REMOTE SENSING VIDEOTAPES

Purdue University's Laboratory for Applications of Remote Sensing announces the completion of five videotape programs on Quantitative Analysis of Remote Sensing Data. The color videotapes, each 25-30 minutes, have qualified remote sensing scientists and teachers offering their perspectives on key issues.

The programs are tutorial in nature and appeal to graduate and under-graduate students, professional scientists and engineers. The programs assume that the viewer is familiar with the basic concepts and terminology of remote sensing.

The titles of the videotape programs are:

The Role of Numerical Analysis in Forest Management
    Professor Roger M. Hoffer
The Role of Pattern Recognition in Remote Sensing
    Professor Philip H. Swain
The Remote Sensing Information System
    Professor David A. Landgrebe
Correction and Enhancement of Digital Image Data
    Paul E. Anuta
Spectral Properties of Soils
    Professor Marion F. Baumgardner

Each videotape cassette is available separately and comes with 25 copies of printed viewing notes at a cost of $250 per videotape. Extra sets of 25 viewing notes are available at $20 per set.

For a descriptive brochure of the programs and to obtain ordering information, contact:

G. W. O'Brien
Continuing Education Administration
116 Stewart Center
Purdue University
West Lafayette, Indiana 47907 USA
Telephone: (317) 494-7231

LARS TRAVEL

DR. MARION BAUMGARDNER traveled to Washington, D.C., January 4-6, 1982 to attend the annual meeting of the American Association for the Advancement of Science. While there he met with officials of the Soil Conservation Service, USAID, Space Applications Board.

CALL FOR PAPERS

The Eighth International Symposium on Machine Processing of Remotely Sensed Data with special emphasis on crop inventory and monitoring will be held at Purdue University, July 7-9, 1982.

Presentations on research results are requested in three areas:
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.

Crop inventory techniques including spectral characterization, species identification, area estimation, condition assessment, and yield prediction will be emphasized.

There is still time to submit short papers and poster papers of recent research results. A one-page abstract of the paper must be received by February 15, 1982 to be considered for the symposium. Authors will be notified of paper acceptance by March 1, 1982.

To submit a paper, send four copies of each poster paper abstract to:
Mr. D. B. Morrison, Symposium Coordinator
Purdue University/LARS
1220 Potter Drive
West Lafayette, IN 47906-1399 USA

Telephone: (317) 494-6305

Inquiries on technical content of the symposium should be referred to MARVIN BAUER, Symposium Chairman.

A special crop inventory short course will be offered the week following the symposium, July 12-16. The course is being offered at that time to allow participants the opportunity to attend the two related activities. For more information, contact D. B. MORRISON at the above address.

VISITORS

Dr. Stanley L. Sclove, professor, Department of Mathematics at the University of Illinois at Chicago Circle visited LARS the week of December 14-18, 1981. Dr. Sclove was here to attend the Numerical Analysis of Remote Sensing Data short course, taught by JOAN BUIS, with assistance from LUIS BARTOLUCCI and DOUG MORRISON.

Mr. Frederic Hilwig, from the International Institute for Aerial Survey and Earth Sciences, visited LARS on December 29 and 30, 1981. Mr. Hilwig, a soil scientist, is the newly appointed chief of party of USAID/South Dakota State University contract in Senegal. He was here to discuss resource inventory of Senegal, West Africa with MARION BAUMGARDNER.

MAP ANALYSIS WORKSHOP TO BE HELD AT PURDUE

Dr. Joseph K. Berry, assistant professor of Forestry at Yale University, will conduct the Fifth Annual Geographic Information Analysis Workshop at Purdue University on July 10 and 11, 1982. PHIL SWAIN and SHIRLEY DAVIS will be co-instructors.

The workshop focuses on the fundamental operations used in computer-aided map analysis and is designed to familiarize participants with advanced techniques for analysis of geographic information. The advantages and constraints of the actual capabilities of this emerging technology, in light of various data types and applications, will be discussed.

The lecture/exercise format introduces participants to various resource-analysis methods, then applies these methods to real problems. Some of the application areas addressed will include wildlife habitat modeling, timber harvesting, site location and land use planning. To insure that each member has an opportunity for "hands-on" experience, the class will be divided into five groups of four individuals, each with access to a computer terminal.

The workshop should prove very useful for individuals considering development or expansion of an automated geographic information system in their organization.

NEW LARS PUBLICATION

112081 <u>LARS System Services User's Guide</u> by LARS Staff.

The <u>LARS System Services User's Guide</u> is a reference manual for both beginning and experienced users of LARS System Services. The <u>User's Guide</u> describes general LARS policies and procedures and the computing services available on the LARS computer. Productivity as a computer user is in direct proportion to understanding the computer environment being used. This publication attempts to provide a framework for developing that understanding.

NEW LARS TECHNICAL REPORTS

061379 <u>Using Landsat MSS Data with Soils Information to Identify Wetland Habitats</u> by C.L. Ernst and R.M. Hoffer. Proc. of the Fifth Annual William T. Pecora Memorial Symposium, June 1979, pp. 474-478.

A previous study showed that fresh water wetland vegetation types can be spectrally separated when a maximum likelihood classification procedure is applied to Landsat spectral data. However, wetland and upland types which have similar vegetative life forms are often confused because of spectral similarity. Therefore, the current investigation attempts to differentiate similar wetland and upland types by combining Landsat multispectral scanner (MSS) data with soils information. The Pigeon River area in northern Indiana used in the earlier study was also employed in this investigation. A layered classification algorithm which combined soils and spectral data was used to generate a wetland classification. The results of the spectral/soils wetland classification are compared to the previous classification that had been based on spectral data alone. The results indicate wetland habitat mapping can be improved by combining soils and other ancillary data with Landsat spectral data.

071380   <u>Spectral Properties of Agricultural Crops and Soils Measured</u> <u>from Space, Aerial, Field, and Laboratory Sensors</u> by M.E. Bauer, V.C. Vanderbilt, B.F. Robinson, and C.S.T. Daughtry. Proceedings International Archives of Photogrammetry, XXIII(B7):56-73, Hamburg, West Germany, July 13-25, 1980.

To develop the full potential of multispectral measurements acquired from satellite or aircraft sensors to monitor, map and inventory agricultural resources, increased knowledge and understanding of the spectral properties of crops and soils is needed. This paper reviews the present state of knowledge emphasizing current investigations of the multispectral reflectance characteristics of crops and soils as measured from laboratory, field, aerial and satellite sensor systems. The relationships of important biological and physical characteristics to their spectral properties of crops and soils are addressed. The paper concludes with discussion of future research needs.

071480   <u>A Multiband Radiometer and Data Acquisition System for Remote</u> <u>Sensing Field Research</u> by B.F. Robinson, M.E. Bauer, D.P. DeWitt, L.F. Silva, and V.C. Vanderbilt. Proceedings International Archives of Photogrammetry, XXIII(B8):783-793, Hamburg, West Germany, July 13-25, 1980.

The specifications of a recently developed prototype multispectral data acquisition system for remote sensing field research will be described. It will consist of a multiband radiometer with 8 bands between 0.4 and 12.5 μm and a data recording module which will record data from the radiometer and ancillary sources. It will be adaptable to helicopter, truck or tripod platforms, as well as hand-held operation. The general characteristics of the system are (i) comparatively inexpensive to acquire, maintain and operate; (ii) simple to operate and calibrate; (iii) complete with data handling hardware and software; and (iv) well documented for use by researchers. The instrument system will be commercially available and can be utilized by many researchers to obtain large numbers of accurate, calibrated spectral measurements. As such it will be a key element in improving and advancing the capability for field research in remote sensing.

071580 Simulated Response of a Multispectral Scanner over Wheat as a Function of Wavelength and View/Illumination Direction by V.C. Vanderbilt, B.F. Robinson, L.L. Biehl, M.E. Bauer, and A.S. Vanderbilt. Proceedings International Archives of Photogrammetry, XXIII(B8):942-952, Hamburg, West Germany, July 13-25, 1980.

This paper analyzes the reflectance response with view angle of wheat, excluding atmospheric effects but otherwise simulating the response of a multispectral scanner. The analysis is based upon spectra taken continuously in wavelength from 0.45 to 2.4 μm at more than 1200 view/illumination directions using an Exotech model 20C spectral radiometer. Data were acquired six meters above four wheat canopies, each at a different growth stage.

The analysis shows that the canopy reflective response is a pronounced function of illumination angle, scanner view angle, and wavelength. The variation is greater at low solar elevations compared to high solar elevations.

060281 Characterization and Extraction of Information in Earth Observational Image Data by D.A. Landgrebe and P.H. Swain. Journal of Electrical and Electronics Engineering, Vol. 1, No. 2, pp. 108-116.

Use of imaging devices from space for gathering information about the earth has developed greatly in the past two decades. In this paper some fundamentals for information systems based upon such devices are discussed. The discussion is divided into two parts: how information is contained in remote sensing image data and how information may be extracted from such data. It is concluded that a firm foundation of fundamental principles exists as a suitable point of departure for extending our understanding of such systems and for discovering new ways to make practical application of the remote sensing technology.

091281 Spectral-Agronomic Relationships of Corn, Soybean and Wheat Canopies by M.E. Bauer, C.S.T. Daughtry, and V.C. Vanderbilt. Proc. of the Intl. Colloquium on Signatures of Remotely Sensed Objects, Avignon, France, September 8-11, 1981.

To fully achieve the potential of remote sensing for crop identification, condition assessment and yield prediction it is important to understand and quantify the relation of agronomic characteristics of crops to their multispectral reflectance properties. During the past six years several thousand reflectance spectra of corn, soybean, and wheat canopies have been acquired and analyzed. The relationships of biophysical variables, including leaf area index, percent soil cover, chlorophyll, and water content, to the visible and infrared reflectance of canopies are described. The effects on reflectance of cultural, environmental, and stress factors such as planting date, seeding rate, row spacing, cultivar, soil type and nitrogen fertilization

are also described. The conclusions are that several key agronomic variables including leaf area index, development stage and degree of stress are strongly related to spectral reflectance and that it should be possible to estimate these descriptors of crop condition from satellite-acquired multispectral data.

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

101281   Determination of the Optimal Level for Combining Area and Yield Estimates by M.M. Hixson and C.D. Jobusch.

Since production estimates can be made only at a level where area and yield strata intersect, it is important that the stratifications for area and yield estimation be coordinated. A study was conducted to determine the optimal level (in a precision sense) for combining area and yield estimates. The results show differences in the precisions by crop and illustrate that estimation at a sub-state level is desirable.

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

101481   Multistage Classification of Multispectral Earth Observational Data: The Design Approach by M.J. Muasher and D.A. Landgrebe.

An algorithm is proposed which predicts the optimal dimensionality and specific subset of features to be used at each node in a binary tree classification procedure. The algorithm takes into account the number of samples used in estimating class-statistics, and is used as a feature selection technique. Results are shown which illustrate its usefulness.

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

111481   Variability of Reflectance Measurements with Sensor Altitude and Canopy Type by C.S.T. Daughtry, V.C. Vanderbilt and V.J. Pollara.

Reliance on portable, ground-based sensors for measuring crop reflectance has created a need for comparable and reliable measurement procedures capable of providing calibrated and reproducible canopy reflectance data. The objectives were to determine how the canopy reflectance varies as a function of sensor altitude above the crop, and particularly, what minimum altitude is needed to acquire repeatable reflectance measurements with a desired precision. Data were acquired in 1979 on three canopies, mature corn planted in 76 cm rows, mature soybeans planted in 96 cm rows with 71 percent soil cover, and mature soybeans planted in 76 cm rows with 100 percent soil cover. Data were acquired using a Landsat band radiometer (Exotech 100) with a 15 degree field of view (FOV) at ten altitudes ranging from 0.2 m to 10 m above the canopy. At each altitude, measurements were taken at 15 cm intervals along a 2.0 m transect perpendicular to the crop row direction.

The reflectance data were plotted as a function of altitude and horizontal position to verify that the variance of measurements at low altitudes was attributable to row effects which disappear at higher altitudes where the sensor integrates across several rows. The coefficient of variation of reflectance decreased exponentially as the sensor was elevated. Systematic sampling (at odd multiples of 0.5 times the row spacing interval) required fewer measurements than simple random sampling over row crop canopies. Extreme care must be exercised in analyzing and interpreting data acquired at sensor altitudes where the diameter of the sensor's FOV at the top of the canopy is smaller than several multiples of row spacing.

SYSTEM SERVICES January 26, 1982

COBOL INSTALLATION BY RONG-JEN LIN PAN

Installation of Release 2 of the os/vs COBOL compiler and subroutine library together with their CMS Interface routines has been accomplished. With the addition of the IBM os/vs COBOL compiler and library the CMS user can control the compilation and subsequent execution of COBOL source programs.

The os/vs compiler contains all the features of the IBM os American National Standard COBOL compiler, version 4, including symbolic debugging, optimized object code, the COBOL library management facility, dynamic subprogram linkage, support for teleprocessing, and syntax-checking compilation. The os/vs compiler also contains improvements in function such as support of American National Standard COBOL X3.23-1974, support for VSAM, enhanced compiler listing facilities, verb usage statistics, support for the 3886 Optical Character Reader, enhanced Sort/Merge support, and a Federal Information Processing Standard flagger (FIPS).

To access the COBOL compiler and library, you should GETDISK COBOL. Contact RONG-JEN LIN PAN for more information.

NEWS FROM REMOTE TERMINALS BY JOAN BUIS

ISURSL NEWS

The major research effort of ISURSL during 1981-82 is associated with geobotanical analysis using ratio, principal component, and regression modified landsat data. The primary investigators are Kam Lulla, Paul Mausel and Robert Howe.

Three remote sensing courses are being offered at Indiana State University during this spring semester. These three semester hour courses are:
1. Remote Sensing: Introduction
2. Remote Sensing: Computer Assisted Techniques
3. Remote Sensing: Seminar in Geological Applications
It is anticipated that collectively 35-40 students will participate in remote sensing courses this semester. The instructors for the courses are Dr. Paul Mausel, Dr. Robert Howe and Dr. Kam Lulla.

Dr. Kam Lulla, in association with Paul Mausel and Robert Howe, will be presenting a two hour segment of the LARS February Short Course about mineral and petroleum exploration. The topic presented by the ISURSL group is the role of geobotany in mineral exploration.

Paul Mausel authored the chapter "Characteristics and Techniques of Computer Assisted Processing of Spectral Data" which will be published in THE SURVEILLANT SCIENCE, edited by Bob Holz.

Paul Mausel and Lee Guernsey authored the chapter "Applications of Remote Sensing in Regional Planning" in INTRODUCTION TO REMOTE SENSING OF THE ENVIRONMENT, Ben Richason, Jr., editor.

The Indiana State University Remote Sensing Laboratory (ISURSL) has published 15 information notes and technical reports during the past two years. These notes and reports are used to publish laboratory research and information used in ISURSL teaching and technology transfer activities. Anyone interested in receiving a copy of titles can contact Paul Mausel.

Nine ISURSL students and staff attended the Pecora 7 meeting in Sioux Falls. Denis Schinderle of ISU presented a poster session entitled "Geomorphological Interpretation of the Glaciated Terrain in Southeastern Wisconsin."

ACARS NEWS

Oscar Montgomery, director of the Alabama Center for the Applications of Remote Sensing (ACARS), reports that ACARS has just completed a forestry inventory for Madison, Jackson, Marshall and Cullman counties, Alabama. The study was made possible by joint funding of NASA, DOE and SEA/CSRS.

The objectives of this study were: (1) determine the volumes of deciduous and coniferous vegetation on the three major physiographic regions (upland, bottomland, slope) in each of the counties and; (2) to output the results in tabular and map form usable by timber harvesting operations.

Data for all four counties was taken from a single landsat frame collected over the area. The data was then geometrically corrected and rescaled to a 1:24,000 line printer aspect. The physiographic boundaries within each county were digitized and used as a fifth channel data set. Training sets were developed for the area using a modified cluster technique. Because the layered classifier was to be used in classifying the four county areas, it was decided to hold the total number of information classes at or below 45. Non-forested areas were pooled and/or deleted when and wherever possible. It was necessary to use the physiographic boundaries in defining classes due to the fact that timber harvesting practices on those areas would differ. The layered classifier made it possible to separate forest stands that were spectrally very similiar but physiographically different and required very different harvesting techniques.

ACARS is very appreciative of the assistance received from the LARS staff, Mrs. JOAN BUIS in particular, in making the effort a success.

NEW CAMPUS USERS BY JOAN BUIS

LARS has offered to help University departments meet their IBM-specific computing needs. To date, nine departments have requested funding from Dr. Donald Brown, Vice President and Dean of Academic Services, to carry out research or instruction using the IBM 4341. These departments are: Entomology, Computer Technology, Statistics, Veterinary Medicine, Electrical Engineering, Medicinal Chemistry and Pharmacognosy, Animal Sciences, Political Science and Industrial and Physical Pharmacy. More than $12,000 in support has been approved as of this writing. LARS has received inquiries from a number of other departments, many of which are using their own funding to use the 4341.

We welcome these new campus users and encourage other Purdue employees needing access to IBM capabilities to contact JOAN BUIS or JIM KAST at 494-6305.

SUMMARY OF 4341 COMPUTER USAGE FOR DECEMBER, 1981

OVERALL USAGE

Basic Rate CPU Time Used	41.26	hours
Priority Rate CPU Time Used	113.08	hours
Total CPU Time Used	154.34	hours
Terminal Sessions	4179	
Batch Jobs	691	

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnight-8AM	12.23	8
Mon-Fri 8AM-4PM	61.69	39
Mon-Fri 4PM-midnight	27.07	17
Weekend	11.49	17

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	38	500.15	13.16
	32	Ampex	208	108.62	0.52
	33	GTX	101	80.30	0.80
	34	GTX	240	164.53	0.69
	35	GTX	236	138.81	0.59
	36	IBM	259	133.06	0.51
	37	Tektronix	111	82.46	0.74
	38	Apple II	32	10.18	0.32
	39	GTX	89	43.75	0.49
	3A	GTX	76	9.74	0.13
	3B	GTX	131	42.96	0.33
	3C	GTX	108	34.05	0.32
	3D	Ampex	44	14.64	0.33
Flexlab 1	40	GTX	43	23.12	0.54
	41	Ampex	104	54.11	0.52
	42	GTX	113	108.29	0.96
	43	DECwriter	30	8.44	0.28
	44	Diablo	30	56.28	1.88

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab 1	45	GTX	30	7.54	0.25
	AO	3276	---	------	-----
		3278	---	------	-----
		3278	---	------	-----
Alabama A&M	4A	CRT	7	1.47	0.21
	4B	DECwriter	3	60.75	20.25
	4C	GTX	11	12.79	1.16
	4D	GTX	43	81.58	1.90
ISU	4E	Apple	47	31.06	0.66
	4F	GTX	105	39.77	0.38
Dial-Up	50	1st in use	117	76.97	0.66
	51	2nd in use	52	23.92	0.46
	52	3rd in use	2	0.15	0.07
	53	4th in use	77	71.13	0.92
	54	5th in use	13	4.20	0.32
	55	In-house-1	45	20.96	0.47
	56	In-house-2	10	5.90	0.59
U. of Cal-Riverside	57	Dial-Up	---	------	-----
ERIM	58	(various)	---	------	-----
	59	(various)	---	------	-----
	5A	(various)	12	16.22	1.35
	5B	(various)	67	49.52	0.74
JSC	60	CRT	61	14.08	0.23
	61	CRT	81	50.74	0.63
	63	CRT	63	28.87	0.46
	68	Dial-Up	---	------	-----
	69	Dial-Up	---	------	-----
	6A	Dial-Up	---	------	-----
	6B	Dial-Up	---	------	-----
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

EILEEN LUKE will be joining the LARS staff on January 11, 1982 as a graduate assistant in statistical services. Eileen has a B.S. degree in math from the University of California at Davis and expects to complete her master's degree at Purdue in statistics in May 1982. She is assigned to Software Products under the supervision of KAY HUNT. Eileen will be available on a half-time basis for statistical consulting on the use of SAS, SPSS, TMSL, etc.

Also joining LARS on January 11, 1982 is JOHN OREOVICZ, a senior at West Lafayette High School. John will cover the front desk during the lunch hour and will help with overload typing. His hours will be 11:45 a.m. - 2:00 p.m. Monday through Friday. John will be under the supervision of PAT WHATLEY.

Our newest graduate student at LARS is JIE-YONG JUANG. Jie-Yong's major areas are computer science and electrical engineering. He is working on the development of the COMTAL system under the supervision of PHIL SWAIN.

STORK DELIVERY

Former Larsian NANCY KLINE and husband David became new parents on Monday, January 11, 1982 with the birth of their daughter, Melissa Jo. Melissa weighed a healthy 9 lbs. 2 oz. Our best wishes and congratulations to the family!

PROPOSALS SENT OUT

Title: "Programming Services for Sunmark Explorations Company"
Sponsor: Sunmark Exploration Company
Duration: 1/1/82 - 5/31/82
P.I.:   James Kast

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

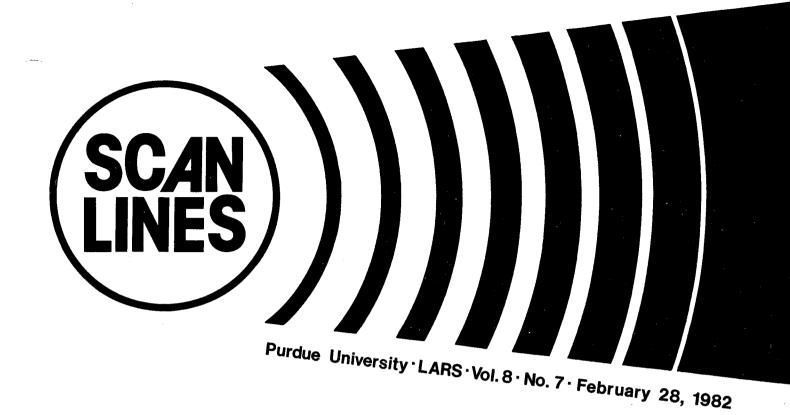Title: "Research on Landsat-D Image Data Quality Analysis"
Sponsor: NASA
Duration: 6/1/82 - 5/31/85
P.I.:   P. Anuta

NPIRS SELECTS LARS AS DEVELOPMENT SITE

During its January meeting at Purdue University, the Coordinating Committee for the National Pesticides Information Retrieval System (NPIRS) decided to lease the ADABAS and Natural data base products from Software AG and proceed with development of a pilot system on the computer facility at LARS.

The NPIRS Development Project was established through a cooperative agreement between the United States Department of Agriculture and Purdue University. The project's goal is to provide a national pesticides information system for state regulatory agencies, cooperative extension services, university research and agri-business. Over 400 megabytes of data will be included in the pilot for the National Pesticide Information Retrieval System.

During November and December 1981, LARS performed the final phase of an evaluation of Data Base Management Systems for NASA's Johnson Space Center (JSC). The list of candidate vendors had been narrowed to three: ADABAS from Software Ag, in previous phases of the evaluation; IDMS from Cullinane; and System 2000 of Intel. For the final phase, vendors were invited to install and demonstrate their systems to a number of specialists at Purdue, including Dr. Richard Collier, Director of the NPIRS project. The ADABAS system from Software AG was selected as the system best satisfying JSC's requirements.

Participation in the data base management system evaluation for NASA led Dr. Collier to investigate the applicability of ADABAS to his Pesticides data base project. Based on this investigation, Dr. Collier estimated that he

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could significantly decrease his cost and development time for the NPIRS by using ADABAS, rather than the more traditional, procedural language approach which previously had been planned.

LARS is the first facility at Purdue to have a widely recognized data base management system. Other Purdue projects with large or complex data management problems may utilize ADABAS providing appropriate cost sharing arrangements are made. Contact: Jim Kast at LARS (494-6305).

NOAA ENVIRONMENTAL SATELLITE DETECTS SURFACE "HOT SPOTS"
(Excerpt from the NOAA Newsletter, December 1981)

One of the infrared channels (3.55 - 3.93 µm) of the second generation Advanced Very High Resolution Radiometer aboard NOAA-7 has been used to detect forest fires and other surface "hot spots." NOAA-7 is the latest in this series of polar orbiting environmental satellites. It is in 849-km orbit, viewing earth locations once in daytime and once at night each 24 hours. The satellite has a northbound equator crossing time of 1435 local sun hour (0235 local when southbound). Surface resolution of the sensor is 1-km (160 acres), but intense heat sources of lesser extent, such as wild-fires, show up with a clear signature in sensor data.

A number of forest fires and surface burnings has been observed and tracked since this satellite went into operation on August 24, 1981. New fires, large and small, have been detected. It has been found possible to distinguish the fire-fronts from the smoldering areas of range and tundra fires. Time-series of satellite data on several fires have been collected for evaluation. Assessment of the applications potential of this capability is continuing.

LARS TRAVEL

STEVE KRISTOF and DICK MROCZYNSKI presented a paper at the international conference of the Remote Sensing Society held December 16-18, 1981, in London, England. Their paper was entitled "Detectability of Wetland Features in Landsat MSS Data."

MARVIN BAUER and RICHARD WEISMILLER presented seminars and met with faculty and graduate students of the Agronomy Department, University of Kentucky, on January 7-8 as part of the Graduate Enrichment Program.

MARVIN BAUER, CRAIG DAUGHTRY, PAUL ANUTA and STEVE HOLLINGER participated in the Quarterly Technical Interchange Meeting at NASA's Johnson Space Center, January 19-22, 1982. Work on registration research was presented and future activities were planned.

LARSIAN AWARDED COMMENDATION

STEVE KRISTOF has been commended by the American Society of Agronomy for the poster presentation he gave at the Society's meeting held in Atlanta, Georgia, November 29-December 4, 1981 (see December, 1981, SCANLINES). Steve's poster presentation was co-authored with DICK MROCZYNSKI and DICK WEISMILLER on "Evaluation of Landsat Imagery for Wetland Studies." To quote the program chairman, Mr. R. A. Schrack, "The presentation was well received, and Mr. Kristof and (LARS) are congratulated for significantly contributing to the success of the Division A-2 Military Land Use Management sessions and to the overall Society meeting."

VISITOR

The National Pesticides Information Retrieval System (NPIRS) planning committee visited LARS on January 21, 1982. The committee was given a tour of the computer facility, introduced to LARS systems services representatives and given a demonstration of the pesticides data base using ADABAS.

SHORT COURSE REPORT

In spite of abnormally bad weather, eight undaunted short course participants got through snow drifts, closed runways, and other obstacles to attend the February Short Course. These representatives of major petroleum companies, consulting firms, and universities came to learn how remote sensing technology is being applied to petroleum and mineral exploration. Three of the participants are shown below with one of the course instructors, LUIS BARTOLUCCI. The concensus was that the week spent here was worth the trouble getting here. Course reaction suggests the advisability of planning another offering - perhaps in March of 1983.

WORKSHOP SERIES SCHEDULE

In the January issue of SCANLINES, information was given concerning the Geographic Information Analysis Workshop to be held at Purdue University on July 10 and 11, 1982. For readers outside of the Purdue area, the entire series schedule is presented here. Anyone needing additional information can contact the principal instructor and coordinator:

> Joseph K. Berry
> Yale University
> School of Forestry and Environmental Studies
> 205 Prospect Street
> New Haven, CT 06511
> Phone (203)436-0440

March 13-14, 1982 (weekend preceeding ASP/ACSM Annual Convention at Denver). Colorado State University. Dr. James A. Smith, co-instructor, (303)491-5420.

June 1-2, 1982, Yale University. Mr. C. Dana Tomlin, co-instructor, (617)495-2573.

June 23-24, 1982, Oregon State University. Dr. Michael J. Manfredo, co-instructor, (503)754-2043.

July 10-11, 1982 (weekend following the International Symposium on Machine Processing of Remotely Sensed Data at Purdue), Purdue University. Dr. Philip H. Swain, co-instructor, (317)494-6305.

SYMPOSIUM PLANNING UPDATE

Planning is underway for the 1982 Symposium on "Machine Processing of Remotely Sensed Data" with special emphasis on "Crop Inventory and Monitoring" to be held July 7-9, 1982, at Purdue University. At this printing, sixty-two paper summaries have been received. In future issues, information about topics, special speakers and other pertinent items will be presented.

NEW NASA CONTRACT SIGNED

The new supporting research contract, research in remote sensing of agriculture, with NASA Johnson Space Center has recently been signed by Purdue and JSC. The tasks and managers are:

SR Contract Administrator	MARVIN BAUER
1. Crop Identification	MARVIN BAUER
2. Crop Development Stage Estimation	MARVIN BAUER
3. Crop Condition Assessment	CRAIG DAUGHTRY
4. Field Research	LARRY BIEHL
5. Landsat Spectral Inputs	STEVE HOLLINGER
6. Soil Moisture	STEVE HOLLINGER
7. Registration	PAUL ANUTA
8. Computer Processing	JAMES KAST

SYSTEM SERVICES

SYSTEMS NEWS

INSTALLATION OF VM/SP

About a year ago, IBM released a new version of VM called VM/System Product (VM/SP). As the IBM user community migrates from the previous versions of the operating system to VM/SP, the support level for the previous systems begins to degrade. It is the policy of LARS System Services to migrate to new versions of VM after they become stable and before the support of the previous systems degrades to an unacceptable level. The time has now come for VM/SP to be installed on the LARS computer.

VM/SP Version 1.1 has been installed on a test basis and a selected subset of the LARS modifications to the operating system has been installed on this test system. Initial testing of this system has been completed by System Services personnel and it is our feeling that the system is ready to install as the production system. On March 28, 1982, we plan to install the CMS component of VM/SP as the standard version of CMS. After this date, ipl of CMS, REFORM, LARSYS, LARSYSDV or LARSYSP1 will access the CMS from VM/SP. If severe errors are encountered in VM/SP version of CMS before March 28, the installation date will be delayed. You will be kept informed of the schedule via NEWS and the system log messages. If VM/SP CMS is installed on March 28 as planned, the Control Program (CP) will be installed on April 11, 1982. Again, you will be kept informed of the installation schedule via NEWS and the system log messages.

People who wish to test their applications on the VM/SP version of CMS before March 28 can do so by issuing the following set of CP commands:

```
det 190
det 19e
link vmmaint la0 190 rr
link vmmaint lae 19e rr
ipl spcms
```

During ipl, the error message:

```
DMKCFT002E INVALID OPERATION - CONMODE
```

will be displayed on the terminal. This message refers to a function which is not available in the current version of the control program. This error has no effect on the operation of CMS and can be ignored. Documentation for VM/SP can be found in the terminal areas at FLEX1, FLEX2 and the remote terminal sites. Additional copies of the documentation may be obtained from ROSS AIKEN.

The major enhancements to CMS are in the area of a new EXEC processor called EXEC2 and a new editor called XEDIT. Both of these capabilities have to be explicitly referenced by the user. EXECS will be processed by the current EXEC processor unless the first line of the EXEC is &TRACE which is

a command unique to EXEC2. If the user starts file creation or editing by
entering EDIT, the commands and operation will be the same as the current
editor. The new XEDIT capabilities can be used only if XEDIT is entered.
Those people using EDGAR for full screen editing should note that EDGAR will
not operate under VM/SP. However, XEDIT has a full screen mode that duplicates
most of the EDGAR functions. For further information about XEDIT capabilities
refer to:

> VM/SP System Product Editor User's Guide
>
> VM/SP System Product Editor Command and Macro Reference

When the VM/SP Control Program is installed, you will notice several
changes in the logon sequence. First, for ASCII terminals, the system
default delete character will be CONTROL-H instead of @. This means that
typing errors during logon must be corrected by entering CONTROL-H instead
of @. Second, after the id password is entered, the system will issue a
carriage return and print ****** to blot out the password. This feature
will improve password protection not only for the id password but also for
passwords required for linking to disks. Please note that the post-blot
of the password will not occur if the password is entered on the logon or
link command line. The password MUST be entered as a separate entry to be
blotted out. Third, the system will not ask for the user's name during logon.
What LARS calls the name field is known by VM/SP as the distribution code
and is displayed on printed output as the second line of block characters
on the banner pages. If no distribution code is set, the second line of
block characters is set to the id name. Using the Directory Maintenance
Program, you can set a default distribution code which will be used to set
the distribution field during logon. The command to do this is:

> DIRMAINT DIST cccccccc

For further information about how to use Directory Maintenance, please refer
to the Directory Maintenance Guide for General Users, IBM publication
SC20-1839-0. The distribution field can be set by issuing the CP command:

> SET NAME cccccccc

after logon. This sets the distribution field (the second line of expanded
characters on banner pages) to cccccccc for the current terminal session only.

For VM/SP, the system prompt character will be '¼' instead of '.'
This will assist you in distinguishing between the versions of the control
program. This change will take place when the control program is changed
on April 11.

We encourage you to test your programs under VM/SP before the installation
date. This will give us more time to diagnose and correct problems without
impacting your project. We thank you for your patience and understanding
during the conversion process and we hope that the installation will be as
painless as possible.

Tape Upgrade Completed

The upgrade of the tape system to include 6250bpi capability has been completed. The current tape configuration now contains one controller with 800/1600/6250bpi capability, one tape with 800/1600bpi, three tapes with 1600 bpi and four tapes with 1600/6250bpi. The 800/1600 and the 1600/6250bpi drives operate at 125 inches per second and the 1600bpi drives operate at 75ips. We plan to convert the three 1600bpi drives to 1600/6250bpi later in the spring. We thank you for your patience and understanding during the conversion process.

The 6250bpi drives can be requested by including 6250 as the fourth parameter on the TAPMOUNT command. To write or read tapes at 6250bpi, the density must be set by specifing DEN 6250 on the FILEDEF command.

Removal of WHERE Exec and Module

The WHERE exec and module will be removed from the system on March 28, 1982. This exec and module perform a mapping between the terminal number and the remote site for printing and punching program output and console logs. Because of the dynamic nature of the terminal configuration, we are finding that it is increasingly difficult to keep the mapping accurate. We are removing WHERE from the system because we would rather not supply a program that is inaccurate.

The function of WHERE can be replaced in most cases by the REMOTE command. Calls to WHERE can be replaced by:

REMOTE dev site

where dev is PRT, PUN or CONS and site is the remote site that is to receive the output. For more information about REMOTE, see the December SCANLINES or enter HELP REMOTE from your terminal.

- ROSS GARMOE

COMTAL NEWS

A new COMTAL system has been ordered, provided by COMTAL Corporation as part of the terms of our contract with them. The upgrade will give us a total of four images and four graphics, an LSI-11/23 CPU (2½ times as fast) and a mother board that allows easy additions of new boards. LARS will inform users when the new system is available.

- JEFF WELCH

SOFTWARE UPDATES

GCS

On January 28, 1982, the GCS system at LARS was upgraded to include an interface to the Tektronix 4663 pen plotter, located in Entomology. The 4663 has the capability to switch between two different colored pens and has a resolution of 4096 addressable points along the longer axis. Actual resolution in inches would vary depending on the size of paper used. Various sizes are available between 8½ x 11 inches and 17 x 22 inches. Detailed documentation is being prepared. Those having questions concerning the interface should contact JERRY MAJKOWSKI.

Also included in the January 28 update were corrections to the 2D and 3D versions of UPLOT and to U3PLOT for problems caused when using the curve fitting capabilities of these routines and the setting of the default USET ('NRESET') option by URESET. Contrary to the "GCS/LARS Usage Notes" documentation, previously the default was RESET.

Another update made on February 3, 1982 involved a correction to a problem causing GCS error 200, encountered when URESET opens the GCS font file. This occured when ending and starting GCS graphics to different devices various times within one program.

Future developments for GCS include the acquisition of an interface to the Tektronix 4027 color terminal and improvements to the 4663 plotter interface to use some of the advanced hardware capabilities not currently implemented.

SAS/GRAPH

LARS now has a SAS/GRAPH device driver for the Tektronix 4663 pen plotter. A brief description of the plotter's capabilities is given in the GCS article above. Contact KAY HUNT or EILEEN LUKE for further details.

LARSPEC

Two new ID parameters were added to LARSPEC on Friday, January 8, 1982. The new parameters are 'emergence date' and 'previous field/plot use'.

On Friday, January 22, 1982, LARSPEC was updated to correct the following problems:
1. A problem which caused overflow errors and program abend when using the 'LIST ALL' card.
2. The printing of improper ID parameters when the 'LIST ALL' card was used for soil type data.
3. Read format errors and bad data punched when using the 'PUNCH $AGRONOMIC, $EXPERIMENTER, $SOILS' control card for crops type data. (Only applies to runs after 1/8/82).
4. Determination of wavelength samples within a band to now include an error margin of .00001 for spectrometer type data. Previously no margin was allowed for upper boundary of specified bands.

The idlist processor was corrected on Thursday, February 4, 1982, for a problem caused when using the copydisk option to create a disk data base. The problem was caused by attempting to read from file 25 data which is now stored on file 30.

Upcoming expansions to the LARSPEC system include the implementing of a new loading procedure. This will greatly facilitate the testing and updating of LARSPEC and hopefully enable quicker corrections to user problems.

- JERRY MAJKOWSKI

SAS NEWS

Because of a malfunction of the accounting software, no charges for the use of SAS will be incurred for the month of January, 1982. Charges for the use of SPSS have been made, however. Any questions regarding this matter may be directed to KAY HUNT.

- KAY HUNT

DATA BASE NEWS

The ADABAS data base management system has been obtained and installed on the LARS computer by the National Pesticides Information Retrieval System (NPIRS) Project. A four-day intensive course on the use of ADABAS is tentatively scheduled for the week of March 8. Enrollment in the course will be limited. If you wish to attend, please contact LUKE KRAEMER as soon as possible.

Two data base seminars will be held on February 19 and 26 following the Program Leader's Meeting. The first session "An Introduction to Data Base Concepts" will define data base management systems, review their history, discuss structures and capabilities and demonstrate some ADABAS utilities. The second session "ADABAS Data Base Capabilities" will concentrate on the ADABAS system.

The data base evaluation task for JSC has been completed and ADABAS was recommended for the EODL system. A written report of the evaluation is in draft form and is available from LUKE KRAEMER. JSC is currently negotiating with Software AG for a version of ADABAS.

- LUKE KRAEMER

COLOR GRAPHICS IN AGRONOMY

John Cushman in the Agronomy Department has connected a Tektronix 4027 Color terminal to LARS through the ADN terminal switching system. The 4027 color terminal is supported by SAS/GRAPH. GCS and IGL plot packages will currently support graphics in a single color, and 4027 color support for GCS will be installed in the near future.

- Gary Brammer

AN ALTERNATIVE BREAK KEY

Users of VM/CMS at LARS who connect through the ADN terminal switching system (PACX) cannot use the BREAK key to go to CP or to go from CP to CMS without disconnecting from the PACX system. To initially go to CP from a running program, multiple carriage returns seem to be most effective. Once in CP, the user can type CTRL D (rather than BREAK) to go to CMS where the HT (halt type) or HX (halt execution) commands can be issued.

- Gary Brammer

SUMMARY OF 4341 COMPUTER USAGE FOR JANUARY, 1982

OVERALL USAGE

Basic Rate CPU Time Used	26.00 hours
Priority Rate CPU Time Used	105.42 hours
Total CPU Time Used	131.42 hours
Terminal Sessions	4208
Batch Jobs	677

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnight-8AM	10.59	7
Mon-Fri 8AM-4PM	54.22	34
Mon-Fri 4PM-midnight	31.09	19
Weekend	9.53	9

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	45	409.15	9.09
	32	Ampex	185	81.09	0.44
	33	GTX	138	55.81	0.40
	34	GTX	281	145.09	0.52
	35	GTX	258	155.75	0.60
	36	IBM	296	124.24	0.42
	37	Tektronix	100	59.00	0.59
	38	Apple II	12	20.04	1.67
	39	GTX	178	77.44	0.44
	3A	GTX	68	12.70	0.19
	3B	GTX	94	36.95	0.39
	3C	GTX	89	46.66	0.52
	3D	Ampex	116	44.62	0.38
Flexlab 1	40	GTX	62	31.89	0.51
	41	Ampex	102	85.44	0.84
	42	GTX	115	63.90	0.56
	43	DECwriter	3	3.67	1.22
	44	Diablo	102	18.17	0.18

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab 1	45	GTX	88	48.92	0.56
	A0	3276	–	–	–
		3278	–	–	–
		3278	–	–	–
Alabama A&M	4A	CRT	20	12.24	0.61
	4B	DECwriter	–	–	–
	4C	GTX	–	–	–
	4D	GTX	88	59.61	0.68
ISU	4E	Apple	13	4.36	0.34
	4F	GTX	49	14.18	0.29
Dial-Up	50	1st in use	146	86.98	0.60
	51	2nd in use	30	19.90	0.66
	52	3rd in use	5	3.40	0.68
	53	4th in use	53	52.89	0.64
	54	5th in use	27	28.73	1.06
	55	In-house-1	21	12.33	0.59
	56	In-house-2	3	0.67	0.22
U. of Cal-Riverside	57	Dial-Up	1	0.24	0.24
ERIM	58	(various)	–	–	–
	59	(various)	1	4.44	4.44
	5A	(various)	39	53.78	1.38
	5B	(various)	60	40.04	0.67
JSC	60	CRT	53	46.52	0.88
	61	CRT	65	28.20	0.43
	63	CRT	49	25.55	0.52
	68	Dial-Up	–	–	–
	69	Dial-Up	–	–	–
	6A	Dial-Up	–	–	–
	6B	Dial-Up	–	–	–
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

LARS welcomes DAVID WHITE as the new 4-midnight full-time computer operator. David will be training on the day shift for a while so introduce yourself to him if you get a chance.

JEFFREY WELCH is leaving LARS at the end of February to work for Micro Data Base Systems, Inc. in Lafayette. Jeff has worked at LARS for one and a half years as a systems engineer. While we are sorry to see Jeff go, we wish him the best of luck in his new position.

Congratulations to BARBARA P. FRANCIS who has accepted a half-time position in the Engineering Experiment Station as manager of the Engineering Production Office. Barbara will spend half her time at LARS (Monday afternoon, Tuesday through Friday mornings) and half her time at EPO in Potter Center (Monday morning, Tuesday through Friday afternoons).

Two more students have joined the LARS work force. BONNIE WHARTON is working for ROSS GARMOE on accounting systems. She is an undergraduate in computer technology. DREW DUNCAN is working on varian plotting for CATHY KOZLOWSKI. He is an undergraduate in industrial management with a minor in computer science. Welcome to LARS.

STEVE HOLLINGER recently accepted a professional position as research agronomist with LARS and the Agronomy Department. He will be a member of the crop inventory research area and leader of tasks on Landsat spectral inputs and soil moisture estimates to crop growth and yield models.

MINI-LARSIANS

On January 21, 1982 at 8:00 p.m. GARY BRAMMER and his wife Donna became parents for the first time. Their son, Christopher Nelson, weighed in at 8 lbs. 5 oz. Christopher shared the nursery with another mini-larsian born just a few hours later. JOAN BUIS and her husband Mike provided the second mini-larsian with the birth of their daughter, Jessica Rae, on January 22, 1982, at 4:00 a.m. Jessica weighed almost as much as Christopher at 8 lbs. 1 oz. Congratulations and best wishes to both families!

Shigeko Akiyama, wife of one of our visiting scientists in Technology Transfer, DR. MINORU AKIYAMA, gave birth to a boy on February 15 at 8:37 p.m. This baby is the Akiyama's first child and they have named him Taichi, which means eldest son. Our best wishes and congratulations to the family!

PRELIMINARY PROGRAM SET FOR JULY SYMPOSIUM

The preliminary program for the 1982 Symposium, Machine Processing of Remotely Sensed Data, has been completed. The special emphasis of this year's symposium will be Crop Inventory and Monitoring. The symposium will be held July 7-9, 1982, at Purdue University's Stewart Center.

The opening and closing plenary sessions will feature presentations by eight outstanding scientists in the fields of agricultural information systems and remote sensing. Sixty contributed papers will be presented in the technical sessions, along with thirty poster paper presentations.

The schedules for the plenary sessions and the symposium events are included below:

The opening plenary topic will be: The Role of Remote Sensing in Meeting Crop Production Information Needs and will be chaired by D. Paarlberg of Purdue University. Speakers and their topics for the opening session are:

L. M. Eisgruber of Oregon State University - Information: An Essential Ingredient in Crop Production, Marketing, Distribution, and Agricultural Policy.

C. E. Caudill, USDA, Statistical Reporting Service - Application of Satellite Remote Sensing in USDA Crop Information Systems.

F. G. Hall, NASA, Johnson Space Center - Satellite Remote Sensing: An Integral Tool in Acquiring Global Crop Production Information.

H. W. Yates, NOAA, National Earth Satellite Service - The Role of Meteorolgical Satellites in Agricultural Remote Sensing.

The closing plenary session deals with Issues and Perspectives in Earth Observation and Resource Information Systems. The chairman of the session is R. B MacDonald of NASA's Johnson Space Center. Other speakers are:

R. A. Holmes, General Motors Institue - Advanced Sensor Systems: Thematic Mapper and Beyond.

J. A. Smith, Colorado State University - Role of Scene Radiation Models in Remote Sensing.

G. Nagy, University of Nebraska - Advances in Information Extraction Techniques.

A. L. Zobrist, Jet Propulsion Laboratory - Information Processing of Earth Resources Data.

The schedule of events for the symposium begins Wednesday morning, July 7, 1982, with the opening plenary session. Wednesday afternoon's topics are: Crop Identification and Area Estimation, Information Extraction Techniques, and Scene Simulation and Modeling. Wednesday evening information discussion sessions will be held.

Four areas will be covered on Thursday morning, July 8: Crop Condition Assessment and Yield Prediction, Geometric and Radiometric Image Processing, Thematic Mapper and Other Advanced Sensors, and Natural Resource Assessment.

Poster paper presentations will be set up on Thursday afternoon and will cover the areas of Pattern Recognition and Image Processing and Remote Sensing Applications. Technical discussions on Thursday afternoon are: Temporal Profile Modeling, Applications of Georeference Information Systems, and Hardware and Software Systems. Thursday evening there will be a chicken barbeque and entertainment at Fort Ouiatenon.

The symposium concludes on Friday morning, July 9, with the closing plenary session - Issues and Perspectives in Earth Observation and Resource Information Systems.

LARS TRAVEL

MARVIN BAUER visited the Canada Centre for Remote Sensing, Ottawa, on February 23, 1982, and presented a seminar on "Spectral Inputs to Crop Growth and Yield Models."

DR. MARION BAUMGARDNER traveled to Athens, Greece, January 23-February 6, to present lectures, sponsored by the Food and Agriculture Organization, on agricultural applications of remote sensing. He also discussed the use of digital analysis of Landsat data as an aid in the Greek National Soil Survey and Land Evaluation project. From February 7-14, Dr. Baumgardner was in New Delhi, India attending the International Congress of Soil Science. He presented an invitational paper on "The Use of Remote Sensing in the Study of Soil Mineralogy" and chaired a technical session and a planning meeting of the International Working Group on Remote Sensing and Soil Survey.

DOUG MORRISON talked to two groups in March on the Applications of Remote Sensing. March 9 he talked to the senior physics class of McCutcheon High School in Lafayette. On March 14 he spoke before the Chicago Society for Space Studies in Chicago, Illinois.

ADABAS TRAINING COURSE

During the week of March 8th, an instructor from Software AG presented a four day course on the use of the ADABAS data base management system. The first two days of the course covered ADABAS concepts, internals and facilities. The final two days of the course were concerned with NATURAL, the ADABAS Inter-active Programming Language. NATURAL is a very powerful, user-friendly, non-procedural interface language to ADABAS. Enrollment in the class was high with close to 30 attendees. Participants included representatives from the Agricultural Experiment Station, Botany and Plant Pathology, CINDAS, Agricultural Economics, the State Chemists Office, ADPC, Schedules and Space, Animal Sciences, Veterinary Medicine and LARS. The course was extremely useful for its discussion of ADABAS capabilities and its instruction of ADABAS functions and utilities. For more information on ADABAS, please contact LUKE KRAEMER.

VISITORS

Professor Russ Anderson and his class from Triton College visited LARS on February 19. Dr. Anderson wanted to pick up a videotape he purchased and to allow his class to tour our facility and to review our newer minicourses.

Mr. Tie Xiang Lu from Beijing, China is here as a visiting scientist for three months starting March 8, to learn remote sensing technology. Mr. Lu is a physicist and teaches at the Remote Sensing Center of Beijing Agricultural University.

LANDSAT D SYSTEM PLANNING - SCHEDULING MSS SCENE ACQUISITIONS
(Excerpt from the NOAA Newsletter, March, 1982)

The Multi-spectral Scanner (MSS) will be the operational sensor when NOAA first takes over the Landsat D system on January 31, 1983. It will take additional months to implements routine Thematic Mapper (TM) operations. At the moment, NOAA is developing alternate MSS data acquisition schedules to find out which of them can be fitted to the engineering and cost constraints of the

Landsat D system.

System output will be capped at 136 processed MSS scenes per day for the first year or two of operation. Disaster and emergency events will have first call on this capacity and special acquisitions, for which requestors pay the full cost, come next. Remaining capacity will be used to collect the MSS Basic Data Set; scenes of general interest acquired, to the extent possible, according to a published plan. The MSS Basic Data Set will be the routine scene collection objective of the operational system.

NOAA will announce a recommended MSS Basic Data Set, including quality standards, in the spring of this year. Interested persons will be asked to comment on it, so that necessary and possible adjustments can be made before it is used to schedule the system. Arrangements are being made for NOAA officials to hear these comments at open meetings to be held in several U.S. cities during May and June of 1982.

NEW TECHNICAL REPORTS

062481 <u>Key Issues in the Analysis of Remote Sensing Data</u>: Proceedings from Workshop, June 22-23, 1981 by Philip H. Swain.

A workshop was convened at Purdue University on June 22-23, 1981, for the purpose of assessing the state-of-the-art of machine analysis of remote sensing data and determining the key research problems remaining as barriers to broader and more effective use of this technology. This report is the proceedings of that workshop.

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

010482 <u>Flexible Workshop on Numerical Analysis of Multispectral Image Data</u> by J.C. Tilton and L.A. Bartolucci.

This publication is a general detailed discussion of numerical analysis of multispectral image data designed to be accompanied by a case study supplement (LARS Publications 010582 through 011482) and corresponding case study computer printouts. The student is taken step-by-step through the decision process used by an analyst. The LARSYS system is featured as an example of a numerical analysis system. This workshop is intended for persons who have a basic background in remote sensing.

010582 <u>Monroe County Case Study</u> by J.C. Tilton.

The analysis steps for a case study based on Monroe County (Indiana) data are shown in this publication that accompanies LARS Publication 010482. The case study is an example of how numerical analysis might be performed on a particular data set. The pair of publications is tutorial in nature, intended for persons who have a basic background in remote sensing.

SYSTEM SERVICES March 31, 1982

SAS SEMINARS

There will be a SAS seminar presented on Monday, March 29, from 7-9 p.m. in the Agronomy department. This seminar will be repeated at LARS on Tuesday, April 6, from 7-9 p.m. The seminars will offer an introduction to SAS with an overview of the components of a typical SAS job. No prior knowledge of SAS or CMS is necessary. If interested, please contact EILEEN LUKE or KAY HUNT.

– EILEEN LUKE

SOFTWARE PRODUCTS NEWS

GCS

A minor update was made to the GCS Exec on Friday, March 12, 1982, to replace calls to the now obsolete WHERE Exec with REMOTE commands. Users who may have experienced problems when sending plots to the VARIAN from March 5 to March 12 may resume using the GCS Exec. Printer output will be re-set back to the site specified by the user before invoking the GCS Exec with output to the VARIAN.

We are currently working on interfacing a GCS device drive for a Tektronix 4027 color graphics terminal as well as improvements to the new Tektronix 4663 pen plotter interface. Contact JERRY MAJKOWSKI with questions concerning these devices.

LARSPEC

On Monday, February 15, 1982, LARSPEC was updated to implement a new loading procedure. This should facilitate testing of LARSPEC software and will hopefully enable quicker corrections to the system.

Various other upgrades and corrections were also made on the 15th. A new card was added for the punching of agronomic data. The "PUNCH $AGRONOMIC" option will now produce five punch cards for each observation. The new fifth card will contain the following extra parameters: field number, field area, row direction, emergence data, previous field use, moisture stress, nutrient deficiency, weedy, disease infection, insect infection, hail or wind damage and lodging damage. Contact JERRY MAJKOWSKI or LARRY BIEHL for more specific information on the format of this card.

Identification parameter printing was changed slightly. Now the printing of day, month, year and date data collected will be done as the information is requested and stored. Previously a request for any of these parameters defaulted to only printing the date in a "MM/DD/YY" format. The date will now be printed as "YYMMDD", and request for day, month or year will only print that parameter. The same will be true for the printing of the date on oneline listings which will now also print the entire instrument name. A correction was also made for the printing of the two new parameters added on January 8, 1982.

A new table was added to the LARSPEC software for improved FSS wavelength recalibration and the output of comments entered via the "$COMMENT" card will now be centered under the header for both normal printouts and graphs.

On Friday, March 5, 1982, LARSPEC was updated to use the new REMOTE commands in place of the WHERE Exec.

Finally, various corrections were made to LARSPEC for the following problems:

1. Improper graphing of data when using a control card of the type "XRDATA XRDATA2/YTDATA3", where the X or Y data is described as a function of data stored originally for X or Y data of one of the classes.
2. The printing of current "SIZEGRAPH" parameters when in the interactive graphics mode on the Tektronix 4054.
3. The printing of the informative message:
   "THERE IS NOT ENOUGH ROOM FOR CLUSTERING, REDUCE EITHER
   NUMBER OF BANDS, RUNS OR MAXCLS. BANDS = N1,
   RUNS = N2, MAXCLS = N3 (CLUST1)"
   Previously, if the number of runs "N2" was greater than 999, it would not be printed.

The next major LARSPEC expansion will be an interface to the ADABAS data base management system. This work is only in preliminary stages but will hopefully give users extensive data querying capabilities as well as possibly decreasing execution time.

- JERRY MAJKOWSKI

VM/SP INSTALLATION UPDATE

In the February issue of SCANLINES, we reported that the CMS component of VM/SP was due to be installed on March 28, 1982 and the control program was to go online on April 11, 1982. We will make every attempt to adhere to this schedule, however, we suspect that these dates may be delayed by at least one week. This one week delay is due to a problem which has been turned over to IBM for attention. We will keep all users informed of the scheduled installation via log messages and SCANLINES.

- ROSS AIKEN

SUMMARY OF 4341 COMPUTER USAGE FOR FEBRUARY, 1982

OVERALL USAGE

Basic Rate CPU Time Used	18.17 hours
Priority Rate CPU Time Used	117.10 hours
Total CPU Time Used	133.04 hours
Terminal Sessions	4641
Batch Jobs	884

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnight-8AM	10.24	6
Mon-Fri 8AM-4PM	50.73	23
Mon-Fri 4PM-midnight	31.45	15
Weekend	8.93	8

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	25	499.65	19.99
	32	Ampex	222	95.86	0.43
	33	GTX	266	140.46	0.53
	34	GTX	364	165.66	0.46
	35	GTX	299	152.25	0.51
	36	IBM	289	143.70	0.50
	37	Tektronix	160	79.37	0.49
	38	Apple II	29	12.36	0.43
	39	GTX	125	78.16	0.63
	3A	GTX	58	14.55	0.25
	3B	GTX	111	47.76	0.43
	3C	GTX	48	10.62	0.22
	3D	Ampex	110	44.37	0.40
Flexlab 1	40	GTX	94	32.74	0.35
	41	Ampex	66	35.50	0.54
	42	GTX	92	53.69	0.58
	43	DECwriter	1	0.16	0.16
	44	Diablo	115	20.91	0.18

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab 1	45	GTX	64	27.65	0.43
	A0	3276	–	–	–
		3278	–	–	–
		3278	–	–	–
Alabama A&M	4A	CRT	44	21.67	0.49
	4B	DECwriter	–	–	–
	4C	GTX	–	–	–
	4D	GTX	77	102.07	1.33
ISU	4E	Apple	40	18.59	0.46
	4F	GTX	96	40.80	0.43
Dial-Up	50	1st in use	171	85.02	0.50
	51	2nd in use	35	18.29	0.52
	52	3rd in use	2	0.45	0.22
	53	4th in use	114	63.63	0.56
	54	5th in use	6	5.07	0.85
	55	In-house-1	47	20.00	0.43
	56	In-house-2	9	2.77	0.31
U. of Cal-Riverside	57	Dial-Up	14	14.27	1.02
ERIM	58	(various)	–	–	–
	59	(various)	4	0.45	0.11
	5A	(various)	56	66.11	1.18
	5B	(various)	33	11.81	0.36
JSC	60	CRT	36	12.96	0.36
	61	CRT	44	9.26	0.21
	63	CRT	26	20.91	0.80
	68	Dial-Up	–	–	–
	69	Dial-Up	–	–	–
	6A	Dial-Up	–	–	–
	6B	Dial-Up	–	–	–
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 NOTICES

JOAN BUIS has returned from maternity leave and will be working a half-time schedule through May. Her schedule is as follows:

Monday, Wednesday, Thursday and Friday mornings and Tuesday afternoon.

Welcome back, Joan!

MARLENE HODGE will accompany her husband to China, March 17–April 16, 1982. The trip will include stops in Japan and Hawaii. Bon Voyage!

MINI-LARSIAN

TED RAPPAPORT, an undergraduate student working in Field Measurements, and his wife, Brenda, are very excited about the birth of their first child, Matthew Benjamin. Matthew was born on February 5, 1982, at 2:26 p.m. and weighed 5 lbs. 6½ oz. Congratulations and best wishes to the Rappaport family!

SCAN LINES

NEW COMTAL USER'S NOTE AVAILABLE

COMTAL User's Note No. 3 is now available. This report entitled "Running the Color Classification Processor on the COMTAL" documents the programs originally written by Bill Shelley of St. Regis and now available on the COMTAL at LARS.

The Color Classification program contains two routines, COLOR and COLKEY. COLOR allows the user to assign a different color to each class in a classification image, up to a maximum of 256 separate classes. The processor is run from the PDP terminal and operates by changing pseudo-color memories of the COMTAL. COLOR can also be used as a level slicer for monochrome images. Each gray level can be considered a separate class and may have a color assignment. COLKEY forms a data file in the PDP which can be transferred to the COMTAL to display a key or legend showing the color choice for each class. COLKEY is limited to 18 classes with a comment about each class.

The Color Classification program is accessed through the COMTAL Utilities Program, i.e., by typing RUN COMTAL on a PDP terminal.

A reference copy of the User's Note is available in the COMTAL room. For a peronsal copy, contact SHIRLEY DAVIS.

NASA SELECTS LARSIAN FOR WORKING GROUP

Because of his nationally recognized scientific expertise, Dr. PHILIP SWAIN has been selected by NASA to be a member of the Multispectral Imaging Science Working Group. The group is an important element in NASA's programs related to long-term research and in the development of new technology to study the Earth on a planetary basis.

The main objectives of the Working Group are to:

Document the current state of knowledge with respect to high-resolution spectral and spatial measurement of the Earth's surface cover and topography.

Identify critical gaps in scientific knowledge that must be filled before new technology can be evaluated.

Define candidate remote sensing experiments to further develop knowledge and understanding of what can be measured.

Evaluate technology alternatives in the light of candidate remote sensing experiments.

Recommend technological developments which may lead to development of new measurement capabilities.

Propose information extraction research which may lead to development of improved techniques for extracting information from multispectral data.

LARS TRAVEL

PAUL ANUTA traveled to Wright-Patterson Air Force Base on March 17 and 18 to discuss research needs in reconnaissance and guidance for air force aircraft and missile imaging systems.

March 17-19, 1982, Dr. MARION BAUMGARDNER journeyed to Washington, D.C. to chair the Soils Panel in the USAID-funded project to assess methods of inventorying and monitoring land, vegetation, water and animal resources in developing countries.

TERRY PHILLIPS and KAY HUNT visited ERDAS Corporation in Atlanta, Georgia on April 6-8, to evaluate the ERDAS system for possible application to various projects at Purdue and LARS.

NOAA HOLDS PUBLIC MEETINGS ON LANDSAT-D SYSTEM
(EXCERPT FROM NOAA NEWSLETTER, MARCH, 1982)

The National Oceanic and Atmospheric Administration (NOAA) will take over responsibility for the operational Landsat-D system on January 31, 1983.

Again, this year, NOAA will host public meetings at locations around the country to inform the interested community of the plans for implementing the operational system. The emphasis at these meetings will be on the alternate possibilities that exist for the routine collection of Landsat-D MSS scene data; the Basic Data Set of the operational system.

The dates and locations of the meetings are printed below for those persons who are interested in presenting their views about scenes that should be included in the Basic Data Set to NOAA officials. Registration (no fee) at the meetings will begin at 8:00 a.m. and presentations will begin at 8:45 a.m. The meetings are scheduled for:

April 30, 1982 - William Marsh Rice University, Department of Space Physics and Astronomy, Sewall Hall, Room 301, Houston, Texas

May 4, 1982   - NASA/MSFC Michoud Assembly Facility Auditorium, 12 miles east of New Orleans and south of Interstate 10 at the Read Boulevard exit, New Orleans, Louisiana

June 3, 1982   - National Bureau of Standards' Auditorium, 325 Broadway, Boulder, Colorado

June 8, 1982   - The Presidio of San Francisco, Post Theater, Building 99, San Francisco, California

Please call 301-763-7822 to register for the session of your choice.

VISITORS

Dr. Norman MacLeod and Dr. George Scott, president and vice president of American Science and Technology Corporation (ASTECH) of Bethesda, Maryland, visited LARS March 30-31, 1982. They discussed the applications and development of remote sensing technology and public awareness of the technology with several members of the LARS staff.

Tom Paustenbach and Jim Riddel of the Formation Computer Company presented a seminar at LARS on April 2, entitled "The F4000 Computer System as a VM/CMS Software Compatible Super Minicomputer."

SEMINAR PRESENTATION

BARBARA PRATT FRANCIS, System Services Coordinator, presented a seminar on "Delegation and Assuming Responsibility" to Purdue University's Career Development Accomplished Clerical Excellence (ACE) Program in March. The audience participative seminar defined delegation, detailed how to delegate, gave examples of good and bad delegation, listed advantages, misuse and abuse and analyzed the responsibilities of both the delegator and delegatee.

CONTRACTS

Title: "Training of Costa Rican Professionals in the Technology of Digital Processing of Remote Sensing Data Through the Visiting Scientist Program"

Sponsor: Costa Rica

Duration: 6/1/82 - 9/30/82

P.I.: L. A. Bartolucci

SYSTEM SERVICES April 28, 1982

SOFTWARE PRODUCTS NEWS

LARSPEC

LARSPEC was updated on Wednesday, March 31, 1982, to enable the mounting and reading of 6250 bpi data tapes. Initially, a LARSPEC job will send a tape mount request with no specification for tape drive type. If it finds the tape unreadable, a request for a 6250 bpi tape drive will be sent before assuming that the tape is not a LARSPEC tape. If a 6250 drive is open and used by the operator on the first request and the data tape is 6250, the second request will not be necessary.

Included in this update was a change to the default size of the temp disk used by LARSPEC jobs. Previously the default was 1200K and will now be 3M.

Also, on Friday, March 26, 1982, a correction was made to the calibration tables for 1979 reflective FSS data.

Two minor updates were made to LARSPEC on April 6 and 7 to correct the punching of soils data and to increase the number of digits printed when listing the 'RADIANT TEMPERATURE' ID parameter.

GCS

A preliminary interface for the Tektronix 4027 color terminal has been developed for the LARS/GCS system. This interface was partly based on software obtained from the U.S. Army Engineer Waterways Experiment Station and was installed on the LARS computer on March 25. The interface enables the user to employ eight of the 64 available colors and also provides some use of the polygon color field capabilities of the 4027. The screen resolution is about 0.0150 inches (66 dots/inch). Further work on improving the interface and employing more of the 4027 hardware capabilities will be done as need arises.

On April 2, an update was made to improve the GCS interface to the Tektronix 4663 Pen Plotter. The improvements include increased efficiency in plotting and pen mounting change requests as well as providing the capability of using the crosshairs for graphics input.

Detailed documentation for both the Tektronix 4027 and 4663 is now available and can be obtained by contacting JERRY MAJKOWSKI.

- JERRY MAJKOWSKI

SUMMARY OF 4341 COMPUTER USAGE FOR MARCH, 1982

OVERALL USAGE

Basic Rate CPU Time Used	63.03
Priority Rate CPU Time Used	115.74
Total CPU Time Used	178.77
Terminal Sessions	5111
Batch Jobs	595

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnight-8AM	11.84	8
Mon-Fri 8AM-4PM	57.79	32
Mon-Fri 4PM-midnight	34.85	19
Weekend	11.26	11

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	45	493.68	10.97
	32	Ampex	196	121.66	0.62
	33	GTX	305	164.83	0.40
	34	GTX	396	163.25	0.41
	35	GTX	366	169.10	0.46
	36	IBM	388	138.88	0.36
	37	Tektronix	112	52.99	0.47
	38	Apple II	31	5.65	0.18
	39	GTX	202	76.07	0.38
	3A	GTX	34	14.82	0.31
	3B	GTX	–	–	–
	3C	GTX	188	72.38	0.38
	3D	Ampex	59	26.85	0.51
Flexlab 1	40	GTX	71	41.13	0.58
	41	Ampex	53	26.85	0.51
	42	GTX	83	77.19	0.93
	43	DECwriter	63	33.53	0.53
	44	Diablo	125	24.86	0.20

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab 1	45	GTX	63	33.53	0.53
	A0	3276	–	–	–
		3278	–	–	–
		3278	–	–	–
Alabama A&M	4A	CRT	32	32.56	1.02
	4B	DECwriter	3	0.05	0.02
	4C	GTX	–	–	–
	4D	GTX	76	84.32	1.11
ISU	4E	Apple	12	45.60	3.80
	4F	GTX	179	73.68	0.41
Dial-Up	50	1st in use	94	51.53	0.55
	51	2nd in use	28	15.24	0.54
	52	3rd in use	–	–	–
	53	4th in use	113	73.91	0.65
	54	5th in use	29	23.02	0.79
	55	In-house-1	17	5.93	0.35
	56	In-house-2	31	14.88	0.48
U. of Cal-Riverside	57	Dial-Up	19	15.72	0.83
ERIM	58	(various)	1	0.00	0.00
	59	(various)	4	7.28	1.82
	5A	(various)	45	66.99	1.49
	5B	(various)	9	2.98	0.33
JSC	60	CRT	31	7.32	0.24
	61	CRT	70	59.63	0.85
	63	CRT	20	6.39	0.32
	68	Dial-Up	3	0.42	0.14
	69	Dial-Up	–	–	–
	6A	Dial-Up	–	–	–
	6B	Dial-Up	–	–	–
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 NOTICES

DAVE SNYDER and JIM COCHRAN have resigned to accept positions with a consulting division of Amoco in Tulsa, Oklahoma. Dave's last day at LARS was April 16 and Jim will be leaving after April 23. LARS wishes them the best in their future endeavors.

A big welcome back to MARLENE HODGE who returned to LARS on April 16 after her vacation to China and other points east. Be sure to stop by and learn all about her trip firsthand.

BILL BAKER, one of our student operators, will be graduating in May. Bill is interviewing for positions and will probably be leaving LARS in the summer.

PROPOSALS

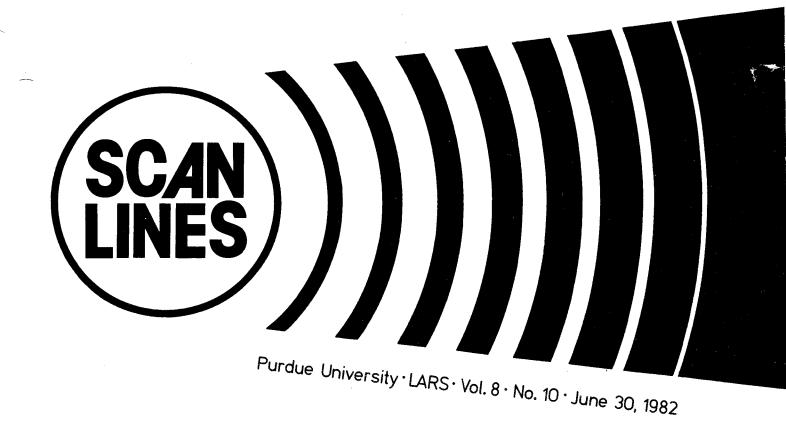Title: "The Continued Support of the Indiana State University Earth Resources Data Processing Remote Terminal"
Sponsor: Indiana State University
Duration: 7/1/82 - 6/30/83
P.I.:   L. A. Bartolucci

NEW DIRECTOR OF LARS APPOINTED

Dr. MARION BAUMGARDNER has been appointed director of the Laboratory for Applications of Remote Sensing. Felix Haas, executive vice president and provost, recommended Dr. Baumgardner's appointment at a board of trustee's meeting held June 18, 1982.

Dr. Baumgardner has been the acting director of LARS for the past year. Before then, he was associate director of LARS. He is also a professor of agronomy at Purdue University.

The new director's credentials are quite impressive and include: past program leader of the earth sciences research program at LARS; program specialist in agriculture for the Ford Foundation in Argentina, instructor in the state soil testing laboratory and lecturer at the Allahabad Agricultural Institute in India. Dr. Baumgardner is known internationally through his connections with various professional organizations and is frequently asked to give lectures and seminars to soil scientists in many countries throughout the world.

Dr. Baumgardner takes over the directorship beginning July 1, 1982.

REMOTE SENSING SYMPOSIUM SCHEDULED

The Eighth International Symposium on Machine Processing of Remotely Sensed Data will be held July 7-9, 1982, at Purdue University, West Lafayette, Indiana. The special emphasis of the symposium this year will be Crop Inventory and Monitoring.

The opening and closing plenary sessions will feature presentations by eight scientists in the fields of agricultural information systems and remote sensing. The session themes are: The Role of Remote Sensing in Meeting Crop Production Information Needs, and Issues and Perspectives in Earth Observation and Resource Information Systems.

Sixty papers and 25 poster papers will be presented in the technical sessions; topics include: crop identification and area estimation, information extraction techniques, scene simulation and modeling, crop condition assessment and yield prediction, temporal profile modeling and applications of georeference information systems. Also, geometric and radiometric image processing, thematic mapper and other advanced sensors, natural resource assessment, and hardware and software systems. Eighty of the papers are included in the Proceedings which will be distributed at the Symposium.

A special post-symposium short course on Numerical Analysis of Remotely Sensed Data, emphasizing crop inventory, is planned for July 12-16. Topics include: spectral reflectance of vegetation and crops, analysis methods for crop identification and area estimation, crop development stage estimation, condition assessment and yield prediction, to be presented by MARVIN BAUER, CRAIG DAUGHTRY and STEVE HOLLINGER.

FORMER LARS ASSOCIATE DIRECTOR HONORED

Dr. John B. Peterson was recognized on May 14, 1982, by the Agronomy department with the honorary degree of Doctor of Agriculture Honoris Causa. Dr. Peterson's long career began in 1928 when he received his B.S. degree in soils from Oregon State College. In 1929 he received his M.S. degree from Iowa State College. He was a full-time instructor and graduate student while earning the Ph.D., which he completed in 1936. At Iowa State University, he was promoted to the ranks of assistant professor (1933), associate professor (1943) and professor (1946). At Iowa in 1934, he also conducted training for young personnel for field work with the newly formed Soil Erosion Service.

His research interests in clays and soil structure were stimulated during his 1939-40 National Research Fellowship at the University of California. Because of his research, he was awarded the Stevenson Research Award by the American Society of Agronomy in 1948 for "outstanding research in soils."

From 1948 to 1971 he served as head of the Department of Agronomy at Purdue University, where he developed one of the most outstanding departments in the world. He was elected Fellow (1951) and president (1958) of the American Society of Agronomy. In 1968 he was selected for the Indiana Crops and Soils Award of the Indiana Crop Improvement Association, and for the

Agricultural Alumni Certificate of Distinction in 1969. He has been a leading spokesman for rewarding excellence in classroom teaching and in adult education as well as in research.

Dr. Peterson's career continued after his mandatory retirement as department head in 1971. He became associate director of the Laboratory for Applications of Remote Sensing, a post he held until 1980. As head of the Department of Agronomy he had been quick to grasp the significance and potential of the new and rapidly developing technology of remote sensing and was instrumental in the creation of the remote sensing laboratory. As associate director and researcher at LARS from 1971-80, Dr. Peterson played a significant role in the LARS earth sciences program. He became the principal spokesman for the group among national and international agencies and built bridges of cooperation that caused the program to expand rapidly.

Scientists from all over the world have come to Purdue to study the techniques developed at LARS for acquiring and analyzing multi-spectral data gathered by aircraft and satellites. This data is extremely useful in the inventory and monitoring of land, vegetation and water resources. Dr. Peterson perceived that remote sensing might be a very useful tool in soil survey and led the LARS research program in this direction. This proved to be one of the most useful practical applications of remote sensing technology and promises to expedite soil survey in the U.S. and other countries.

Again required to step down because of retirement rules, he continues to work vigorously as a consultant to many groups and as management advisor to the Purdue Ag Alumni Seed Association.

Dr. Peterson has contributed a great deal to his field and justly deserves the highest accolades for his service.

LARS TRAVEL

LUIS BARTOLUCCI traveled to Quito, Ecuador, April 12-16, to participate as the U.S. coordinator of SELPER (Society of Latin American Remote Sensing Specialists). He presented a paper entitled "The Future of Remote Sensing in Latin America."

April 13-15, CRAIG DAUGHTRY attended a vegetation conference in Washington, D.C. sponsored by NASA. The conference outlined requirements for future satellite sensors to monitor vegetation. While in Washington, Craig took part in the Multispectral Imaging Science Working Group.

PAUL ANUTA, MARVIN BAUER, LARRY BIEHL, CRAIG DAUGHTRY, STEVE HOLLINGER, JON RANSOM and BARRETT ROBINSON attended the Quarterly Technical Interchange meeting at NASA's Johnson Space Center on April 26-29.

MARVIN BAUER, LARRY BIEHL and BARRETT ROBINSON went to the University of Kansas, Remote Sensing Laboratory on April 30 - May 1 to demonstrate the use of the multiband radiometer. The Remote Sensing Lab at the University of Kansas will use the radiometer in conjunction with radar experiments on crops.

MARVIN BAUER attended a committee meeting of the International Society of Photogrammetry, Working Group on Spectral Signatures of Remotely Sensed Objects in Washington, D.C. on May 7.

There was a Landsat-D Investigators Workshop held in Washington, D.C. on May 13-14. PAUL ANUTA was there for the presentation by NASA on the radiometric and geometric properties of the Landsat-D thematic mapper and multispectral scanner sensors.

Dr. MARION BAUMGARDNER attended several meetings in May and early June. He traveled to Washington, D. C. to chair a meeting of the AAAS Soils Panel on May 17-19. Also in Washington on May 23-24, he attended African Day at Howard University and held discussions with AAAS and USAID officials. On May 25 he was at the Coastal Plains Experiment Station for a seminar. Dr. Baumgardner then traveled to Athens, Georgia to present a seminar to the Agriculture Faculty at the University of Georgia on May 26. On June 8, he was back in Washington, D.C. to do editorial work for the Soils Panel on the AAAS/USAID project and hold discussions with USAID/SCS officials.

TERRY L. PHILLIPS attended a Forestry Conference, "Microcomputers: A New Tool for Foresters," held at Purdue University on May 18, 19 and 20. He presented a paper entitled "Use of a Microprocessor in the Development of Geographic Information Systems."

ROSS GARMOE and ROSS AIKEN flew to Wichita, Kansas on June 9-11 to attend a VM/SHARE Workshop and Conference at Wichita State University. The purpose of the trip was to present the LARS Batch 2.0 system and learn more about VM/SP performance and maintenance.

THEMATIC CONFERENCE SCHEDULED

The Second Thematic Conference, entitled "Remote Sensing for Exploration Geology," organized as part of the continuing series of International Symposia on Remote Sensing of Environment, will be held in Ft. Worth, Texas, from 6 to 10 December 1982. The conference is being organized and conducted jointly by the Environmental Research Institute of Michigan (ERIM), and Texas Christian University (TCU).

This symposium is intended to stimulate communication and information exchange through the presentation of reports on work planned, in progress or completed; and to encourage international cooperation in the development and application of remote sensing technology for geologic exploration.

The program for this Second Thematic Conference will include Conventional Sessions and Discussion Groups, including a limited number of invited presentations, as well as Poster Sessions for the presentation of papers selected from among contributions received in response to this Call for Papers.

All persons interested in contributing a paper for consideration for the Poster Session portion of the Conference should submit a comprehensive summary of their proposed presentation for review by an international committee.

Only summaries of 300 to 1,000 words, containing no illustrations or references and received prior to July 15, 1982, will be considered for review. Twenty (20) copies, in English, should be submitted to:

> Donald R. Morris-Jones
> Environmental Research Institute of Michigan
> P. O. Box 8618
> Ann Arbor, Michigan   48107   USA
> Telephone: (313) 994-1200

Commercial exhibits and displays will also be included to provide an additional means of encouraging information dissemination as well as increasing awareness of available products and services. Organizations interested in exhibiting should contact the address above to obtain more information.

LARS RECEIVES PUBLICITY VIA LOCAL NEWSPAPER

On May 13, 1982, the Lafayette Journal & Courier printed an article describing the work LARS conducts in remote sensing research. In the article, RICHARD MROCZYNSKI gave a simple definition of remote sensing as "the science of being able to identify a target like the earth from great distances." Mroczynski went on to describe the many ways LARS uses the information it receives for research. The article was a clear presentation for the local public of the work LARS performs.

VISITORS

On May 11 and 12, MARVIN BAUER, LARRY BIEHL and BARRETT ROBINSON conducted a Field Radiometry Workshop. Attendees were: Mark Seely/University of Minnesota, Marla Jackson and Cynthia Rosenweig/Rutgers University, Eric Stoner/NASA/ERL, and Adele Childreth Roberts/Michigan State University.

The radiometer was also demonstrated on June 2 to Don Deering and Frank Wood of NASA/Goddard Space Flight Center.

Tom McBride of CDC, Mr. J. Kivi and Mr. Risto of Finland's Technical Research Center – Computing Service were here April 22 to visit Technology Transfer and tour LARS.

Twenty people from the Geology Society of America visited LARS on April 28 to learn the basics of numerical analysis of remote sensing data and how it could be applied to geology problems. Two more people from GSA visited LARS on April 30.

On May 19, Professor D. McClarin of the University of Kentucky visited LARS to learn more about Technology Transfer activities.

Also on May 19 representatives from ERDAS, Earth Resources Data Analysis Systems, visited LARS to demonstrate their system. Charles Killpack, an ERDAS distributer from IRIS International, and Nicholas Faust of ERDAS

demonstrated the ERDAS system using both landsat data and geographic information system data.

The preliminary Research Management Committee from the Air Pollution Effects Branch of the Environmental Protection Agency visited LARS on June 3-4 to evaluate Purdue University as a possible site to study impact of acid rain on corn and soybeans.

NEW LARS TECHNICAL REPORTS

050682   Predicting the Required Number of Training Samples by H.M. Kalayeh and D.A. Landgrebe.

In this paper a criterion which measures the quality of the estimate of the covariance matrix of a multivariate normal distribution is developed. Based on this criterion, the necessary number of training samples is predicted. Experimental results which are used as a guide for determining the number of training samples are included.

The research described in this report was sponsored by NASA under Contract No. NSG-5414.

042182   Soybean Canopy Reflectance as a Function of View and Illumination Geometry by K.J. Ranson, V.C. Vanderbilt, L.L. Biehl, B.F. Robinson, and M.E. Bauer.

This paper presents the results of an experiment designed to characterize a soybean field by its reflectance at various view and illumination angles and by its physical and agronomic attributes. Reflectances were calculated from measurements at four wavelength bands through eight view azimuth and seven view zenith directions for various solar zenith and azimuth angles during portions of three days. An ancillary data set, consisting of the agronomic and physical characteristics of the soybean field, is described. These data sets should prove useful for validating most light interaction canopy models.

The results of the study indicate that the distribution of reflectance from a soybean field is a function of the solar illumination and viewing geometry, wavelength, and row direction as well as the state of development of the canopy. Shadows between rows greatly affected the reflectance in the visible wavelength bands and to a lesser extent in the near infrared wavelengths.

A model is proposed that describes the reflectance variation as a function of projected solar and projected viewing angles. The model appears to approximate the reflectance variations in the visible wavelength bands from a canopy with well defined row structure.

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

030182 **Spectral Estimates of Solar Radiation Intercepted by Corn Canopies** by C.S.T. Daughtry, K.P. Gallo, and M.E. Bauer.

If agronomic variables related to yield could be reliably estimated from multispectral satellite data, then crop growth and yield models could be implemented for large areas. The objective of this experiment was to develop models for combining spectral and meteorological data in crop yield models which are capable of providing accurate estimates of crop yields. Initial tests of this concept are presented.

Reflectance factor data were acquired with a Landsat band radiometer throughout two growing seasons for corn (*Zea mays* L.) canopies differing in planting dates, populations, and soil types. Agronomic data collected included leaf area index (LAI), biomass, development stage, and final grain yields.

The spectral variable, greenness, was associated with 78% of the variation in LAI over all treatments. Single observations of LAI or greenness have limited value in predicting corn yields. The proportions of solar radiation intercepted (SRI) by these canopies were estimated using either measured LAI or greenness. Both SRI estimates, when accumulated over the growing season, accounted for approximately 65% of the variation in yields. Models which simulated the daily effects of weather and solar radiation on growth had the highest correlations to grain yields. This concept of estimating intercepted solar radiation using spectral data represents a viable approach for merging spectral and meteorological data for crop yield models.

070381 **Contextual Classification of Multispectral Image Data: An Unbiased Estimator for the Context Distribution** by J.C. Tilton, P.H. Swain, and S.B. Vardeman. Proc. of the 1981 Symp. on Machine Processing of Remotely Sensed Data, pp. 304-313.

Recent investigations have demonstrated the effectiveness of a contextual classifier that combines spatial and spectral information employing a general statistical approach. This statistical classification algorithm exploits the tendency of certain ground-cover classes to occur more frequently in some spatial contexts than in others. Indeed, a key input to this algorithm is a statistical characterization of the context: the context distribution. Here discussed is an unbiased estimator of the context distribution which, besides having the advantage of statistical unbiasedness, has the additional advantage over other estimation techniques of being amenable to an adaptive implementation in which the context distribution estimate varies according to local contextual information.

Results from applying the unbiased estimator to the contextual classification of three real Landsat data sets are presented and contrasted with results from non-contextual classifications and from contextual classifications utilizing other context distribution estimation techniques.

121880 <u>Characteristic Variations in Reflectance of Surface Soils</u> by E.R. Stoner and M.F. Baumgardner. Published in Soil Science Society of America Journal 45(6):1161-1165, November-December.

Surface soil samples from a wide range of naturally occurring soils were obtained for the purpose of studying the characteristic variations in soil reflectance as these variations relate to other soil properties and soil classification. A total of 485 soil samples from the U.S. and Brazil representing 30 suborders of the 10 orders of <u>Soil Taxonomy</u> was examined. Spectral bidirectional reflectance factor was measured on uniformly moist soils over the 0.52 to 2.32 μm wavelength range with a spectroradiameter adapted for indoor use.

Five distinct soil spectral reflectance curve forms were identified according to curve shape, the presence or absence of absorption bands, and the predominance of soil organic matter and iron oxide composition. These curve forms were further character-ized according to genetically homogeneous soil properties in a manner similar to the subdivisions at the suborder level of <u>Soil Taxonomy</u>. Results indicate that spectroradiometric measurements of soil spectral bidirectional reflectance factor can be used to characterize soil reflectance in terms that are meaningful to soil classification, genesis, and survey.

SYSTEM SERVICES June 30, 1982

SAS UPDATE

When the new version of SAS, 79.6, arrives, we will replace version 79.4 with it. The zaps to 79.5 have been installed and are running. As a result, PROC EDITOR now works on 79.5.

The following combination of options results in an error:
        SAS filename (LD PD LP PP. If you want the SASLOG and LISTING
to go to both the disk and printer, use the following:
        SAS filename
        SASPR filename

If you have any other dependencies on 79.4 or any questions concerning the new SAS version, please contact EILEEN LUKE in Flex 2.
                                                                — EILEEN LUKE

FULL DUPLEX ON DIAL-UP PORTS

The 300 baud (463-7551 and ext. 300) and 1200 baud (494-6700) dial-up ports have been changed from half-duplex to full-duplex. Users will need to reconfigure the terminals used for dial-up. If the terminal prints each typed character twice, the terminal or modem is in half-duplex and should be changed to full-duplex.
                                                                — GARY BRAMMER

PDP SCHEDULE

As the need arises, a schedule for use of the PDP 11/34 will be set up. If you need the PDP dedicated solely to your work, notify CATHY KOZLOWSKI of your requirements. At the present time, analog to digital conversion and PDP table digitizing need a dedicated machine.
                                                                — CATHY KOZLOWSKI

DISCONNECTED USERIDS

In recent weeks, a large number of userids are not logging off of the system at night. Rather, they are using some version of the BYE exec. There is an error in this exec which prevents the id from automatically logging off after the time delay. This is causing an excessive number of userids to remain on the system in disconnected mode.

Effective June 1, 1982, disconnected userids will be forced off of the system at 8 p.m. The exceptions to this rule will be the userids required for system operation (RSCS, ACNTCARD, BATCH, SIM3278, etc.) Before you leave in the evening, please log off all of your ids to insure that nothing is lost. Contact ROSS GARMOE for a copy of the BYE exec.
                                                                — ROSS GARMOE

SOFTWARE PRODUCTS NEWS

LARSPEC

Two updates were made to the LARSPEC system during May on the 17th and 28th. The purpose of these updates was to correct the following problems:

1. change use of the 'SPOOL' command from a CP to CMS function for VMSP.

2. change batch cards created by the LARSPEC 'BATCH' command to include '/SET TAPE = 1'.

3. detach LARSPEC test disk after a SPECT test run.

4. correct problem with using the 'LIST ALL' option in GSPEC.

5. correct problem with excessive execution time for jobs using FSS data.

The next LARSPEC update will include corrections to PRINTRONIX graphics title and legend output.

GCS

On Friday, June 4, a major upgrade was made on the GCS system. Changes made involved various improvements and corrections for the following high level capabilities:

1. improvement of hidden line algorithms used by the surface drawing routine USURF.

2. addition of a parameter in the UGRID1 subroutine call to give users the ability to control the number of points upon which the interpolation for each grid point is made. The call to UGRID1 is now:
   CALL UGRID1(FNDP,SD,YD,ZD,FNXI,FNYI,XI,YI,ZI,IWK,WK,FNCP)

   where FNCP is the new parameter and defaults to 4.0.

3. correction of contouring algorithms used by the various UCONT routines for situations where certain contour lines would not be drawn. Also an alternate version of the UCDRW routine described in the 'GCS Manual' was put on the PLTDSK for general use. This version will rotate and insert contour height labels along the contour lines and can be used by copying 'UCDRW1 TEXT' from the PLTDSK to one's own A disk as 'UCDRW TEXT'.

4. changes to the UPLOT routine to inhibit automatic point plotting when the curve fit option is chosen.

Two other improvements were made for the PRINTRONIX and TTY device drivers. For the PRINTRONIX a change was made to insure a page eject at the beginning of each plot regardless of the use of other FORTRAN output to the printer. The TTY device driver can be more easily used with full screen terminals since UERASE will cause a clearing of the device screen when executed.

- JERRY MAJKOWSKI

SUMMARY OF 4341 COMPUTER USAGE FOR MAY, 1982

OVERALL USAGE

Basic Rate CPU Time Used	64.33 hours
Priority Rate CPU Time Used	101.35 hours
Total CPU Time Used	165.68 hours
Terminal Sessions	4041
Batch Jobs	549

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnight-8AM	6.10	4
Mon-Fri 8AM-4PM	61.90	39
Mon-Fri 4PM-midnight	22.44	14
Weekend	9.28	11

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	80	512.51	6.41
	32	Ampex	142	58.93	0.41
	33	GTX	190	76.77	0.40
	34	GTX	292	146.22	0.50
	35	GTX	262	119.29	0.46
	36	IBM	300	141.13	0.47
	37	Tektronix	116	60.11	0.52
	38	Apple II	13	1.95	0.15
	39	GTX	150	87.03	0.58
	3A	GTX	138	36.82	0.27
	3B	GTX	---	------	----
	3C	GTX	199	96.90	0.49
	3D	Ampex	184	54.25	0.29
Flexlab 1	40	GTX	25	14.98	0.60
	41	Ampex	36	23.10	0.64
	42	GTX	60	47.36	0.79
	43	DECwriter	13	3.33	0.26
	44	Diablo	89	24.55	0.28

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab 1	45	GTX	67	22.93	0.34
	A0	3276	---	------	----
		3278	---	------	----
		3278	---	------	----
Alabama A&M	4A	CRT	16	14.19	0.89
	4B	DECwriter	10	36.24	3.62
	4C	GTX	---	------	----
	4D	GTX	28	24.96	0.89
ISU	4E	Apple	---	------	----
	4F	GTX	60	23.88	0.40
Dial-Up	50	1st in use	70	78.22	1.12
	51	2nd in use	31	14.32	0.46
	52	3rd in use	2	1.47	0.74
	53	4th in use	5	2.23	0.45
	54	5th in use	41	25.52	0.62
	55	In-house-1	2	0.08	0.04
	56	In-house-2	19	8.98	0.47
U. of Cal-Riverside	57	Dial-Up	1	0.07	0.07
ERIM	58	(various)	---	------	----
	59	(various)	---	------	----
	5A	(various)	---	------	----
	5B	(various)	---	------	----
JSC	60	CRT	3	0.55	0.18
	61	CRT	6	25.47	4.24
	63	CRT	---	------	----
	68	Dial-Up	2	0.24	0.12
	69	Dial-Up	12	2.60	0.22
	6A	Dial-Up	---	------	----
	6B	Dial-Up	---	------	----
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

EILEEN LUKE began a full time position at LARS on May 24, 1982. She is the Statistical Consultant and SAS advisor. Please call her if you have problems with SAS.

SUSAN ROTH GARROD joined LARS on May 17, 1982, as a Systems Training Specialist in Technology Transfer. Her duties include handling the remote terminal accounts, teaching short courses, and training new visiting scientists. At present, Sue is working part time while she completes her MSEE degree. She should complete the degree in December and will begin working full time in January. Many of you may remember Sue; she worked in Field Measurements in 1980-81. Welcome back to LARS, Sue.

JOAN BUIS has resigned from LARS and moved to California. We wish her much luck and good wishes in her new location.

RUTH JARRET, who has been at LARS since 1977, is leaving June 23. Her husband has accepted a position in Costa Rica. A computer operator now, Ruth has also worked as a secretary at LARS. She will be greatly missed but we hope her stay in Costa Rica is a very happy one. Best of luck!

After eight years of dedicated service to LARS, MARLENE HODGE has left and accepted a position at Herrick Labs on campus. We will all miss Marlene very much (especially when it is time to plan the Christmas party). LARS wishes her the very best and hopes she will keep in touch!

CRAIG DAUGHTRY has three new student workers to assist in field research data collection. They are: Dwight Lindman, Ken Draves, and Randy Simms. Welcome to LARS.

FUN, FOOD AND FROLIC

Approximately 90 people attended the LARS picnic at Happy Hollow Park on June 12, 1982. After general mingling by some and fierce volleyball competition by others we all gathered around for games organized by KAY HUNT. We cooled off with a few brief games of water balloon tossing then several people participated in a thoroughly undignified contest of grapefruit rolling. PETE LIESENFELT, BARRETT ROBINSON and MARION BAUMGARDNER were the overall winners of the grapefruit roll. Next, we turned our undivided attention to the food – barbecue sandwiches, delicious fruit, vegetable and dessert dishes and plenty of lemonade and iced tea. Liberal helpings of lively conversation were served with the meal. Undoubtedly, the picnic was a huge success!

PROPOSALS

Title: "Image Processing Algorithms Using a Priori Information for Earth
            Scene Segmentation"
Sponsor: NSF
Duration: 12/1/82 - 11/30/84
P.I.:   P. Anuta

Title: "To Provide Technical Assistance in Remote Sensing Education"
Sponsor: Triton College
Duration: 6/1/82 - 3/31/83
P.I.:   S. Davis

Title: "Measurement and Modeling of the Optical Scattering Properties
            of Crop Canopies"
Sponsor: NASA
Duration: 6/1/82 - 5/31/85
P.I.:   V. Vanderbilt

Title: "Communication Through the Use of Graphic Symbols"
Sponsor: American Science & Technology Corporation
Duration: 5/1/82 - 10/31/82
P.I.:   T. Phillips