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REMOTE SENSING IN CANADA

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A NATIONAL PROGRAMME IN REMOTE SENSING IS COORDINATED BY THE DEPARTMENT OF ENERGY, MINES AND RESOURCES IN CO-OPERATION WITH OTHER AGENCIES OF THE GOVERNMENT OF CANADA, PROVINCIAL GOVERNMENTS, INDUSTRY AND CANADIAN UNIVERSITIES

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REMOTE SENSING IN CANADA - NOVEMBER 1980

Remote Sensing in Canada is the quarterly newsletter of the Canada Centre For Remote Sensing. It is principally intended to provide a vehicle for communication among the members of the Canadian remote sensing community.

"Quarterly" means that the newsletter is published four times a year if all goes well. Since July 1972 when the first issue made its mark on the history of journalism (more of a smudge actually), all has rarely gone well,

and as long as the trolls continue to lurk behind the CIAS air conditioner, we do not expect all to improve.

Brief submissions for the newsletter are most welcome, but due to space limitations, they will be subject to editing where necessary.

Material and comments may be sent to:

The Editor, Applications Division, Canada Centre For Remote Sensing, 717 Belfast Road, Ottawa, Ontario, K1A 0Y7

LANDSAT ALERT

Complaints were received last May, after NASA switched from Landsat III to Landsat II as the prime satellite for MSS over Canada. Some of our users were getting ready, or already performing ground truth for Landsat III, when the satellite actually being received and recorded was Landsat II.

CCRS recognizes the necessity of transmitting changes of Landsat status to users as soon as the information is received from NASA. The problem is, we don't know how to do it. There are now some 1800 active Landsat users in Canada, and it is not possible to individually alert all users of a change of status within hours of notification from NASA.

In future, in order to disseminate status changes as quickly as possible, CCRS will telex a bulletin to each provincial or regional remote sensing centre as soon as the information is received. Users will then be able to contact the nearest dissemination centre to verify the latest Landsat status for logistic planning. The same information will subsequently be distributed to all users by mail, as a bilingual newsbrief.

If everyone cooperates, this procedure will prevent a recurrence of the problems experienced last May. Comments or questions concerning this procedure should be directed to Art Collins, Data Control and Distribution, CCRS, Ottawa.

Provincial and Regional Centres and Contacts:

Alberta Remote Sensing Center (Mr. Cal D Bricker) 037-2006

Manitoba Remote Sensing Centre (Mr. William G. Best) 07-587740

Ontario Centre for Remote Sensing (Mr. Victor Zsillinszky) 06-219701

Service de Télédétection (M. Hervé Audet) 051-31598

Fredericton, New Brunswick (Mr. Burt Smith) 014-46230

Charlottetown, P.E.I. (Dr. Awni Raad) 014-44154

Victoria, B.C. (Mr. Edward R. McMinn) 049-7127

Yellowknife, N.W.T. 034-45528

Laurencetown, Nova Scotia (Mr. John F. Wightman) No telex Tel: 584-2226

St. John's Newfoundland (Mr. Doug Moodie) 016-4949 DID SNF

Saskatoon, Saskatchewan (Dr. John L. Bergsteinsson) 074-2484

Whitehorse, Yukon (Mr. Al Hodgson) 036-8260

IN MEMORIAM

It is with deep regret that we announce the recent sudden deaths of Jack Fleming and Ernie Smythe, both of CCRS Data Acquisition Division. They will be very much missed as companions, as colleagues, and as individuals.

SOURCE OMITTED

In the March, 1980 issue of the CCRS Newsletter, an article titled "X and C Band Radar for Canada" was inadvertently printed without giving its source, which was the Newsletter of the Ontario Association for Remote Sensing. We apologize for any embarrassment which may have been caused by this omission.

LARRY MORLEY LEAVES CCRS AND CANADA

Dr. L.W. "Larry" Morley, the founding Director of the Canada Centre for Remote Sensing took up new duties as the Science Counsellor in London, England on August 22, 1980.

Dr. Morley's departure was a shock to the remote sensing community in Canada because he has been so much identified with the national program which he was responsible for developing.

As a result of his efforts, we now have in Canada a vigorous well-integrated national remote sensing program with participation from all provinces and territories. In addition, we have a strong industrial remote sensing capability.

Dr. Morley was born in Ontario, and obtained his early schooling in Toronto, Collingwood and Owen Sound. He was a Radar Officer on loan to the Royal Navy from 1941-44, and then joined the Fairchild Aerial Surveys as Chief Geophysicist in Venezuela and Columbia immediately after the war. He undertook miscellaneous missions for aid agencies and the United Nations. He received his Ph.D in Geophysics in 1952 from the University of Toronto, and immediately he became chief of the Geophysics Division, in the Geological Survey of Canada.

He was the first Geophysicist to be appointed to the Geological Survey of Canada, and built up the Exploration Geophysics Division over a period of 17 years to a staff of 90 scientists and technicians.

His greatest scientific contribution was hypothesizing the theory of magnetic imprinting on the ocean floor by the self-reversing of earth's magnetic field. This theory was recognized internationally

and was the key in justifying the now accepted theory of ocean floor spreading, continental drift and plate tectonics. It has become known as the Morley-Vine-Matthews Hypothesis.

In 1964, Dr. Morley became interested in the new field of remote sensing and set up an interdepartmental committee on remote sensing, consisting of scientists at the working level. A Program Planning Office was established in 1969 which resulted in 1971 in the establishment of the Canada Centre for Remote Sensing, of which Dr. Morley was the first Director General.

Since then, the Centre has grown to a staff of 106 people and has seen all provinces and territories of Canada participate in the remote sensing program—four to the extent of setting up their own provincial remote sensing centres. CCRS now reads out satellite data from 2 stations, one in Prince Albert, Saskatchewan, and one in Shoe Cove, Newfoundland, and operates a fleet of four aircraft. Recently, the Centre has become involved in developing Synthetic Aperture Radar technology for use in Canada, especially in the Arctic and offshore areas.

Although it was difficult to see Larry Morley leave the Centre, he has, in fact, brought it through its most difficult time and left it in a stable and vigorous state! Dr. Morley is now fully engrossed in his new duties.

From a recent telephone conversation with Larry Morley we conclude that although he was reluctant to leave the Centre, he fully intends to live happily ever afterward, and that of course, is what we in the Centre and his other friends in Canada wish for him and his family.

E.A. Godby

LANDSAT PRODUCT DELIVERY LEAD TIMES

In an effort to better match customer expectations with actual CCRS production capabilities, the following schedule shows the maximum interval from the time of receipt of order until the requested products are delivered to the purchaser.

<u>Product</u>	<u>Lead Time</u>
Microfiche	Same day
Facsimile service	4-24 hours
Black and White	
- produced at Prince Albert Satellite Station (PASS)	2.0 weeks
- produced at Shoe Cove Satellite Station (SCSS)	1.0 week
Colour	
- produced at PASS	3.0 weeks
- produced at Ottawa	4.0-5.0 weeks
CCTs	
- produced at PASS	3.0 weeks
- produced at SCSS	2.0 weeks
- produced at Ottawa	4.0 weeks
DICS	8.0 weeks
RETURN BEAM VIDICON	
- Quicklook	2.0 weeks
- Black & White print	11.0 weeks

These delivery lead times are currently used by the CCRS production centres as production objectives, based on present equipment capacities and customer order levels. If we are not meeting these objectives, or for any other problems related to these products, please contact Mrs. Jean Heffernan, Canada Centre for Remote Sensing, 717 Belfast Road, Ottawa. Tel (613) 995-1210

DENNY KALENSKY TO FAO

Congratulations to Z.D. "Denny" Kalensky who moved to Rome in September to take a senior appointment with the FAO. Denny will assist Director John Howard in administering the FAO's many resource development projects in agriculture and forestry.

SEVENTH CANADIAN SYMPOSIUM ON REMOTE SENSING WINNIPEG, SEPTEMBER 9-11, 1981

This meeting will be sponsored by the Canadian Remote Sensing Society and the Canadian Aeronautics and Space Institute, and will be hosted by the Manitoba Branch of the Canadian Institute of Surveying. For further information contact Bill Best, Manitoba Remote Sensing Centre, 1007 Century Building, Winnipeg, Manitoba R3H 0W4.

CANASIP '80

The Sibbald Group of Deloitte Haskins and Sells Associates have initiated a rapeseed crop acreage estimating experiment that promises to be a real advancement for the Canadian agricultural community. The CANASIP'80 (Canadian Agricultural Satellite Intelligence Program) project had six subscribers including both Federal Government and private industrial users.

The objective of the program was to provide timely rapeseed acreage data for a number of sites in Western Canada. The resulting acreage maps from the analysis work done by the Sibbald Group were printed on simple typewriter-type terminals that could access a central database using standard telephone communication lines.

For more information on CANASIP'80 contact Paul Hession at CCRS (613) 993-0121.

REMOTE SENSING AT GULF CANADA RESOURCES

Tom Feuchtwanger has recently joined the staff of Gulf Canada Resources, Inc. (Calgary, Alberta) to establish a major program to demonstrate the usefulness of remote sensing for geological exploration. Mr. Feuchtwanger has also accepted an appointment to the Geology Working Group of the Canadian Advisory Committee on Remote Sensing. Over the next two years, Mr. Feuchtwanger plans to apply his many years of experience in this field to the challenge of using remote sensing data for enhancing geological exploration activities in Western Canada.

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LANDSAT MSS CCT FORMAT STANDARDIZATION

In addition to its present products, since April 1980 CCRS has been offering Landsat MSS imagery on CCTs in the new "Standard Format". This product belongs to the Standard CCT Format Family as adopted by the Landsat Ground Stations Operators Working Group, (LGSOWG). It will allow the Landsat ground stations to offer to the international remote sensing user community format-compatible products by the time Landsat-D is launched.

A Standard Format CCT contains a full scene of raw or system-corrected MSS imagery or an NTS map-compatible subscene of precision-processed data. For each imagery file there is one leader file for the image description, and for the radiometric and geometric transformations, and one trailer file for histogram data and quality information. A volume directory specifies the logical content of the CCT. In the band interleaved by line organization, the CCT consists of a volume directory, leader file, imagery file and trailer file. For the band sequential organization there are four leader, imagery and trailer files. Associated with each scan line for each band, are prefix and suffix data containing sensor and line related ancillary information. A preliminary version of the document describing the CCRS CCT product in the Standard Format, and the LGSOWG documents defining the Standard Format Family, are available on request.

The Standard Format Family is based on the concept of a "superstructure" which defines logical rules for file, record and data organization. This superstructure is general and applicable to other types of data such as geocoded polygon, profile and single point data. The Standard CCT Format Family is suitable for multiple applications due to its logical organization and its open-ended definition and it should benefit the remote sensing users by reducing the software development cost. For example, a Spatial Data Transfer Committee has completed the design of a format for geocoded information in spatial data polygon files. Geocoded information is geographic information stored in machine-readable form. This format is described in Standard Format for the Transfer of Geocoded Polygon Data, D.G. Goodenough et al., CCRS Research Report 79-3, December 1979.

CCRS will also continue to offer Landsat-1, 2 and 3 MSS CCTs in the "universal format" (sometimes referred to as the "JSC format") until the launch of Landsat-D. The format description has been updated in a revised document: Format Specifications for Canadian Landsat MSS System Corrected Computer Compatible Tape, J. Murphy, CCRS Research Report 79-2, August 1979.

After the launch of Landsat-D, Landsat-1, 2 and 3 CCTs will be produced in the Standard Format only. CCRS is also offering a service for the conversion of old Landsat MSS CCTs from the universal format to the Standard Format, at a charge of twenty dollars per tape.

CCTs can be ordered in the Standard Format following the usual procedures. Systems or software related questions concerning the new CCTs and the Standard Format Family can be addressed to F. E. Guertin, Head, Systems Section, Data Processing Division, CCRS, 2464 Sheffield Rd., Ottawa, K1A 0Y7.

REMOTE SENSING FOR JUNIOR HIGH STUDENTS

Grant Smith, Assistant Principal at the Overlander Junior High School in Hinton, Alberta, has been awarded a Hillroy Fellowship award at the provincial and national level. The Hillroy Fellowships are designed to encourage teachers to develop and apply innovative ideas in their classrooms.

The achievement for which Mr. Smith has been recognized, is the development of a junior high school option in remote sensing.

With the help of the Alberta Remote Sensing Center, and financial support from the Yellowhead School Division's educational fund, Mr. Smith built a course around the concept of recording, transferring and interpreting satellite images.

Mr. Smith was the first teacher in Alberta to incorporate this concept into a junior high school course.

LIMERICKS, LOBSTERS AND ENLIGHTENMENT AT THE SIXTH CANADIAN SYMPOSIUM ON REMOTE SENSING

Near the end of May this year, 350 people from fifteen countries gathered at the Hotel Nova Scotian in Halifax to see and hear about the latest developments in remote sensing, with emphasis on the Canadian point of view.

For three days the attendees participated in successive plenary and poster sessions, and viewed a wide range of technical exhibits. Authors repeatedly found themselves involved in impromptu discussion groups, or being quizzed on their presentations well into the lunch or dinner hour.

Social events consisted of an evening cruise of Halifax harbour, a wine and cheese party hosted by the exhibitors, shopping and sightseeing tours of Halifax by accompanying persons, a visit to picturesque Peggy's Cove and a lobster banquet.

The remote sensing limerick contest was a great success at the banquet, where the winner (by acclamation), Ross Brown of McGill University, was presented with the "Perfect Pixel" award. His limerick, as well as the more than seventy others submitted, will be printed and sent (in plain brown wrapper) to all Symposium attendees who purchased a set of Proceedings. The editorial staff is working diligently to get the Proceedings into print before the end of 1980.

CALL FOR PAPERS IEEE GEOSCIENCE AND REMOTE SENSING SOCIETY

The 1981 IEEE International Geoscience and Remote Sensing Symposium (IGARSS'81) will be held at the Twin Bridges Marriott Hotel in Washington, D.C. on June 8-10, 1981. The meeting is being sponsored by the IEEE Geoscience and Remote Sensing Society, and co-sponsored by many European and North-American organizations, including the Canadian Remote Sensing Society.

Technical sessions for the Symposium will be coordinated to provide a well-balanced, comprehensive program stressing the problems and perspectives of the geoscientific disciplines, instrumentation systems and data

processing techniques, and sensor-target models. A primary goal of the Symposium is to provide attendees with broad perspectives in both the status and outlook of the geoscientific disciplines and the techniques of remote sensing, as well as more detailed summaries of recent technical progress in these fields. Feature papers will be presented by a number of distinguished authorities.

Authors are invited to submit summaries before January 16, 1981 to the Technical Program Committee Chairman: Prof. K.R. Carver, Box 3-PSL, Physical Science Laboratory, New Mexico State University, Las Cruces, New Mexico 88003.

ENGINEERING AND SITE SELECTION IN FRAGILE ENVIRONMENTS

A Special session on this topic will be held during the American Society of Photogrammetry Annual Meeting on February 24, 1981 at the Washington Hilton Hotel, Washington, D.C. The session will be sponsored by the Engineering Applications Committee of the ASP's Remote Sensing Applications Division.

The session, which will include two keynote invited papers, should be of interest to those involved in route selection (pipeline, highway, energy corridors) and capital construction in sensitive and isolated environments. Emphasis will be on practical solutions using remote sensing.

For further information contact:

Dr. Robert A. Ryerson, First Deputy Director
Engineering Applications Committee
RSA Division, ASP
c/o Canada Centre for Remote Sensing
Energy, Mines and Resources
Ottawa, Canada
K1A 0Y7
(613) 995-1210

CONTINUING BIBLIOGRAPHY OF PRACTICAL APPLICATIONS OF REMOTELY SENSED DATA

Here, for your reading pleasure (to say nothing of increased operational effectiveness) a few carefully-culled papers to supplement the listing in our March 1980 issue. Once again, we admit to a blatant bias toward operational remote sensing, technology transfer, benefit analysis and geographical data bases.

1. Zsilinszky, V. Transfer of Remote Sensing Technology to the Private Sector, Ontario Centre for Remote Sensing, 880 Bay St., Toronto, Ontario, M5S 1Z8, Nov. 1979, RESORS # 1022033
2. Calder, M. Wrelads - The Australian Laser depth Sounding System, Int. Hydrographic Technical Conf., Proc. 1st, Ottawa, Ontario, May 14-18, 1979, PP. 111-139, Can. Inst. of Surveying, 157 McLeod Street, Ottawa, Ontario, K1S 4L9, May 1979, RESORS # 1021318
3. Everett, J.R. Successful Use of Landsat Imagery for Lead-Zinc Exploration in Tennessee and Kentucky, Earth Satellite Corporation, 1747 Pennsylvania Ave. N.W., Washington, D.C. 20036, RESORS # 1021349
4. Hussey, W.J./Heacock E.L. The Economic Benefits of Environmental Satellites, U.S. NESS, Washington, DC 20233, April 1978, RESORS # 1021366
5. Mullane, T.F. Operational Use of Satellite Imagery in the Canadian Ice Program, Can. Atmospheric Environment Service, Ice Forecasting Central, 473 Albert Street, Ottawa, Ontario, 1980, RESORS # 1023740
6. Bryant, N.A./Zobrist, A.L. An Image Based Information System: Architecture for Correlating Satellite and Topological Data Bases, Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, California 91103, 1976, RESORS # 1020808
7. Dueker, K.J. Land Resource Information Systems: A Review of Fifteen Years Experience, Geo-Processing, vol. 1, No. 2, Dec, 1979, pp. 105-128, RESORS # 1022223
8. Joyce, A.T. Final Report on the Natural Resources Inventory System ASVT Project, U.S. NASA, Scientific and Technical Information Office, Washington, DC 20546 Jan. 1979, RESORS # 1022242

NINTH ALBERTA REMOTE SENSING COURSE University of Alberta, Edmonton, 23-27 February 1981

Conducted by the Alberta Remote Sensing Center in cooperation with the Faculty of Extension, University of Alberta

The purpose of the course is to develop practical expertise in the use of remote sensing in earth resources surveys and management.

It instructs multidisciplinary users in the application, acquisition and interpretation of earth resources satellite (LANDSAT) and aircraft multiband data - both photographic and non-photographic. It emphasizes practical uses of remote sensing, and utilizes imagery interpretation exercises based upon actual research projects under the guidance of the researchers involved.

Excellent instruction will be provided by Canadian scientists from many agencies across Canada actively engaged in remote sensing, and by Professor R.N. (Bob) Colwell of the

University of California, one of the world's leading scientists in the field of remote sensing.

The course will include: an introduction to remote sensing; historical development; basic matter and energy relationships; data acquisition - photographic and non-photographic sensors; the Canadian satellite and airborne remote sensing programs; techniques of manual and instrument aided image interpretation; use of digital satellite data; land use studies and classification; agricultural applications; geosciences; and much more.

Registration will be open to anyone, in order of receipt. The planned registration fee of \$150 includes syllabus and course materials.

Past courses have been oversubscribed, so persons should plan early to attend. Those interested should call the Alberta Remote Sensing Center at (403) 427-2381.

CANADA CENTRE FOR SPACE SCIENCE

The National Research Council of Canada has recently expanded its activities in the field of space science and has announced the formation within the NRC of the Canada Centre for Space Science. The new Centre, whose director is Dr. Ian McDiarmid, will undertake the planning, coordination and major support for space science in Canada. One of the objectives of the Centre is to promote maximum interaction and technology transfer between industry, university and government laboratories in technical areas where Canada presently has a leading position as a result of previous space science programs.

The programs carried out by the Centre will include the existing rocket and balloon program, aimed at providing a better understanding of the earth's space environment in the neighbourhood of 100 km, and a new international program for which the government has recently approved expenditures of some \$42 million over the next six years. The new program will allow Canadian and US scientists to investigate the properties of plasmas and neutral winds in the space environment of the earth. It also will involve the development and construction in Canada of a number of major new scientific instruments, all of which will be flown on the US Space Shuttle around 1985.

For further information, please contact Dr. I.B. McDiarmid at (613) 992-7884.

(WRC news Release, 20 August 1980)

CANADA SPONSORS INTERNATIONAL MEETING

Representatives from the Governments of Canada, France India, Japan and the United States and from the European Space Agency met in Ottawa May 8 and 9, 1980, at the invitation of the Government of Canada for an informal exchange of views on areas of possible international cooperation in remote sensing satellite systems.

The participants discussed means of improving coordination of remote sensing satellite systems which might be beneficial to both operators and users. They agreed

that the Ottawa meeting was useful in providing a basis for further consultations. Several opportunities for consultation in the area of long and medium-range planning and for coordination of operations in the short-term were identified, and these will be pursued.

The participants agreed to meet in early 1981 to review long-term planning and accepted the invitation of the European Space Agency to host this meeting. The participants considered this method of work would be a valuable means of promoting cooperation in this area and of helping to make the benefits of this technology available to the international community.

The group also discussed the possibility of stimulating a series of regional meetings with nations which plan to use remote sensing data to help bring the needs of the user states to the attention of satellite operators in the implementation of their programs. These meetings might also constitute a useful contribution to the preparations for the 1982 United Nations Conference on the Exploration and Peaceful Uses of Outer Space.

CONTINUING SURVEY OF CANADIAN DIGITAL ANALYSIS SYSTEMS

The following is the fifteenth reply to the survey questionnaire which was printed in the September 1978 issue of Remote Sensing in Canada. Previous replies may be found in the issues of May 1979 and September 1979 (if you had the foresight to save them).

SYSTEM NAME: To be determined

CONTACT: André Grenon

Ministère de l'énergie et des ressources,
Québec

1995 Ouest, boul. Charest

Ste-Foy, Québec

(418) 643-6871

APPLICATIONS: Numerical processing of remotely sensed images for the requirements of the following three agencies: The Ministry of Energy and Resources, Laval University, Laurentides Forestry Research Centre of the Canadian Forestry Service.

THE PHOTOGRAPHIC ANALYSIS SYSTEM

The Applications Division of CCRS has modified its density slicer to permit multispectral analysis of satellite and airborne photographic data. The system, briefly described below, is also available to outside users.

The Photographic Analysis System (PAS) is a device for analyzing optical densities in a film transparency. The input image consists of a black and white (B&W) film or a colour film. The image may be obtained from aircraft or satellite platforms and may be up to 30.5 x 30.5 cm (12 x 12 in.) in size. A uniformly illuminated light table and a continuously scanning vidicon tube T.V. camera of high quality are used to convert image values into an electrical video signal which is then displayed on both B & W and colour T.V. monitors, or recorded on a video disc for storage and a subsequent analysis.

Multispectral images of the same scene can be input and stored on the video disc, thereby allowing a reconstitution of the original scene as a colour composite on the colour monitor. The registration of the various bands is accomplished manually with the aid of a light table and a registration punch. The images stored on disc can be ratioed together and their brightness and contrast can also be modified. Single band or ratioed images can be divided into up to 32 density levels, each coded in a different colour. A form of rectangular parallelepiped supervised classification by means of logic functions can also be accomplished.

Additional features of the system include:

1. area measurement of one or more density levels by an electronic planimeter;
2. spot density measurement;
3. density profile display;
4. an edge enhancement display (B & W) which allows the detection and display of all locations on the image at which the image density gradient (rate of change with distance) exceeds a specified threshold value;
5. a video micrometer for measuring distances;
6. a keyboard for annotating images;
7. a second T.V. camera for overlaying a map onto the image being studied.

The map and image registration is done manually. Hard copy output is obtained by photographing the colour or B & W monitors or a grey level copy analogous to a digital binary map. A standard video colour recorder (cassette or reel-to-reel) can receive output from the PAS.

Users of this system are provided with a manual and appropriate training for work lasting longer than 2 days. For shorter term users, an operator will be present.

Persons interested in seeing or using the PAS for 1 or 2 days may contact:

Grant Dixon,
Applications Division,
Canada Centre for Remote Sensing,
717 Belfast Road,
Ottawa, Ontario. K1A 0Y7
(613) 995-1210

For projects involving more than 2 days of PAS time a project proposal and estimations for time should be submitted to:

Committee for Image Equipment Utilization (CIEU),

717 Belfast Road,
Ottawa, Ontario.
K1A 0Y7
(613) 995-1210

CCRS REPORT PUBLICATIONS

Copies of the following reports are available, free-of-charge, from the CCRS Technical Information Service at 717 Belfast Road, Ottawa K1A 0Y7.

The 1978 Status of Applications of Remote Sensing Data in Forestry, Wildlife and Wildlands Projects in Canada J. Cihlar and C. Rubec

A Canada-wide survey of applications of remote sensing data was conducted during the fall and winter months of 1978. The purpose of the survey was to establish the current status of operational applications of remote sensing data, primarily by agencies and individuals responsible for resource management in Canada. The report describes the methodology used to conduct the survey, analyzes the returns, and offers an assessment of the status of operational remote sensing applications in forestry, wildlife and wildlands disciplines.

Laboratory Evaluation of the Prototype MEIS (Multi-detector Electro-Optical Imaging Scanner), RR 78-5 H. Zwick, J.N. de Villiers, and W. McColl

A new two channel imaging sensor based on the "pushbroom" scanning approach is reported. The pushbroom imager consists of solid state linear detector arrays located in the focal plane of imaging lenses. The spectral content of the imaged radiances is selected by interchangeable spectral filters placed in front of the lenses. Electronic readout of the integrated photocurrent on each detector of each array provides the scanning function usually provided by rotating mirrors in a conventional scanner. In particular, it was found that the image channels could be spatially registered to one pixel, and that the noise equivalent radiance of the prototype imager was $2 \times 10^{-8} \text{ W cm}^{-2} \text{ sr}^{-1} \text{ nm}^{-1}$ when using a 10 nm bandwidth, 685 nm centre wavelength, 70 percent peak transmission spectral filter, a f/1.4 lens speed, and a 50 scans/second readout rate.

The report covers the operating characteristics of the sensor and includes the results of laboratory evaluation. Although the sensor was developed as a prototype, its performance is generally good, and some experimental field evaluation will

be possible. The analysis of performance reported here provides a sound basis for specifying pushbroom sensor capability and predicting field performance of future systems.

Digital Analysis of Remotely Sensed Data: A Bibliography with Emphasis on CCRS Image Analysis Systems, RR 79-1 R.G. Dixon and J. Cihlar

This bibliography has been prepared to aid researchers and users involved in utilizing digital analysis techniques on various forms of remote sensing data. The entries are broadly categorized under Applications and Techniques. Applications is further subdivided into Agriculture, Ecological and Biophysical, Forestry, Geology, Hydrology, Land Use, Thermography, Wildlife, and Miscellaneous. Techniques is subdivided into Digital Image Analysis (Classification), Enhancements, Equipment, Geometric Correction, Microwave and Radar Analysis, Radiometric and Atmospheric Correction.

Format Specifications for Canadian Landsat MSS System Corrected Computer Compatible Tape, RR 79-2 Jennifer Murphy

This document describes the format used for both raw and system corrected Landsat Multispectral Scanner (MSS) Computer Compatible Tapes (CCT's) generated by the Canada Centre for Remote Sensing (CCRS). A description of the relevant satellite subsystems is included to clarify the optional radiometric and geometric processing algorithms used. Although the tape format has not changed appreciably from that previously described by Strome et al. in CCRS Research Report 75-3, the radiometric and geometric algorithms have been considerably improved. All Landsat MSS CCT's produced by CCRS after March 12, 1979 conform to this document.

Standard Format for the Transfer of Geocoded Polygon Data, RR 79-3

D.G. Goodenough, K.J. O'Neill, L.A. Gordon, J. Yan, T. Fisher, C.L. MacDonald, A. DesRochers

This report describes a standard format for the transfer, via computer compatible tape, of geocoded information in spatial data polygon files. The format was developed through the mutual efforts of four departments in the Government of Canada: Energy, Mines, and Resources, Environment Canada, Statistics Canada, and Agriculture Canada. Staff from these departments established the Spatial Data Transfer Committee (SDTC), which completed the design of this format in 1979. The format described in this report also conforms to "The CCT Family of Tape Formats" superstructure developed by the LANDSAT Ground Station Operators Working Group. The SDTC intends to use this format for the exchange of geocoded information.

Land Use Information From Remotely Sensed Data: a Users' Manual, 80-1
Robert A. Ryerson

This manual outlines the most cost-effective and accurate methods of obtaining various types of land use data using cases drawn from the files of the Canada Centre for Remote Sensing, Department of Energy, Mines and Resources. Major factors to consider when planning remote sensing data acquisition are presented. Identified in tabular form are types of land use data available from remote sensing, the type, scale and date of the most cost-effective imagery, and the accuracies with which one could expect to collect data. Appendices provide lists of firms engaged in image acquisition, image archives and provincial centres and contacts.

Runyon's Law - The race is not always to the swift, nor the battle to the strong, but that's the way to bet. (Damon Runyon)

Ryan's Law - Three consecutive correct guesses will establish you as an expert.

Rowe's Rule - The odds are 6 to 5 that the light at the end of the tunnel is an oncoming express train.

(from Dickson, The Official Rules)

FOR THOSE WHO DON'T KNOW IT ALL . . . YET

You may be interested in some of these books and proceedings recently acquired by the CCRS Library. We give fair warning: if you buy ALL of these tomes they'll put quite a dent in your budget (and quite a droop in your bookshelf).

Landsat II over New Zealand: monitoring our resources from space/edited by P.J. Ellis, I.L. Thomas, and M.J. McDonnell - Wellington, N.Z.: Dept. of Scientific and Industrial Research, 1978

International Symposium on Remote Sensing of Environment, 13th, Ann Arbor, Michigan, 1979

International Joint Conference on Pattern Recognition, 4th, Kyoto, Japan, 1978

Environmental monitoring by remote sensing; proceedings of a one day seminar, London, England, May 16th, 1979/sponsored by Fairey Surveys Ltd. - London: Remote Sensing Society, 1979

Remote sensing and national mapping: proceedings of the Fifth Annual Conference of the Remote Sensing Society, University of Durham, England, December 18-20, 1978

Télédétection du littoral océanique de la France - Montrouge, France: Ecole Normale Supérieure, 1977

Soil erosion: prediction and control, West Lafayette, Indiana, May, 1976. Proceedings of a National Conference on Soil Erosion, West Lafayette, Indiana, May 24-26, 1976

Programs for digital signal processing/edited by the Digital Signal Processing Committee, IEEE Acoustics, Speech, and Signal Processing Society - New York: IEEE Press, 1979

The Canadian space program: five year plan (80/81 - 84/85) = Le programme spatial canadien: plan quinquennal (80/81 - 84/85) - Ottawa, Dept. of Communications, 1980

CALL FOR PAPERS
FIFTEENTH INTERNATIONAL SYMPOSIUM
ON REMOTE SENSING OF ENVIRONMENT
MAY 11-15, 1981
Ann Arbor, Michigan

The Fifteenth International Symposium on Remote Sensing of Environment, to be held from May 11 to 15, 1981 in Ann Arbor, Michigan, will address state-of-the-art capabilities and techniques, as well as new or innovative concepts in scientific research and development, leading to a better understanding of the technology and its effective application.

This symposium, open to all who have an interest in remote sensing, is intended to promote increased international cooperation in research, development and application of this technology, and to stimulate an exchange of information on all aspects of this multidisciplinary field.

Conventional sessions and multidisciplinary poster sessions will be formulated to address:

- . New or innovative techniques and methodology
- . Advanced sensor and data acquisition system design
- . Advanced data processing and analysis capabilities
- . Earth resources, environmental monitoring and information system requirements
- . Discipline or mission oriented projects leading to operational utilization of the technology

Recent results or innovative concepts based upon current or future sensors and sensor systems will be considered, including ultra-violet, visible, infrared, microwave, acoustic, seismic or other sensors, singly or in combination; as well as new or improved techniques for the effective handling, processing and utilization of remotely sensed data. Investigations involving ground-based, airborne or spaceborne data acquisition are encouraged.

Contributed papers selected for the Fifteenth Symposium will be presented in multidisciplinary poster sessions, a format considered optimum for technical presentation in the field of remote sensing.

A comprehensive summary of each proposed presentation should be submitted for review **no later than November 1, 1980**. Both this summary and the proposed presentation should be structured in light of the poster-session format and the symposium's advanced technology theme.

Proposed presentations will be considered and evaluated in terms of their contribution to an advancement of the state of the art, the development of specific applications or operational programs, the improvement of existing techniques and methodology, or a better understanding and utilization of the technology.

Each summary should provide a brief justification for the work, program or concept reported, and an explanation of its relation to the current state of the art or to the development of the specific application involved. Additionally, each summary submitted should provide details of any results obtained to date; and, in the case of a new or innovative approach, should provide a brief discussion of how the concept, technique or methodology differs from existing methods.

Only summaries of no less than 300 and no more than 1000 words, containing no figures or references, and received prior to the above deadline will be considered. Twenty copies, in English, should be submitted to:

Dr. Jerald J. Cook
Environmental Research Institute of
Michigan
P.O. Box 8618
Ann Arbor, Michigan, 48107, USA
(Telephone 313-994-1200)

Final program and registration materials will be available in April 1981.

CONFERENCES - COURSES

A list of meetings, conferences, courses, etc. in the areas of remote sensing, pattern recognition, computers and computer applications, space surveying and mapping and other related topics.

October - December, 1980

Tenth International Laser
Radar Conference (ILRC)
October 6-9, 1980
Silver Spring, MD

I.F.I.P. Congress '80
October 6-9, 1980
Tokyo, Japan
October 14-17, 1980
Melbourne, Australia

Advanced Training of Foreign
Participants in Remote Sensing :
Land Use Planning and Environ-
mental Applications
October 6 - November 7, 1980
Northern Arizona University
Flagstaff, Arizona

American Society of Photogrammetry
Meeting
October 7-10, 1980
Niagara Falls, NY

Annual Meeting Optical Society
of America
October 13-17, 1980
Chicago, Ill.

12th Congress of the International
Council of the Aeronautical
Sciences (ICAS)
October 12-17, 1980
Munich, Germany

International Symposium on
Environmental Pollution
October 16-17, 1980
Atlanta, Georgia

Space Activities and Implications:
Where From and Where to at the
Threshold of the 80's
October 16-17, 1980
Montreal, Quebec

International Microelectronics
Symposium
October 20-22, 1980
ISHM
New York, N.Y.

1st Canadian Symposium on
Astronautics
October 20-22, 1980
CASI
Ottawa, Ontario

Military Microwaves '80
October 22-24, 1980
London, England

Remote Sensing for Resource
Management
October 28-30, 1980
Soil Conservation Society of
America
Kansas City, Missouri

Image Processing - Correction
or Degradation
November 14, 1980
University of London
London, England

Land Policy Formulation Conference
November 14-15, 1980
University of Guelph
Guelph, Ontario

International Conference on
Electronic Imaging
November 16-20, 1980
Society of Photographic Scientists
and Engineers
Washington, D.C.

Symposium and Workshop on Mount St. Helens
Eruption: Its Atmospheric Effects and
Potential Climatic Impact
November 18-21, 1980
NASA
Washington, D.C.

Coastal Zone '80, Symposium on
Coastal & Ocean Management, 2nd
November 17-20, 1980
Clemson University
Hollywood, Florida

4th Canadian Symposium on
Navigation
November 18-19, 1980
Halifax, N.S.

Arid Land Resource Inventories:
developing cost efficient methods
November 30-December 6, 1980
USDI Bureau of Land Management
La Paz, Mexico

5th International Joint Conference
on Pattern Recognition
December 1-4, 1980
Miami Beach, Florida

AIAA Conference on Sensor
Systems for the 80's
December 2-4, 1980
Colorado Springs, CO

WSC'80, Winter Simulation
Conference
December 3-5, 1980
Orlando, Florida

Workshop on Digital Signal and
Waveform Analysis
December 5, 1980
IEEE
Miami Beach, Florida

AGU Fall Meeting
December 8-12, 1980
San Francisco, CA

Geological and Terrain Analysis
Applications of Remote Sensing
7th Annual Conference of the
Remote Sensing Society
December 15-17, 1980
Plymouth, UK

Lasers'80, 3rd International
Conference on Lasers and Applications
December 15-19, 1980
New Orleans, LA

January - March, 1981

Symposium on Machine Intelligence
and Perception
January 3-8, 1981
AAAS
Toronto, Ontario

URSI Commission Fall Symposium on
Signature Problems in Microwave
Remote Sensing of the Surface of
the Earth
January 5-8, 1981
University of Kansas
Lawrence, Kansas

Plants and the Daylight Spectrum
January 6-8, 1981
University of Leicester
Leicester, U.K.

Image Analysis Techniques and
Applications
January 6-9, 1981
Society of Photographic Scientists
and Engineers
Tucson, AZ

Preview of Technology and Applications
for the 80's
January 15-16, 1981
ASP-ACSM
Denver, CO

Advanced Training of Foreign
Participants in Remote Sensing :
Digital Image Processing
February 9 - March 6, 1981
Northern Arizona University
Flagstaff, Arizona

American Society of Photogrammetry
Annual Meeting
February 22-27, 1981
Washington, D.C.

Ninth Alberta Remote Sensing Course
February 23-27, 1981
University of Alberta
Edmonton, Alberta

ACM Annual Computer Science
Conference
February 24-26, 1981
St. Louis, MO

Oil Spill Conference, 7th
March 2-5, 1981
API
Atlanta, GA

21st International Scientific
Meeting on Space
March 25-26, 1981
European Space Agency
Rome, Italy

15th Conference on Agriculture
and Forest Meteorology and
Fifth Conference on Biometeorology
March 30-April 3, 1981
Riverside, CA

April - June, 1981

Perspectives in Landscape Ecology
April 6-11, 1981
NSLE
The Netherlands

Offshore Technology Conference,
13th
May 4-7, 1981
Houston, TX

Fifteenth International Symposium
on Remote Sensing of Environment
May 11-15, 1981
ERIM
Ann Arbor, MI

AGU Spring Meeting
May 25-29, 1981
Baltimore, MD

Advanced Training of Foreign Participants
in Remote Sensing Geologic Interpretation
June 2 - July 3, 1981
U.S. Geological Survey
Flagstaff, Arizona

1981 International Geoscience
and Remote Sensing Symposium
(IGARSS'81)
June 8-10, 1981
IEEE
Washington, D.C.

Fourth Conference on
Atmospheric Radiation
June 16-18, 1981
AMS
Toronto, Ontario

Conference on Lasers and
Electro-Optics (CLEO)
June 10-12, 1981
Washington, D.C.

July - September, 1981

POAC '81
July 27-31, 1981
Université Laval
Quebec City, Quebec

XX General Assembly of URSI Open
Symposium on Remote Sensing
August 11-12, 1981
Washington, D.C.

Seventh Canadian Symposium on
Remote Sensing
September 9-11, 1981
Winnipeg, Manitoba

If there are subject areas which you would like to see covered, conferences which have been missed or upcoming conferences which you are aware of or for further information contact:

Canada Centre for Remote Sensing,
TIS (Lidia Jurkiewicz),
717 Belfast Road,
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