



# ACRES UPDATE

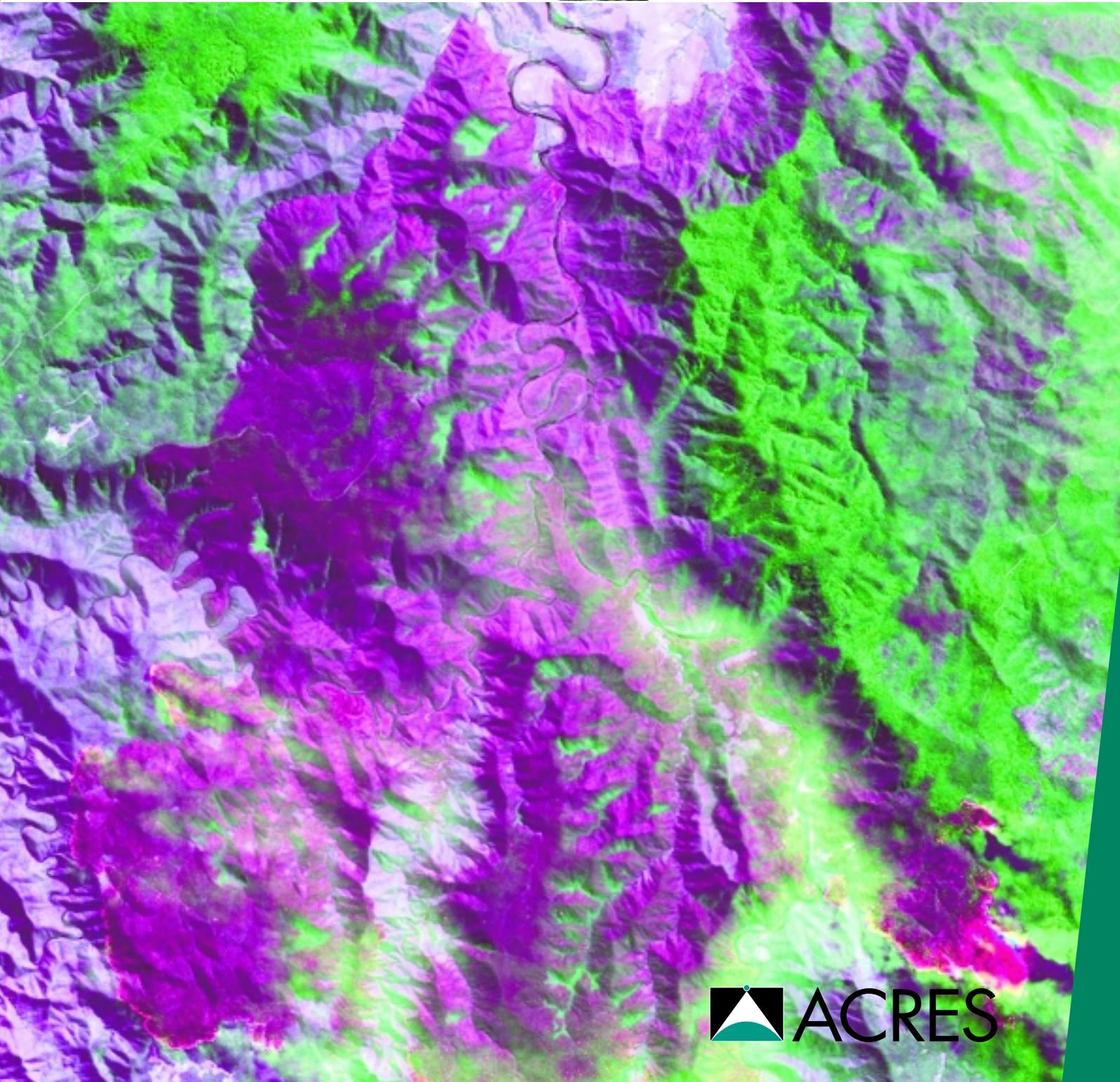
## FEATURES



**ACRES Archive a National Resource 3**



**First MODIS poster of Australia**



# Contents

- 3 ACRES archive a valuable national resource
- 5 Projects using ACRES archive
- 7 Trends for the future – 10th Australasian Remote Sensing and Photogrammetry Conference
- 8 Second X Band antenna at Alice Springs
- 8 ACRES high speed communication link
- 9 ACRES awards contract management to BAE SYSTEMS
- 9 Report on Australia's remote sensing industry
- 10 Upgrade to SAR processor provides "Sea" Look Up Table
- 10 SPOT products, etc
- 11 Landsat 7 update
- 11 Upcoming remote sensing satellites
- 12 Australia's Oil Spill Response Atlas
- 12 Infrared thermal band on MODIS ideal for detecting forest fires
- 13 ACRES 1999/2000 sales report
- 14 Spatial Data Forums a success
- 16 Staff changes
- 17 SPOT Asia Pacific sales network seminar
- 17 Canberra to host GDIN Conference 2001
- 18 Beijing hosts meeting of Landsat ground stations
- 18 ACRES RADARSAT sub-distributor meeting
- 19 Spillcon 2000
- 19 Conference calendar
- 20 ACRES Distributors

**Cover: Landsat 7 ETM Plus image acquired of fires in northern New South Wales on 8 October 2000, showing bands 745 RGB.**

## PUBLICATION DETAILS

Published by ACRES, Australian Centre for Remote Sensing, a business unit of Australia's national mapping agency, AUSLIG, Commonwealth Department of Industry, Science and Resources.

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Belconnen ACT 2616, Australia  
FREECALL 1800 800 173



## MANAGER'S MESSAGE



In August, I was privileged to attend the 10th Australasian Remote Sensing and Photogrammetry Conference in Adelaide. This biennial event, held under the auspices of the Remote Sensing and Photogrammetry Association of Australasia (RSPAA), provided a valuable insight into the state of the industry in the region.

It was particularly encouraging to see such a big roll-up of presenters and exhibitors, with many familiar faces but also some new players making their first public appearance on the Australian scene. This suggested that the industry is still very much alive and kicking, despite the occasional setback and the ongoing hard times in traditionally strong applications sectors such as minerals exploration.

Of particular interest to me was the rapidly expanding use of the ACRES historical archive, especially in the area of environmental monitoring. A number of excellent applications were presented in the areas of land cover change, wetlands monitoring, flood modelling and land degradation. A number of these interesting applications are highlighted in this edition of *ACRES Update*, and many more can be found in the conference proceedings.

It was clear to me that Australia is really beginning to reap the rewards of the early investments made in the Australian Landsat Station in the 1970s and 1980s. It also highlighted the wisdom of the substantial investment made by AUSLIG throughout the 1990s in rescuing the historical archive from decay, making it highly visible through a digital catalogue and preserving it for future generations. A second generation transcription of the ACRES archive to Digital Linear Tape is now well underway. This will bring the many additional benefits which are outlined in the article on page three.

In September, we welcomed Donna Scott to her new role of ACRES Director of Operations. Donna was previously BAE SYSTEMS Contract Manager at ACRES. She brings a wealth of experience with ACRES operations and a strong commitment to continuous improvement of our products and services. BAE SYSTEMS has nominated a very experienced replacement for Donna in Peter Badowski. Peter comes to us highly recommended from the Tidbinbilla Deep Space Communications Complex, where he has performed a similar role for a number of years.

September also marked the completion of 12 months of successful Landsat 7 product distribution by ACRES. During the month, I attended the 29th annual Landsat Ground Station Operations Working Group meeting. The meeting was very ably hosted by our Chinese counterpart, the China Remote Sensing Satellite Ground Station, in Beijing. The Landsat 7 satellite continues to perform very well and efforts to ensure Landsat's continuity beyond this mission via a Landsat Data Continuity Mission (LDCM) finally appear to be gaining some momentum. With the continuity provided by Landsat and SPOT and the exciting new capabilities that should become available in the next few years, the prospects for satellite remote sensing in Australia continue to appear bright.

Paul Trezise

# ACRES ARCHIVE A VALUABLE NATIONAL RESOURCE

**A program to preserve Australia's archive of satellite imagery was announced by Parliamentary Secretary to the Minister for Industry, Science and Resources, Warren Entsch and ACT Senator, Margaret Reid, in August 2000.**

*The ACRES Archive holds 21 years of data from the Landsat satellites*



*Landsat 2  
Sydney 1979*



*Landsat 5  
Sydney 1991*



*Landsat 7  
Sydney 2000*

Australia's valuable national resource of satellite imagery will be preserved by converting it from optical tape to industry standard digital linear tape over the next two years.

The new digital linear tape technology and an automated tape library system developed by ACRES will provide many benefits, such as faster access to the archive for ACRES customers.

The archive has been used extensively in the last decade for monitoring changes in land cover, soil salinity and land degradation.

The ACRES archive provides a comprehensive historical coverage of satellite data over all of Australia (including external territories within ACRES reception circles) and New Zealand. The archive is a significant resource for studies involved with environmental monitoring, mineral exploration and change detection.

The ACRES archive holds data from a variety of satellites commencing with Australia's first acquisition in 1979. The table below shows the satellites and sensors from which archived data is available as well as the dates and the total number of scenes acquired by each sensor.

## Duplicate archive

ACRES is undertaking a project to create two new copies of the entire archive — one for everyday use and the other to be stored off-site for added safety and risk management. Until recently, the ACRES archive was stored using optical tape technology. Support for this technology, however, is being phased out, necessitating a change to an alternate form of storage. Prior to optical tapes, high-density magnetic tapes were used.

The new archive and duplicate archive will be stored on digital linear tape (DLT). DLT is ideal for this purpose because it is easy to store, easy to

handle and is compatible with automated tape libraries. DLT has become the industry standard for storing large data volumes such as the ACRES archive.

## Re-cataloguing the archive

In addition to copying the entire ACRES archive, all the scenes within the archive are also being re-catalogued. This is an equally important task and involves a major effort that will take an estimated two and a half years. Some benefits to customers will be:

- ▶ Landsat Multispectral Scanner (MSS) browse imagery and metadata incorporated into the Digital Catalogue for the first time;
- ▶ higher resolution and quality browse imagery for existing datasets (eg Landsat TM);
- ▶ more informative metadata, highlighting any data quality issues and allowing more informed choices of data;
- ▶ more archived synthetic aperture radar (SAR) data in the Catalogue; and
- ▶ minor errors in the current Catalogue corrected.

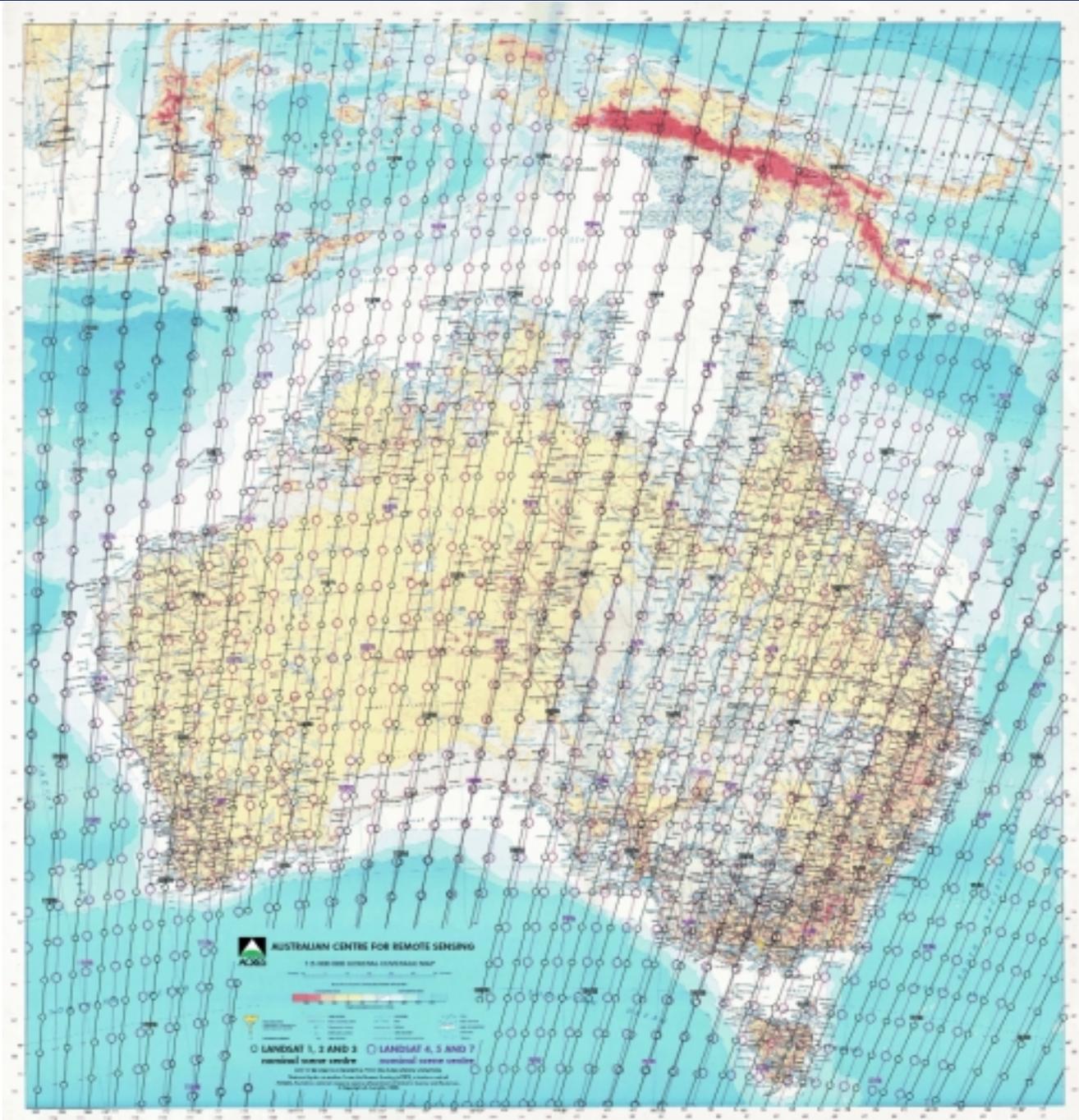
Due to the different types of datasets involved, ACRES plans to re-catalogue data in the following order:

- ▶ Landsat MSS from 1979 to 1989 (Landsat 1-4)
- ▶ SPOT
- ▶ RADARSAT (SAR)
- ▶ ERS (SAR)
- ▶ JERS (SAR)
- ▶ Landsat TM
- ▶ Landsat MSS from Landsat 5.

Information about the progress of re-cataloguing is updated weekly on ACRES What's New web page: [www.auslig.gov.au/acres/whatnew1.htm](http://www.auslig.gov.au/acres/whatnew1.htm)

It is worth noting that MSS data from Landsat 2 and 3 used a different path/row reference system to that of the later satellites. Consequently, the

Satellite and Sensor	Australian imagery	New Zealand imagery	Total number of scenes in archive
Landsat MSS	Sep 1979 – Dec 1997	Nil	139 513
Landsat TM	Sep 1987 – Jan 2000	Nil	177 063
Landsat ETM+	Jul 1999 – now	Jul 99 – now	17 646
SPOT Pan and XS	Jan 1990 – now	Oct 97 – now	548 113
SPOT Mono and Xi	May 1998 – now	May 98 – now	27 008
ERS SAR	Sep 1991 – Mar 2000	Aug 95 – Mar 2000	2 308
JERS SAR	Mar 1993 – Oct 1998	Nil	14 009
RADARSAT SAR	Mar 1998 – now	Oct 98 – now	5 785



Landsat database on the ACRES catalogue has been split into two groups — one that covers Landsat 2 and 3, and one that covers Landsat 4, 5 and 7.

The coverage map above shows paths and rows for all Landsat satellites. It can be downloaded from the ACRES ftp site at: [ftp.auslig.gov.au/pub/acres/coverage\\_maps/](ftp.auslig.gov.au/pub/acres/coverage_maps/)

The new browse imagery for all sensors will be similar in quality to that of the Landsat ETM+ browse imagery. This browse imagery is a very close representation of the final data that would be supplied to customers.

### Changes to catalogue metadata

When customers search the online Digital Catalogue, detailed metadata for each scene is included in the search results page. This information helps customers determine which images

meet their requirements. Some changes in the metadata fields of the Catalogue have been made to provide more useful and relevant information about the data quality.

A new web page has also been developed to describe all the metadata fields and any relevant data issues. The page can be accessed via links at the bottom of each Digital Catalogue page.

With the provision of the new metadata information, three fields have been deleted from the previous metadata information: Synch Loss Data count; Frame Synch Errors; and Num-Missing swath.

These fields were no longer relevant due to the different way ACRES samples and checks the data for cataloguing. They were deleted to avoid confusion.

### Bit Error Rate Image Quality (random distribution of errors)

Less than $1 \times 10^{-7}$	"Error free" data (less than one error pixel in 1,000,000)
$1 \times 10^{-7}$ to $1 \times 10^{-6}$	"Excellent" data (less than one error pixel in 100,000)
$1 \times 10^{-6}$ to $1 \times 10^{-5}$	"Good" data (artefacts of errors may be detectable) Recommended minimum for "excellent" SAR data
$1 \times 10^{-5}$ to $1 \times 10^{-4}$	Artefacts may be visible in optical data. FEC satellites still excellent.
$1 \times 10^{-4}$ to $1 \times 10^{-3}$	Probably cannot be processed except for FEC satellites.
Greater than $1 \times 10^{-3}$	Probably cannot be processed.

In their place, a Bit Error Rate (BER) estimate field has been included to give an indication of how often a single bit of data may be different from the data that was transmitted from the satellite.

A single Landsat TM scene consists of approximately 2 000 million bits of information. A single bit error would be 1/2 000 000 000 and expressed in scientific notation as  $5 \times 10^{-10}$ .

For optical satellites (SPOT/Landsat), a single bit error will affect the radiance value of a single pixel of a single band of the image. At an increasing BER, this may lead to visible 'speckles' in the image, and eventually an inability for the processing system to create imagery from the data. These artefacts may be much less apparent for higher level products (eg ortho-corrected) where re-sampling and other algorithms have mitigated or eliminated bad data.

With SAR data (ERS/RADARSAT), on the other hand, a single bit error will affect 'thousands' of pixels on the output image. As each pixel is calculated from 'thousands' of radar echo samples, the error contribution to any one pixel is greatly minimised and usually not detectable. Again, increasing BER may lead to an inability to process the data to an image, but with far fewer (if any) visible artefacts.

Recent satellite instruments (Landsat 7, MODIS) incorporate Forward Error Correction (FEC) which can permit detection and correction of a certain number of errors. This should permit error free images if the error rate is low enough to allow processing.

Another more meaningful metadata field that has been added to the catalogue is a Comments field. This replaces the Notes field and will be used for a number of data quality and sensor issues. It will indicate generic data issues, which cannot be detected in the browser and changes in satellite status, for example, Band Gain changes. It will use complete words rather than codes for easy interpretation. It can hold more than one comment.

When using the Catalogue, we suggest you always check the BER and Comments fields before selecting your data.

# PROJECTS USING ACRES ARCHIVE

**Papers presented at the Tenth Australasian Remote Sensing and Photogrammetry Conference have highlighted the importance of preserving Australia's archive of satellite imagery. Governments and organisations are using the ACRES archive to assist them with studies that are important for Australia's economic, environmental and social wellbeing.**

One of the projects which was presented at the conference is making successful use of Landsat Thematic Mapper (TM) satellite imagery to monitor the extent of salt-affected land in Western Australia (WA).

The Land Monitor Project is a multi-agency project of the WA Salinity Action Plan and is supported by the Natural Heritage Trust. Agencies involved in this project include CSIRO, the Department of Land Administration, Agriculture Western Australia, the Department of Conservation and Land Management, the Water and Rivers Commission and the Department of Environmental Protection. These agencies are using sequences of calibrated Landsat TM satellite images integrated with landform information derived from height data, ground truthing and other existing mapping data as the basis for monitoring changes in salinity and woody vegetation between 1988 and 2000 over the southwest agricultural region of WA.

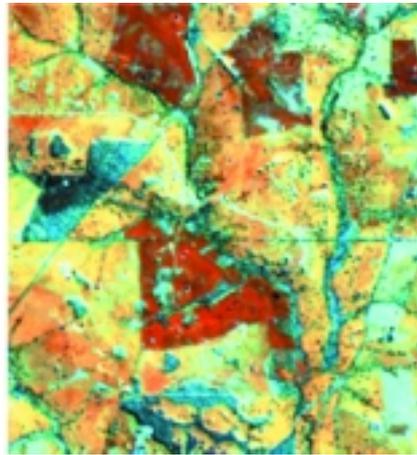
Land salinisation, salinisation of inland waters and maintenance of biodiversity were identified as the three highest priority environmental issues in WA. The Land Monitor Project aims to improve knowledge of the extent and changes in dryland salinity, and to more accurately assess the extent of salt-affected land and the effect of salinity on native vegetation in the area.

Researchers for the project have drawn on previous studies which had successfully used sequences of Landsat TM data for mapping and monitoring salt-affected land and changes in perennial vegetation. They also drew on other studies which had developed a method for predicting the future extent of saline land using TM data in conjunction with high-resolution digital elevation models and expert ground knowledge.

The Land Monitor Project assembles and processes basic datasets, consisting of digital elevation models (DEMs) and sequences of TM data, over the entire southwest agricultural region. Approximately 16 Landsat scenes cover this area of 24 million hectares.

For each scene area, the project uses sequences of spring and summer data from the period 1988–2000. Spring Landsat TM images are considered the optimal time for detecting salt-affected land, as it is the time for maximum growth and maximum spectral contrast for crops and pastures in the region.

To enable multi-temporal analysis of Landsat TM data, the images are accurately registered so that each pixel in the multi-temporal sequence represents the same ground location. Scenes in the project's base mosaics for summer and spring are cross-calibrated using a robust regression method. This method was chosen as it provides a consistent radiometric base across the region.



The Land Monitor Project used satellite images which were co-registered to AMG coordinates at 25m pixel and calibrated to 'like values'. These images show a small subregion of the calibrated imagery for August 1989 and September 1990. Images provided by WA Department of Land Administration.

Using imagery from ACRES archive, the Land Monitor Project is providing WA with a series of base datasets and a range of information products to landcare groups, land managers, participating agencies and the WA Land Information System (WALIS) community. On the Land Monitor website, there are a range of sample products available, such as Landsat satellite imagery overlaid with shire boundaries which give a 'whole of shire' perspective on water, vegetation and soil activities.

([www.landmonitor.wa.gov.au/products/index.html](http://www.landmonitor.wa.gov.au/products/index.html))

### Data integration for wetland monitoring and management: the Mary River, Northern Territory of Australia

Another collaborative project, which has drawn extensively on satellite imagery from the ACRES archive, is using the imagery to monitor saltwater intrusion and weed invasion in the Northern

Territory's Mary River catchment. A paper on this project, funded by the Natural Heritage Trust, was presented at the conference by the Northern Territory Department of Lands, Planning and Environment.

The project is looking to create a basis for an adaptive and efficient wetland management strategy. The agencies involved are using Landsat TM imagery acquired over 1987–1999, in conjunction with aerial photography, video, ground monitoring, geomorphology and land unit mapping. This data is then used to produce time trend analyses of the vegetation changes in the Mary River catchment.

Saltwater intrusion and weed infestation, particularly by *Mimosa pigra*, are serious threats to the Mary River catchment area which is located about 100km east of Darwin.

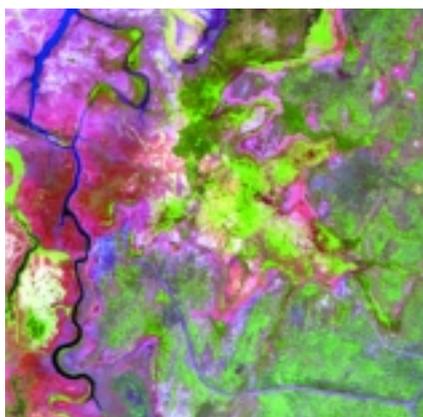
The paper states that over 240 sq km of freshwater wetlands have been destroyed by saltwater intrusion over a 50 year period. For the past 13 years, barrages have been constructed in order to rehabilitate part of the degraded floodplain in the Mary River Conservation Reserve. This area offers visitors year round wildlife observation, fishing, bushwalking and photography.

Efforts to control the spread of the Mimosa weed have included chemical spraying, chaining, burning and revegetation. The project is examining the effectiveness of these control methods in an effort to identify the most suitable management strategies in an area which has international significance for its flora and fauna habitats.

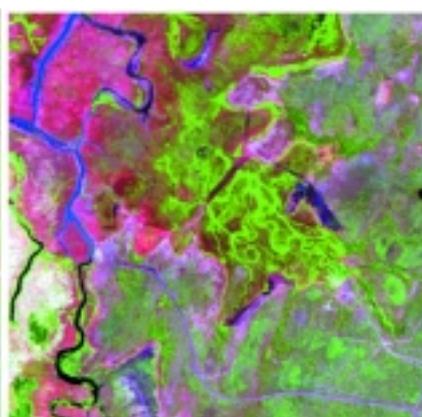
Ultimately, the project aims to track major vegetation changes over time, as well as to develop an ongoing monitoring system, which it is hoped will provide a greater understanding of ecological processes in the wetlands. ACRES historical archive of Landsat satellite data has been an invaluable resource for this project.

*Image time sequences below using the ACRES Archive show the spread and control of Mimosa in 1988, 1995 and 1996. The area shown is 11.5km x 11.5km. Bands 3, 4 and 5 are displayed in Blue, Green and Red. These three images indicate changes in the spread and control of the mimosa pigra weed on one property. In the 1988 image, the bright green area in the central section indicates the presence of mimosa.*

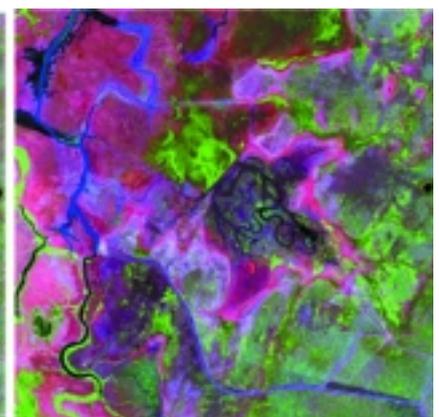
*The middle image indicates how far the weed had spread in seven years. The 1999 image shows how much the weed had decreased after controlled clearing was carried out between 1995 and 1997. Images provided by Northern Territory Department of Lands, Planning and Environment.*



1988



1995



1996

# TRENDS FOR THE FUTURE

## THE 10TH AUSTRALASIAN REMOTE SENSING AND PHOTOGRAMMETRY CONFERENCE



*"Absolutely fantastic interaction amongst Australian colleagues from universities, scientific and industrial research organizations through to commercial firms ... With more international attendance the exposure of Australian expertise and know-how could have been greater."*

Arnold from Canberra

**The 10th Australasian Remote Sensing and Photogrammetry Conference (ARSPC) held in Adelaide from 21 to 25 August provided an opportunity for ACRES staff to observe the key research, development and applications of the remote sensing industry in Australasia. Paul Trezise, John Payne, Rosalie Booth, Lan-Wei Wang, Alla Metlenko and Medhavy Thankappan represented ACRES at the conference.**

Techniques such as data compression of remote sensing and GIS datasets for Internet delivery as well as analyses and applications of hyperspectral datasets were highlighted during the conference. The scheduled new sensors, which will provide data with increased spectral and temporal capabilities, were of great interest to participants.

### **ACRES/RADARSAT workshop**

RADARSAT International (RSI), in conjunction with AUSLIG, organised a workshop at the conference titled "Water, IT and RADAR: Using Information Networks for Integrated Solutions to Marine and Hydrological Applications". RSI presented case studies from Vietnam and Bangladesh on flood and coastal zone management. The workshop focused on the use of information networks for an integrated solution to natural resource management problems. Surveillance for vessels, fisheries and pollution was also covered.

Present at the workshop were representatives from State Emergency Services (SA), Coastwatch, Australian Hydrographic Office, the Australian Geological Survey Organisation, OMNISTAR Pty Ltd, DUNHESS Pty Ltd, Charles Sturt University and the Department of Conservation, Land Management (CALM) WA, Geo Mapping Technologies, Resource Industry Associates, Landcare Research NZ and the Department of Land Administration (WA).

### **ACRES at the Conference Exhibition**

ACRES, in conjunction with RSI and Eurimage, had the largest exhibition booth at the conference and the range of enquiries kept staff very busy. Many users interested in vegetation studies wanted to know when MODIS data will become available and how it will be distributed.

The availability of thermal data from night acquisitions was another popular topic and users were able to access browse imagery of thermal data from night time Landsat 7 passes through the ACRES Digital Catalogue at the stand.

Other areas of interest were:

- ▶ new SPOT-LITE features and the SPOT-LITE catalogue;
- ▶ satellite data for emergency applications, particularly bushfire monitoring; and
- ▶ the availability of hyperspectral data.

The Australian Geological Survey Organisation (AGSO), AUSLIG, RSI and RSI's work using SAR imagery to detect natural oil seeps offshore also generated a lot of enquiries. The newly released AUSLIG product catalogue was a popular handout during the exhibition.



The site for the second antenna.

## SECOND X BAND ANTENNA AT ALICE SPRINGS

**Installation of a second X Band antenna at ACRES Data Acquisition Facility in Alice Springs will ensure ongoing acquisition of the full range of satellite imagery for customers.**

Tenders to install the additional X Band receiving antenna closed on 19 September and the submissions are currently being evaluated.

ACRES Director of Operations, Donna Scott, says that greater demand will be placed on ACRES with the launch of a number of satellites over the next few years — satellites such as AQUA which is the follow-on satellite from TERRA, ENVISAT, SPOT 5 and RADARSAT 2.

“With the community’s increasing demand for acquisitions from a range of satellite sensors, it is becoming more difficult to successfully acquire all the data requested, as many of the satellites overpass Australia at similar times,” said Ms Scott. “An additional antenna will allow us to continue meeting the demands for national data coverage of a growing range of satellite imagery.

“ACRES is committed to providing reliable, uninterrupted access to remotely sensed satellite data for the benefit of all Australians. Installation of a second antenna will ensure that access can continue without any possibility of a single point of failure,” she said.

ACRES Production Operation Manager, Mike Pasfield, says that Alice Springs is the ideal choice for the second antenna due to the efficiencies of using existing facilities; existing data capture links, the presence of on-site staff; and its location near the centre of the Australian landmass, which enables broad coverage.

The antenna, which is expected to be available in mid to late 2001, will use the existing data capture systems already in operation at Alice Springs.

ACRES currently tracks and acquires data from the following satellites:

- ▶ Landsat 7
- ▶ SPOT 1, SPOT 2 and SPOT 4
- ▶ RADARSAT 1
- ▶ ERS 2
- ▶ NOAA 14
- ▶ TERRA



Alice Springs staff (L-R):  
DAF Acquisition Manager, Warren Serone, operator, Jeremy Williams and electronics technician, Shaun Evans.

## ACRES HIGH SPEED COMMUNICATION LINK

**ACRES has installed high speed communication links between its acquisition and processing sites in response to an increased demand for Near Real Time (NRT) services. Customers requiring satellite data for agriculture and emergency applications are particularly keen to get the data within a few hours of its acquisition.**

The Wide Area Network (WAN) link connecting ACRES acquisition sites with its Data Processing Facility (DPF) in Canberra is being upgraded and ACRES software engineers are currently testing its capabilities.

Once the new link is operational, ACRES will be offering two new services.

- ▶ Priority processing with a turn-around time of 48 hours or better. This service will be available by December 2000 and will include standard RADARSAT image products, SPOT and ETM+ products.
- ▶ Subscription to MODIS, AVHRR and sub-sampled Landsat 7 data on a daily basis, scheduled for release by March 2001.

ACRES is currently developing software to implement priority processing. This software extracts a window from a full pass and transmits the data to the DPF in Canberra. The transmission time will depend on the network traffic, the product type and the product size. The delivery time to Canberra has been approximated to be about 40 minutes for a single SPOT scene, two hours for RADARSAT standard beam mode data and five hours for an ETM+ scene.

“RADARSAT products will be given high priority because of their cloud free nature and potential scope for emergency applications.

“The high-speed communication link between the Alice Springs and Canberra facilities will ensure that the raw data is transferred to Canberra on the same day, within a few hours of acquisition. ACRES data processing systems, both the Optical Data Processing System (ODPS) and the Synthetic Aperture Radar Processing System (SARPS) are fast, efficient systems capable of generating standard products very quickly.

“We intend to deliver the products to customers by electronic file transfer via ACRES FTP site. Having a reliable, efficient Internet link at the client’s end is crucial to ensure that the data is delivered quickly. Traditional courier services are not effective for same day delivery, which is critical for near real time applications. We hope that this service promotes operational use of remote sensing data for near real time applications in future,” said Dr Reddy.



*Signing the new contract.  
 (Back Row L-R): Donna Scott (ACRES Business Manager), Christine Salcedo (AUSLIG Purchasing and Contract Management), Steve Kirk (AUSLIG Director of Purchasing and Contract Management), Ian Sutherland (AUSLIG Manager Major Projects) and Paul Trezise (ACRES Manager).  
 (Front Row L-R): Ken Rylands (BAE SYSTEMS Program Manager, Operations), Mike Fullgrabe (BAE SYSTEMS Head of Support Services Division), and Peter Holland (AUSLIG General Manager).*

# ACRES AWARDS CONTRACT MANAGEMENT TO BAE SYSTEMS

**The BAE SYSTEMS Support Services Division has successfully re-tendered for the Facilities Management Contract and will again manage the ACRES operation on behalf of the Australian Surveying and Land Information Group (AUSLIG).**

“This is a significant decision because it is the first time the contract has been re-won by the existing contractor,” said Mike Fullgrabe, Head of BAE SYSTEMS Support Services Division.

ACRES is confident that BAE SYSTEMS will continue to provide sound management of the contract while maintaining focus on the timely delivery of quality remotely sensed data products for the benefit of customers.

Peter Badowski, the new ACRES contract manager, believes that BAE SYSTEMS has ‘delivered the goods’ under the previous contract, and, at the same time, taken good care of the needs and expectations of the people employed at ACRES.

“Awarding the new contract to BAE SYSTEMS will maintain employer stability and conditions,” said Mr Badowski.

“BAE SYSTEMS implemented initiatives to improve the ACRES Staff Classification and other processes during the previous contract with positive outcomes for all employees,” he said.

Strong cohesion and close liaison with AUSLIG staff enabled ACRES to implement a host of initiatives during the previous contract period. Many were achieved despite having to relocate facilities to a new building while maintaining a high level of customer service. They include:

- ▶ new automatic acquisition, archiving and cataloguing systems for remotely sensed data;
- ▶ installation and commissioning of a new, high-throughput Optical Data Processing System (ODPS);
- ▶ set up and commissioning of the Integrated Satellite Acquisition Management System (ISAMS); and
- ▶ upgrading of the Digital Catalogue system.

## REPORT ON AUSTRALIA'S REMOTE SENSING INDUSTRY

**The release of a study commissioned by the Department of Industry, Science and Resources provides a unique insight into the industry's history in Australia.**

The report seeks to profile and characterise the remote sensing industry in Australia and also looks into the business groupings and markets in which it operates, the national structure of the industry and the general economic benefits the sector provides to the nation.

The report, prepared by Price Waterhouse Coopers, will feed into the Spatial Information Industry Action Agenda process and provide a useful source of up-to-date information on the remote sensing industry.

The report should also prove useful to the Action Agenda Steering Group in defining and addressing impediments to the industry's growth and development.

For more information on the report, please see the Spatial Information Industry Action Agenda web pages at [www.isr.gov.au/agendas/sectors/siiaa.html](http://www.isr.gov.au/agendas/sectors/siiaa.html) or ring the SIIAA Task Force on 6213 7262.

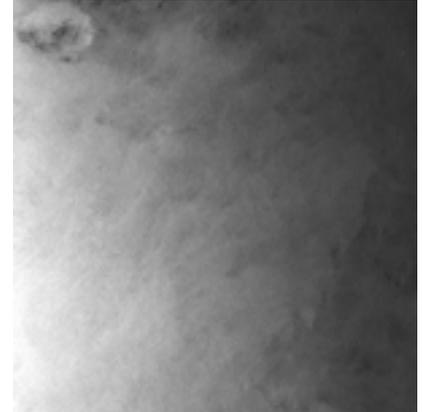
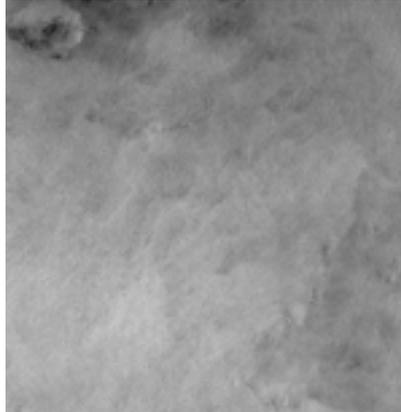
# UPGRADE TO SAR PROCESSOR PROVIDES "SEA" LOOK UP TABLE

**The appearance of oceans in RADARSAT images has been enhanced with the recent upgrade to ACRES Synthetic Aperture Radar Processing System (SARPS).**

The upgrade has provided the capability to apply a "sea" Look Up Table (LUT) to all RADARSAT path oriented or higher level products. The LUTs improve the visual appearance of oceans and were supplied to ACRES by Vexcel Corporation of Boulder, Colorado, USA, suppliers of ACRES SARPS processing system.

Examples on the ACRES web site demonstrate that changes in the radar backscatter with changing incidence angles is not compensated for unless the LUTs are applied. When the image is processed using the "sea" LUT option, it has a uniform distribution of grey tones and good image contrast

*The RADARSAT image below left was processed using the "sea" Look Up Table and shows a uniform distribution of grey tones.*



across the image from near end to far end.

RADARSAT International recommends the "sea" LUT option for imaging of oceans for applications such as identification of oil slicks or seeps detection. The land

area in images using this LUT may show saturation, particularly at steeper incidence angles. Customers interested in the "sea" LUT should specifically request this option when ordering a RADARSAT image from ACRES.

## MORE SPOT PRODUCTS AT REDUCED PRICES

**ACRES and Spot Imaging Services have introduced a number of initiatives to enhance the appeal of SPOT products to the market.**

On 1 July 2000, following a review of prices for satellite image products by ACRES and SPOT Image, prices were reduced by up to 30% in conjunction with the introduction of GST.

The new pricing structure simplified the prices for SPOT panchromatic and multispectral images. SPOT Pan, Xi and XS products are now all the same price. The price for a Full Scene, SPOT PAN, Map Oriented image was reduced from \$2 090 to \$1 830, including GST.

A new Super Scene option was introduced for variable window products, allowing customers to purchase one product that covers 260km in the north-south direction. This compares to a standard full scene of 60km in the north-south direction. Such a large swath of data in one product makes this Super Scene an ideal way to cover large areas where a mosaic would normally be required.

An earlier initiative was also undertaken to provide discounts for multi-date, multi-resolution and stereo SPOT data.

A 50% discount is given to second and subsequent products for scenes which cover the same area, are processed to the same level and delivered on the same medium.

The new SPOT prices are listed at:

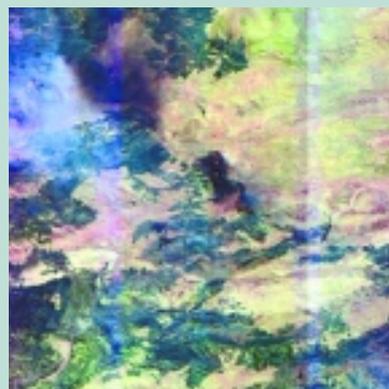
[www.auslig.gov.au/acres/prod\\_ser/spotpric.htm](http://www.auslig.gov.au/acres/prod_ser/spotpric.htm)

## NEW SPOT BROWSE IMAGERY

**New, high quality browse imagery for all new SPOT acquisitions was introduced to ACRES online catalogue on 1 August 2000. The images are the same resolution as before, but have been re-sampled using a wavelet technique which provides a much improved result.**

You can now detect the presence of more subtle features on the imagery including small pockets of cloud and haze. All archival SPOT browse imagery will eventually be converted to this new standard as part of ACRES second generation transcription project.

Please note that all SPOT browse imagery on the ACRES Digital Catalogue is copyright by CNES and must only be used for the purpose of image selection. This copyright notice has also been added to the relevant pages on the Digital Catalogue.



*SPOT2 image acquired on 21 October over Newman, near the Hammersley Range in Western Australia. Haze from bushfires is evident in the top left of this image.*

# LANDSAT 7 UPDATE

## Panchromatic band maintains spatial resolution quality

Fears that the sensor on board the Landsat 7 would degrade have so far proven groundless. NASA has reported that the spatial resolution of the Landsat 7 Enhanced Thematic Mapper Plus (ETM+) panchromatic band data has not degraded since its launch in April last year, despite pre-launch engineering predictions that the sensor would suffer gradual loss of focus.

The Landsat 7 Geometric Calibration Team at Goddard Space Flight Centre in USA has recently analysed test scenes and confirmed that the spatial resolution of the ETM+ panchromatic data is consistently around 18m.

Before the launch of Landsat 7, NASA discovered that the performance of the panchromatic band could degrade to 21m resolution over time because of an error in the sensor assembly. NASA officials

decided the potential degradation to 21m was tolerable and have subsequently granted a waiver to the sensor's manufacturer.

## Processing of foreign data by ACRES

A recent upgrade to ACRES processing systems will enable ACRES to supply data acquired outside the Australian reception circles in the standard Landsat 7 ETM+ product formats. This capability will prove useful in the unusual situation where data within our reception circles could not be acquired by ACRES, but was recorded on-board the satellite and downlinked to a foreign station.

The ACRES Optical Data Processing System (ODPS) and Archive Data Server (ADS) have recently been upgraded. These upgrades will allow standard Landsat 7 ETM+ products to be produced from data sourced externally from ACRES, such as from EROS Data Centre (EDC) in the US. This data is ingested by the ODPS

in a standard ground station exchange format (LOR) which is basically a standard level 0 HDF product.

For data over Australia, the LOR data will be processed by ACRES to any currently available processing level. For orthorectification of data not over Australia, customers will need to supply appropriate maps, Ground Control Points and Digital Elevation Models.

## Changes to ACRES Landsat standard scene sizes

Customers buying standard ETM+ products will now get 5km extra data along track for the same price. The product size for all MSS, TM and ETM+ standard (path oriented) scenes was lengthened to 185km in August 2000. This change ensures that the standard product size matches with the browse image in the ACRES Digital Catalogue.

The table below shows the scene size before and after the change for each Landsat sensor.

Satellite	Sensor	Path oriented scene size (length)	
		Before July 2000 Lines (km)	After July 2000 Lines (km)
Landsat 7	ETM+	6 000 (180)	6 160 (184.8)
Landsat 5	TM	5 733 (172)	6 160 (184.8)
Landsat 4 & 5	MSS	2 429 (199.2)	2 259 (185.2)

## UPCOMING REMOTE SENSING SATELLITES

Satellite	Operators	Brief Description	Launch Date	More Information
EO-1	NASA	10m PAN, 30m MS	16 November 2000	eo1.gsfc.nasa.gov
EROS A1	ImageSat International	1.8m PAN	4th Quarter 2000	www.imagesatintl.com
QuickBird 1	EarthWatch	1m PAN, 4m MS	19 November 2000	www.digitalglobe.com
Aqua (EOS PM-1)	NASA	Multi-sensor mission	7 May 2001	eos-pm.gsfc.nasa.gov
OrbView-4	Orbital Imaging	1m PAN, 4m MS, 8m HS	2nd Quarter 2001	www.orbimage.com
OrbView-3	Orbital Imaging	1m PAN, 4m MS	3rd Quarter 2001	www.orbimage.com
ENVISAT	ESA	Multi-sensor mission	June 2001	envisat.estec.esa.nl
SPOT 5	CNES, Spot Image	3.5m PAN, 10 MS	1st Quarter 2002	www.spotimage.fr
RADARSAT 2	CSA, Orbital Imaging	3-100m SAR	Late 2002	www.rsi.ca
ALOS	NASDA	2.5m PAN & MS, 10-100m SAR	Mid 2003	www.nasda.go.jp

# AUSTRALIA'S OIL SPILL RESPONSE ATLAS

**The use of AUSLIG's GEODATA SPOT-LITE product in Australia's Oil Spill Response Atlas (OSRA) is providing current information on major ports, harbours, and environmentally significant areas of the Australian coastline.**

The well defined offshore and foreshore landmarks in the ortho-corrected SPOT-LITE imagery provide an ideal backdrop for overlaying environmental and oil response information.

GEODATA SPOT-LITE is a detailed satellite image mosaic of Australia that can be purchased and downloaded directly from AUSLIG's website: [www.auslig.gov.au/spotlite](http://www.auslig.gov.au/spotlite)

SPOT-LITE is derived from data acquired by the panchromatic (PAN) sensor on board the SPOT series of satellites. The SPOT-LITE tiles are supplied in industry standard GeoTIFF format so they can be displayed easily by any graphics package that can read TIFF. In addition, many Geographic Information Systems (GIS) and Image Analysis Systems (IAS) can read the geo-referencing information stored in the GeoTIFF header and can be readily integrated with other georeferenced information.

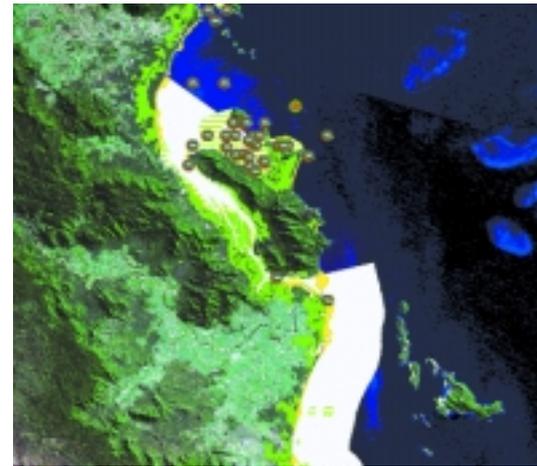
OSRA is a computerised GIS produced by the Australian Maritime Safety Authority (AMSA) under a \$1million allocation from the Natural Heritage Trust, Coasts and Clean Sea Program. Including digital maps, charts, satellite imagery and textual information, the Atlas is a useful resource for identifying marine and coastal areas of sensitivity that could be affected by marine pollution incidents.

OSRA brings together coastal and marine environmental information, in a common format, which covers all Australian States and the Northern Territory.

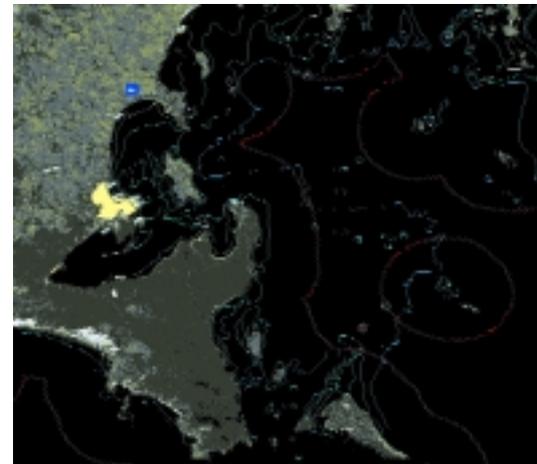
AMSA has produced a five minute video about OSRA and how it assists agencies responding to marine spills occurring in Australian waters. If you would like further information about OSRA or if you would like a copy of the video, please contact:

Ph: (02) 6279 5610  
Fax: (02) 6279 5026  
E-mail: [eps@amsa.gov.au](mailto:eps@amsa.gov.au)

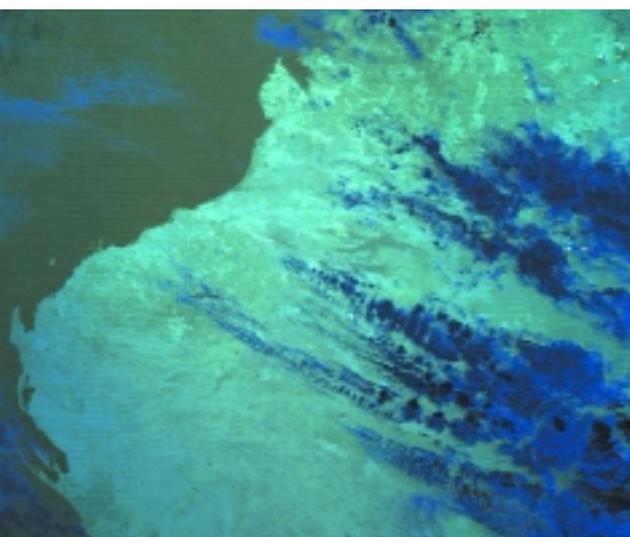
Reference:  
Gilbert, T., 2000, 'The Australian Oil Spill Response Atlas and Introduction of a New Oil Spill Trajectory Model', SPILLCON2000 conference proceedings, <http://www.meetingplanners.com.au/spillcon>.



*Output from the Oil Spill Response Atlas showing selected environmental data for the Hinchinbrook Island region in Queensland.*



*Selected infrastructure layers in the Port Lincoln region in South Australia from the Oil Spill Response Atlas.*



**Acquired on 12 October 2000 by ACRES ground station in Alice Springs, the image above shows several fires as bright white specks around burnt patches. In early October, CSIRO reported massive smoke plumes over this area of Western Australia which attracted the attention of global monitoring agencies.**

## INFRARED THERMAL BAND ON MODIS IDEAL FOR DETECTING FOREST FIRES

Until recently, scientists have relied on NOAA data to monitor forest fires, but the availability of MODIS data will significantly improve such studies in the future.

The MODIS image at left shows the unique capability of the MODIS instrument to detect fires, compared to existing sensors on board satellites such as NOAA.

The MODIS sensor uses middle infrared thermal bands which are more sensitive to heat radiation than the longer wavelength thermal infrared (10 to 12  $\mu\text{m}$ ) channels. This image is a subset of MODIS bands 20 (3.66 to 3.84  $\mu\text{m}$ ), 22 (3.929 to 3.989  $\mu\text{m}$ ) and 23 (4.02 to 4.08  $\mu\text{m}$ ) extracted from orbit number 4339.

ACRES has acquired MODIS imagery in test mode from both Alice Springs and TERRS stations since June 2000. Until recently, MODIS passes have been affected by interference from the Deep Space Network station in Canberra. Since NASA took action to minimise this interference, ACRES has noticed improved MODIS acquisitions from both stations.

# ACRES 1999/2000 SALES REPORT

The 1999/2000 financial year saw the introduction of Landsat 7 into ACRES product range. With a reduction in satellite access fees for Landsat 7 and the increased efficiencies of the optical data processing system, ACRES was able to drastically reduce the price of Landsat products. Landsat prices dropped by up to 70% depending on the scene size and processing level.

Despite the major reduction in Landsat pricing, there was only a small 4% increase in Landsat sales volume. Overall, there was a net decrease in Landsat revenue.

During the year, ACRES also introduced the new parameter of "usage units" for measuring output of satellite imagery to the market. One usage unit for a particular satellite sensor represents the geographical coverage of one standard full scene for that sensor. For example, four separate quarter scene products would represent one usage unit. Hence, usage units represent a consistent measure of the market demand for ACRES data, irrespective of major pricing changes.

The two graphs below right show the usage units for Landsat and SPOT data over the last three years. The use of Landsat data has been increasing for the last three years while SPOT usage declined last financial year.

Table 1 at right shows more details regarding gross sales from the individual product lines during 1999/2000. Of particular interest was the 154% increase in SPOT-LITE sales compared to its previous inaugural year. Sales of radar data (RADARSAT, ERS, JERS) declined in 1999/2000.

The pie chart below left shows the proportion of sales attributable to various application sectors. Sales for environmental monitoring increased to become the largest application sector. This was followed by mining/exploration which showed a small decrease compared to the previous year. The use of data for topographic mapping (excluding AUSLIG internal use) showed a substantial increase over last year's figures to become 10% of total gross sales. The use of data for agricultural applications remained fairly consistent compared to the previous year.

Sales by Application Type 99/00

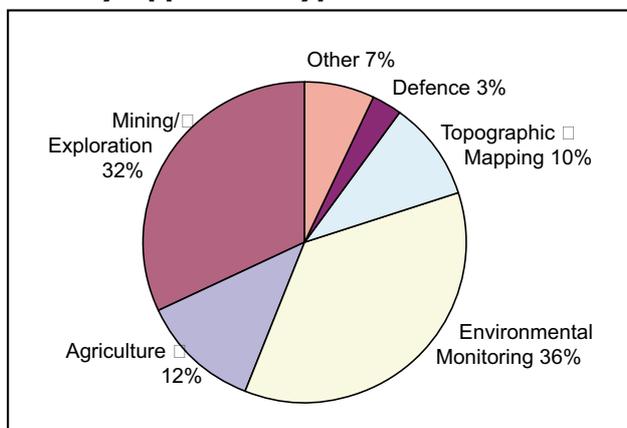
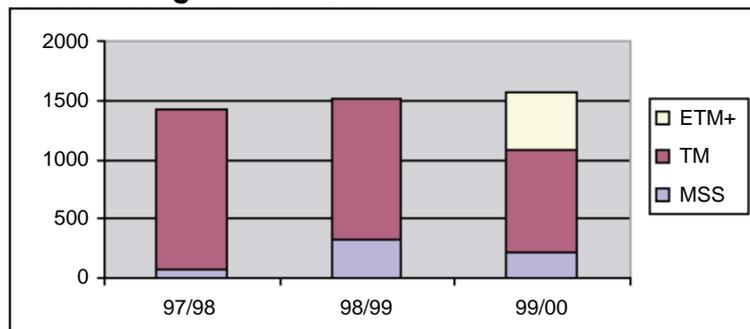


Table 1 — Gross sales 99/00

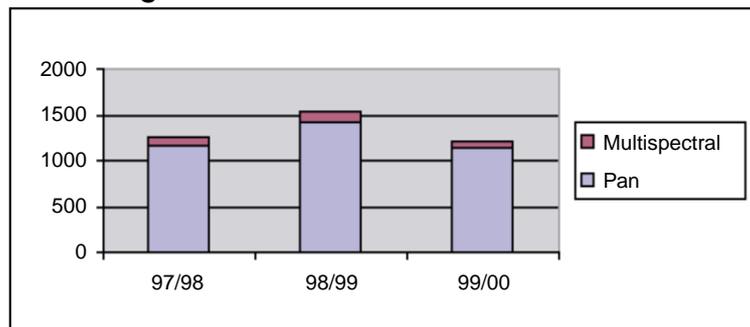
LANDSAT		
ACRES MSS	\$124,700	2%
ACRES TM	\$1,784,533	30%
ACRES ETM+	\$845,760	14%
Space Imaging TM	\$29,598	1%
NRCT – Thailand TM	\$92,198	2%
EROS MSS & ETM+	\$39,118	1%
TOTAL	\$2,915,908	50%
SPOT		
Panchromatic & Mono	\$2,186,457	*37%
Multispectral (XS & XI)	\$63,667	1%
New Zealand	\$18,600	0%
PNG	\$3,100	0%
SPOT-LITE	\$104,668	2%
TOTAL	\$2,376,491	40%
OTHER		
ACRES RADARSAT	\$98,115	2%
Imported RADARSAT	\$229,225	4%
ERS SAR	\$58,089	1%
JERS	\$3,607	0%
Image Writing	\$74,854	1%
Royalties	\$50,247	1%
Freight	\$21,555	0%
Misc	\$49,882	1%
TOTAL	\$585,574	10%
<b>GRAND TOTAL</b>	<b>\$5,877,973</b>	<b>100%</b>

\*70% of the SPOT figure is attributable to AUSLIG internal usage.

Landsat Usage Units 99/00



SPOT Usage Units 99/00



# SPATIAL DATA FORUMS A SUCCESS

**The last in a series of Spatial Data Forums was held in Brisbane on 18 August after a successful, month-long tour which included all Australian capital cities, as well as Lincoln and Palmerston North in New Zealand. Attendances at the forums averaged 90 with the largest audience being 170 at the Melbourne forum.**

Organised by AUSLIG, in conjunction with its remote sensing and digital data distribution networks, the forums included presentations by AUSLIG on its future product plans, and presentations from the leading distribution businesses in the spatial information industry. Presentations were also made by the distributors on successful business applications using AUSLIG digital map data or remotely sensed data.

Copies of the majority of the presentations can be downloaded from AUSLIG's ftp site at:  
[ftp://ftp.auslig.gov.au/pub/acres/spatial\\_data\\_forum/](ftp://ftp.auslig.gov.au/pub/acres/spatial_data_forum/)

Andrea Celentano, ERS Product Manager from Eurimage in Italy, accompanied AUSLIG to each city. He presented recent successful overseas applications of ERS data for monitoring oil pollution and natural seeps, subsidence, DEM production and fusion of SAR and optical data. Andrea also outlined plans for the forthcoming ENVISAT satellite due for launch in mid 2001 and the proposed arrangements in conjunction with AUSLIG for the continued reception and distribution of ERS data and ENVISAT over Australia and its external territories.

The forums had something to offer representatives from the business, government and spatial industry sectors. Feedback was extremely positive with both users and distributors commenting on the value they received from participating.

*"Well organised.*

*Good venue.*

*High quality presentations.*

*Very informative."*

Brisbane

*"Very informative forum.*

*Many new ideas of where we are heading."*

Sydney

*"Very successful forum."*

Sydney

*"I attended the AUSLIG Forum held in Melbourne on the 1st August 2000. It was a great day and I made a number of contacts that will help me in the future. Many thanks to you and your organisation for all your and their efforts."*

Melbourne



*AUSLIG General Manager, Peter Holland, with Andrea Celentano at the Canberra Forum*



*ERSIS presenter, David Stephenson, at the Adelaide Forum*



*GEOIMAGE and ERSIS information stands at the Darwin Forum*



*A big audience attended the Melbourne Forum*



*At the Lincoln NZ Forum (L-R) Andrea Celentano, Medhavy Thankappan, John Payne and Carl McMaster*



*The Sydney Forum*

## STAFF CHANGES



### ACTION FOR DAN JAKSA

**ACRES remote sensing Product Manager, Dan Jaksa, has recently transferred to a temporary position with the Spatial Information Industry Action Agenda Taskforce within the Department of Industry Science and Resources.**

As Product Manager for the last three years, Dan was heavily involved in market research, product specifications, product documentation, monitoring product performance and promotion of remote sensing products. His friendly, cheery nature is well-known by many ACRES customers and well appreciated within ACRES.



### NEW ROLE FOR DONNA SCOTT

**Donna Scott was appointed ACRES Director of Operations on 18 September.** In her previous role as ACRES Contract Manager for BAE SYSTEMS, Donna successfully managed the ACRES contract through a particularly challenging time which included relocating the facilities and completing upgrades of acquisition, archiving and production systems.

Prior to joining ACRES in 1995, Donna was employed by British Aerospace as the Training Coordinator at the Canberra Deep Space Communications Complex at Tidbinbilla.



### WELCOME TO PETER BADOWSKI

**ACRES new BAE SYSTEMS Contract Manager is Peter Badowski. Peter has transferred from the Canberra Deep Space Communication Complex at Tidbinbilla where he occupied a similar position for 12 years.**

Born and raised in Canberra, Peter began his career with the Department of Defence before moving on to a number of other jobs and ultimately finding a niche at Tidbinbilla.

Peter has recently completed a Graduate Certificate in Management and a Graduate Diploma in Employment Relations at the University of Canberra.



### JOHN PAYNE RETIRES FROM AUSLIG

**After 34 years of service, John Payne has moved on to greener pastures from his position as Director of Product Development.**

John began his career as a technical assistant in the geodetic area of National Mapping and later moved into map production where he became the youngest team leader at the time. John worked in every program area of National Mapping, later AUSLIG, and built up extensive experience and knowledge of spatial information products, markets and customers. In 1984, he moved into the sales and distribution area of map products which eventually expanded to include digital map data.

In 1994, John took on responsibility for the distribution of remote sensing products, which later encompassed marketing and product management of all AUSLIG products. He was instrumental in the introduction of many new AUSLIG products, conducting market research for the AUSLIG map series, negotiating data exchange Memoranda of Understanding with other government organisations and building up a large map retailer and wholesaler network.

John represented AUSLIG as a foundation member of the International Map Trade Association and has the distinction of holding a board position throughout its 11 years of operation. In 1998/1999, John was elected president of the Asia Pacific Region of the Association, and still maintains his active role on the board today.

**We thank John for his enormous contribution to AUSLIG and the industry and wish him well in his future endeavours.**

# SPOT ASIA-PACIFIC SALES NETWORK SEMINAR

**The SPOT Asia-Pacific sales network seminar was held in Taipei, Taiwan from 7-9 September 2000. Representatives from SPOT Image, regional SPOT distributors, ground stations and regional subsidiaries of SPOT Image attended the meeting.**

SPOT Image presented its business strategies on developments in the Asia-Pacific region and the global satellite data market. The focus was on promoting information solutions rather than data and moving from one-sensor to multi-sensor offers to take advantage of the complementarity of datasets from both optical and radar sensors. Presentations on market trends indicated greater use of the Internet and IT to disseminate information.

SPOT Image also revealed its plans to have unique services addressing large coverage requirements including online sale of ortho-image products. Participants heard about the concept of having several complementary systems rather than one single system as a possible scenario for SPOT 5 and beyond.

Presentations at the meeting demonstrated the successful use of SPOT data in defence, topographic mapping, thematic mapping, agriculture, telecommunications and risk management. Taiwan's experience with operational applications of SPOT data was also highlighted.

The meeting provided an opportunity to speak about AUSLIG's use of SPOT data in its Mapping Program and to give an online demonstration of GEODATA SPOT-LITE. Due to the current interest in data delivery through the Internet, the SPOT-LITE product generated a lot of interest at the meeting.

Delegates witnessed a real-time data downlink through the SPOT Terminal during their visit to the Taiwan satellite ground station facilities at the Centre for Space and Remote Sensing Research (CSRSR) located within the National Central University, Chung-Li near Taipei.

Delegates also took in some of the sights in and around Taipei, including a cultural dance performance at Taiwan's National Theatre in Taipei and visits to a Tao temple and a handicraft pottery factory near Taipei.



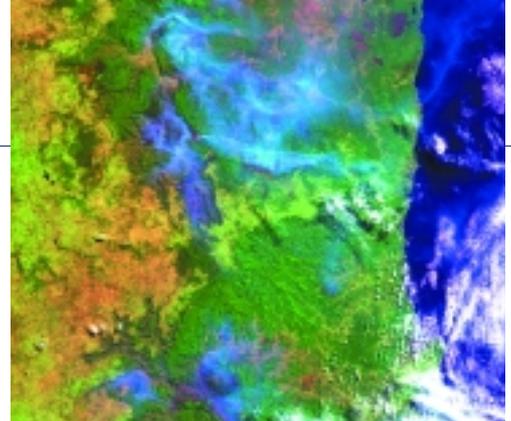
Representatives at the Seminar



At the pottery factory were (L-R) SPOT Image Sales and Marketing Director, Yves Bechacq, ACRES Remote Sensing Account Manager, Medhavy Thankappan and Alain Hirschfeld, SPOT Image.



Taiwan's National Theatre



Landsat 7 image of Northern NSW fires acquired on 8 October 2000

## CANBERRA TO HOST GLOBAL DISASTER INFORMATION NETWORK CONFERENCE 2001

**Projects to save lives and property and protect the environment will be one of the themes at the Fourth Global Disaster Information Network (GDIN) Conference to be held in Canberra in March 2001.**

As a member of the Australian GDIN Conference Committee, AUSLIG, will aim to provide support and advice on matters relating to the availability and use of broad scale geographic information and remotely sensed imagery.

The use of remote sensing technology in disaster management is expected to attract many industry representatives to the conference.

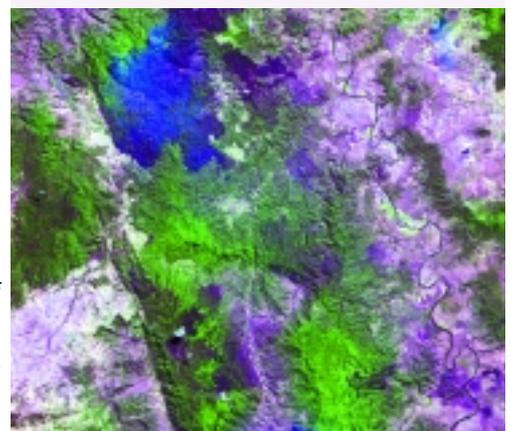
The GDIN 2001 Conference will also aim to:

- ▶ build closer relationships among users and providers of disaster management information; and
- ▶ explore how communication and information management technologies can be used to promote sharing of disaster information.

Emergency Management Australia, a Federal Government agency responsible for reducing the effects of disasters on the Australian community, will host the conference. The organisation promotes a national approach to emergency management in Australia.

For a copy of the conference registration form, brochure and further details see: [www.ema.gov.au/gdin/index.html](http://www.ema.gov.au/gdin/index.html)

For further information on GDIN International see: [www.gdin-international.org/home.html](http://www.gdin-international.org/home.html)



SPOT 4 image of northern NSW fires acquired by ACRES on 5 October

# BEIJING HOSTS MEETING OF LANDSAT GROUND STATIONS

**Representatives at the 29th annual meeting of the Landsat Ground Stations Operations Working Group (LGSOWG) in Beijing in September received good news about the future of the Landsat 7 satellite.**

The satellite continues to operate very well and there are no current indications that it should not remain operational until at least 2007/2008.

All the countries which attended the meeting receive Landsat 7 with the exception of South Africa, Indonesia and Brazil. Indonesia hopes to begin receiving Landsat 7 in November 2000, with Brazil and South Africa following in early 2001.

Demand for Landsat 7 products in the USA has been strong with sales levelling out at around 60 products per day. However, Europe and Canada have shared ACRES experience so far where large reductions in Landsat pricing have only resulted in modest growth in sales volume.

NASA reported on the Landsat Data Continuity Mission (LDCM) which is scheduled for 2005/2006. NASA has decided that the LDCM will be achieved via a "science data buy" — a purchase of data from a satellite that is not owned



*Main entrance to the China Remote Sensing Satellite Ground Station*



*The Summer Palace*



*Beijing Opera*

or operated by the US government. A working group has been established to issue a Request For Proposal (RFP) by mid 2001.

The primary "customers" for the LDCM will be specified as US and international global change researchers. A draft data specification, mission concept and data policy are under development now. Public workshops will be held in the US until February 2001 to discuss these and the draft RFP. It is unclear what involvement Australia and other traditional Landsat partners will have in the LDCM.

As well as participating in the formal meeting sessions, LGSOWG members also had the opportunity to visit the very impressive facilities of their hosts, the China Remote Sensing Satellite Ground Station as well as some of China's magnificent cultural icons including the Great Wall, the Forbidden City and the Summer Palace.

Representatives from Australia, Brazil, Canada, European Space Agency (ESA), Germany, South Africa, Indonesia, Japan, China, plus the US agencies USGS and NASA and the Italian company Eurimage attended the meeting.

## ACRES RADARSAT SUB-DISTRIBUTOR MEETING

**The ACRES RADARSAT sub-distributor meeting was held in Adelaide, South Australia on 20 August 2000 with representatives from Resource Industry Associates, Geoimage, Geo Mapping Technologies, Landcare Research New Zealand, Department of Land Administration (WA) and the Environmental Research and Information Consortium.**

Presentations from RADARSAT International and ACRES addressed a number of organisational, sales and marketing issues, as well as the use of RADARSAT imagery in new applications such as marine, coastal, land and disaster monitoring.

The sub-distributors presented a short report on the use of RADARSAT data and areas for market development in their regions. Flood monitoring was identified as the main area of potential market development.

Discussions at the meeting also highlighted the positive implications for Near Real Time applications arising from ACRES high-speed data link with its acquisition facilities, coupled with increased throughput from the upgrade to the ACRES Synthetic Aperture Radar Processing System.



Antenna at the China Remote Sensing Satellite Ground Station at Miyun



Prof. Pan Xi-Zhe and Steve Covington, USGS



Climbing the Great Wall



The Forbidden City



Delegates in front of China's Great Wall

# SPILLCON 2000

ACRES was one of 13 exhibitors at Australasia's 8th biennial oil spill conference, SPILLCON 2000, which was held in Darwin in August.

With 210 delegates attending, there was considerable interest in the use of geo-spatial and satellite data and how these datasets may assist in decision making and responding to oil spills.

Interest in products such as AUSLIG's GEODATA SPOT-LITE product increased after the Australian Maritime Safety Authority presented their Oil Spill Response Atlas, a Geographic Information System used as a decision support system to respond to oil spills in Australia.

Papers presented at the conference are available from this web address: [www.meetingplanners.com.au/spillcon](http://www.meetingplanners.com.au/spillcon)

For more information about OSRA see:  
[www.amsa.gov.au/me/natplan/toolbox/osra.htm](http://www.amsa.gov.au/me/natplan/toolbox/osra.htm)

## CONFERENCE CALENDAR

**20-24 November 2000**

**Queensland, Australia**

*AURISA 2000*

Tel: +61 2 6257 3299

Fax: +61 2 6257 3256

Email: [aurisa@ausconvservices.com.au](mailto:aurisa@ausconvservices.com.au)

**1-4 December 2000**

**Hyderabad, India**

*ICORG 2000 - International Conference on Remote Sensing and GIS/GPS*

Prof. Iyyanki V Muralikrishna

Fax: +91 40 339 7648

Email: [iyyanki@icorg.org](mailto:iyyanki@icorg.org)

Web: [www.icorg.org](http://www.icorg.org)

**3-6 December 2000**

**Sydney, Australia**

*Mapping Sciences Institute of Australia National Conference*

Tel: +61 2 9332 2900

Fax: +61 2 9332 2911

Web: [www.promaco.com.au/conference/2000/msia/index.htm](http://www.promaco.com.au/conference/2000/msia/index.htm)

**4-8 December 2000**

**Taipei, Taiwan**

*ACRS 2000 - 21st Asian Conference on Remote Sensing*

Ms. Mei Yuan Lai

Tel: +886 3 425 7232

Fax: +886 3 425 5535

Email: [maylai@csrsr.ncu.edu.tw](mailto:maylai@csrsr.ncu.edu.tw)

Web: [acrs2000.csrsr.ncu.edu.tw](http://acrs2000.csrsr.ncu.edu.tw)

**5-8 December 2000**

**Goa, India**

*PORSEC 2000. The Pacific Ocean Remote Sensing Conference on: "Inter-disciplinary Multi-Sensor Studies of Oceans"*

Tel: +91 0832 226 253

Fax: +91 0832 223 340

Email: [porsec@cnsio.re.nic.in](mailto:porsec@cnsio.re.nic.in)

**8-12 January 2001**

**Aussois, France**

*CNES-ISPRS Colloquium on Physical Measurements & Signatures in Remote Sensing*

Inez Burger

Tel: +33 1 4464 1515

Fax: +33 1 4464 1516

Email: [i.burger@colloquium.fr](mailto:i.burger@colloquium.fr)

**27 February-1 March 2001**

**Canberra, Australia**

*OUTLOOK 2001*

Tel: 1 800 806 591 or +61 2 6272 2265

Fax: +61 2 6272 2330

Web: [www.abareconomics.com](http://www.abareconomics.com)

**21-23 March 2001**

**Canberra, Australia**

*Global Disaster Information Network International Conference (GDIN2001)*

Tel: +61 2 6257 3299

Fax: +61 2 6257 3256

Web: [www.gdin-international.org/](http://www.gdin-international.org/) or [www.ema.gov.au/gdin](http://www.ema.gov.au/gdin)

**2-6 April 2001**

**Berlin, Germany**

*3rd IAA Symposium on "Small Satellites for Earth Observation"*

Tel: +49 30 67055 545

Fax: +49 30 67055 532

Email: [iaa.symp@dlr.de](mailto:iaa.symp@dlr.de)

Web: [www.dlr.de/iaa.symp](http://www.dlr.de/iaa.symp)

**23-27 April 2001**

**St. Louis, USA**

*ASPRS Annual Conference*

Tel: +1 301 493 0290

Fax: +1 301 493 0208

Email: [meetings@asprs.org](mailto:meetings@asprs.org)

**9-13 July 2001**

**Sydney, Australia**

*International Geoscience and Remote Sensing Symposium*

Tel: +61 2 6257 3299

Fax: +61 2 6257 3256

Email: [igarss@ausconvservices.com.au](mailto:igarss@ausconvservices.com.au)

Web: [www.IGARSS2001.org](http://www.IGARSS2001.org)

**17-19 July 2001**

**Sydney, Australia**

*Geospatial Information and Agriculture*

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ACRES is a business unit of AUSLIG, Australia's national mapping agency, Commonwealth Department of Industry, Science and Resources.

