Australian Landsat Station

DIVISION OF NATIONAL MAPPING
DEPARTMENT OF RESOURCES AND ENERGY

NEWSLETTER

FOR THE REMOTE SENSING INDUSTRY

CONTENTS

NEXT ISSUE

The next issue of this newsletter will be known as ACRES NEWS. Although we aim to publish biannually, the upgrade decision has generated a great deal of additional activity and made it impossible to achieve the required deadlines. We apologise for the delay but hope that you will find this issue worth waiting for. Organizations and individuals wishing to contribute to the next issue of this publication are invited to present their work in type-written form on A4 paper and ready for publication. Illustrations should be presented in camera-ready form with captions attached. We look forward to receiving your contribution soon!

A GOOD NEWS ISSUE

Government initiatives which have seen the start to implementation of recommendations contained in the Madigan Report - A Space Policy for Australia - constitute very good news indeed, especially where these concern remote sensing. The decision to upgrade the Australian Landsat Station (Now: The Australian Centre for Remote Sensing) for direct reception of Landsat TM and SPOT data ensures the continuation and further development of expertise in the application of remote sensing data in Australia. The successful launch of SPOT and the excellent performance of its operational systems further help make 1986 a vintage year for remote sensing.

COVER STORY

Seeing the Trees from Space

The data for this false colour image of the Wagga Wagga area was recorded by the French satellite SPOT from 835 km altitude, on 23 March 1986 only one month after launch. It was down linked over Europe for archiving at the SPOT Image processing facility in Toulouse (France). The data was recorded in the Multispectral mode with 20 m pixels in visible green, visible red and near-infrared, and was pre-processed by SPOT Image before dispatch to Australia. Further processing and contrast enhancement of this 20 km x 20 km sub-scene at the ALS through its Image Writing Service resulted in this spectacular 1:100 000 false colour image. The red colours correspond to healthy vegetation, green to red soils of fields ready for sowing, and blue indicates water, urban/industrial areas, roads and bare ground.

Throughout the image and particularly along the Murrumbidgee River individual trees can be seen as red dots. In the south-west quadrant, business and industrial areas (blue) of Wagga Wagga contrast sharply with the vegetated (red) urban areas, parks and sportsfields. Fairways and greens of the golf course can be seen as irregular red lines just west of the town. In the country, patterns of ploughing and drainage can be recognised, and individual paddocks, fields, dams and farm buildings can be identified and the status of crops can be assessed. The airport is clearly visible in the south-east corner. Digital and photographic data of this kind and at the resolution shown here are invaluable to resource managers in many disciplines. An example of 10 m resolution panchromatic data is shown elsewhere in this issue.

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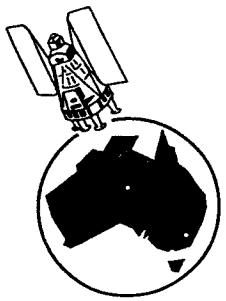
LATE NEWS



We have changed our name . . .

THE

AUSTRALIAN LANDSAT STATION

is now the . . .

AUSTRALIAN CENTRE FOR REMOTE SENSING

Following the Australian Government's decision to upgrade the Australian Landsat Station's facilities at Alice Springs and Canberra to be able to receive and process data from the new generation of remote sensing instruments, the ALS is to be renamed the "Australian Centre for Remote Sensing". The official acronym for the name will be "ACRES".

The new name more accurately reflects the expanded capabilities planned for the Centre and its role as the Commonwealth Government's principal facility and archive for Earth resources data from satellite remote sensing instruments.

Initial capabilities following upgrade, will allow for the reception, archiving and processing of data from high resolution instruments such as Landsat's Thematic Mapper, and from the French satellite SPOT with high resolution stereo imaging and quick revisit capabilities.

The Australian Centre for Remote Sensing is a Commonwealth Government remote sensing data dissemination and information service provided by the Department of Resources and Energy through the Division of National Mapping.

The name change takes effect as from 1 October 1986.

Advice of this change was received in the post editing phase of this newsletter. Any reference to the Australian Landsat Station or ALS should be read as the Australian Centre for Remote Sensing or ACRES. Subsequent issues of this newsletter will be known as "ACRES News".

ALS NEWS

ALS UPGRADE!!

The Australian Landsat Station will be upgraded to be able to receive and process data from the new generation of satellite remote sensing instruments, which includes Landsat's Thematic Mapper and the SPOT-HRV sensors.

The announcement was made by the Minister for Resources and Energy, the Hon. Senator Gareth Evans Q.C. on 19 August 1986. Senator Evans said that the Australian Government has agreed to the expenditure of $15 million over the next three years for the upgrading and replacement of equipment at the ALS receiving and processing facilities in Alice Springs and Canberra.

An amount of $1.5 million has been allocated in the 1986 - 1987 Federal Budget for the commencement of the project, which is expected to be completed towards the end of 1988. Reception and archiving of the new data should commence during the first quarter of 1988, with processed products becoming available about six months later.

Following the completion of the upgrade, the ALS will be able to provide the much sought after data from Landsat's Thematic Mapper and from the French satellite SPOT. The Thematic Mapper provides data over the same large area as the current Multi-Spectral Scanner (MSS), but at much higher resolution and a wider range of spectral channels, including a thermal channel. The SPOT sensors provide even greater spatial resolution, albeit over a smaller area, and through off-nadir viewing capability revisit periods of only a few days are possible. Another benefit of off-nadir viewing is that very high resolution stereo pairs can be acquired, for three dimensional viewing of land surfaces and for digital terrain modelling.

While the upgrade of the Australian Landsat Station facilities is in progress, the lower resolution MSS data will continue to be made available and every effort will be made to obtain new high resolution data from overseas sources, albeit in limited quantities.

The decision to proceed with the upgrade of the Australian Landsat Station in a time of severe economic restraint, is a clear indication that the Government recognises that continued access to satellite remote sensing data will significantly benefit all resource related industries and enable more extensive and cost-effective monitoring, management and development of our natural resources.

Geology and mineral exploration, with a long history of effective use of remote sensing data from earlier resource satellites, will benefit greatly from the availability of data from the new generation of remote sensing instruments. The data will enable the detection of specific rock and mineral types and allow for more detailed and complex structural analysis in search of economic mineral and energy deposits.

In agriculture much benefit will be derived from the high resolution data by acquiring the ability to markedly improve crop yield predictions and by the early detection and diagnosis of stresses in crops caused by diseases, drought, rising water tables and land degradation. The new data will also help in the detection and monitoring of infestations by pests and noxious weeds. In rangeland management, the improved data will facilitate better management practices and help optimize the use of natural pasture through the monitoring of grazing pressures. The data will further facilitate more effective pasture improvement programs.

Environment monitoring and land use planning will be greatly assisted by being able to better discriminate between vegetation types, by finer terrain detail and by the ability to carry out moisture content analysis. Fuel load assessments in fire prone areas can help prevent disastrous bushfires through allowing early preventative measures to be taken. The ability to derive multi-level inventories of forest and rangeland resources will assist many government and private environment monitoring agencies.

Mapping applications, which have in the past been constrained by the high cost of conventional methods and the low resolution of earlier satellites, will derive much benefit from the finer detail and the availability of stereoscopic image pairs. The new data will lead to reductions in the time needed to complete the revision cycle for topographic maps and add to a greater completeness and accuracy of thematic maps for the Atlas of Australian Resources.

In narcotics investigation, the improved spectral and spatial resolution of the new satellite systems may contribute to the early detection fo cannabis crops, especially where these are grown in small quantities amongst other crops. Frequent observation of areas under suspicion at the time that illicit crops reach maturity is an important factor in interrupting the drug trade at the source.

Water resources management needs improved accuracy in land use and flood inundation mapping. The monitoring of flood water movement and levee performance at various stages of a flood will enable more effective development of flood mitigation schemes and water storage facilities. The detection and control of pollution of surface water and ground water will be greatly aided by the higher spectral and spatial resolution of the new data.

Marine applications of satellite image data will be

significantly enhanced by the better resolution both above and under water in terms of the ongoing work in delineation of land/sea boundaries, charting and classification of reefs, shallow water mapping, sedimentation, and ocean current mapping. The added ability to measure sea surface temperatures and the detection of chlorophyll concentrations, both indicative of fish habitation, should be of great assistance to the fishing industry.

In addition, the upgrade of the Australian Landsat Station will also provide indirect high-technology benefits, by underpinning the continued development of Australia's remote sensing expertise, thereby contributing to marketing of analysis and interpretation systems and skills overseas.

SPOT DATA DISTRIBUTION IN AUSTRALIA

Following the successful launch of the French commercial remote sensing satellite SPOT on 22 February 1986 and the completion of the in-orbit check out and calibration phase, the Division of National Mapping (NATMAP) is negotiating with SPOT Image (the French marketing organisation for SPOT data), for the ALS to become a distributor of SPOT products. Upon the successful completion of the negotiations, it is expected that SPOT products will be available through the existing ALS distribution network. In the interim, the ALS has an informal arrangement whereby SPOT products can be ordered through the station.

The NATMAP license will entitle the ALS to purchase, reproduce, generate and sell SPOT products to the Australian user community on a non-discriminatory basis. However, SPOT products, derivatives and value added products are subject to very strict copyright conditions, protecting the commercial interests of SPOT Image and the French space agency, CNES.

In its role as the national distributor for SPOT products, the ALS will be building up a national archive of digital and photographic masters of SPOT data to facilitate the rapid turn-around of orders the Australian user community is accustomed to from the ALS.

First acquisitions of images however, will be subject to turn-around times that apply at the SPOT Image processing facility in Toulouse in France, or other overseas ground stations if applicable. Although no figures on delivery times can at this point in time be quoted, an initial peak demand for SPOT data may result in some delays. Customers are therefore advised to place their orders well in advance of the date of requirement. Details on the SPOT system and product range are given in the Features section of this newsletter.

For the selection of images, SPOT Image operates a fully computerised catalogue of all images that have been archived world wide. The catalogue is operated and updated continuously on a 24 hour basis. For each scene the following details are recorded: the catalogue and grid reference system identification numbers, acquisition date, spectral mode, viewing configuration, viewing angle, image quality, cloud cover percentage, and the level of processing. In order to be able to provide the best possible service to its customers, the ALS has established direct access to this data base from the Belconnen facility.

If a required image is not available from archive base, or a customer wishes to acquire imagery on a specific date, a request to program the satellite can be made. No extra cost is (at present) involved in making a programming request. However, the customer making the request is obliged to purchase the ordered product, following successful acquisition of the data. The ALS has established an electronic communication link with SPOT Image to facilitate quick and easy service. ALS user services staff will be happy to discuss and assist in making your SPOT programming request.

ELEVENTH DESIGNATED REFERENCE CENTRE

The School of Applied Science at the Canberra College of Advanced Education (CCAE) has become the eleventh institution to be formally recognised as a designated Reference Centre of the Australian Landsat Station. The close proximity of the CCAE to the ALS, the Division of National Mapping and the Australian Survey Office in Belconnen as well as to A.C.T. offices of other government and private users, offers an opportunity for effective co-operation in the area of remote sensing applications. The School has particular strength in techniques for natural resource management and has offered courses in Earth and environmental sciences since 1970, including the use of remote sensing data. Specialist remote sensing courses will be offered at post graduate level in the near future.

Enquiries should be directed in the first instance to Dr Brian Button, Dr Peter Morgan or Mr Eric Best of the Resource Science Division, School of Applied Science, Canberra C.A.E., PO Box 1, Belconnen 2616. Phone (062) 52 2565.

AUSTRALIAN NEWS

US/AUSTRALIA JOINT SCANNER PROJECT

As a result of the high standing of Remote Sensing in Australia, a unique invitation was received from the National Aeronautics and Space Administration (NASA) and the Jet Propulsion Laboratory (JPL) to participate in a joint research project here in Australia.

Following the acceptance of this offer by a group of participants involving both private enterprise and government agencies (Table 1), the NASA C-130 Hercules aircraft, believed to be the most sophisticated airborne remote sensing facility in existence, arrived in Australia in October 1985.

During its 30 day presence a total of 74 hours and 24 minutes of data was collected over 54 test sites scattered throughout mainland Australia (Fig 1). The outstanding success of the acquisition phase of the two year research project is largely due to the excellent organisation by Dr. Jon F. Huntington and co-workers at CSIRO's Division of Mineral Physics, the excellence and professionalism of the NASA C-130 crew and the fine weather conditions that prevailed over most of the test sites at the time of deployment. These three factors resulted in more data having been collected over Australia than over any other country in the world.

The Joint Scanner Project data will aid research on a diverse range of topics which include geological investigation and the detection of mineral deposits, agricultural applications, forestry, vegetation mapping, wetland and rangeland mapping, conservation, soil salinity and degradation processes, and groundwater hydrology.

LIST OF AGENCIES

Australian Landsat Station
Australian Survey Office
BHP Exploration Pty Ltd
BMR
BP Minerals Australia
BP Petroleum
CRA Exploration Pty Ltd
CSIRO Division of Mineral Physics and Mineralogy
CSIRO Division of Groundwater Research (With CSIRO Maths & Stats, CSIRO Minerals & Geochemistry & WA Department of Lands)
CSIRO Division of Water and Land Resources
Defence Research Centre, Salisbury
ESSO Minerals
NASA/JPL
NERC
NSW Soil Conservation Commission
Placer Pacific Pty Ltd
Qld Department of Mapping and Surveying (With Qld Department of Water Resources)
SA Centre for Remote Sensing
Sumitomo Metal Mining Co Ltd
University of NSW, Centre for Remote Sensing
Western Mining Corporation

Table 1

The Sensors

The sensor package included the NS001 Thematic Mapper Simulator, the Airborne Imaging Spectrometer (AIS), the Thermal Infrared Multispectral Scanner (TIMS) and two aerial cameras, a Zeiss 15/23 with a 153 mm lens and the AIS Nikon 35 mm tracking camera, used for location identification and tracking respectively.

NS001 Thematic Mapper Simulator

The NS001 is a remote sensing instrument with detectors in spectral bands similar to those of Landsat's Thematic Mapper, but with the addition of a 1.2 μm short wave infrared band useful for vegetation discrimination and plant moisture studies. The pixel sizes range from 2.5 m - 25 m and the swath widths from approx. 1.4 km - 14 km at altitudes ranging from 1 km - 10 km respectively. Like the Thematic Mapper, the NS001 uses a scanning mirror to sweep across its 100 degrees field of view and it can do this at variable speeds ranging from 10 - 100 scans per second. The 8 bit data provides for 256 quantization levels in the spectral bands shown in Table 2.

Airborne Imaging Spectrometer (AIS)

The AIS is designed to operate at an altitude of 3 km at which the pixel size is nearly 6 m and the swath width 183 m. It covers a spectral range of 1.2 μm - 2.4 μm (see Fig 2) at a sampling interval of 9.6 nm over 128 spectral channels, which are adjustable over a window of wavelengths. The average data rate of this instrument is 400 kilo-bits per second. With the AIS it is possible to obtain spectral reflectance curves (Fig 3) over a given area and detect the presence of a range of minerals, provided these are present at the surface. Stresses induced in some species of vegetation through the presence of particular minerals (e.g. sulfides) may also be observed as shifts occurring in the absorbtion spectra for those species.

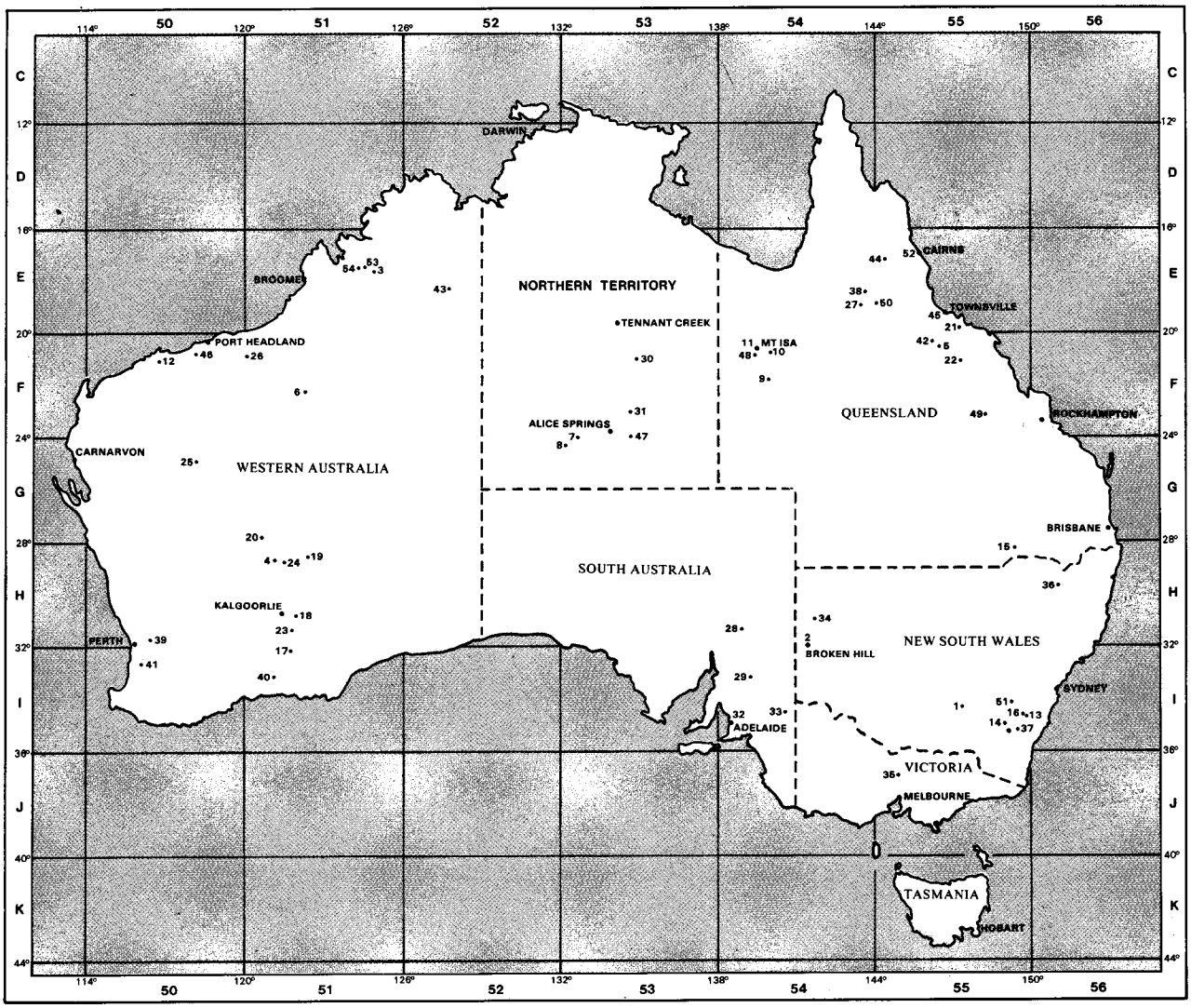


Figure 1 Australian Test Sites

TEST SITES

1 Temora, NSW
2 Broken Hill, NSW
3 Ellendale, WA
4 Leonora, WA
5 Plateau, QLD
6 Broadhurst Range, WA
7 Palm Valley, NT
8 Stairway, NT
9 Phosphate Hill, QLD
10 Mary Kathleen, QLD
11 Mount Isa, QLD
12 Munni Munni, WA
13 Goulburn, NSW
14 Dicks Creek, NSW/ACT
15 Wycanna, QLD
16 Yarralaw, NSW
17 Norseman, WA
18 Yindarlgooda, WA
19 Skull Creek, WA
20 Agnew, WA
21 Burdekin River, QLD
22 Bimurra, QLD
23 St. Ives, WA
24 Murrin Murrin, WA
25 Illawara, WA
26 Coppins Gap, WA
27 Bald Mountain, QLD
28 Wilka Willina, SA
29 Pine Creek, SA
30 Hatches Creek, NT
31 Mt. Riddock/Mordoor, NT
32 Adelaide/Barker, SA
33 Loxton, SA
34 Fowlers Gap, NSW
35 Puckapunyal, VIC
36 Inverell, NSW
37 Braidwood, NSW/ACT
38 Newcastle Range, QLD
39 Yalanbee, WA
40 Cascades, WA
41 Dwellingup, WA
42 Mt. Leyshon, QLD
43 Halls Creek, WA
44 Chillagoe, QLD
45 Townsville (1 & 2) QLD
46 Port Hedland, WA
47 Allambi/Amadeus, NT
48 Gorge Creek, QLD
49 Gregory Mine, QLD
50 Kidston, QLD
51 Junction Creek, NSW
52 Cairns – Green Island, QLD
53 Blina, WA
54 Sundown, WA

NS001 Spectral Characteristics

Band #	Detector	Bandwidth μm	NEΔP %	Region	Use
1	Si	0.45-0.52	0.5	Blue	Iron oxide absorption, some water penetration.
2	Si	0.52-0.60	0.5	Green	Veg. green peak.
3	Si	0.63-0.69	0.5	Red	Veg. chlorphyll absorption, red peak of iron.
4	Si	0.76-0.90	0.5	NIR	High IR plateau of veg.
5	Ge	1.00-1.30	1.0	SWIR	Veg. water stress.
6	Ge	1.55-1.75	1.0	SWIR	Peak for most rocks and soils.
7	InAs	2.08-2.35	2.0	SWIR	Clays, carbonates, micas.
8	HgCdTe	10.40-12.50	NE T= 0.25°K	TIR	Thermal IR.

Table 2 NS001 Spectral Characteristics.

The above bands are similar to those on the Landsat 5 Thematic Mapper with the addition of the 1.2 μm band useful for vegetation discrimination and plant moisture studies.

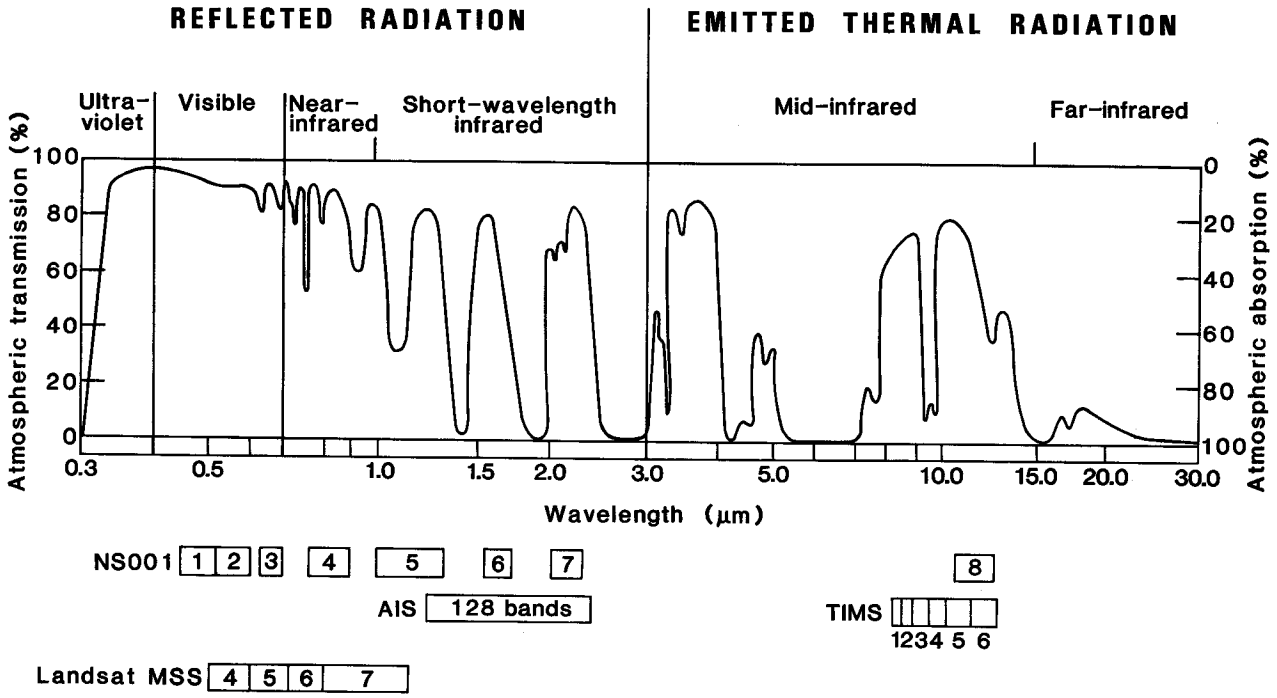


Figure 2 Atmospheric Transmission of Electrical Energy

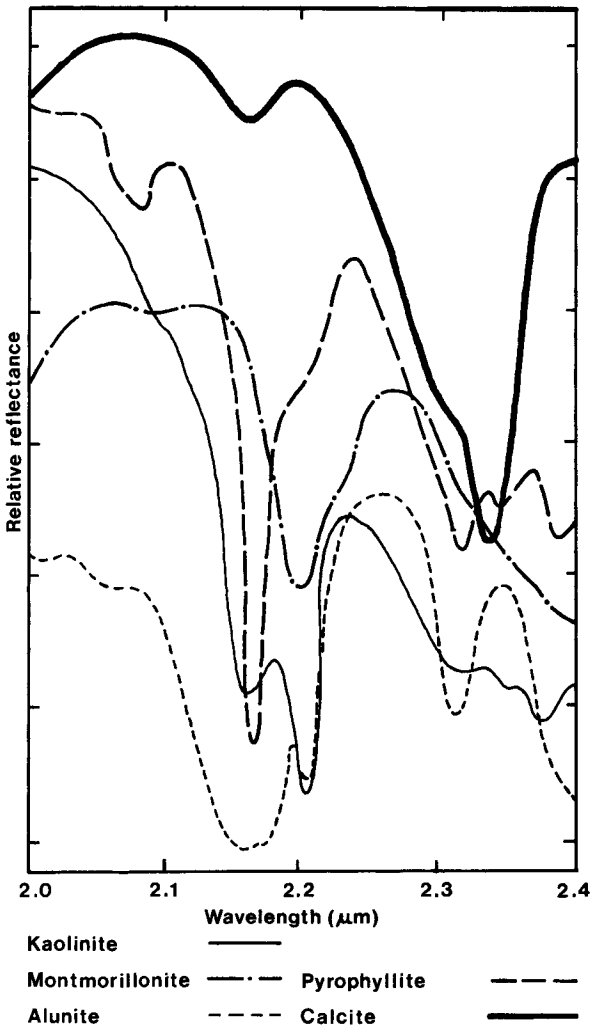


Figure 3 Spectral reflectance curves of several minerals (after 'Imaging Spectrometry: the next step in remote sensing', NASA/JPL Publication).

Thermal Infrared Multispectral Scanner (TIMS)

The spectral characteristics of the TIMS instrument are more aligned with the thermal bands of the Landsat TM and NOAA AVHRR instruments and measure the spectral emittance from the Earth's surface rather than the reflectance as is the case with the AIS. TIMS allows for the first time, the recording of these data in six discrete spectral bands (Fig 3), and makes it possible to differentiate from the air between several rock forming minerals, as well as rock types and weathering products based on their thermal characteristics. Over a field of view of nearly 80 degrees and an instantaneous field of view (IFOV) of 2.5 milliradians the instrument allows for the calibration of each band to within 0.3°C noise equivalent temperature. Because of its high sensitivity both thermally and spectrally the TIMS instrument is superior to earlier thermal scanners.

Data Processing and Analysis

This second phase of the Joint Scanner Project began in Australia with the arrival of the CCTs containing the data from the above instruments and the film products from the two cameras. The tapes are stored at the national archive for the project – the ALS, where some 170 CCTs were copied for safety back-up and off station storage. As part of the ALS contribution, further copies were made and selectively distributed to the participants according to their nominated test sites. As a further contribution, the ALS has also made available free of charge (on a limited basis) the ALS Image Writing Service, to enable participants to present their data as high quality photographic products.

Although, researchers will present their findings at a final meeting at the end of the two year research period in late 1987, CSIRO scientists at the Division of Mineral Physics have already analysed some of the AIS data and discovered that a vegetation filter, which was called for in the design of the system, was not in place at the time of the operation. The absence of this filter causes significant leakage of reflected energy of shorter wavelengths in the near infrared region into the mineral bands, and results in a degradation of the data in terrain containing considerable amounts of vegetation. NASA/JPL managers were unaware of this problem, encountered in the Mary Kathleen data, because previous testing had taken place in much less vegetated terrain in Nevada. Despite this problem however, sophisticated processing techniques employed by CSIRO scientists on the AIS data have shown that much of the information sought can be recovered in all but the severest cases of contamination.

The ALS/NATMAP participation in the Joint Scanner Project concerns the evaluation of the NS001 Thematic Mapper Simulator data. The area chosen is the same as the one selected for the evaluation of SPOT data under the PEPS proposal, the Gregory Mine area just west of Rockhampton in Queensland. The evaluation of the NS001 scanner allows the ALS to obtain processing experience on this type of data ahead of upgrade for the reception and processing of data from the new generation of remote sensing instruments, which includes Landsat's Thematic Mapper and SPOT's HRV. Choosing the same site for both investigations has the obvious advantage of enabling comparison of the quality of both data sets, as well as the quality of our own processing and image generation procedures following an upgrade.

AUSTRALIAN SCIENTISTS PROPOSE DEVELOPMENT OF IMAGING SPECTROMETER

The development of a high spectral resolution imaging spectrometer for Earth resources remote sensing was proposed to the Department of Industry, Technology and Commerce (DITAC) in December 1985. The proposal came from CSIRO's Division of Mineral Physics and Mineralogy in conjunction with the University of New South Wales and the Electronics Research Labor-

atory of Salisbury, South Australia. The proposal was made in response to the Mirrabooka announcement of opportunity by DITAC, which involved the placement of instrumentation on a Spartan satellite of NASA to be refurbished and enhanced in Australia.

The scientific objectives of the project are to test the capability of acquiring high resolution information from space on the short wave infrared (SWIR) spectra of materials at the Earth's surface in Australia, and to test the influence of atmospheric components on these spectra. The data will also permit the definition and development of processing techniques for both onboard and ground processing of data from the next generation of remote sensing satellites.

Technologically, the objectives of the project are to develop within Australian industry the techniques and skills for manufacturing precision components for future remote sensing instruments. In addition, a demonstrated ability of our industry to produce space qualified precision hardware would put it in a position to bid for and win overseas contracts.

JOINT USA/AUSTRALIAN WORKSHOP ON ARID LAND REMOTE SENSING

In October 1986 the US and Australian governments set up a bilateral exchange program for science and technology. The object of the agreement is to facilitate and foster the exchange of scientists between laboratories and/or the exchange of information and ideas on problems of mutual interest via the medium of seminars and workshops. Funding is provided by the National Science Foundation (US) and the Department of Science (Aust) to a small number of projects that are jointly prepared by US and Australian organizers. Scientific meetings and collaborative research of world class has resulted from this sparingly funded bilateral agreement.

A US/Australian workshop was held in Tucson, Arizona in June this year, as one such project funded under the agreement. The theme of the workshop was "Arid Land Remote Sensing" with an emphasis on the spectral characteristics of arid landscapes. There were a total of fifteen participants: six from Australia and nine from the USA. The Australian contingent consisted of two very experienced operational users of satellite data (H.J. Houghton, D.R. Barber) and four CSIRO applied researchers (N.A. Campbell, B.D. Foran, R.D. Greatz, R. Pech). The American contingent was more diverse but surprisingly contained no operational users from state or federal level.

The workshop ran for five days and included a day of field work. The combined opinion of the entire group was that it was an excellent meeting, successful in achieving all its objectives. From a purely parochial point of view it succeeded well beyond my hopes – the Australians presented very good papers in a spirited manner and we came away with the view that we have come a long way in the world of remote sensing of arid lands and are amongst the best. That is not to say that we had little to learn. Very thought provoking papers were presented by A.R. Huete (Arizona) and M.B. Satterwhite (Virginia), as well as a mind-boggling paper by Jim Tucker of NASA.

Very noticeable too, was how well integrated research groups and users are here in Australia and how advanced our applications were compared with the USA. There seemed to be no application success stories from the USA that were comparable to, say, the activities of the Remote Sensing Applications Centre in W.A. Henry Houghton laid them in the aisles with his presentations. It would seem that the USA – the home of remote sensing – has yet to sell and apply the data well to the rangelands in its own backyard. The site-limiting step appears not to be remote sensing, but rather the state of rangeland science and management in the USA.

The collected papers from the workshop are to be published as a special issue of Remote Sensing of Environment, the first issue of 1987. It should make interesting reading.

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REMOTE SENSING EDUCATION IN QUEENSLAND

The Queensland Department of Mapping and Surveying in conjunction with the University of Queensland and the Queensland Institute of Technology have jointly formed a centre for surveying and mapping studies called "The Australian Key Centre For Land Information Studies". The Centre offers remote sensing and digital image processing courses for applications in geology, rangeland management, agriculture and shallow water mapping. As an institution of tertiary education, graduate courses and post graduate courses to PhD level, are offered drawing on local expertise and specialists from around Australia. It is anticipated that graduate courses will also be offered to external students in 1987. For hands-on image processing experience the centre relies on a number of IBM-ATs, running on CSIRO developed micro Brian software.

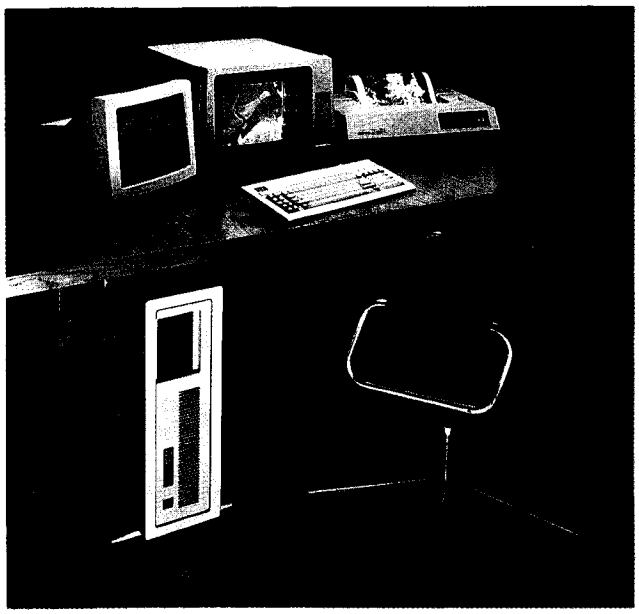
LANDSAT and SPOT
Image data is
Available to anyone and everyone
in Australia and overseas

BRIAN BURSTS ONTO WORLD MARKET

Barrier Reef Image Analysis (BRIAN) software, developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) has become available for worldwide application. Prior to release, the software was thoroughly tested during extensive reconnaisance of the 348 000 km^2 Great Barrier Reef (see ALS NL, Vol 3, No 4, November 1985). The BRIAN software used for this project is now available for use on micro processors as micro-BRIAN.

The original software was developed by Dr David Jupp and colleagues at CSIRO's Division of Water and Land Research and was subsequently adapted for use on IBM XT/AT hardware by the CSIRO team in conjunction with Micro Processor Applications Pty Ltd (MPA). The micro-BRIAN package resulting from these efforts is a powerful, yet inexpensive software package for the analysis of remote sensing data from space and airborne scanners, digitised photographic data, digital elevation data etc. and permits the integration of these data with other data sets. During the development specific care was taken to simplify the user interface for easy operation. The system is interactive and menu driven, while allowing the experienced user to bypass the menu structure and "help" facility.

The many orders received by MPA for the software have come from both Australian and overseas users. Applications include shallow water mapping, agriculture, forestry, fisheries, geology, land management, environment monitoring, and education. Marketing in the US began at Siggraph in Dallas in August 1986 and MPA will be demonstrating the micro-BRIAN system at the World Congress on Remote Sensing, Beijing in November this year.



Micro Brian System

Micro Processor Applications Pty Ltd
101-107 Whitehorse Rd
Blackburn, Vic. 3130 Australia.

AUSTRALIAN ACADEMIC AWARDED FULBRIGHT FELLOWSHIP FOR REMOTE SENSING RESEARCH

Dr Brian Button

Dr Brian Button, Senior Lecturer in Applied Science at the Canberra College of Advanced Education has been awarded a Fulbright Post-Doctoral Fellowship by the Australian American Educational Foundation to undertake research on remote sensing applications in hydrology, water management and irrigated agriculture. Dr Button will be attached to the Geoscience Applications Office of the EROS Data Center at Sioux Falls in South Dakota (U.S.A.) for twelve months from August 1986. He will also visit a number of other major U.S. and Canadian institutions involved in the hydrological applications of remote sensing data.

Dr Button's investigations will focus on four main areas of application:

* mapping of floodplains and flood events.
* conducting regional inventories of water usage and storage conditions, particularly with reference to the use of on-farm irrigation storages.
* airborne techniques for irrigation scheduling with crop vigour assessment based on measurements of infrared reflectance,
* locating near surface aquifers and storage beds using microwave systems.