AUSTRALIAN CENTRE FOR REMOTE SENSING

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ACRES UPDATE

FEATURES

ACRES

Contents

Cover: Landsat 7 ETM+ image of Lake Eyre, acquired on 6 April 2000.

PUBLICATION DETAILS

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MANAGER'S MESSAGE

It has certainly been a busy six months at ACRES since the last edition of *ACRES Update* hit the streets.

The new century got off to a smooth start and the "millennium bug" did not cause any interruptions to ACRES operations. This result was undoubtedly due to the excellent preparations put in during 1998 and 1999 by ACRES staff and suppliers, under the watchful eye of former Director of Operations, Paul Wise.

The success of ACRES Y2K program and the presentation of a departmental Year 2000 Australia Day award formed a fitting end to Paul's illustrious 30-year career with the Australian Public Service. Paul retired for health reasons in December 1999 after making a tremendous contribution to Australia's mapping and remote sensing industry through his work with Natmap in Melbourne and then later with AUSLIG and ACRES in Canberra. I would like to sincerely thank Paul on behalf of all ACRES staff, distributors and customers and to wish him well in his new endeavours.

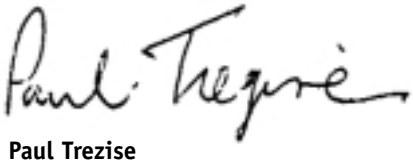
In February, we saw the launch of the long awaited Shuttle Radar Topographic Mission (SRTM). The mission was a great success and generated a tremendous amount of publicity worldwide for our industry. AUSLIG has played an important support role for the mission in Australia and we are all looking forward to evaluating our first local datasets later this year.

While the Endeavour shuttle was still airborne, some key figures from the global remote sensing industry visited Canberra when ACRES hosted SPOT's GOSS and ESA's ESOWG groundstation meetings. SPOT's Chief Executive Officer, Jacques Mouysset, presented an interesting insight into the strategic positioning of his company in the light of increased competition.

In April, ACRES was successful in acquiring MODIS data from NASA's Terra satellite at the first attempt. MODIS is a sensor with a very wide range of potential applications. It forms the transition instrument to the VIIRS sensor aboard NPOESS missions that will eventually supersede NOAA's AVHRR sensor from 2008. Provided the Aqua satellite is successfully launched in December this year, we will soon have access to daily morning and afternoon overpasses from MODIS. ACRES plans to fully support routine MODIS reception and processing within the next few months in collaboration with our partners at TERSS.

Another key priority in the coming months will be to increase the reception capacity of our groundstation network to match the growing workload. In addition, the implementation of high speed data links between the Hobart and Alice Springs reception facilities and our processing centre in Canberra will enable ACRES to provide a range of near real time services for the first time.

I look forward to catching up with many of our *ACRES Update* readers at the 10th Australasian Remote Sensing and Photogrammetry Conference in Adelaide during August.



Paul Trezise

The Atlas II rocket lifts off from Vandenberg Air Force Base on 18 December 1999 with the Terra satellite on board.

TERRA — OBSERVING THE EARTH

The first remote sensing satellite from NASA's Earth Observing System (EOS) was successfully placed into a near polar orbit on 18 December 1999. The Terra Satellite (formerly called EOS AM-1) carries a payload of five sensors that will study interactions between the Earth's atmosphere, lands, oceans, life and radiant energy.

Each sensor on board Terra has unique design features that will enable scientists to meet a wide range of scientific objectives.

Terra circles the Earth in an orbit that descends across the equator at 10:30am local time. The life expectancy of the Terra mission is six years. It will be followed by other EOS spacecraft that take advantage of new developments in remote sensing technologies.

The five sensors on board the Terra satellite include:

- MODIS — Moderate-resolution Imaging Spectroradiometer;
- MISR — Multi-angle Imaging SpectroRadiometer;
- ASTER — Advanced Spaceborne Thermal Emission and Reflection radiometer;
- MOPITT — Measurements Of Pollution In The Troposphere;
- CERES — Clouds and the Earth's Radiant Energy System.

A sensor on board Terra which has generated widespread international interest is the MODIS instrument. Data acquired with MODIS will improve our understanding of global dynamics and processes occurring on the land and in the oceans and the lower atmosphere.

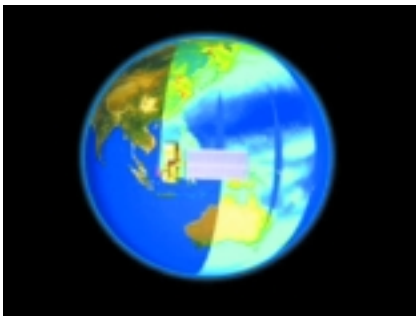
MODIS will play a vital role in the development of validated, global, interactive Earth system models which will be able to predict global change accurately enough to assist policy makers in making sound decisions concerning the protection of our environment.

Terra on board Atlas II rockets away from Earth.

The MODIS instrument provides high radiometric sensitivity (12 bit) in 36 spectral bands ranging in wavelength from 0.4 µm to 14.4 µm. The responses are custom tailored to the individual needs of the user community and provide exceptionally low out-of-band response. Two bands are imaged at a nominal resolution of 250 m at nadir, with five bands at 500 m and the remaining 29 bands at 1,000 m. A ±55 degree scanning pattern at the EOS orbit of 705km achieves a 2,330km swath and provides global coverage every one to two days.

The first MODIS Flight Instrument, ProtoFlight Model or PFM, is integrated on the Terra satellite. The second MODIS flight instrument, Flight Model 1 or FM1, is in the final stages of acceptance testing. Once it is ready, FM1 will be integrated on the Aqua satellite (formerly called EOS PM-1). These MODIS instruments will offer an unprecedented look at terrestrial, atmospheric and ocean features for a wide and diverse community of users throughout the world.

More information on the Terra satellite and MODIS can be found at: **terra.nasa.gov** and **ltpwww.gsfc.nasa.gov/**



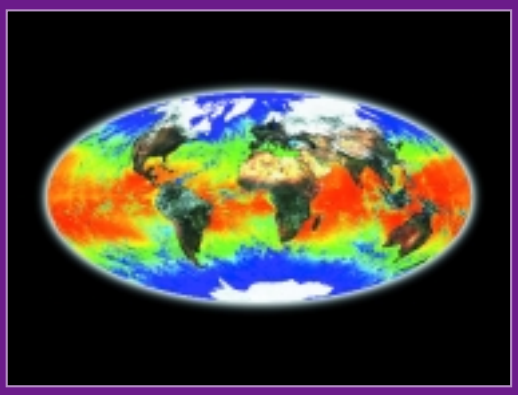
Terra orbiting the Earth acquiring data with the MODIS sensor.

MODIS TECHNICAL SPECIFICATIONS

Orbit:	705 km, 10:30am descending node (AM-1) or 1:30pm ascending node (PM-1), sun-synchronous, near-polar, circular
Scan Rate:	20.3 rpm, cross track
Swath Dimensions:	2330 km (cross track) by 10 km (along track at nadir)
Telescope:	17.78 cm diameter off-axis, afocal (collimated), with intermediate field stop
Size:	1m x 1.6m x 1m
Weight:	228.7 kg
Power:	162.5 W (single orbit average)
Data Rate:	10.6 Mbps (peak daytime); 6.1 Mbps (orbital average)
Quantization:	12 bits
Spatial Resolution:	250 m (bands 1-2); 500 m (bands 3-7); 1000 m (bands 8-36)
Design Life:	6 years

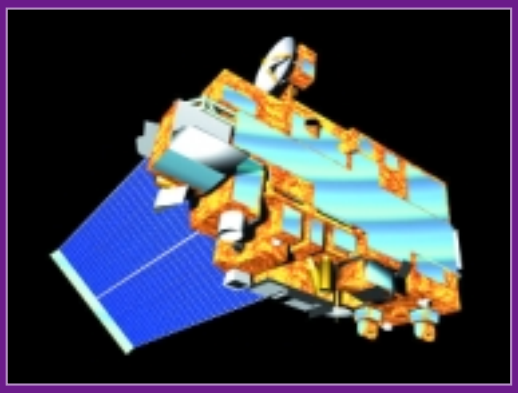
Primary Use	Band	Bandwidth[1]	Spectral Radiance[2]
Land/Cloud/Aerosols Boundaries	1	620 – 670	21.8
	2	841 – 876	24.7
Land/Cloud/Aerosols Properties	3	459 – 479	35.3
	4	545 – 565	29.0
	5	1230 – 1250	5.4
	6	1628 – 1652	7.3
	7	2105 – 2155	1.0
Ocean Colour/Phytoplankton/ Biogeochemistry	8	405 – 420	44.9
	9	438 – 448	41.9
	10	483 – 493	32.1
	11	526 – 536	27.9
	12	546 – 556	21.0
	13	662 – 672	9.5
	14	673 – 683	8.7
	15	743 – 753	10.2
	16	862 – 877	6.2
Atmospheric Water Vapour	17	890 – 920	10.0
	18	931 – 941	3.6
	19	915 – 965	15.0
Surface/Cloud Temperature	20	3.660 – 3.840	0.45(300K)
	21	3.929 – 3.989	2.38(335K)
	22	3.929 – 3.989	0.67(300K)
	23	4.020 – 4.080	0.79(300K)
Atmospheric Temperature	24	4.433 – 4.498	0.17(250K)
	25	4.482 – 4.549	0.59(275K)
Cirrus Clouds Water Vapour	26	1.360 – 1.390	6.00
	27	6.535 – 6.895	1.16(240K)
	28	7.175 – 7.475	2.18(250K)
Cloud Properties	29	8.400 – 8.700	9.58(300K)
Ozone	30	9.580 – 9.880	3.69(250K)
Surface/Cloud Temperature	31	10.780 – 11.280	9.55(300K)
	32	11.770 – 12.270	8.94(300K)
Cloud Top Altitude	33	13.185 – 13.485	4.52(260K)
	34	13.485 – 13.785	3.76(250K)
	35	13.785 – 14.085	3.11(240K)
	36	14.085 – 14.385	2.08(220K)

1 Bands 1 to 19 are in nm; Bands 20 to 36 are in µm
2 Spectral Radiance values are (W/m2 -µm-sr)



This image from the NASA website shows a false-colour land surface and a false-colour sea surface temperature map. Red and yellow are warmer and blue is cooler.

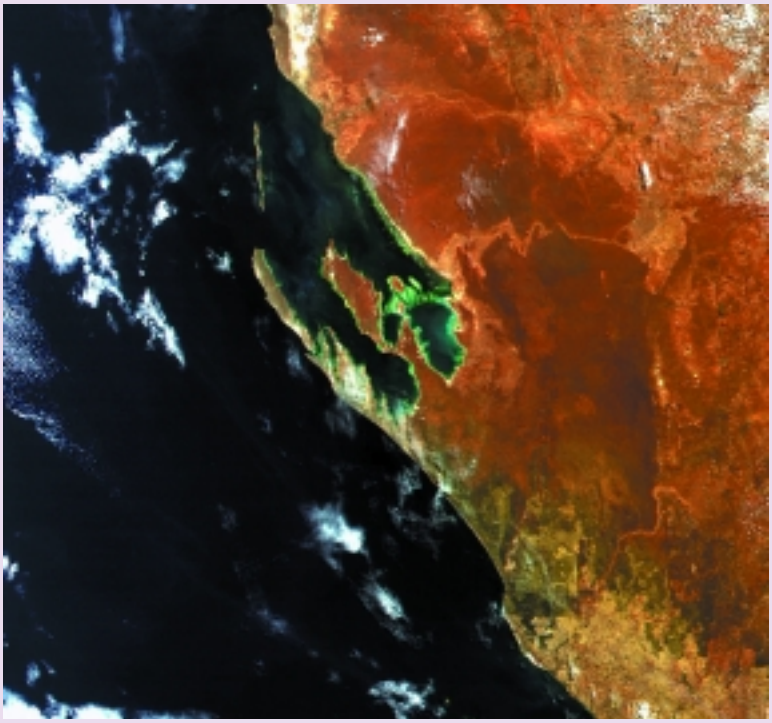
This global image is from the NASA MODIS website. It shows where green foliage is being produced by land plants (green and dark green show greater productivity; yellow shows little or no production; red is a boundary zone), as the terrestrial biosphere "breathes in" carbon dioxide for photosynthesis.



The Terra EOS satellite.

ACRES SUCCESSFULLY ACQUIRES MODIS IMAGE DATA

NASA turned on the direct broadcast mode of the MODIS sensor on board its Terra satellite at 5am on 29 April, Australian Eastern Standard Time. This real-time data stream carries the data from all 36 spectral bands for the entire MODIS field of view whenever MODIS can be seen from a groundstation.



An example of a Terra MODIS image acquired over Shark Bay, WA on 27 February 2000 (from the NASA website).

The data stream is "free to air" (similar to NOAA AVHRR) but requires a suitably configured X-band groundstation such as the ACRES-operated groundstations at Alice Springs and Hobart (TERSS) for reception.

ACRES has been preparing its systems over the last few months for MODIS reception. NASA granted a number of test passes during April and ACRES staff were delighted that a MODIS pass was successfully acquired at Alice Springs on the first attempt on 12 April 2000. A few days later, MODIS passes were successfully acquired at TERSS, underlining the value of maintaining identical reception systems at both sites.

In the meantime, CSIRO Marine Research Division had been working to implement the MODIS processing system elements obtained from NASA and the University of Wisconsin and integrate these with the reception system at the TERRS facility.

On 19 April 2000, CSIRO scientist Paul Tildesley processed the first Australian MODIS scene through this system. This made Australia one of the first countries in the world to successfully receive and process a MODIS scene from the direct broadcast mode.

Over the next few months, ACRES and CSIRO Marine Research will work towards a fully operational MODIS production system capable of routinely generating MODIS products in near real time. This will involve a significant effort, as the NASA supplied software is still under development. ACRES hopes to include MODIS metadata and browse imagery in the ACRES digital catalogue during July 2000.

In the meantime, acquisitions will continue wherever possible at both Australian groundstations.

At present, reception opportunities are limited because the direct broadcast mode is switched off whenever the Terra satellite is within range of the NASA Deep Space Network. Due to the presence of the Deep Space Network station at Tidbinbilla ACT, MODIS direct broadcast acquisitions over eastern Australia have not yet been possible. NASA hopes that the issues with the Deep Space Network will be resolved over the next few months so that the volume of MODIS direct broadcast will increase to an acceptable level.

NEW MILLENNIUM SATELLITE — EO-1

Set for launch on 17 October 2000, Earth Observing-1 (EO-1) is the first satellite in NASA's New Millennium Program Earth Observing series, managed by the Goddard Space Flight Center.

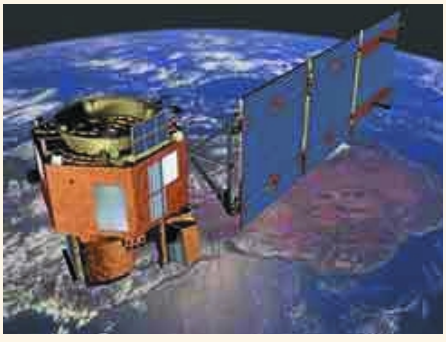
The EO missions will develop and validate instruments and technologies for space-based Earth observations with unique spatial, spectral and temporal characteristics not previously available.

One of the key responsibilities of NASA's Earth Science Office is to ensure the continuity of future Landsat data. EO-1's orbit will fly in formation with the Landsat 7 satellite and will take a series of images over the same area. Comparison of these "paired scene" images will be one means to evaluate EO-1's land imaging instruments.

Three revolutionary land imaging instruments on board EO-1 will collect multispectral (Advanced Land Image) and hyperspectral scenes (Hyperion sensor) over the course of its mission in coordination with the Enhanced Thematic Mapper Plus (ETM+) on Landsat 7.

EO-1 will also be equipped with an Atmospheric Corrector sensor that will enhance the accuracy of surface reflectance estimates. Breakthrough technologies in lightweight materials, high performance, integrated detector arrays and precision spectrometers will be demonstrated in these sensors. Detailed comparisons of the EO-1 and ETM+ images will be carried out to validate these instruments for subsequent missions.

Future NASA spacecraft will be smaller and lighter than current versions. The EO-1 mission will also provide the on-orbit demonstration and validation of several spacecraft technologies to enable this transition. Key technology advances in communications, power, propulsion, thermal and data storage are also included on the EO-1 mission.



The EO-1 satellite.

EO-1 ALI & Landsat 7 ETM+ Comparison

ALI based concept for a future Landsat instrument		Enhanced Thematic Mapper Plus (ETM+)
100	Mass (kg)	425
100	Power (W)	545
0.2	Size (m3)	1.4
10	VNIR/SWIR Bands	7
6200	Detectors per Band	16
0	Thermal Bands	1
300	Data Rate (Mbps)	150
10	Pan Resolution (m)	15
4x	Relative SNR	1x

EO-1's smaller, cheaper and more capable spacecraft instruments and technologies will set the pace for future Earth Science missions in the new millennium.

Advanced Land Imager (ALI)

EO-1's Advanced Land Imager (ALI) is a technology verification instrument. The focal plane for this instrument is partially populated with four sensor chip assemblies and covers 3° by 1.625°.

Operating in a pushbroom fashion at an orbit of 705 km, ALI will provide Landsat-type panchromatic and multispectral bands. These bands have been designed to mimic six Landsat bands with three additional bands covering 0.433-0.453, 0.845-0.890 and 1.20-1.30 µm.

ALI also contains wide-angle optics designed to provide a continuous 15° x 1.625° field of view for a fully populated focal plane with 30-metre resolution for the multispectral pixels and 10 metre resolution for the panchromatic pixels.

Hyperion

The Hyperion provides a high-resolution hyperspectral imager capable of resolving 220 spectral bands (from 0.4 to 2.5µm) with a 30 metre resolution. The instrument can image a 7.5 km by 100 km land area per image and provide detailed spectral mapping across all 220 channels with high radiometric accuracy.

More information on the EO-1 satellite can be found at:

eo1.gsfc.nasa.gov
nmp.jpl.nasa.gov
www.eoc.csiro.au/hswww/

EO-1 PROJECT SCIENTIST VISITS ACRES

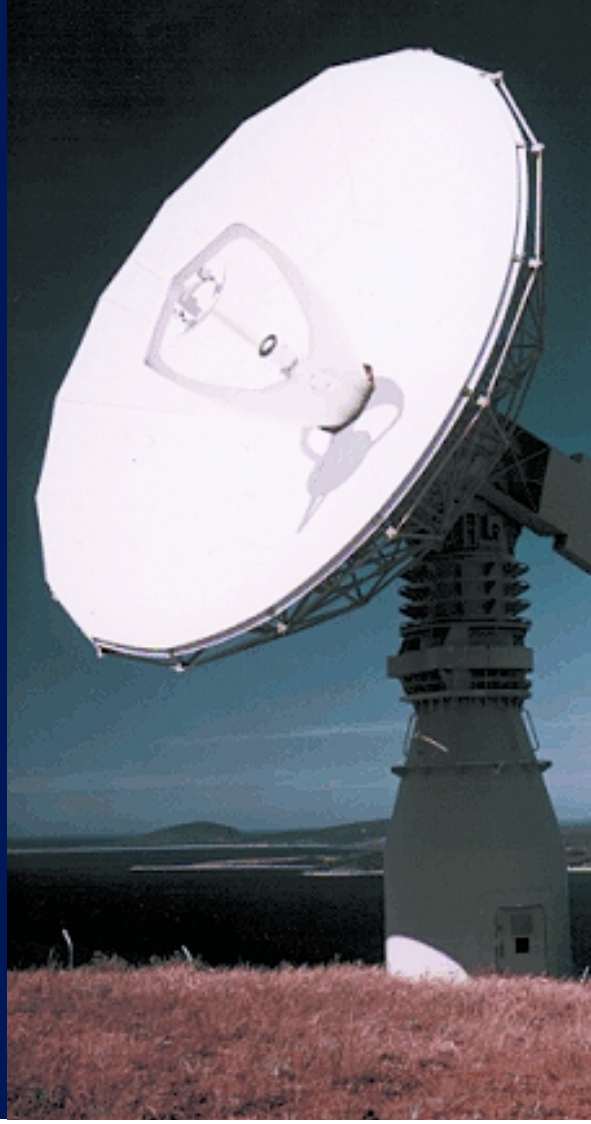
Dr Steve Ungar, NASA project scientist for EO-1, along with Drs Jay Pearlman and Carol Segal of TRW Inc (USA), gave a presentation on the EO-1 mission to ACRES and AUSLIG staff in February.

Dr Steve Ungar gave an illuminating presentation to ACRES and AUSLIG staff during his visit to Australia.

This followed an announcement by NASA that scientists from CSIRO and ACRES had been selected as one of the 10 science teams, drawn from research institutes around the world, who would be evaluating data from the EO-1 mission.

ACRES will provide Landsat 7 data for comparison with EO-1 data and then participate in the comparative assessment of data from Landsat 7 ETM+ and EO-1 acquired over some of the CSIRO calibration/validation sites.

ACRES also anticipates receiving recorded EO-1 data at the groundstation in Hobart, Tasmania, which it operates on behalf of the Tasmanian Earth Resources Satellite Station consortium (TERSS) pictured at right. This would free up the spacecraft's on-board recorder enabling it to acquire more data.



ACRES TO OPERATE ALOS NODE

ACRES has been invited by the Japanese Space Agency, NASDA, to operate the Australia/Oceania Data Node for its Advanced Land Observing Satellite (ALOS). This node will cover Australia, New Zealand, Papua New Guinea and the Pacific Island nations.

ALOS is due for launch in August 2002. It will host three sensors:

- PRISM, an along track stereo instrument with 2.5 metre resolution and 35 km swath;
- AVNIR-2, a 4-band multi-spectral instrument with 10 metre resolution and 70 km swath; and
- PALSAR, a multi-polarised L-band SAR instrument with 10 metre to 100 metre resolution and 70 km to 360 km swath.

ALOS distribution is based around the concept of decentralised "data nodes". Data nodes are responsible for archiving ALOS data of their region, processing it to meet user requests and promoting the use of ALOS data for research and operational applications within their region.

Advanced Land Observing satellite from NASDA.

US agency NOAA has been invited to operate the node for North and South America, and the French space agency CNES has been invited to operate the node for Europe and Africa. NASDA will operate the Asian data node itself.

SRTM AND THE FIRST 3D AUSTRALIAN IMAGE

The spatial information industry in Australia took great interest in NASA's Space Shuttle Endeavour mission during February.

After 222 hours orbiting the Earth, the Endeavour, with its specially modified radar system, collected data which will create the most detailed, near global, topographic map of the Earth ever made. The Endeavour mapped approximately 123 million square kilometres of the Earth.

The clarity of the data gathered by the shuttle has been acclaimed by Australia's spatial information industry with the release of a number of 3D images from around the world, including Australia.

"In Australia, this 3D model of the continent will be especially useful in telecommunications, environmental management and aviation," said Peter Holland, AUSLIG General Manager.

"The data will be used to generate 3D images which scientists will use for studies of flooding, erosion, landslide hazards, earthquakes, ecological zones, weather forecasts and climate change. Other possible uses include optimising locations for cellular phone towers and improving topographic maps for backpackers, firefighters and geologists."

The digital elevation data of Australia will be available later next year.

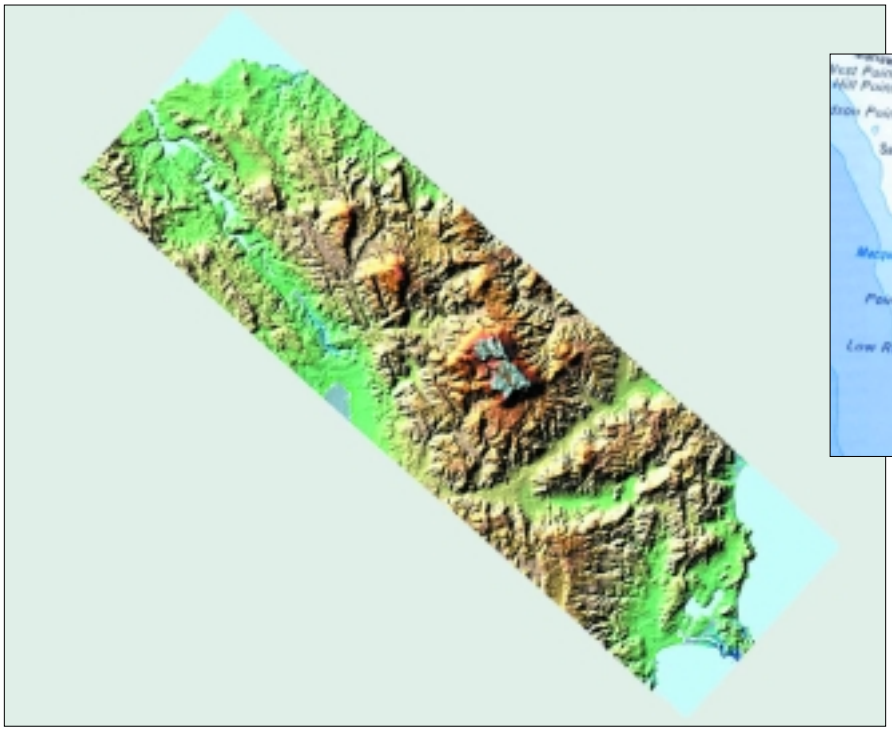
SRTM DEM validation

Australia's spatial information industry is actively involved in the Shuttle Radar Topography Mission (SRTM). As a Principal Investigator for the mission, ACRES is heading a research team to help validate the Australian elevation data derived from the SRTM by testing it against existing datasets of Perth, Lake Frome, Melbourne, Brisbane and Canberra.

Expected results

The primary results of the validation program would be to confirm the predicted accuracy of the X-SAR/SRTM DEM at the regional level within Australia. If the accuracy of the SRTM DEM is confirmed, then a comparison of the SRTM information with the existing 9 second DEM of Australia will also be made to assess the accuracy of the latter. If the data proves suitable, AUSLIG will develop a new 3 second DEM of the whole of Australia when the data becomes available.

A similar data set for Papua New Guinea will also be developed. These new products will be marketed by AUSLIG as part of its product range of digital data products.



3D image acquired by Endeavour on 13 February 2000 showing Tamar River and Georgetown in the north-east of Tasmania down to Coles Bay in the south-east. The image is approximately 50km across and 175km long.

SCIENTISTS FIND THEMSELVES WAIST HIGH IN WATER

Dr Rodriguez (centre) on dry land with team members, Gary Johnston (right) and John Dawson (left).

On 29 February 2000, ACRES hosted a flying visit from Dr Ernesto Rodriguez of NASA's Jet Propulsion Laboratory (JPL). Dr Rodriguez was in Australia to supervise the positioning of radar reflectors for the Shuttle Radar Topographic Mission (SRTM).

The reflector sites, which were situated between Darwin and Victoria River in the Northern Territory, had been chosen and accurately coordinated by AUSLIG surveyors in September 1999.
The reflectors were used for calibrating the C-band SAR on-board the shuttle in conjunction with a second test site in Death Valley California. The Northern Territory site was chosen because of its geographical separation from the USA and the ease of access to the 20 or so sites that were used.

Due to unforeseen circumstances, the SRTM was delayed several months and Dr Rodriguez and his team found themselves installing the bulky reflectors in the middle of the Northern Territory's wet season. Sites that were fine in September were by then submerged in one metre of water. Despite this, sufficient suitable sites were found and the calibration team managed to complete its tasks, which included re-orienting the reflectors five days into the mission.

Dr Rodriguez said that NASA was very pleased with the results of the mission, so much so that there was a strong possibility that there would be a follow-on Shuttle Radar Topography Mission.

The stability of the 60 metre mast that was attached to the Endeavour space shuttle's cargo bay was better than expected and this will translate directly into more accurate elevations. Dr Rodriguez expected the calibration results to be completed by mid 2000, allowing computation of the digital elevation model (DEM) to begin.

No other ancillary data (such as streams, cliffs or coastline) will be used in this computation. The DEM will not have drainage enforced and will have some errors due to radar scattering from the vegetation canopy. However, JPL's experience from analysis of the AIRSAR data collected over Australia is that this error is only two to five metres in the open forests that are prevalent in most parts of the country.

ERS 1 ATTITUDE CONTROL SYSTEM FAILS

After orbiting the Earth for nine years, more than three times its planned lifetime, the ERS 1 mission ended on 10 March when its on-board attitude control system failed.

From its launch on 17 July 1991, ERS 1 made 45,000 orbits. As the first European Space Agency's sun-synchronous polar orbiting mission, ERS 1 acquired more than 1.5 million individual Synthetic Aperture Radar (SAR) scenes. ERS 1 SAR images, together with the data from other instruments on board, were delivered to a worldwide community of 4,000 users in science and industry.

Since ACRES began acquiring ERS 1 satellite image data in September 1991, it has acquired and archived the coverage of Australia many times with the ERS 1 SAR sensor.

Information on surface winds derived from ERS 1's scatterometer and altimeter has been supplied to meteorological services worldwide since 1991.
The duration of the mission also meant that scientists were able to observe several El Nino phenomena through combined observations of surface currents, topography, temperatures and winds. The measurements of sea surface temperatures, critical to the understanding of climate change, made by the ERS 1 Along-Track Scanning Radiometer are the most accurate measurements ever obtained from space. All these critical measurements are continuing and being enhanced with the current ERS 2 mission.

The most exciting results from the ERS 1 mission have been in the field of SAR interferometry where, for the first time, precise topographic information could be routinely produced from space data. The ERS 1 and ERS 2 tandem operations demonstrated this technique for various applications and paved the way for the definition of new, dedicated SAR interferometry missions.

ERS 2 was launched in 1995 and took over the operational services of ERS 1 in 1996. It too has now exceeded its nominal lifetime and remains in excellent condition. ACRES continues to acquire and archive ERS 2 SAR data. Next year, ENVISAT will be launched to continue this series of Earth Observation missions. ACRES is likely to have a pivotal role in the acquisition and distribution of ENVISAT satellite image data.

ACRES WINS RADARSAT Y2K AWARD

ACRES was awarded the special "Y2K Award" during the RADARSAT International Distributors' meeting held in Vancouver, Canada, from 11–13 May.

ACRES Manager, Paul Trezise congratulates Brian McDonald (right) on his part in winning the RADARSAT Y2K award

The Y2K Award was assessed on the results achieved by groundstations around the world in processing a specific Y2K rollover product. The criteria were timeliness of delivery to RSI in Canada and geometric accuracy.

ACRES computer operator, Brian McDonald, processed the product using ACRES Vexcel synthetic aperture radar (SAR) processing system.

RADARSAT's Director of International Network Stations, Pierre Engel (centre) presented the novel award, a pair of ice skates, to Alla Metlenko (left) with ACRES Manager, Paul Trezise, also present.

AUSLIG Remote Sensing Account Manager, Alla Metlenko, accepted the award on ACRES behalf. The presentation venue was the University of British Columbia's ice skating complex, where earlier the RSI ice hockey team had gone through its paces for the benefit of the international visitors. In keeping with this local theme the award consisted of a set of inscribed ice skates.

UPCOMING REMOTE SENSING SATELLITES

Satellite	Operators	Brief Description	Launch Date	More Information
QuickBird 1	EarthWatch	1m PAN, 4m MS	September 2000	www.digitalglobe.com
EO-1	NASA	10m PAN, 30m MS	17 October 2000	eo1.gsfc.nasa.gov
EROS A1	West Indian Space	1.8m PAN	4th Quarter 2000	www.westindianspace.com
Aqua (EOS PM-1)	NASA	Multi-sensor mission	21 December 2000	eos-pm.gsfc.nasa.gov
OrbView-4	Orbital Imaging	1m PAN, 4m MS, 8m HS	1st Quarter 2001	www.orbimage.com
OrbView-3	Orbital Imaging	1m PAN, 4m MS	April 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	4th Quarter 2001	www.spotimage.fr
ALOS	NASDA	2.5m PAN & MS, 10-100m SAR	August 2002	www.nasda.go.jp
RADARSAT 2	CSA, Orbital Imaging	3-100m SAR	Late 2002	www.rsi.ca

ACTION AGENDA FOR SPATIAL INFORMATION INDUSTRY

The Spatial Information Industry is one of four key Australian industry sectors to benefit from the development of new Action Agendas which aim to encourage industry growth and international competitiveness.

The Minister for Industry, Science and Resources, Senator Nick Minchin (pictured), said the industry is at the cutting edge of innovation and can take full advantage of emerging space technologies and the opportunities opened up by digitisation.

"The Government believes the spatial information industry has the potential to generate significant economic benefits given its strong knowledge-based foundation and high value-added component.

"The Action Agenda provides a mechanism for the Government and industry to work together to overcome barriers to growth and to ensure a whole-of government approach to the development of the industry," he said.

"It will enable the industry to build on its existing strengths, generate new domestic and export marketing opportunities, enhance the development of Australia as a regional centre of excellence and encourage the creation of new technologies and products.

"The Action Agenda will also promote the capabilities of the industry, facilitate access to infrastructure, streamline technology diffusion between public institutions and the private sector, and encourage clustering to ensure effective competition for global market opportunities."

Senator Minchin said the Department of Industry, Science and Resources has already taken the first step by commissioning a scoping study of the remote sensing sector.

"This study will provide valuable, up-to-date background information about the industry, including its size, economic contribution, supply chain and spill-overs," he said.

The Action Agenda will also have regard to the work of the Industry Development Standing Committee of the Australia New Zealand Land Information Council (ANZLIC), which is examining matters relevant to the Action Agenda.

"Representatives of the industry and my Department will meet shortly to discuss the development of the Action Agenda and its subsequent implementation," Senator Minchin said.

Action Agendas would also be developed for Aquaculture, Freight Transport Logistics and the Environment Management Industry.

"These exciting areas of development have the potential to offer a range of opportunities for new investment and employment in regional and metropolitan Australia," the Minister said.

"The spatial information industry has the potential to generate significant economic benefits."

ACRES DIRECTOR OF OPERATIONS RECEIVES ISR 2000 AUSTRALIA DAY AWARD

After a 30 year career in Australia's mapping and remote sensing industry, ACRES Director of Operations, Paul Wise, received a Year 2000 Department of Industry, Science and Resources Australia Day Award. The award recognised Paul's outstanding service to the industry.

Paul played a key role for over 10 years in the evaluation, development and application of technology and systems within ACRES. He developed a specialised knowledge in the field of Synthetic Aperture Radar and applied this knowledge on a practical and innovative level as a team member and in all his dealings with the industry, professional organisations and other government bodies involved in mapping, remote sensing and land information within Australia and overseas.

In his early career as a surveyor, Paul gained extensive experience in aerial photography, geodetic and offshore boundary field surveys, photogrammetry, contract stereoplotting, as well as map compilation, map specification review and map revision.

Paul was responsible for the research and development of products from remotely sensed data which have been essential both to Australia's national mapping program and the wide-ranging industry which depends on this program.

Paul began his career with the former Division of National Mapping which amalgamated with the former Australian Survey Office in 1987 to become the Australian Surveying and Land Information Group (AUSLIG). Within AUSLIG, he played a leading role in the development of many remote sensing programs and products from 1987 until his departure at the end of 1999, for health reasons.

NEW *PRODUCT CATALOGUE* INCLUDES RRP AND GST

A new tax system came into operation in Australia on 1 July 2000. It introduced a new goods and services tax (GST) which is a broad-based tax of 10 per cent on most goods and services. The new tax system also abolished Wholesale Sales Tax.

AUSLIG's new *Product Catalogue* lists all Recommended Retail Prices (RRP) with GST added. Copies will be available in July from all Distributors listed on the back cover of this magazine.

An online version of the *Product Catalogue* will also be available on the AUSLIG website at **www.auslig.gov.au**

For Australian Customers, the RRP of ACRES products with GST will rise by up to 8.2 percent as of 1 July. ACRES products have not previously been subject to the Wholesale Sales Tax.

For information on price changes for specific products, please see the ACRES Product & Services pages at **www.auslig.gov.au**.

ACRECON WINS AUSTRALIAN TECHNOLOGY AWARD

Congratulations to ACRES distributor, AGRECON Pty Ltd, which has won the Australian Technology 2000 award for Excellence in the Development of Technology from an Organisation Employing Less than 50 People.

Managing Director, Professor Brian Button, said he was "absolutely thrilled" with the award.

"It substantiates AGRECON's ongoing emphasis on value adding through research and development. AGRECON will continue to use satellite imagery in conjunction with other spatial and temporal data to advantage growers and other industry stakeholders in Australian agriculture," he said.

AGRECON is a research and development company that specialises in the use of satellite imagery for agricultural and environmental resource management. The company has developed comprehensive systems for accurate crop forecasting and yield production using a combination of satellite imagery, climatic data and yields from previous years. Crop forecasting systems are now under development for international monitoring.

AGRECON was also one of three finalists in the Chairman's Award category of the Australian Technology Awards.

LANDSAT 7 AND 5 UPDATE

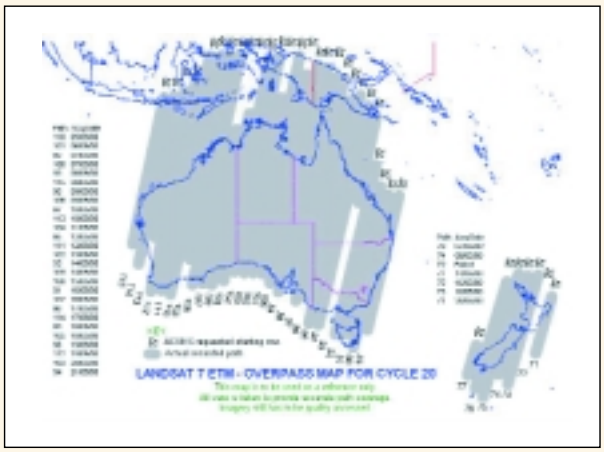
In early June 2000, ACRES was in the process of acquiring the 21st, sixteen-day cycle, of Landsat 7 ETM+ data over Australia, South East Indonesia, Papua New Guinea and New Zealand.

The completed overpass map for cycle 20 is shown in the diagram at right.

While ACRES continues being granted good access to the satellite, there are some small gaps in coverage when satellite resource limitations restrict downlinks. ACRES now has over 12,000 ETM+ full scenes in its catalogue.

With the introduction of Landsat 7 ETM+, the acquisition of data from the 16-year-old Landsat 5 satellite by ACRES ceased on 31 December 1999. ACRES acquired all 16 years of image data and holds over 200,000 Landsat 5 TM full scenes and over 300,000 Landsat MSS scenes.

ACRES remains committed to maintaining and growing this valuable Landsat archive.



Landsat 7 ETM+ overpass acquisition map for the 20th 16-day cycle.

ACRES NEW ARCHIVE PRINT PRODUCT AVAILABLE FROM $75

Low cost satellite images for publication will now be available from ACRES, in response to customer demand.

This new ACRES product addresses an important part of the image data market by making satellite images more accessible. Many customers have been asking for low cost satellite images for publication purposes, such as in books, CDs, newspapers, brochures, posters, etc.

ACRES has responded to these requests by providing access to its extensive archive of photographic satellite image negatives. The images available cover a variety of areas and sensors, with the majority being Landsat TM images.

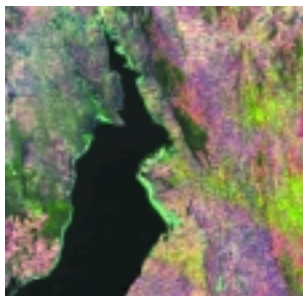
ACRES has scanned about 800 satellite image negatives that can be viewed online as quick-looks in the ACRES Digital Catalogue.

The ACRES Archive Print product is available as paper or transparency prints.

- Paper prints can be purchased as 1:1 scale contact prints (approx. 240 x 220mm) and up to a 5:1 enlargement (approx. 1,200 x 1,100mm).
- Transparencies are also available as a standard 1:1 print.
- Prices range from $75 for a standard contact print, to $162 for a 5:1 enlargement.

Product	Size (mm)	Price (GST Incl)
1x Paper	238 x 219	$75
1x Transparency	238 x 219	$86
2x Paper	476 x 438	$108
4x Paper	952 x 876	$135
5x Paper	1190 x 1095	$162

Take a look at the images available on ACRES Archive Print by linking to the ACRES Digital Catalogue at **www.auslig.gov.au** and selecting ACRES, then Digital Catalogue, then New User. Once you've registered and logged onto the Digital Catalogue, select your area of interest on the map displayed. Then, on the Databases page, select ACRES Archive Prints and click on the Search button. Browse images will then be displayed over the area you have selected.



An example of the type of image available from ACRES new Archive Print service.

FREE AUSLIG EMAIL NEWS SERVICE

A new AUSLIG email news service will commence in July. It will be available to anyone who wants to keep up with the latest news, events and information from AUSLIG, ACRES and/or Spatial Data Information.

Subscription to the service will be free and details about how to subscribe will appear on the AUSLIG home page (**www.auslig.gov.au**)

ACRES NEW-LOOK DIGITAL CATALOGUE

ACRES upgraded its online Digital Catalogue to Terrasoar Version 4.1 in May. The new version provides users with some of the improved features they have requested over the last few months, including:

- display of search result images in a geographic context;
- ability to manipulate the image result;
- ability to save the last search features;
- display of search area selection, and
- display of search results on a data density map.

One of the key benefits of the new look catalogue is its ability to overlay vectors without the need to export to a GIS package.

To connect to ACRES new Digital Catalogue, open the AUSLIG web site at **www.auslig.gov.au**, click on ACRES in the left-hand column and then Digital Catalogue.

As with previous versions of the Digital Catalogue, ACRES welcomes your feedback on the latest upgrade. Just email ACRES on **acres@auslig.gov.au**

REMOTE SENSING AND EMERGENCY MANAGEMENT

In March 2000, ACRES made a presentation on recent developments in remote sensing to the National Communications and Information Systems Advisory Group. This group provides policy advice to and undertakes projects on behalf of the National Emergency Management Committee (NEMC).

The National Emergency Management Committee is Australia's peak consultative emergency management forum. It is chaired by the Director General of Emergency Management Australia and its members come from State emergency management committees (the various State and Territory peak consultative committees established to coordinate and advise on emergency management/counter disaster matters). The Committee meets annually to provide advice and direction on the coordination and advancement of Commonwealth and State interests in emergency management issues. It establishes working parties to examine particular issues.

ACRES presentation was made at the Australian Emergency Management Institute in Mount Macedon, Victoria. There were 21 delegates representing each Australian State and Territory. The presentation included:

- ACRES products and services;
- current examples of the use of satellite remote sensing in emergency management;
- trends in satellite remote sensing in the next five years; and
- initiatives and improvements at ACRES.

The presentation was followed by a live demonstration of the ACRES digital catalogue and the GEODATA SPOT-LITE catalogue.

In Australia, there is increasing use of spatial data in emergency management. For example, the Australian Capital Territory (ACT) Emergency Services is currently implementing the Australian Earth Data on Line (AEDOL) prototype to assist ACT Fire Services to gather, interpret and disseminate spatial data and value-added information to ACT fire fighting communities. With the use of AEDOL, the ACT Emergency Services will be able to expand its services and centralise the interpretation of imagery and other datasets. For more information about the AEDOL prototype, see: **http://aedol.anu.edu.au**

A draft report on the use of satellite remote sensing in emergency management, prepared by Mr Richard McRae from the ACT Emergency Services Bureau, can be accessed at this address: **http://www.esb.act.gov.au/candr/rs4em.htm**

ACRES has implemented a number of new initiatives which are relevant to emergency management sectors. These include:

- programming and acquiring satellite data during emergencies;
- improvements in accessing information on current image acquisitions; and
- an investigation of near-real-time capabilities for processing and delivering data.

Recent upgrades to ACRES digital catalogue have incorporated a number of new features which assist with emergency management. They are:

1. the inclusion of Synthetic Aperture Radar (SAR) browse images;
2. higher quality browse images for both optical and SAR data sets; and
3. the cataloguing of imagery within hours of image acquisition.

The Digital Catalogue is a free service available 24 hours a day, seven days a week. To register, visit AUSLIG's homepage **www.auslig.gov.au** and in the left-hand column, click on ACRES Satellite Data.

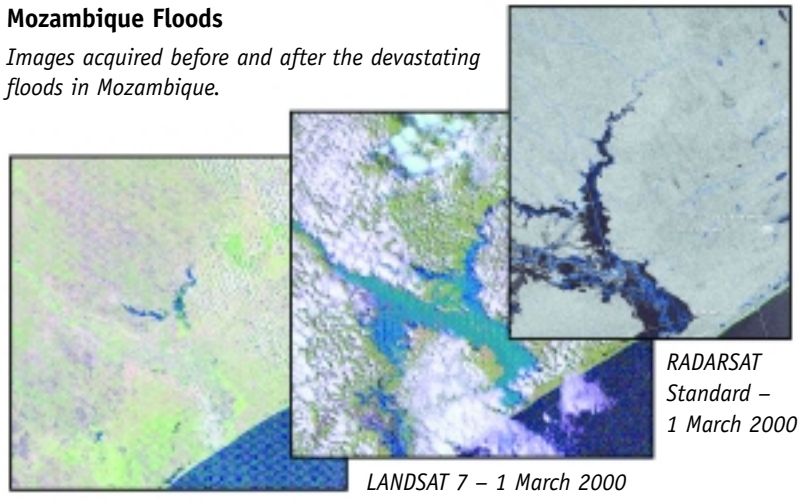
An initiative currently in progress is a cost-benefit analysis of implementing near real time capabilities to process and deliver satellite data. This service may prove very beneficial in emergency response situations where current updates of information are vital or useful in operational type applications such as oil spill or ship detection.

Keep track of developments in remote sensing on ACRES *What's New* page at: (**http://www.auslig.gov.au/acres/whatnew1.htm**)

Alla Metlenko

Mozambique Floods

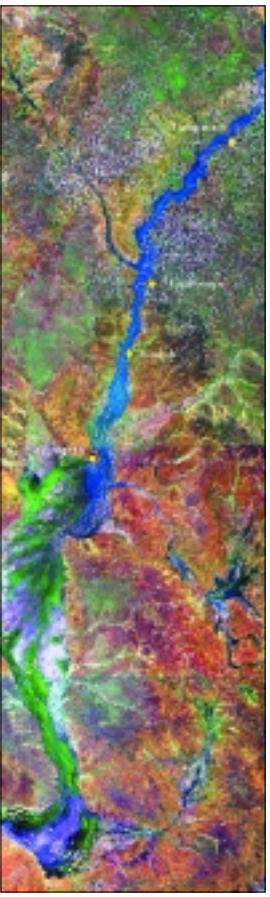
Images acquired before and after the devastating floods in Mozambique.



RADARSAT Standard – 1 March 2000

LANDSAT 7 – 1 March 2000

LANDSAT 7 – 22 August 1999



QUEENSLAND FLOODS

Landsat 7 and SPOT 2 satellite images showing extensive flooding in south-west Queensland in late February were in strong demand from the media.

Excess water from this area flows down to Lake Eyre, a vast drainage basin in Australia's arid interior. Lake Eyre had significant amounts of water flow into it on only six occasions last century. The last time it filled up was in 1989.

Satellite images of the floodwaters can be viewed on AUSLIG's *What's New* at: **www.auslig.gov.au/new.htm#eyre**

The mosaic image on the left was produced by joining together four satellite images which were acquired on 29 February 2000 by the Landsat 7 satellite—705 km away in space.

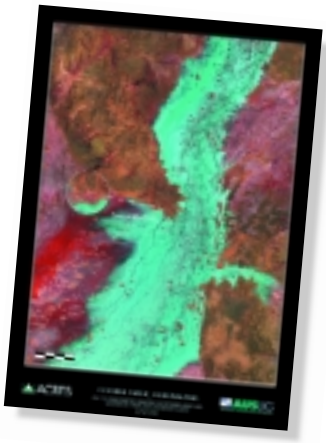
The mosaic covers an area approximately 180km across and 700km long and also takes in the small outback towns of Longreach, Stonehenge, Jundah and Windorah.

Dominating this image is the Thomson River which rose to a peak of 7.85 metres at Jundah on 1 March 2000, the day after these images were acquired. Many residents had to move their belongings to higher ground, outlying properties were isolated, and there were reports of huge stock losses.

Cooper Creek begins just near the town of Stonehenge and the mosaic here shows the enormous volume of water in this creek on 1 March 2000.

POSTER NO.2

The poster included with this issue of ACRES Update shows the town of Windorah on Cooper Creek in Queensland at the height of the floods. The SPOT 4 Xi mosaic image was made from images acquired on 4 March 2000. It was path oriented, edge enhanced and stretched (2.9 std dev) to create the poster.



WA AGENCIES MAP FLOODS

Landsat 7 satellite imagery of flooded river systems is being used to improve flood plain management planning in a cooperative project in Western Australia.

Six agencies joined together to buy and process 10 Landsat images acquired in January and February this year. The images, covering much of the south-west of Western Australia, show the river and lake systems at the peak of a once-in-a-hundred-year flood. It is rare for these rivers to flow at all. They are usually a series of unconnected lakes, many of which are very saline and nutrient rich.

As this river system had not flushed for 60 years, flood waters washed nutrients down the system through Perth causing a toxic algal bloom which closed Perth's Swan River to aquatic sports.

Mr Rick Bretnall, Senior Engineer, Flood Plain Management, Water and Rivers Commission, initiated the purchase of the imagery.

"The imagery provides a 'big picture' overview which for the first time allows us to see what is happening across the whole river system during such a rare event. The Commission will combine this information with data gathered during the flood to improve our management planning," said Mr Bretnall.

"Other agencies involved in this project include Transport, Environmental Protection, Emergency Services, Main Roads and Agriculture. They are all keen to use the data for their own purpose," said Mr Bretnall.

Ken Dawbin, Satellite Remote Sensing Services, Dept of Land Administration
Ken_Dawbin@notes.dola.wa.gov.au

Landsat 7 image of Yenyening Lakes shows a part of the flooded river system where normally the lakes are unconnected.

FIRST AUSTRALIAN MEETING OF GROUNDSTATION OPERATORS

In February 2000, more than 60 international delegates attended the annual operators' meetings of the European Space Agency (ESA) and the French company, SPOT Image in Canberra. ACRES was proud to host these meetings, which were held in Australia for the first time.

SPOT Image Chief Executive Officer, Mr Jacques Mouysset, told delegates at the 13th meeting of the Groundstation Operators of the SPOT System (GOSS), that SPOT's objectives for the future aimed to provide a guarantee of continuity and improvement of the full range of multi-source and multi-spectral data, and provide the best quality of service.

At the 8th meeting of the Earth Resource Satellite Groundstation Operators Working Group (ESOWG), delegates heard that Europe would continue to play a leading role in the remote sensing field.

"The current European Space Agency (ESA) satellites continue to perform well, 10 years after they were first launched, and plans for the launch of the new generation ENVISAT-1 satellite are well advanced," said senior European Space Agency official, Mr Vincenzo Beruti.

"European technology is at the front of the field in remote sensing," he said. "The cooperation between different companies and nations has placed Europe in this important role."

Mr Jean-Charles Bigot, also a senior ESA official, said one of ESA's major achievements over 1999 had been recognition of the strategic importance of space and new space applications programs from the June 1999 Council Ministerial Conference.

"These programs include Galileo, Artes 3 and Living Planet (both Earth Watch and Earth Explorer). Galileo is an EU-ESA initiative which will develop and implement the Global Navigation Satellite System. It is scheduled for launch in 2005. The advantages this program offers are that it will be interoperable with GPS, it will be operated under civilian control and it will be accurate to within a few metres," said Mr Bigot.

Delegates joined together to celebrate SPOT Image's 14th birthday during the meetings.

SPOT Image CEO, Jacques Mouysset.

"Australia's spatial information industry will be watching with great interest as future ESA missions, such as ENVISAT and METOP are launched in the next couple of years," said Mr Paul Trezise, Manager of AUSLIG's Australian Centre for Remote Sensing (ACRES). "These programs will have wide applications in scientific research as well as commercial applications."

1999 DISTRIBUTORS' AWARDS

At the ACRES Distributors' meeting held in Canberra on 6-7 December 1999, three companies received awards for excellence in sales volume.

Carl McMaster, (left) Managing Director, SPOT Imaging Services presented Sylvia Michael of Geoimage Pty Ltd, Brisbane, with the Gold award for excellence in sales of SPOT data.

Gold	Geoimage Pty Ltd
Silver	Satellite Remote Sensing Services, Department of Land Administration, Western Australia
Bronze	Department of Natural Resources, Queensland.

A Special Achievement award for excellence in sales growth was presented to the Environmental Research and Information Consortium Pty Ltd, Canberra, ACT.

A further three awards for excellence in sales of SPOT data in 1998-99 were presented by SPOT Imaging Service to the following distributors:

Gold	Geoimage Pty Ltd, Brisbane, Queensland
Silver	Terralink, Wellington, New Zealand
Bronze	Landcare Research, Lincoln, New Zealand

FIRST ALOS INTER-AGENCY MEETING HELD IN TOKYO

ACRES manager, Paul Trezise, attended the first two meetings concerned with the Japanese Space agency's Advanced Land Observing Satellite (ALOS) in March.

The First ALOS Data Node Inter-agency Meeting was held at the Japanese National Space Development Agency (NASDA) headquarters in Tokyo on 14 March. Representatives attended from ACRES, National Oceanic and Atmospheric Resarch Administration (NOAA), the Centre National d'Etudes Spatiales (CNES), the European Space Agency (ESA), the United States Geological Survey and the Alaska SAR Facility.

Issues discussed included the progress of the ALOS space and ground segments, the progress of negotiations with the proposed data nodes, the proposed ALOS data policy, commercial distribution arrangements and the possibility of direct reception of ALOS by the Data Nodes.

The following day, NASDA hosted the First ALOS Data Utilisation International Symposium at the Tokyo International Forum. Over 200 people attended this meeting, mainly from the Japanese private sector.

NASDA, the three other Data Nodes (AUSLIG, NOAA and CNES) and a number of Japanese government agencies made presentations. A number of agencies also presented their data utilisation plans for ALOS.

The view from the 28th floor of Tokyo's World Trade Centre, NASDA headquarters, where the First ALOS Data Node Inter-agency meeting was held.

The key applications for ALOS are likely to be cartography, regional environmental monitoring, disaster monitoring and earth resources surveys. There is also strong interest from the research community and over 200 applications have been received for the initial ALOS scientific and utilisation research program.

ACRES AT THE REMOTE SENSING CONFERENCE

ACRES will be attending the 10th Australasian Remote Sensing and Photogrammetry Conference, hosting representatives from Eurimage and RADARSAT International (RSI).

As part of the 10th ARSPC program, RSI has organised a workshop on Coastal Zone Management, to be held on 21 August. For more details on this workshop, titled *"From Research to Operationalization to Information: Integrated Solutions for Coastal Zone Monitoring"*, please visit **www.roseworthy.adelaide.edu.au/10arspc/workshop.html**

RSI also plans to organise a one-day commercial workshop on 25 August. This workshop will have a strong focus on the use of RADARSAT for various applications, with particular reference to fisheries in the Southern Ocean, coastal zone management, sensitivity mapping, coastline and intertidal zone mapping. New information services, such as Ship Watch and Oil Watch, the Ocean Features system and RADARSAT 2 will also be presented. The $50 workshop fee will cover catering and other expenses. All *ACRES Update* subscribers will receive an invitation. Contact Jim Mollison for further information on 02 62014129.

AUSLIG SPATIAL DATA FORUM

During August 2000, AUSLIG, in partnership with its distributors, will be holding a series of product and application presentations in every Australian capital city and two cities in New Zealand.

Each seminar will be conducted over one day and will cover all AUSLIG spatial information products and ACRES satellite image products. ACRES distributors and AUSLIG data distributors will present case studies on their use of AUSLIG and ACRES products.

Dates and locations are:

Monday 31 July	Hobart
Tuesday 1 August	Melbourne
Thursday 3 August	Palmerston Nth, NZ
Friday 4 August	Christchurch, NZ
Monday 7 August	Perth
Wednesday 9 August	Adelaide
Friday 11 August	Darwin
Monday 14 August	Canberra
Wednesday 16 August	Sydney
Friday 18 August	Brisbane

Keep an eye on AUSLIG's web pages (**www.auslig.gov.au**) for up-to-date information on the presentation in your area. If you wish to attend any presentation, please contact your local AUSLIG or ACRES distributor, listed on the back cover of *ACRES Update*.

CONFERENCE CONVENOR, MEGAN LEWIS, INVITES YOU TO THE 10TH AUSTRALASIAN REMOTE SENSING AND PHOTOGRAMMETRY CONFERENCE

On behalf of the Organising Committee, I invite you to attend the 10th Australasian Remote Sensing and Photogrammetry Conference to be held in Adelaide in August 2000.

After 20 years of such conferences in Australasia, we have many achievements to look back on in the rapid growth of remote sensing and photogrammetry. However, it is to the future that we are turning our attention in this conference. We are entering a dynamic period of new sensors and data with increased capabilities, greater sophistication in analytical tools, and ready use of imagery for wide-ranging applications. Our conference theme *New Resolutions...Changing Dimensions* aims to capture the excitement of this turning point in remote sensing development.

Australasia and the South-east Asian region are significant contributors to these developments. Our scientists and researchers are among the world leaders in the development of new technologies and many of our government organisations and companies have been quick to adopt innovations for effective application of spatial information. Our Keynote Speakers, from home and abroad, are some of these leaders, and will highlight areas that are at the forefront of research, development and the application of imagery and related spatial technologies.

Speaker	Topic
Craig Dobson University of Michigan	The use of radar polarimetry and interferometry for land cover mapping.
Professor Clive Fraser University of Melbourne	The prospects for high resolution satellite imagery for photogrammetry applications.
Jon Huntington CSIRO	Hyperspectral remote sensing.
Professor Lim Hock Singapore Centre for Remote Sensing	Remote sensing for monitoring of the Southeast Asian environment.
John Le Marshall Bureau of Meteorology	Remote sensing of earth and atmosphere using high spatial, temporal and spectral resolution observations.
Stuart Nixon Founder of Earth Resource Mapping	The challenges in creating and serving very large orthophoto mosaics.
Dennis Puniard Director, AUSLIG National Data Centre and Chairman of the Remote Sensing and Photogrammetry Association of Australasia	"A look forward with hindsight" of where we are at with remote sensing in Australasia.

The program of presented papers and posters provides an opportunity for practitioners to share their work, and submissions have been strong. Authors of both oral and poster presentations will have an opportunity to submit full written papers for inclusion in the CD-ROM of Conference Proceedings.

An extensive program of technical and commercial workshops will precede and follow the three main conference days.

Megan Lewis, Conference Convenor.

Workshops

PACRIM Airborne Synthetic Aperture Radar (AIRSAR)	Integrated Solutions for Coastal Zone Monitoring
Theory and Practice of Hyperspectral Sensing	Transcending Traditional Remote Sensing and GIS Separations Using TNTLite
Remote Sensing of Wetland Inundation	3d Visualisation with ERDAS Imagine Virtual GIS
Commercial High Resolution Satellite Imagery	Remote Sensing of Salt-Affected Land
Photogrammetry Made Easy with Imagine Orthobase	Orthophotography Demystified
Precision Agriculture	Image Enhancements Using Different Software Packages
Airborne Remote Sensing — Instrumentation and Applications	Land AVHRR (and beyond): Progress, Future Developments and Applications

We invite your contribution to the 10th Australasian Remote Sensing and Photogrammetry Conference, whether as a presenter, sponsor, exhibitor or participant, and look forward to welcoming you to Adelaide in August 2000.

Registration Brochures and more information can be obtained from the web site at **www.adelaide.edu.au/10arspc/** or from the Conference Secretariat, c/- Australasian Convention and Travel Services Pty Ltd., GPO Box 2200, CANBERRA ACT 2601, AUSTRALIA, Ph.(02) 6257 3299 (Int +61 2) or Email:10arspc@ausconvservices.com.au

Megan Lewis
Convenor

CONFERENCE CALENDAR

16–23 July 2000 — **Amsterdam, Netherlands**

XIX ISPRS Congress Geo-Information for All
Prof. Klaas Jan Beek
Tel: +31 53 487 4511
Fax: +31 53 487 4335
Email: ISPRS@ITC.NL
Web: www.itc.nl/~isprs/

24–28 July 2000 — **Honolulu, USA**

IEEE / IGARSS '00
Tel: +1 281 251 6067
Fax: +1 281 251 6068
Email: tstein@phoenix.net
Web: www.igarss.org

15–17 August 2000 — **Darwin, Northern Territory**

SPILLCON 2000
Email: aip@aip.com.au
Web: www.aip.com.au/events/conferences/spillcon.html

21–25 August 2000 — **Adelaide, South Australia**

10th Australasian Remote Sensing and Photogrammetry Conference
Tel: +61 2 6257 3299
Fax: +61 2 6257 3256
Email: 10arspc@ausconvservices.com.au
Web: www.adelaide.edu.au/10arspc/

2–8 September 2000 — **Banff, Canada**

4th International Conference on Integrating GIS & Environmental Modeling
Tel: +1 497 6330
Fax: +1 497 6513
Email: bparks@colorado.edu

3–8 September 2000 — **Barcelona, Spain**

15th International Conference on Pattern Recognition
Tel: +34 93 423 9408
Fax: +34 93 325 2708
Email: icpr2000@cvc.uab.es
Web: www.cvc.uab.es/ICPR2000

12–14 September 2000 — **Tokyo, Japan**

UM3 2000 — The 3rd International Workshop on Urban 3D/Multi-Media Mapping
Tel: +81 3 5452 6413
Fax: +81 3 5452 6414
Email: um3@skl.iis.u-tokyo.ac.jp
Web: shiba.iis.u-tokyo.ac.jp/um3/

12-14 September 2000 — **Leicester, UK**

RSS 2000 -Adding Value to Remotely Sensed Data
Email: RSS-2000@leicester.ac.uk

18–20 September 2000 — **Houston, USA**

GITA's 9th GIS for Oil & Gas Conference
Tel: +1 303 337 0513
Fax: +1 303 337 1001
Email: tmoran@gita.org

22–25 October 2000 — **Corpus Christi, USA**

Remote Sensing 2000
Fax: +1 254 774 6001
Email: rs2000@brc.tamus.edu
Web: www.brc.tamus.edu/rs2k/rs2000.html

6–8 November 2000 — **Las Vegas, USA**

14th International Conference & Workshops on Applied Geologic Remote Sensing
Tel: +1 734 994 1200
Fax: +1 734 994 5123
Email: wallman@erim-int.com
Web: www.erim-int.com/CONF/GRS.html

6–10 November 2000 — **Puerto Iguazu Misiones, Argentina**

IX Latin American Remote Sensing Symposium (SELPER)
Tel: +54 23 422 3171
Fax: +54 23 425 795
Email: porditel@mail.unlu.edu.ar

20–24 November 2000 — **Queensland, Australia**

AURISA 2000
Tel: +61 2 6257 3299
Fax: +61 2 6257 3256
Email: 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
Web: www.icorg.org

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
Web: acrs2000.csrsr.ncu.edu.tw

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

23–27 April 2001 — **St. Louis, USA**

ASPRS Annual Conference
Tel: +1 301 493 0290
Fax: +1 301 493 0208
Email: meetings@asprs.org

24–28 June 2001 — **Fredericton, Canada**

Geomatics 2001
Tel: +1 506 453 8855
Fax: +1 506 444 4310
Email: wayne@gov.nb.ca

8–12 January 2001 — **Aussois, France**

CNES-ISPRS Colloquium on Physical Measurements & Signatures in Remote Sensing
Inez Burger
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Fax: +33 1 4464 1516
Email: i.burger@colloquium.fr

23–27 April 2001 — **St. Louis, USA**

ASPRS Annual Conference
Tel: +1 301 493 0290
Fax: +1 301 493 0208
Email: meetings@asprs.org

24–28 June 2001 — **Fredericton, Canada**

Geomatics 2001
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