INTERNATIONAL SOCIETY FOR PHOTOGRAMMETRY AND REMOTE SENSING (ISPRS)
XV CONGRESS RIO DE JANEIRO 1984
MEMBER REPORT
AUSTRALIAN PHOTOGRAMMETRIC AND REMOTE SENSING SOCIETY (APRSS)

REPORT OUTLINE

Due to the short time available to meet the March '84 deadline for the Rio de Janeiro Congress publications, this report (apart from the notable exception of Commission VI) does not conform to the guidelines for member reports received late in 1983 but follows the format of reports by the Australian society to previous ISPRS quadrennial congresses, namely, society information and reports by the national correspondents to the seven technical commissions. The Australian society will follow the guidelines and present a full report to the 1988 ISPRS meeting.

BACKGROUND TO APRSS

The Australian Photogrammetric Society was formed on 1 December 1965 as a result of cooperation between the Institution of Surveyors Australia, and the Australian Institute of Cartographers to ensure that Australia obtained full membership status of the International Society for Photogrammetry. Previously it had been represented by an individual correspondent, namely the then Director of National Mapping Mr Bruce Lambert, who was responsible for initiating this change of membership.

In 1982 the Australian society added remote sensing to its name and activities following the lead given at the 1980 Hamburg Congress by the International Society for Photogrammetry and Remote Sensing.

The Australian Photogrammetric and Remote Sensing Society (APRSS) now operates "under the auspices of" the Institution of Surveyors, Australia the Australian Institute of Cartographers and quite recently the Remote Sensing Association of Australia. This triple sponsorship provides a sound basis for extended cooperation and coordination of activities and interests of people working in the related disciplines of surveying, cartography, photogrammetry and remote sensing. Regular technical meetings and newsletters are organised by the local affiliated societies in Victoria and New South Wales with a combined membership of about 250. The total membership of the three sponsoring organisations is approximately 5300.

The Australian Photogrammetric and Remote Sensing Society is an organisation devoted to the advancement of photogrammetry and remote sensing and their applications.

The purpose of APRSS is to:

- sponsor meetings of people interested in photogrammetry and remote sensing and to promote communications, discussions, lectures, visits and exhibits;
- encourage research in the fields of photogrammetry and remote sensing by creating technical commissions and working groups concerned with particular aspects of photogrammetry and remote sensing;
- circulate records of discussions and results of research;

. participate in the affairs of the International Society for Photogrammetry and Remote Sensing.

The functions of the Society are managed by the Federal Executive, currently located in Melbourne, which consists of three members appointed annually by each sponsoring body plus one nominee from each affiliated state society, and supported by State and National Correspondents.

Membership of APRSS is offered to interested persons and organisations in those parts of Australia (or overseas) where a local society for photogrammetry and remote sensing is not in existence. Membership dues are $10 (ordinary) and $50 (institutional - any organisation, commercial, government or academic with an interest in photogrammetry and or remote sensing).

A national newsletter is published at regular intervals with news and reports of meetings, new developments, research and applications.

APRSS FEDERAL EXECUTIVE ADDRESS and MEMBERS

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		J.C. Trinder

It is with great sadness that we report the death on February 13, 1984 of Mr L.J. Rivett, Honorary Secretary and National Correspondent for Commission V. Leo was well known for his research in "Special Applications" of photogrammetry, in particular the recording of aboriginal rock art and archaeological sites.

HIGHLIGHTS DURING REPORTING PERIOD

Photogrammetric and remote sensing highlights in Australia since 1980 are:

. Land data base development

. "AUTOMAP" STAGE 2

. Analytical stereoplotter SD-4 development

. Commission I Canberra symposium

. Remote sensing name and activities included in APRSS

. RSAA becomes third sponsoring organisation of APRSS.

Some details of these items can be obtained from the following reports.

COMMISSION I REPORT

J.C. Trinder

The activities of Commission I in Australia have been highlighted by Australia's responsibilities of Commission I ISPRS in Australia 1980-84. The Symposium held in Canberra in April 1982 was an important event in Australia, it being the first ever symposium held in Australia. Some 42 papers were presented at the symposium, 2 being given by Australia. However, Australians participated in the panel discussions and questions, all of which have been summarized in the Proceedings which are obtainable from School of Surveying, UNSW, PO Box 1 Kensington, 2033, Australia. Activities of Australian participants in many cases are revealed in these Proceedings.

Within the subject area of Commission I the following matters can be reported:

- The camera calibration facilities, based on a vertical goniometer, which were formerly under the control of the National Measurements Laboratory in Sydney have now been transferred to the Division of National Mapping in Melbourne. The facilities have been described in the above Proceedings. A further report on the installation should be available at the Congress.

- The Australian Landsat Station (ALS) formerly under the control of the Department of Science and Technology, has now also been placed under the control of the Division of National Mapping. The decision to upgrade the facility to receive Landsat TM and SPOT data has not yet been taken.

- A summary of aerial photographic materials and processing equipment has been presented to Working Group I/5 ISPRS for inclusion in a world-wide report to the Congress. A summary of the details are as follows:-

  Black and white photography -
  Films used are Kodak XX, Kodak Panatomic X(2412), Kodak Plus X (2402) and Agfa Gevaert Aviphot Pan 200PE. Processing is mainly done on Kodak Versamat processors with Kodak 885 chemistry. Tasmania and New South Wales have Pakotane processors.

  Colour photography -
  Generally Kodak 2445 is used with processing done by Air Photographs Pty Ltd in Melbourne. South Australia however use 2448 and process on their own Hope 187 processor.
  The ratio of Black-and-White to Colour varies from 1/6 in South Australia to 2/1 in New South Wales and Western Australia.

- The specifications for aerial photography in Australia are currently under review.

Contributions have been made by Australia to the ISPRS Commission I proposal of specifications for aerial photography.

COMMISSION II REPORT

M.H. Elfick

The main instrument research in Australia has been directed towards instrumentation to improve the productivity and versatility of existing photogrammetric instruments.

The Royal Australian Survey Corps has been developing a general mapping system called AUTOMAP. As part of this project RASVY, in a cooperative development with the Intergraph Corporation and the Defence Research Centre Salisbury, has developed a stereoplotter work station which includes features such as voice recognition and synthesis, a high resolution raster display, graphics superimposition of the collected data over the field of view and an optimised keyboard data entry system. The Intergraph Corporation has the marketing rights to these systems.

QASCO Australia has been continuing work on the SD-4 analytical stereoplotter with the main work being towards including graphics superimposition and digital image correlation. These features are being developed independently of the work by RASVY and are part of the original design of the SD-4 analytical plotter. The optics for the SD-4 have been completely redesigned by DRC Salisbury to increase the field of view and provide better resolution. Also there have been hardware and software changes to increase accuracy and reduce the computing load on the host computer.

The Department of Surveying of the University of New South Wales is currently carrying out a detailed evaluation of the SD-4 and a paper on this work will be presented at Rio.

COMMISSION III REPORT

R. Clatworthy

During the past four years (1980/84) Australian photogrammetrists (both Government and Private Enterprise) have continued to upgrade and update their technology relevant to acquiring coordinates from aerotriangulation.

Many Government departments have acquired analytical stereoplotters which include in their software options either an independent model block adjustment program, and/or a bundle adjustment program.

Some Government departments have opted for phased development. For example they have continued to acquire either plate coordinates from a stereocomparator or model coordinates from a precise digitised analogue plotter in conjunction with either a bundle or model adjustment program as installed in a large computer.

A significant number of private enterprise photogrammetric companies continue to use analogue plotters as their mainstay instrument.

Because of this fact, many have opted for the technique of simultaneous model block adjustment, particularly for large scale mapping projects, where they have found they can decrease their ground control requirements whilst maintaining the specifications requested. These companies are most selective in their block adjustment requirements. They usually want a program that is:-

(a) Easy to work with, eg. has a front end interactive program;

(b) Gives improved results over sequential techniques;

(c) Gives enhanced output to assist with the rapid detection of normal errors encountered.

(d) Model dial settings for specific analogue plotters;

(e) Permits easy expansion of the program to accommodate any number of models. In this regard virtual memory computers have greatly assisted.

Research in Australia with respect to this commission has usually been of an applied nature. In this regard many private companies cooperate and liaise with Government departments by incorporating additional check points in Government projects undertaken. These applied research studies have confirmed the accuracy of the latest block adjustment procedures particularly to the operational photogrammetrist.

Most Universities and Colleges of Advanced Education have these new adjustment programs.

Consequently students are being introduced to these techniques at undergraduate level.

COMMISSION IV REPORT D.I. Glendinning

TOPOGRAPHIC MAPPING

The principal thrust of Australian Topographic Mapping continues to be centred upon the General Purpose needs. Notwithstanding economic sanctions, interesting developments within the programme and a change in emphasis on the basic scales for compilation are evident during the past 4 years.

1:250 000 The outdatedness of the existing Series has been an embarrassment to both the Civil and Military mapping authorities and an urgent programme, destined to be completed in 1987, will see a new Military Series, plus a Civil Series, completed. Each series is near totally dependent upon an updated 1:100 000 map base.

1:100 000 This Series has most felt the effect of the economic sanctions imposed. Its development in the years 1967 onwards provided a near total national contour coverage for the first time and it has proven to be a much sought after product.

1:50 000 There has been an escalated military programme of this series during the past two years. Apart from servicing military needs it is providing a useful framework in which to coordinate and/or ratify cadastral boundaries in regions lacking a standardised survey framework.

1:25 000 This mapping is most evident in the various State mapping programmes and in the more densely populated rural regions. Invariably the maps combine a cadastral composite or overlay.

NEW EQUIPMENT

Australian advancement into the realms of automated photogrammetry and cartography has been positive and this has been largely due to the pioneer work by a number of organisations both public and private, but most particularly to the Australian Military Mapping Authorities.

Experience with AUTOMAP I has heralded its recent replacement with AUTOMAP II and the addition of the following:-

. Interactive graphics at every work station

. Graphical superimposition and voice entry response at each stereoplotter work station,

. New data management software servicing user needs.

It should be noted further that a raster scanning system has been purchased but not installed.

The Federal Government Department, responsible for satisfying the Civil Mapping Requirements, has also introduced an automated mapping system.

This system is divided into input and output systems.

The input being used to collect and edit data, the output being used to produce repromat suitable for the production of 1:100 000 and 1:250 000 scale maps.

The essential components of the input system are:

. stereodigitizing work stations

. graphic digitizing work stations

. graphic screen editing stations

Data collected are processed by the output system, which is essentially a precision flat bed plotter, automatically producing the repromat required.

Other authorities both public and private without the resources necessary to establish such sophisticated systems have sought the development of automated practices using existing analogue equipment with digital accessories and computer assisted plotting. There has been a marked increase in the sales of analytical plotters and in new orthophoto facilities. Sales of an Australian produced analytical plotter are noted.

Orthophoto Mapping Large scale orthophotomapping is pursued by most State Government Departments and certain Private Offices, medium and small scale formatting is part of both Civil and Military mapping operations. There have been some interesting developments in colour production procedures for orthophoto work but for the most part distribution is confined to diazo emulsions.

Land Information Systems

If one was to discuss the most significant development influencing Australian mapping in the past quadrenium it would surely be the impact of computerised land data bases and the information systems, a direct result of those developments.

For the most part all systems, both Private and Public, are based upon the Australian Map Grid and combine a cadastral map framework in digital form as the reference and storage medium.

It is not unusual therefore, to find exciting new map products derived as a result of combining topographic, cadastral and thematic data in a variety of forms.

Map design concepts have undertaken remarkable changes. The professional map user is demanding the formatting and collection of digital land data in a manner consistent with the needs of his own modelling rather than beginning with land data modelling expressed through cartographic license and rearranging it. He is seeking raw data rather than generalised data and this is virtually shifting the character of certain mapping from General Purpose to Special Purpose.

Photogrammetry is at the forefront of this change as indeed is the use of higher resolution Satellite Imagery. The strength of both systems, when integrated is reflected in the most complete resources data base available.

Within Australia a great deal of enquiry has taken place into the means which best serve the integrating of the systems. Joint research and manufacture have provided an Australian digital airborne scanner combining 15 selectable channels. The resulting imagery is very encouraging and emphasis is now being given to incorporating digital relief data.

COMMISSION V REPORT

S.G. Bervoets (for L.J. Rivett)

A steady increase in the use of terrestrial photogrammetry may be detected in the areas of recording/mapping historical sites, buildings and objects. There is also some evidence of its use in connection with accident appreciation by police.

Most of the work in terrestrial photogrammetry appears to concentrate on analog restitution and graphic presentation of the objects. This activity is mainly carried out by private consultants, but the general observation is that it is hardly worthwhile from an economic point of view. The analytical approach is more commonly pursued by academic institutions interested in the application of highly sophisticated mathematical models. Valuable work has been carried out using high-precision photogrammetry for monitoring engineering structures and industrial applications including the (self-) calibration of both metric and non-metric cameras.

Publications

Earls, C.J. 1983. Accuracy Potential of a System for Analytical Close-range Photogrammetry. Photogrammetric Record 11(62).

Fryer, J.G. and Done, T.J. 1982. An underwater Trilateration. The Australian Surveyor 31(1).

Fryer, J.G. 1983. Photogrammetry through Shallow Water. Australian Journal of Geodesy, Photogrammetry and Surveying, No 38, University of New South Wales.

Rivett, L.J. 1983. The Application of Photogrammetry to the Recording of Rock Art and Archaeological Sites in Kakadu National Park. The Rock Art Sites of Kakadu National Park, Ed. D. Gillespie, Special Publ. 10, Australian National Parks and Wildlife Service.

Rivett, L.J. 1983. The Role of Photogrammetry in Surveillance Surveys. Symposium on the Surveillance of Engineering Structures. Publ. Department of Surveying, University of Melbourne.

Shortis, M.R. 1981 Computer-aided Orientations of Terrestrial Models on the Zeiss (Jena) Topocart B. Photogrammetric Record 10(58).

Shortis, M.R. 1982 Sequential Adjustment of Close-range Stereopairs. Intern. Archives Photogrammetry 24(V/2), York.

Shortis, M.R. 1983 Deformation Analysis and Monitoring by Close Range Photogrammetry. Symposium on the Surveillance of Engineering Structures. Publ. Department of Surveying, University of Melbourne.

COMMISSION VI REPORT

A. Adamec

5. EDUCATION

(a) (i) Staff. There were an average of 34 staff members involved in teaching Photogrammetry and Remote Sensing as major or minor subjects in Australian tertiary institutions during the above period. These were supported by 13 teaching assistants, 10 researchers, 16 technical staff and 12 auxiliary personnel.

(ii) Equipment. The list below approximately shows the equipment owned by Australian tertiary institutions during the period of reporting.

PHOTOGRAMMETRIC EQUIPMENT

Mirror Stereoscopes with par. bar	140
Analytical Plotter	2
Wild B8 Stereomat	2
Wild A8	1
Wild A10	1
Wild A5	5
Wild A6	14
Wild A7	2
Wild B8	8
Wild A9	1
Wild B9	1
Kern PG2	3
Zeiss Jena Topocart	4
C.P.1.	3
Zeiss Planitop	1
Multiplex	9
Sketchmaster	2
Minicomputers	1
Zeiss Jena Stecometer	2
Zeiss Jena Stereometrograph	2
Zeiss Stereotope	5
Digital Cambridge Comparator	1
Digitisers	5
Terrestrial Cameras	6
Galileo Stereosimplex	1
Zeiss Reductor	1
Thompson Watts Plotter	3
Zeiss 03 - P	1
Aerial Cameras	10
Kelsh Plotter	1
Radial Secator	1

REMOTE SENSING EQUIPMENT

Ramtech Graphics Terminal	3
Dipix Image Analysis System	1
Normende Colour Monitor	1
ITC Igekanui T.V. Camera	1
ITC Igekanui B/W Monitor	1
Multispectral Viewer	1
Zeiss Jena Interpretscope	2
Stereopret	1
Hasselblad Cameras	2
Leitz 70mm projector for Multispectral Imagery	1
Grinnel GMR 27 with Colour Monitor	1
Densitometer	1
Minicomputers	4

(iii) Number of Graduates. While the number of graduates majoring in Photogrammetry and Remote Sensing in Australia is relatively small there is a large number of graduates with a substantial amount of Photogrammetry and Remote Sensing studied during their undergraduate courses. The statistics given below apply to graduates at all levels with a content in Photogramemtry and Remote Sensing of not less than 6 hours per week for the duration of at least 2 academic years. Post graduates listed are those who specialized in Photogrammetry and/or Remote Sensing or did research in one of the two fields.

Average number of students completing undergraduate studies per year	270
Average number of students completing graduate diplomas per year	20
Average number of students completing masters studies per year	3
Average number of students completing Ph.D studies annually	1

(b) Possibilities for Foreigners The number of foreign students permitted to study at Australian tertiary institutions is not restricted by the government if the students are able to finance themselves. However, some institutions set a quota on foreign student enrolments. There are some government and private scholarships available for such students. The number of scholarships is dependent on funds made available in any year by the government and private foundations.

(c) Updating Education Short courses are being run from time to time by the various educational institutions to teach the profession at large new technology which came recently into being. Such courses are popular mostly in such aspects of the sciences which use computer equipment.

(d) Guest Lecturing Limited funding is available for bringing guest lecturers to the Australian tertiary institutions. Several such lecturers have visited Australia in the past 4 years. Some Australians also visited, Europe, Asia and Africa for the purpose of delivering some guest lectures or introducing new courses.

6. PUBLICATIONS

(a) Periodicals There is no periodical in Photogrammetry and Remote Sensing in Australia. However, several periodicals of associated fields such as The Australian Surveyor, Cartography and some others published articles in Photogrammetry and Remote Sensing. Newsletters by the local ISPRS association also publish articles of interest to the Photogrammetric and Remote Sensing community.

(b) Series Publications No series publications in Photogrammetry or Remote Sensing exist in Australia, but some series publications such as UNISURV cover topics in Photogrammetry and Remote Sensing within a range of topics in the fields of Surveying and Cartography.

(c) Textbooks No textbooks in the true sense of the word have been published in Australia in the period 1980-84. Some academic institutions however, print through their own publishing departments printed lecture notes often of the quality of textbooks.

(d) Bibliography A list of bibliography for Australia is being compiled at the present. It will be supplied as soon as it is available.

(e) Information Retrieval The following information retrieval systems amongst others are at the present used in Australia for information in Photogrammetry and Remote Sensing.

1. AUSINET
2. AUSTRALIAN MEDLINE
3. DIALOG
4. ESA
5. INFOLINE
6. ORBIT

COMMISSION VII REPORT

K.R. McCloy

Since 1980 there have only been minor developments in the techniques or applications of interpretation of aerial photography. In contrast there has been extensive research and development in the use of other forms of remote sensing in a number of disciplines. Currently the geologic community extensively uses remotely sensed data as an operational tool. Since 1980 there has been the development of some practical application of remote sensing in other disciplines, particualrly in the monitoring of environmental resources in South Australia and in the use of remote sensing in agriculture and water management in New South Wales.

The majority of research and development in applications of remote sensing is concentrated in certain divisions of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) within some tertiary institutions, and within a selection of Government Departments. Since 1980 numbers of image processing facilities have been established primarily in the tertiary and Government Department sectors enabling much greater access to these facilities for analysis purposes.

AGRICULTURE

Most work on developing applications of remote sensing in agriculture are concentrated within the CSIRO (Canberra and Perth) and the NSW Department of Agriculture (Sydney). Both organisations are involved in different aspects of utilising remotely sensed data for census work associated with rice and

winter cereals. Work in NSW indicates that Landsat is quite satisfactory for monitoring total areas under rice and work is underway to convert these experimental results to an operational system. Work is being done in the CSIRO (Canberra) in modelling and predicting rice yields for use in collaboration in the Landsat estimates of areas, so as to produce estimates of total production. Work on monitoring wheat is effected by the greater complexity involved in the Australian wheat crop due to the spread of that crop and the variations in management practices involved. Currently computer based techniques which have been shown to be quite accurate for relatively small areas are constrained by the cloud cover limitations of Landsat data in terms of reliability of the technique. Alternative approaches being explored are to utilise the local knowledge of district officers and visual interpretation techniques to estimate areas as well as to use the data for improving yield predictions. Fundamental work on analysing the spectral characteristics of winter cereals is being conducted by the CSIRO (Perth). Other programmes in agriculture include a programme in the CSIRO (Canberra) to investigate the use of GMS and NOAA data for monitoring soil temperature, soil moisture and solar radiation and a programme to provide district agricultural officers with regular current Landsat imagery to assist them to better understand the districts for which they are responsible. This cooperative programme, between the CSIRO (Sydney) and the NSW Department of Agriculture is concerned with producing consistent imagery, displaying soil reflectance, vegetation status and change.

SOILS

The CSIRO (Perth) is analysing the spectral properties of soils and clays in the range 400 to 2000 nanometers as well as the microwave back scatter properties of selected radar bands. The objective is to develop techniques for mapping, monitoring soil waterlogging and salinisation.

RANGE AND GRASSLAND

Work is being done in the CSIRO (Deniliquin) and the NSW Department of Agriculture on transforming satellite data into estimates of herbage biomass and condition for rangeland management purposes. The CSIRO (Deniliquin and Perth) are also interested in using this transformed information as a form of growth index to see if growth curves can be derived as characteristic with multi-temporal imagery for the delineation of those communities.

URBAN ENVIRONMENTS

The University of NSW has a programme to investigate the use of combined Landsat and ancillary data for urban monitoring and management.

GEOLOGY

Geologic interpretation and analysis is conducted in many private companies as well as in the Bureau of Mineral Resources (Canberra) and the CSIRO (Sydney). The CSIRO (Sydney) is analysing the metallogenic significance of lineaments identified on remotely sensed imagery and has developed statistical tests for the significance of associations. The CSIRO (Sydney) is also integrating remotely sensed data with other types of geological and geophysical data and addressing how to visually present this integrated data set for visual interpretation. Some of the more interesting developments in the CSIRO are in gathering high resolution spectral reflectance data and interpreting this data collected along traverse lines in conjunction with imagery of the area, in relation to ground conditions.

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