plans on the precision and bias of crop area estimates made by sampling classifications of Landsat MSS data. Full-frame classifications of wheat and non-wheat for 80 counties in Kansas were repetitively sampled to simulate alternative sampling plans. Four sampling plans involving different numbers of samples and different size sampling units were evaluated. The precision of the wheat area estimates increased as the segment (cluster) size decreased and the number of segments was increased. Although the average bias associated with the various sampling schemes was not significantly different, the maximum absolute deviation was directly related to sampling unit size.

The research described in this paper was sponsored by NASA under Contract No. NAS9-14970.

SYSTEM SERVICES November 3, 1981

SYSTEMS NEWS BY ROSS GARMOE

New Batch System

The new LARS developed batch system has become the production batch system on the LARS computer. On November 1, the last of the old batch system virtual machines was removed from the system. Any jobs submitted to the old system will be lost. Only a few errors have been encountered with the new system and these will be corrected as soon as possible. If you discover any problems, please report them to Computer Products personnel immediately through the on-line TROUBLE system. For assistance in learning how to use the new system contact LOUIS LANG at LARS. For copies of the BATCH 2.0 documentation, contact MIKE COLLINS.

Seven Track Tape Drive Discontinued

On October 14, the seven track tape drive was disconnected from the LARS system. It is no longer possible for seven track tapes to be read or written on our system. If you have tapes in this format, you will need to find another system to process them. We will assist you in finding another system to do this processing if necessary.

Visit by Bill Weimer from JSC

Bill Weimer from JSC visited ROSS GARMOE and PETE JOBUSCH from October 7 through October 15. The purpose of the trip was to learn how LARS personnel maintain the VM/370 operating system and its associated program products and applications system.

Tape System Upgrade

During the next few months, IBM engineers will be upgrading the tape system on the LARS computer. The upgrade will be in two steps. The first step will take place during November and December of this year. After this step, the tape configuration will have a single controller with one tape drive with 800/1600 bits per inch (bpi), three drives with 1600 bpi density and four drives with 1600/6250 bpi. Early next year, the three 1600 bpi drives will be upgraded to 1600/6250 bpi density and all of the drives will operate at 125 inches per second instead of the current 75 inches per second. Since the drives will be connected to a single controller, there will be some channel contention. Total throughput will improve because of the increased density and speed. We will notify you through the logon messages as this upgrade occurs.

RSCS Driver for Dumb ASCII Printers

Computer Products personnel have developed a new line driver for RSCS which allows ASCII terminals (including receive-only models) to be used as printers for spooled output. This driver is being tested now on the Diablo 1650 in Flexlab2 which is used for word processing output. Acceptance and use of this capability has been good and we expect to eventually use this driver for the Diablo in Flexlab1. If you are interested in using this capability for your site, contact GARY BRAMMER at LARS. The terminal that is to be used must be capable of supporting XON/XOFF flow control logic.

SCRIPT 3.7 Available for Testing

Version 3.7 of the Waterloo SCRIPT is now available for testing. To access this version of SCRIPT, link to the LARSLIB 290 disk and access it to CMS. The changes are primarily problem corrections and minor enhancements. However, full support of the Diablo 1650 proportional print capability has been added. For copies of the new user documentation, contact BARBARA FRANCIS at LARS. If you encounter any problems with the new version, please report them through the on-line TROUBLE system.

Please note that the format of the SCRIPT program call has changed slightly. To select specific pages to be displayed, enter:

SCRIPT fname (FROM nn TO mm

instead of the current format of

SCRIPT fname (PA nn:mm

WORD PROCESSING CAPABILITIES DEMONSTRATED BY JIM COCHRAN

On October 1, 1981 JIM COCHRAN presented two demonstrations on the use of the full screen terminals and edgar editor. The demonstrations were for the clerical and professional staff of both Flex1 and Flex2 who were interested in learning more about the terminals and the editor. There is a handy reference handout of the edgar functions that Jim covered in his presentations available from BONNIE PHIBBS in Flex2. If anyone who missed one of these demonstrations would be interested in another presentation of the material, please contact Jim Cochran.

SAS NEWS BY CAROL JOBUSCH

Release 79.5 of SAS is now the default version at LARS. Please report any problems to KAY HUNT.

There is a new SAS map data library on the SAS disk, called WORLDMAP, with a map for each continent, and one for the whole world. JIM COCHRAN at LARS can help you learn to use these maps. A copy of the world map documentation may be obtained from Jim or Kay.

ADN LINK BY GARY BRAMMER

Two 1200 baud lines have been installed to the Ag Data Network (ADN) terminal switching system. These lines will allow any terminal connected to the ADN switching system to be connected to the IBM 4341 at LARS. These two lines are to be used by researchers in Agronomy.

JSC DATA BASE PLANS BY LUKE KRAEMER

In support of the ADS Data Base Task, LARS will select, install and evaluate a commercial data base management system (DBMS) on the LARS computer. During the week of October 19, LUKE KRAEMER will travel to JSC and attend DBMS product presentations. The vendors invited and their products include CINCOM (TOTAL), Cullinane (IDMS), Infodata (INQUIRE), INTEL (System 2000), IBM (System R), IDBS (SEED), Mathematica (RAMIS II), and Software AG (ADABAS). Following the presentations, three products will be selected for a thorough technical review. The candidate systems will be invited to Purdue during the week of November 16 for a more complete examination of their products. Purdue staff members also invited to the review include Professor Vincent Shen (Computer Science), Professor Susan Schwingendorf (Computer Technology) and Dr. Richard Collier (Biochemistry). Following this final review, a product will be selected and ordered for LARS. After installation, the system will be tested and evaluated and the results presented to JSC.

GCS BY JERRY MAJKOWSKI

LARS/GCS updates during October involved changes to the TEKTRONIX 4002A interface to correct problems causing random lines and change the default view port of the screen to be a square area. On October 28, the 4002A interface was added to the EODL system.

Currently, interfaces to the DIABLO 1650 and the TEKTRONIX 4663 pen plotter are being developed for the LARS/GCS system. New 'GCS Usage Notes' will be distributed during the first week of November.

LARSPEC BY JERRY MAJKOWSKI

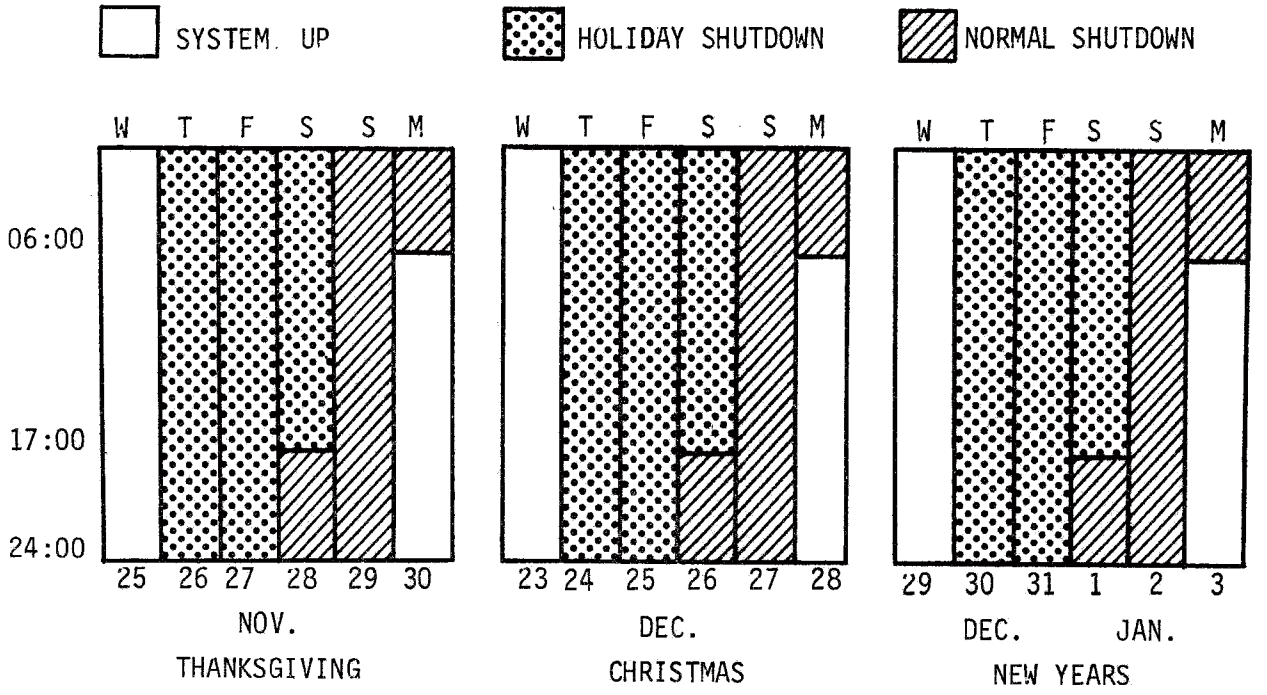
Two updates were made to the LARSPEC program testing system SPECT during October. The purpose of these updates was to enable the use of the TEKTRONIX 4002A interface until more extensive work is done to include the interface in the main system. Users who desire to use the interface should follow the following procedure.

1) insert the cards:
   OUTPUT TK54
   OPTION SIZEGRAPH (0, 8, 0, 6)
   in a GSPEC control card deck

2) run the job by typing
   'RUN SPECT TKØ2'
   in the LARSPEC environment.

The next update to LARSPEC will include the interface to the new GCS system and the PRINTRONIX printer.

LARS COMPUTER HOLIDAY SCHEDULES



COMTAL USER'S NOTES BY SHIRLEY DAVIS

A new edition of COMTAL User's Note No. 1 is now being printed and will be available soon. The modifications include the addition of 1) directions for using the COMTAL Utility Program and its menu for transferring data from the PDP disk to the COMTAL image memory at the start of a session, and 2) information on coloring classifications by rolling pseudocolor memory. The menu of functions available on the COMTAL Utility Program and parallel "help" files can be accessed by typing the command "Run COMTAL" on a PDP terminal.

JEFF MADDEN, a graduate student in education, is now working with SHIRLEY DAVIS in developing user documentation and educational materials for the COMTAL. Jeff was a forestry major as an undergraduate and is a veteran of several remote sensing undergrad and graduate courses. He has gained analysis experience at LARS through the Ducks Unlimited project and will continue working on that project along with COMTAL-related work.

SUMMARY OF 3031 COMPUTER USAGE FOR SEPTEMBER 1981

OVERALL USAGE

Basic Rate CPU Time Used	25.04
Priority Rate CPU Time Used	120.76
Total CPU Time Used	145.80
Terminal Sessions	4957
Batch Jobs	773

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	22.66	16
Mon-Fri 8AM-4PM	65.05	38
Mon-Fri 4PM-midnite	33.02	19
Weekend	13.55	17

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	44	0.09	0.02
BATSHORT	22	4.75	0.14
BATMED	4	2.75	0.21
BATONITE	18	17.83	1.19
BATLONG	1	18.23	1.19
TAPTRAN	0	0.00	0.00
BATEOD	43	14.98	3.98
BATJSC	100	9.96	1.30

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Computer Room	01	3277			
Flexlab 2	11	3277			
	12	3277	66	16.83	0.26
	30		--	--	--
	31	Hazeltine	229	108.66	0.47
	32	GTX	197	112.55	0.57
	33	GTX	243	147.61	0.61
	34	GTX	317	166.58	0.53
	35	GTX	306	144.14	0.47
	36	GTX			

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab 2	37	Tektronix	128	59.40	0.46
	38	Apple II	151	57.21	0.38
	39		2	0.09	0.04
	3A		--	--	--
	3B	GTX	217	81.46	0.38
	3C	GTX	129	56.12	0.44
	3D	Diablo	195	48.50	0.25
	3E	DECwriter	--	--	--
Computer Tech	3F	GTX	--	--	--
Flexlab 1	40	GTX	123	96.04	0.78
	41	GTX	183	120.72	0.66
	42	GTX	202	98.95	0.49
	43	DECwriter	47	19.61	0.42
	44	Diablo	69	23.77	0.34
Alabama A & M	4A	GTX	--	--	--
	4B	DECwriter	3	0.15	0.05
	4C	GTX	47	69.09	1.47
	4D	GTX	48	123.76	2.58
ISU	4E	(various)	66	43.75	0.66
	4F	(various)	173	72.69	0.42
Dial-Up	50	1st in use	187	109.89	0.59
	51	2nd in use	78	43.47	0.56
	52	3rd in use	9	4.21	0.47
	53	4th in use	6	3.30	0.55
	54	5th in use	36	12.75	0.35
	55	In-house-1	56	27.38	0.49
	56	In-house-2	8	7.80	0.97
U. of Cal-Riverside	57	Dial-Up	--	--	--
ERIM	58	(various)	23	13.27	0.58
Houston	59	(various)	24	84.98	3.54
	5A	(various)	66	100.72	1.53
	5B	(various)	95	176.38	1.86
	60	CRT	97	29.74	0.31
	61	CRT	145	87.42	0.60
	62	Trendwriter	--	--	--
	63	Trendwriter	99	29.18	0.29
	64	CRT	5	1.27	0.25
	65	CRT	--	--	--
	66	CRT	--	--	--
	67	CRT	--	--	--
	68	CRT	124	87.52	0.71
	69	CRT	59	49.71	0.86
	6A	Dial-Up	37	17.28	0.47
	6B	Dial-Up	8	14.03	1.75
	6C	Dial-Up	--	--	--
	6D	Dial-Up	--	--	--
	6E	Dial-Up	--	--	--
	6F	Dial-Up	--	--	--

INTRALAB NOTES

STUDENT OPERATOR WINS PLACE ON PROGRAMMING TEAM

BILL BAKER has been accepted to the Purdue Programming Team. The team is composed of 4 students from Purdue and competes in competitions sponsored by the Association for Computing Machinery. The first contest will be the Regional Tournament to be held at Ohio State University in November. If the Purdue team places in first or second place at this contest, they will go on to the National Tournament which will be held in Indianapolis, Indiana in early 1982 at the yearly convention of the ACM. Purdue has failed to attend the National Tournament only once since the contests began, and has placed as high as second place. Bill has worked at LARS for the last 3 years as a student computer operator and is a senior in Computer Science.

PERSONNEL CHANGES

SHASHI SATHAYE recently joined the LARS Systems Services group as a Systems Analyst I. She will be working primarily on the ADS Systems Interconnect Task. Shashi comes to us from the University of Kentucky where she earned her Master's in computer science. Shashi shares an office with JEFF WELCH and can be reached at extension 261. Her supervisor is LUKE KRAEMER.

NANCY KLINE, whose baby is due at Christmas time, has resigned from LARS and BRENDA PRATHER has been selected to fill her position. Brenda has worked at LARS for 3½ years and was secretary for ROGER HOFFER, DICK MROCZYNSKI and DICK WEISMILLER before accepting the position of account clerk. Brenda is being trained in her new position by MARTA DZIUBINSKYJ.

LARS welcomes DEBRA PRESSLER and HILL DENHAM to the student work force. Debra and Hill are Purdue Agronomy undergraduate students. They will be supervised by Craig Daughtry and will assist in collection and preprocessing of field research data.

PROPOSALS SENT OUT

Title: "Parallel Processing Concepts for Remote Sensing Applications"
Sponsor: Texas A&M Research Foundation
Duration: 4/1/82 - 3/31/85
P.I.: H. J. Siegel

Title: "Assessment of Soil Erosion on Agricultural Lands"
Sponsor: NASA
Duration: 7/1/82 - 6/30/84
P.I.: R. Weismiller

SCAN LINES

LARS · Purdue University · Vol. 8 · No. 5 · December 31, 1981

1982 SHORT COURSE SCHEDULE

Beginning in calendar year 1982, the LARS Short Courses will be offered on a quarterly basis. The schedule for the courses is:

March 1-5, 1982
June 7-11, 1982
September 13-17, 1982
December 6-10, 1982

Unless there is a demand for a special course, the course offered at these times will "Numerical Analysis of Remote Sensing Data."

Two special emphasis courses are planned for 1982. The first, February 1-5, 1982, is on "Applications of Remote Sensing to Petroleum and Mining Exploration." This course will address the theory and use of enhancements for exploration, geologic mapping, integration of data from different sources, geographic information systems, petroleum exploration, lithium exploration and models for mineral and petroleum exploration.

July 12-16, 1982, there will be a special "Crop Inventory and Monitoring" course. Areas of emphasis will include spectral characteristics of crops, analysis methods for crop identification and area estimation, spectral inputs to crop growth and yield models, use of landsat data for crop area estimation, field research on spectral properties of crops and soils and prospects of remote sensing for inventorying and monitoring crops in the future.

Scan Lines is prepared 10 times a year for distribution at Purdue University, Laboratory for Applications of Remote Sensing (LARS), 1220 Potter Drive, West Lafayette, Indiana 47906 USA. Persons external to Purdue who wish to receive one year of *Scan Lines* should send $7.50, payable to Purdue University, to *Scan Lines* at the above address.

Anyone interested in any of these short courses should contact:

Mr. D. B. Morrison
Purdue University/LARS
1220 Potter Drive
West Lafayette, Indiana 47906-1399
Telephone: (317) 494-6305

CHINESE DELEGATION TOURS LARS

Six visitors from the People's Republic of China were at Purdue University from Thursday, December 3, to Tuesday, December 8, 1981, to tour the Laboratory for Applications of Remote Sensing and to discuss with LARS personnel the possibility of an educational exchange program with Purdue in 1982.

The visitors, all from Beijing, included: Mr. Chen Weijiang, Director (engineering) and Mrs. Chen Kai, Director of Department of Technical Training (geography) from the National Remote Sensing Center of China; Mr. Yang Shiren, Deputy Director of Institute of Remote Sensing (electrical engineering) and Mr. Chen Shupeng, Institute of Remote Applications (geography) from the Chinese Academy of Science; and Mr. Zhu Puyi (photogrammetry) and Mr. Ba Hao (geography, translator) from the Research Institute of Surveying and Mapping.

VISITORS

H. S. Borkovitz, of the Realist Corporation - Milwaukee, Wisconsin, visited LARS December 8, 1981, to discuss the Realist/Purdue MEDANS Project with Professor LEROY SILVA.

William D. Carter of the U.S. Geological Survey was at LARS December 16 and 17 to discuss the Bolivia project with Dr. CARLOS BROCKMANN, to learn about the development of the Geographic Information System with special interest in the digital mosaic, and to talk to other LARS staff.

RECENT TRAVEL BY LARS STAFF

TERRY L. PHILLIPS attended the Remote Image Processing Workshop sponsored by EROS, October 20-23, 1981. The participants discussed and reviewed the use of microprocessors for analysis of remote sensing data.

STEVE KRISTOF presented a paper November 6, at the 97th Annual Meeting of the Indiana Academy of Science held at Wabash College in Crawfordsville, Indiana. The paper, authored by Kristof and RICHARD MROCZYNSKI, dealt with the results of a study to determine the feasibility of using machine-aided analysis of Landsat MSS data to inventory hydric soils of artic and subarctic wetlands in the Canadian Arctic.

BARRETT ROBINSON traveled to Corvallis, Oregon, November 10-14, to install multiband radiometer equipment at the Environmental Remote Sensing Applications Laboratory at Oregon State University.

PAUL ANUTA attended the NASA Workshop on Registration and Rectification November 16-19. He participated in panel discussions overviewing the needs for research in registration and rectification for future NASA programs.

November 28-December 5, 1981, LUIS BARTOLUCCI and CARLOS BROCKMANN attended the First Meeting of Latin American Remote Sensing Users in Brazil. The meeting was sponsored by the Brazilian Institute of Space Research (INPE).

M. BAUER, C. DAUGHTRY, S. HOLLINGER, D. HOLT, S. KRISTOF, R. MROCZYNSKI, R. WEISMILLER and graduate students J. WARD, K. GALLO and J. C. BROOKS traveled to Atlanta, Georgia, to attend the 73rd Annual Meeting of the American Society of Agronomy held November 29-December 4, 1981. Kristof, Mroczynski and Weismiller presented a poster session on the "Evaluation of Landsat Imagery for Wetland Studies."

DR. CARLOS E. BROCKMANN journeyed to Ann Arbor, Michigan, December 14-15, to attend planning meetings for the sixteenth symposium , sponsored by ERIM. Dr. Brockmann participated in organizing the symposium, and reviewed contributed papers and specific invited presentations.

PROFESSOR LEROY SILVA went to Milwaukee, Wisconsin, to confer with the Realist Corporation on the Realist/Purdue project. The project deals with the design and development of an electro-optical distance and angle mensuration system.

DR. MARION BAUMGARDNER traveled to Santa Cruz, California, to attend meetings sponsored by the American Association for the Advancement of Science. As chairman of the Soils Panel and a member of the Synthesis Panel, Dr. Baumgardner worked on a USAID funded project to assess methods of inventorying and monitoring resources in developing countries.

SHIRLEY DAVIS attended the ASP Regional Meeting in Chicago, November 13 and 14. The meeting, a two-day tutorial seminar, was held jointly with ASCM and was a first for this region. At the request of the Steering Committee, Shirley prepared an evaluation form that was distributed to attendees.

The U.S. Army Corps of Engineers sponsored a Remote Sensing Symposium in Nashville, Tennessee, November 30-December 2. SHIRLEY DAVIS attended and presented an invited paper, authored by Shirley and LUIS BARTOLUCCI, entitled "Numberical Analysis of Digital Remote Sensing Data." Shirley also put up a display featuring three short courses LARS presented for the Corps of Engineers last year.

CORPS OF ENGINEERS COURSE SCHEDULED IN JANUARY

LARS will hold a specially designed course for the U.S. Army Corps of Engineers January 18-22, 1982. Twenty-one students are expected to attend. SHIRLEY DAVIS is coordinating the course; presentations will be given by DICK MROCZYNSKI, LUIS BARTOLUCCI, ROGER HOFFER, LEROY SILVA, John Snow from the Geosciences Department, and Jack Hill from the Department of Civil Engineering, Louisiana State University in Baton Rouge. Because of the number of students, the course will be held at the Sheraton Inn.

CONTRACTS

Title:	"Addendum to the Alabama A&M University Earth Resources Data Processing Remote Terminal Support Proposal"
Sponsor:	Alabama A&M University
Duration:	10/1/81 - 9/30/82
P.I.:	L. Bartolucci
Title:	"A Proposal to Initiate Development of a COMTAL Vision ONE/20 System for Remote Sensing"
Sponsor:	COMTAL
Duration:	10/1/81 - 12/31/81
P.I.:	S. Davis and P. Swain
Title:	"Radiometry and Data Base Support for Scene Radiation Research on Small Grains"
Sponsor:	Realist Corporation
Duration:	12/1/81 - 11/30/82
P.I.:	L. Silva
Title:	"Design and Development of a Modular Electro-optical Distance and Angle Mensuration System"
Sponsor:	Realist Corporation
Duration:	12/1/81 - 11/30/82
P.I.:	L. Silva
Title:	Funding for 1982 Symposium
Sponsor:	NASA
P.I.:	M. Baumgardner

NEW LARS TECHNICAL REPORT

072981 Incorporating Spatial Context Into Statistical Classification of Multidimensional Image Data by J.C. Tilton and P.H. Swain.

Compound decision theory is employed to develop a general statistical model for classifying image data using spatial context. The classification algorithm developed from this model exploits the tendency of certain ground-cover classes to occur more frequently in some spatial contexts than in others. A key input to this contextual classifier is a quantitative characterization of this tendency: the context function. Several methods for estimating the context function are explored, and two complementary methods are recommended. The contextual classifier is shown to produce substantial improvements in classification accuracy compared to the accuracy produced by a non-contextual uniform-priors maximum likelihood classifier when these methods of estimating the context function are used. This improvement in classification accuracy is paid for by a substantial increase in computational requirements. An approximate algorithm, which cuts computational requirements by over one-half, is presented. Further reduction in computational requirements may be possible with a suggested hybrid algorithm. The search for an optimal implementation is furthered by an exploration of the relative merits of using spectral classes or information classes for classification and/or context function estimation. Finally, an unsuccessful attempt to devise a context measure for use in conjunction with context function estimation is described.

The research described in this report was sponsored by NASA under Contract No. NAS9-15466.

SYSTEM SERVICES December 31, 1981

NEW REMOTE COMMAND BY LOUIS LANG

The REMOTE command is used to send spool files through RSCS to a remote site. REMOTE is a new CMS transient routine, replacing the CP command of the same name. This means programs that use CPFUNC for REMOTE-ing files will have to use CMSFNC instead. CMSFNC is located on the LARSYS disk. Note: EXECs which use REMOTE prefixed by CP and user programs will need to be modified.

REMOTE was changed to accommodate the growing number of remote sites on the LARS computer system. The CP version required a system change each time a new remote site was added to the system. The CMS version asks RSCS about the site you want to REMOTE to and either issues the proper commands, or informs the user that the site does not exist. Another possible response is that a link is up, but hasn't been signed on yet. In this case, the appropriate commands are done, and the user is informed that the link needs to be signed on.

An enhancement to REMOTE was added to facilitate use of some SPOOL and TAG options. The options are described below, but their inclusion in the REMOTE command was made to simplify the use of the command.

A list of valid sites can be obtained by issuing the following commands:

```
SMSG RSCS Q SYSTEM
SMSG RSCS Q ROUTE
```

The following is from the online HELP file:

Use the CMS REMOTE command to send printer, punch, or console output to a specific remote site. Optionally, some SPOOL and TAG functions are available for use with the command.

```
'  REMOTE   '
'           '  device     To      sitename        options
'           '
'           '                 Options:
'           '   CLass c        COPY nn     START      HOld
'           '   CONT           NOCONT      STOP       NOHold
'           '   TAG ( tagtext )            / Userid
```

device	any valid spool device or the mnemonic for it. i.e., prt, pun, cons; or the real address for the device.
sitename	the remote site name where the spooled output is to go.

OPTION descriptions:

CLass c	send the output class 'c' to the specified remote site.
COPY nn	send multiple copies to the remote link. nn is in the range of 1 to 99.

CONT	send output as a single file instead of multiple files.
NOCONT	turns off the CONT option, but does not close the file.
START	(cons only) start a spooled console output.
STOP	stop the spooled console output.
HOld	send the files on HOLD status (to be released later).
NOHold	send the files and print them as soon as possible.
/ Userid	move the userid specified into the tag field for remote system processing.
TAG (tagtext)	copy what is inside the parentheses to the tag field for the specified device. The parentheses are required.

Examples:

REMOTE E TO FLEXLAB2 COPY 3 CLASS F HOLD
sends all future output to FLEXLAB2, class F, copy 3, on user hold. This remains in effect until the user changes it or logs off.

REMOTE E TO EODL / VMMAINT CLASS Q COPY 1 TAG (PRIORITY 40)
same as above, except the output will end up in VMMAINT's RDR on the EODL system. The priority option is placed in the TAG field of the file for use by RSCS.

The program and help files are located on the LARSLIB 290 disk.

The REMOTE command will be moved to the system disk on February 1, 1982.

LARSPEC BY JERRY MAJKOWSKI

Various upgrades and corrections were made to the LARSPEC system on Friday, December 7, 1981. A major part of the changes includes an interface to the new GCS system including additional options such as major and minor tic marks and printronix graphics capabilities. The Decwriter graphics capabilities will no longer be available.

The LARSPEC exec was upgraded to allow any LARSPEC terminal command except 'quit' to be executed from the batch environment. This greatly expands the batch capabilities of LARSPEC so that any job which could be run at the terminal can also be run on the batch system. D-Disk was also changed to access mini data base disks as mode K and virtual address 199 (instead of 195 b). This change also allows compatability with the new batch system for the use of disk data bases in batch jobs.

Various corrections were also made for the following problems:

1. In EXOPD for the improper printing of long wavelength data.

2. In EXOGS1 for improper error processing when the condition of requested data not being found exists.

3. In EXOGS1 for the improper graphing of data in classes that did not have data.

4. Correction of initialization problems in EXOGS1 and SPWAVC.

An informative message was also added to FINDRN to tell the user when an entire tape has been searched for data and the number of runs on the tape.

Another minor update was made on December 11, to increase the number of significant digits printed for various soils identification parameters. The parameters effected are calcium, magnesium, sodium, potassium, extractable acidity, cation exchange capacity and electrical conductivity.

COMTAL CAMERA AVAILABILITY BY MIKE COLLINS

The Canon AE-1 camera used in taking pictures from the COMTAL may be obtained from JEFF MADDEN, SHIRLEY DAVIS or the Computer Operators according to the following schedule.

* Daytime 8 a.m. - 5 p.m. weekdays
  If someone wishes to use the camera during these hours they must contact Jeff Madden or Shirley Davis. The Computer Operators are not required to sign out the camera but will do so only if Jeff or Shirley cannot be contacted.

* Night shift 5 p.m. - 8 a.m. and weekends
  If the camera is required during these hours users must contact the Computer Operator on duty.

The procedure which will take place when the camera is requested follows:

A. Shirley, Jeff or the Operator will unlock the cabinet in the COMTAL room and issue the equipment that is needed.

B. The user will complete an entry on a sign-out sheet with the date, then name, project name or LARS master account number and the number of rolls of film issued.

C. The entry will then be initialed by the person issuing the camera and supplies and the cabinet will be locked.

D. Once the user has completed their picture taking they must again contact the appropriate person to have the camera returned to the cabinet where the form will be initialed indicating the camera was returned.

E. The user must then turn their film into DAVIDA PARKS (Flex 1) for processing.

NEW SYSTEM DIRECTORY (DIRMAINT) BY MIKE COLLINS

A new directory maintenance system (DIRMAINT) has been placed online which gives the general user the capability to modify control statements in their own directory entry. The changes the user can make are restricted to those that do not affect allocation or distribution of system resources or performance in any way. Changes that do involve such factors must still be made through the system administrator (ROSS AIKEN, ext. 259). The directory maintenance program provides a set of commands that allows the system administrator to more rapidly and safely make changes for the user.

Users may invoke the online HELP facility if needing assistance in using the DIRMAINT command with any of its pertinent operands. Copies of the 'DIRECTORY MAINTENANCE GUIDE FOR GENERAL USERS' will not be provided on an individual basis but a copy will be available in each user's area.

The DIRMAINT operands available are:

?	requests background information on various directory maintenance topics.
DISTrib	change the distribution code for spooled output. (I)
DLink	drop linkages made by other users to one of your minidisks.
FOR	perform any of the operands on behalf of one of your dependent virtual machines.
Help	presents a summary listing of online help information available. This operand is intended primarily for users at 3270 display stations.
IPL	add, delete, or change an IPL card. (I)
Link	cause an automatic CP LINK at logon to another user's minidisk. (O, M, P)
MDisk	change minidisk access mode; change, add, or delete minidisk passwords. (M, P, I)
MDPW	display the passwords of the defined minidisk.
OPtion	add or delete options for your virtual machine. (O, M, I)
PW	change your CP LOGON password. (I)
PW?	query how long ago your CP LOGON was changed.
QLog	ask for any messages that were sent while you were logged off, disconnected, or not receiving any messages.
REView	get a copy of your own directory entry without any passwords.
Term	add, replace, or delete logical line editing characters. (M, I)
Verified	verify that your minidisk is working and unchanged after being moved to a new extent.

SYSTEMS EQUIPMENT NEWS BY GARY BRAMMER AND SHASHI SATHAYE

NEW LINES TO CAMPUS

Several new lines have been installed to campus, one at political science connected to a Decwriter IV, one at entomology connected to a VT100 terminal or a Tektronix 4663 pen plotter and a Tektronix 4052 terminal, and four at Ag Data Network connected to a terminal switching network (PACX) that can be accessed by any terminal connected to the PACX. The connect code for LARS at ADN is 14.

A TI 820 serial printer (2400 baud rate) located in Lilly Life Science, room 2-442, is connected as an RJE printer. To have output printed at this site, enter the following commands:

```
SP E RSCS
TAG DEV E AGRY
```

In addition to the printer mentioned above, there are two Ampex terminals available for public use in Rm 2-442 Lilly Hall. These terminals can be linked to LARS through two (1200 baud rate) lines to ADN.

The log-on procedure is posted on the terminals. IBM-system, FORTRAN IV, SAS and Graphics (GCS) manuals are available for the users while they are using the terminals.

TEKTRONIX HARDCOPY UNIT

A new hardcopy unit was purchased to obtain copies of anything displayed on the Tektronix 4054 terminal. The hardcopy unit uses an electrostatic process to apply a toner to paper for printing. This process is less expensive than the old hardcopy unit and should be more reliable.

COMTAL NEWS BY SHIRLEY DAVIS

COMTAL User's Note #2, now available, describes how to take pictures off the COMTAL screen using the Canon AE-1 available for that purpose. Additional equipment for use with the Canon includes a tripod, cable shutter release, power winder, and data back. Color Ektachrome film (ASA 64) is also available for you to use.

Following the instructions in the User's Note should yield very good slides. Sample slides are available in the COMTAL room so you can see the effects of different f-stop settings and shutter speeds.

If you want to use the camera, see the instructions elsewhere in this issue of Scanlines. Contact JEFF MADDEN or SHIRLEY DAVIS if you have questions.

SAS AND LARSYS NEWS BY KAY HUNT

EILEEN LUKE, a graduate student in Statistics, will be available for statistical consulting beginning January 11, 1982. She will be available at LARS on M-W-F from 1:00 p.m. - 5:00 p.m. and T-Th from 8:00 a.m. - 12:00 noon. Please call her regarding questions on SAS, SPSS, IMSL, etc.

SAS SEMINARS

Carol Jobusch presented three SAS, SAS/GRAPH seminars at LARS on October 27, 29, 30, to over 65 persons from the University, with more than 30 departments represented. Other SAS seminars will be scheduled in the future.

SAS 79.5 INSTALLED

In October, 1981, release 79.5 of SAS and SAS/GRAPH was installed as the production version on the LARS computer. Users encountering problems should report them to KAY HUNT or EILEEN LUKE.

LARSYS NEWS

Several updates have been made to the LARSYDV processors. Briefly, the *CDISPLAY and *IDPRINT processors will allow input of universal format data tapes now. Several problems have been encountered with the *PRINT RESULTS processor regarding the acreage tables and performance tables and these problems have been fixed. Users encountering other problems with LARSYS or LARSYSDV should contact CHING LUE.

LARS SYSTEM SERVICES USER'S GUIDE

The November 1981 version of the System Services User's Guide is available for distribution. Persons wishing copies of the guide should contact BARBARA FRANCIS.

SUMMARY OF 4341 COMPUTER USAGE FOR NOVEMBER 1981

OVERALL USAGE

Basic Rate CPU Time Used	57.22
Priority Rate CPU Time Used	123.99
Total CPU Time Used	181.22
Terminal Sessions	4800
Batch Jobs	1022

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnight-8AM	10.62	8
Mon-Fri 8AM-4PM	72.21	46
Mon-Fri 4PM-midnight	33.14	22
Weekend	8.02	14

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Computer Room	14	3278	--	--	--
	15	3278	--	--	--
Flexlab 2	22	3277	--	--	--
	23	3277	--	--	--
	24	3277	--	--	--
	25	3277	--	--	--
	30	Diablo	50	437.53	8.75
	32	Ampex	229	136.38	0.60
	33	GTX	235	137.84	0.59
	34	GTX	254	143.50	0.56
	35	GTX	273	140.28	0.51
	36	IBM	232	127.21	0.55
	37	Tektronix	112	78.12	0.70
	38	Apple II	30	19.44	0.65
	39	GTX	72	48.93	0.68
	3A	GTX	123	20.13	0.16
	3B	GTX	168	75.63	0.45
	3C	GTX	122	54.29	0.45
	3D	Ampex	--	--	--
Flexlab 1	40	GTX	99	78.29	0.79
	41	Ampex	181	96.27	0.53
	42	GTX	154	109.06	0.71
	43	DECwriter	36	14.82	0.41
	44	Diablo	84	46.03	0.55

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab 1	45	GTX	90	55.00	0.61
	A0	3276	--	--	--
		3278	--	--	--
		3278	--	--	--
Alabama A&M	4A	CRT	--	--	--
	4B	DECwriter	5	0.58	0.12
	4C	GTX	57	23.27	0.41
	4D	GTX	83	139.41	1.68
ISU	4E	Apple	79	26.88	0.34
	4F	GTX	143	66.36	0.46
Dial-Up	50	1st in use	96	104.59	1.09
	51	2nd in use	49	40.27	0.82
	52	3rd in use	2	5.14	2.57
	53	4th in use	87	53.73	0.62
	54	5th in use	19	24.49	1.29
	55	In-house-1	83	44.06	0.53
	56	In-house-2	18	13.81	0.77
U. of Cal-Riverside	57	Dial-Up	--	--	--
ERIM	58	(various)	7	27.01	3.86
	59	(various)	13	19.26	1.48
	5A	(various)	100	33.07	0.33
	5B	(various)	188	70.18	0.37
JSC	60	CRT	33	11.57	0.35
	61	CRT	116	65.26	0.56
	63	CRT	111	75.79	0.68
	68	Dial-Up	54	42.49	0.79
	69	Dial-Up	15	20.39	1.36
	6A	Dial-Up	4	7.52	1.88
	6B	Dial-Up	5	2.09	0.42
Computer Tech.	81	ADDS	--	--	--
Entomology	82	Tektronix	--	--	--
Political Sci.	83	DECwriter	--	--	--
Ag. Data Network	8C	PACX	--	--	--
	8D	PACX	--	--	--
	8E	PACX	--	--	--
	8F	PACX	--	--	--

INTRALAB NOTES

PERSONNEL CHANGES

After eight and one-half years of service to LARS, MICHAEL COLLINS has resigned to accept a position at Caterpillar as a computer programmer trainee. Mike's last day at LARS is December 28. Mike will be missed, but everyone at LARS wishes him the best of luck in his new endeavor.

ROSS AIKEN has accepted the position of Supervisor of Computer Operations effective December 7, 1981. Ross has been at LARS since February, 1981 as an applications programmer. Congratulations, Ross, on your promotion.

MARILYN HIXSON has moved to Satellite Beach, Florida where her husband is employed at Harris, Inc. Marilyn was a senior research statistician in the crop inventory area at LARS for five years.

FARZIN DAVALLOU, who has been working at LARS as an undergraduate student, has accepted a position as a graduate research assistant in the Data Processing program area starting January 1, 1982. He was accepted as a graduate student in the School of Electrical Engineering for January, 1982.

ELAINE PETERS joined LARS on October 28 as switchboard relief. She works a two hour shift every day from 11:00 a.m. - 1:00 p.m. Elaine is a graduate student in Audiology.

MINI-LARSIANS

On November 7, 1981 CHING-NEU and Ping LUE became the proud parents of a baby boy. Bert Dan Lue, who weighed in at 8 lbs. 11 oz., is the first child for Ching and Ping. Congratulations to the new parents.

Twins! CARLOS VALENZUELA and his wife, Erna, have two new additions to their family. Erna gave birth to twins on November 10, 1981. The twins, a boy and a girl, were 7 lb. 10 oz. and 5 lb. 14 oz., respectively. Carlos and Erna named them Paolo Johan and Lorena Carola. Congratulations to the Valenzuela family.

PROPOSALS SENT OUT

Title: "Image Processing Methods for Agricultural Scene Structure Analysis"
Sponsor: NASA
Duration: 6/1/82 - 5/31/85
P.I.: P. Anuta

Title: "Spectral Characterization of Iron Oxides and Organic Matter Interactions in Eroded Soil"
Sponsor: NASA
Duration: 7/1/82 - 6/30/84
P.I.: R. Weismiller

Title: "Atmospheric Effects on Scene Radiation in the Presence of Horizontal Variations"
Sponsor: NASA
Duration: 4/1/82 - 3/31/85
P.I.: S. Hollinger

Title: "Measurement and Modeling of the Optical Scattering Properties of Crop Canopies"
Sponsor: NASA
Duration: 4/1/82 - 3/31/85
P.I.: V. Vanderbilt

Title: "To Develop an Interactive Geo-referenced Information System Based on the COMTAL Vision ONE/20"
Sponsor: COMTAL
Duration: 1/1/82 - 12/31/82
P.I.: P. Swain and S. Davis