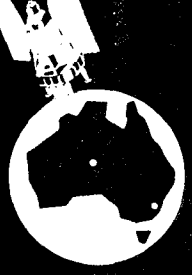
Vol. 1 No. 1 November 1980



NEWSLETTER

THE AUSTRALIAN LANDSAT STATION - NOW OPEN FOR BUSINESS

The Australian Landsat Station is now operating commercially. Following commissioning trials and "working up" of systems, ALS is accepting user orders.

Station Director, Don Gray, is pleased at the number of orders already received, in view of largely word-of-mouth publicity to date. Over 110 orders were recorded in the first weeks of October, when commercial production began in earnest.

MICROFICHE CATALOGUE

Each eighteen day coverage cycle of quick-look (raw data) images will be produced as a set of microfiche, which will be progressively updated. Present Australian coverage is partial since October 1979 and total since December 1979. Subscriptions to the micro-catalogue are available for a calendar year. Subscribers to the end of 1980 will receive a "bonus" of micro-catalogue going back to the first Australian acquisitions in October 1979 for the regular annual fee of $275.

Until microfiche catalogues for the late part of 1979 are completed, and at any time to obtain latest-cycle cloud cover or other scene availability, please contact Catalogue Clerk Ted Donnell at our ACT Station.

ORDERING

ALS policy is to process orders chronologically as they are received, and to normally have them in the mail or carrier's hands within ten days of receipt. For urgent requirements a premium charge is levied - twice list price for delivery to carrier within five days of receipt; three times list price for 72 hour turnaround.

When ordering, please use the Worldwide Reference System (WRS) Path/Row numbers and the date of required image. Order forms are available from ALS on request; telex ordering is available, and the above data is requested.

Should you be unsure of the WRS scene, please indicate the geographical coordinates (Lat and Long) or Australian Map Grid (AMG) reference - ALS can compute the scene having most appropriate coverage.

BROWSE CENTRES

ALS has established Browse Centres in all capital cities and Alice Springs where microfiche image (and later digital) catalogues are on public view. There, current price lists and order forms are on hand, and Browse Centres will accept orders for on-forwarding. Their addresses are:

Australian Landsat Station
Data Processing Facility
14-16 Oatley Court
BELCONNEN ACT 2617
Tel: (062) 515411

Australian Landsat Station
Data Acquisition Facility
Stuart Highway
ALICE SPRINGS NT 5750
Tel: (089) 523353

Aerial Photography Library
76 George Street
BRISBANE QLD 4000
Tel: (07) 2245774

Lands Department Building
23-33 Bridge Street
SYDNEY NSW 2000
Tel: (02) 20579

Map Sales
Department of Crown Lands & Survey
35 Spring Street
MELBOURNE VIC 3002
Tel: (03) 6513024
6513029

Mapland
Industry House
12 Pirie Street
ADELAIDE SA 5001
Tel: (08) 2272675

Department of Lands & Survey
Central Map Agency
Cathedral Avenue
PERTH WA 6000
Tel: (09) 3230151

Moonta House
Mitchell Street
DARWIN NT 5794
Tel: (089) 897572

Tasmanian Government Publications Centre
134 Macquarie Street
HOBART TAS 7000
Tel: (002) 303382

LANDSAT OPERATION BULLETIN

from NASA

LANDSAT II is currently the prime satellite for all domestic and foreign real time operations - the capability for storing data does not exist. The spacecraft and instruments are performing well, with negligible late line starts on the Multi Spectral Scanner (MSS).

LANDSAT III is currently used for MSS stored data modes in support of US agriculture programs, and for Return Beam Vidicon (RBV) acquisitions. The Australian Landsat Station is not currently equipped to receive RBV data. Stored data tape recorder utilization is limited due to the partial failure of one recorder, capable of acquiring RBV data only. The second recorder is fully operational.

Special requests for MSS real time coverage for foreign ground stations will be considered, but NASA desires to limit "on time" to prolong instrument use without switching to the pseudo pulse mode (scan monitor system off).

Late line start occurrences on LANDSAT III are now in excess of 90% of each scene. NASA will consider switching to the pseudo pulse mode possibly in November/ December. Any user comments, positive or negative, on this action are requested.

NASA has begun its second pre-production test on the processing of RBV data; the test appears to be successful. However, NASA will continue testing during September in order to improve efficiency.

NASA are considering a cross axis burn for LANDSAT III during October, which would affect the mean orbital elements.

NOAA Goes Into Space

President Carter announced late last year that US civilian remote sensing from space will progressively come under the administration of the US Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). This is expected to lead to further integration and prospective cost savings.

NOAA's first action will be to develop a transition plan for moving to a fully integrated satellite-based land remote sensing program.

Initially, operational remote sensing efforts will rely on experience derived from the LANDSAT program, begun in 1972 by NASA.

User Group News

INDUSAT -

"ALS Provides Practical Benefits"

Founded by commercial users in 1978, the Australian Industry Satellite Group, INDUSAT, has been keenly awaiting the opening of the Australian Landsat Station. Previously the restriction of the spacecraft - chiefly the need to tape-record data on-board - has limited the availability of timely data to Australian users.

Seminar Planned Soon

INDUSAT plans to hold a one-day seminar on LANDSAT applications to agriculture, land use and other primary industry applications.

The seminar is tentatively planned for November or December 1980 in Sydney.

If you would be interested to attend such a seminar, please contact INDUSAT direct:

INDUSAT Group
C/- Technical & Field Surveys Pty Ltd
PO Box 722
CROWS NEST NSW 2065
Tel: (02) 4383700

Applications of Remote Sensing

MOUNT ST HELENS - HOLOCAUST AND AFTERMATH

A Volcano Workshop for Educators
December 27-29, 1980

On 18 May 1980, Mount St Helens in southern Washington state (USA) erupted after 123 years of dormancy. Through television photography, and satellite coverage, people around the world had the rare opportunity of witnessing the event almost as it occurred. But fully understanding the implications of the eruption is another matter.

A planned three day workshop will bring together the numerous groups who played and are playing key roles in monitoring, assessing, documenting and repairing damages of the Mount St Helens eruption. It is an early opportunity for educators at all levels to study first-hand the many physical and social impacts of the holocaust and its aftermath. The volcano is still active as the "Newsletter" is being written.

PROGRAM

The advance program includes:

- An overview of the Volcanic Cascade Mountains, background for the Mount St Helens eruption. Presentation on contemporary physical happenings and how remote sensing techniques were and are being used to monitor, predict and assess the blast and its aftermath.

- Panel discussions on the material developed for educators on Mount St Helens; an extensive field trip to affected areas, as close to Mount St Helens as is permitted at the time.

- A look at the social impacts of the eruption; cost and clean-up; community and business problems; the effect on natural resources; and the on-going role of the local media in documenting and disseminating information on the blast and its aftermath.

Schedule: 27-29 December 1980; Saturday to Monday, 08.30 - 17.00.

Location: Portland State University, Portland, Oregon (situated in the foothills of the Cascade Range, West Coast, USA).

Fees: $US195 for educators; $US160 for students. A $US20 discount is available to two or more educators from the same institution. (Accommodation and transport is extra). Overseas participants should forward full fee with registration form.

To Register, contact:

Mad River Institute
616 14th Street
Arcata
CALIFORNIA 95521
USA

ALS Promotion Officer, A G (Bill) Hordern, has details of the workshop; please call or write for a copy.

MSS LATE LINE START ANOMALY

The multispectral scanner (MSS) flown on Landsat spacecraft utilizes an oscillating mirror to scan 100 nm strips of the Earth 13.6 times per second. The start and end points of the MSS scan are identified by scan monitor pulses generated by diode detections of internal light sources reflected from the scan mirror. The line-start pulse activates the digitization and transmission of the video data sensed by the MSS detectors. The end of line pulse identifies the end of the desired image strip.

The scan monitor pulses control the flow of data transmitted to the ground station. A line-start pulse generates a line start code word to be transmitted, followed by a minor frame synchronization word and eight words of space-craft time code. Video words representing the digitized outputs of the MSS detectors are then transmitted for the remainder of the mirror sweep. The end of line pulse generates an end of line code (100 black followed by 100 white) which is inserted into the video to identify the end of the desired scan.

LINE START ANOMALY

If the normal line start pulse is not detected within the expected time window (9 msec), a

late line start pulse is generated by a time-out circuit that is phase-locked to the mirror control electronics. This pulse will then activate the digitization and transmission of the video data. The format of the transmitted data will be the same as that described above. However, since the MSS scan mirror is in motion during the 9 millisecond search time, the scan is already 28 percent into the desired sweep before digitization and transmission of video data is initiated. This 28 percent of the desired nominal sweep is lost.

The late line start anomaly was first detected on Landsat-3 in August of 1978. The frequency of occurrence has varied since that time with a worst case of about 50 percent within an MSS frame.

SOLUTION

Normally, the alignment of video data between sweeps is based on the line start code. In the case of a late line start the end of line code must be used. The delayed line must be corrected by inserting fill pixels (zero level) between the time code and video pixels. The number of fill pixels is determined by the length of the last good line or by a nominal line length if no good lines have been found. The value of the nominal line length is programmable by the operator.

In the NASA Goddard Space Flight Center MSS serial error corrector (MSEC), a delayed line is detected by locating the end of line code. If the line is normal, the end of line code will be located nominally 79,625 pixels (full mirror sweep of video data) after line start for Landsat-3 and 81,050 pixels after line start for Landsat 2. If a

Editorial

OUR AIMS - OUR HOPES

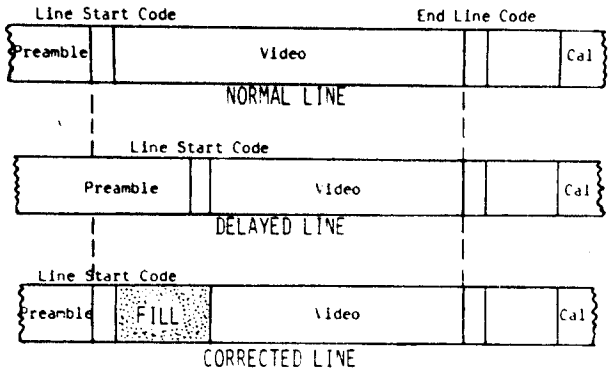
This is the first issue of the Australian Landsat Station (ALS) "Newsletter", and in the tradition of all journals we must have an initial editorial to set out our aims and our hopes. Unlike the traditional journals, we don't propose to editorialize incessantly - this may even be the last such formality! But time and necessity will tell.

Our aim is twofold - to tell the user community about ALS and the LANDSAT program, and to give users a forum for mutual contact. Our hope is that we will further the use of remote sensing for our mutual benefit.

ALS believes it can act as a "clearing house" for information exchange in the user community, in addition to its prime role as data gatherer and processor. Although the Station functions do not include analysis or interpretation, we believe we can serve as a reference centre - for example, compiling lists of consultants, peripheral equipment suppliers, training courses, publicising short courses and seminars, publishing abstracts and so forth. Naturally, such services could not imply endorsement by ALS or its sponsor, the Department of Science and the Environment.

We expect to evolve as we grow, and would particularly like to hear from readers what services they would appreciate.

A Happy Christmas and a Prosperous New Year to all from the Australian Landsat Station Director and Staff.



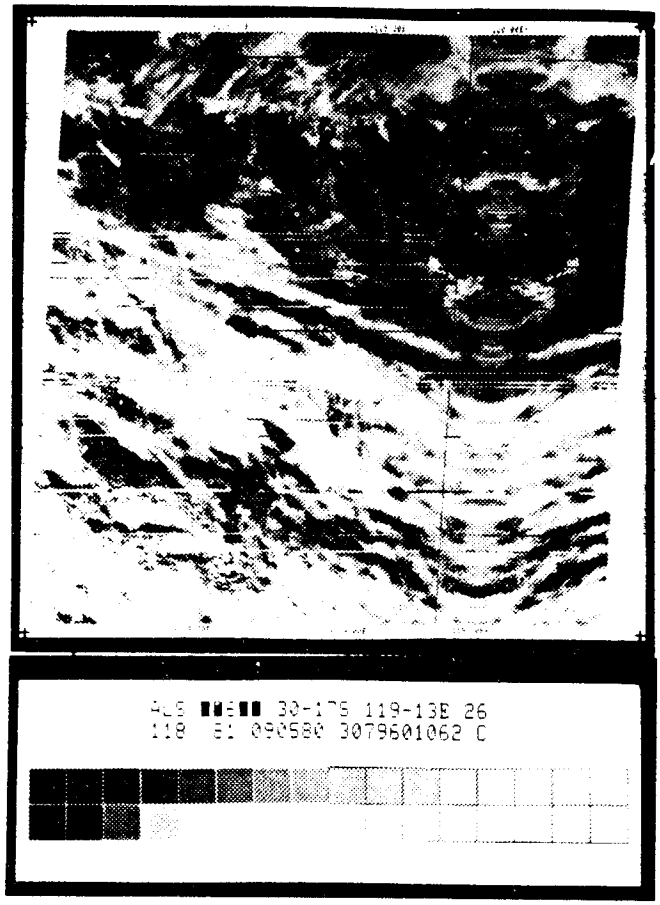
Representation of intermittent failure and correction

late line start occurs, this interval will be shortened by approximately 23,200 pixels. The MSEC determines which satellite is transmitting and whether a late line start has occurred by searching the neighbourhoods of the various nominals for end of line code. If end of line (EOL) code is not found, a late line start is assumed. The MSEC has two conditional options for correcting such a line:

1. If a previous line (with late line start and with end of line code in place) has been processed to match a normal line, the same number of fill pixels are inserted and the EOL code is inserted to match the line length.

2. If no previous line has been corrected to a normal line, a nominal number of fill pixels are inserted and the EOL code is inserted to match the nominal line length.

In the MSEC, the minor frame sync and band 8 pixels are stripped out of the video stream (i.e. every 25th pixel starting with the first pixel following the line start). For lines with detected late line starts, multiples of 24 fill pixels are inserted between the time code and video pixels. The multiple of 24 fill pixels is required to maintain the proper sequence of pixels. The number of multiples is determined by comparison with



Uncorrected delayed line

Corrected line

the last normal line or by a nominal line length. Starting with the first pixel following the line start, appropriate minor frame syncs are reinserted after every 24th pixel. The line length code of a corrected line must also be corrected.

A very small number of scenes with the line start anomaly will not be capable of processing.

Processing without Scan Monitor Pulses

In the case of total failure of the scan monitor pulses (i.e. all late line starts and no end of line code), the previous technique would apply, using a nominal line length and a specified location for insertion of an artificial EOL code. This mode would also be required if the scan monitor pulse is turned off by command. The so-called pseudo-pulse mode would also result in total left-edge fill of photo images.

Impact on Calibration Data

When late line starts occur at a frequent rate, the calibration wedge is delayed with respect to the video data and EOL. The calibration wedge will then not appear within the normal 10 milliseconds after EOL. Displacement by as much as 10 additional milliseconds can occur. This maximum delay can occur, for example, after approximately 7 seconds of consecutive late line starts. In typical scenes that contain a mixture of good lines and delayed lines, the location of the calibration wedge is compromised between its normal position and the worst-case offset position, depending on the frequency of occurrence of the late line starts. Present MSEC design cannot handle extreme calibration shifts; however, design changes are planned.

LANDSAT WORKSHOP

Canberra College of Advanced Education, 16-20 February 1981

A five day live-in workshop is proposed in February by Canberra College of Advanced Education (CCAE). All aspects of LANDSAT will be covered, including hands on digital and analogue experience.

Programme

Lecturers from diverse backgrounds, including CCAE, CSIRO, Australian Landsat Station (ALS), Australian National University and industry will cover topics incorporating principles of remote sensing, the LANDSAT system, products of the ALS, digital pre-processing techniques, analogue techniques, digital analysis, systems specification and applications.

Hands-on digital experience (DIPIX interactive system) and analogue handling of LANDSAT images will be interlinked with the lecture program.

Tours to ALS Data Processing Facility and CSIRO will be conducted.

The all-inclusive live-in course fee will be about $300 (to be finalized). Accommodation will be on the Belconnen campus of CCAE.

Enquiries

Further enquiries or reservations should be addressed to:

Geoff Halsey
School of Applied Science
CCAE
PO Box 1
BELCONNEN ACT 2616

THE ALS NEWSLETTER

Published to present information of interest to the user community regarding ALS products, systems, and related remote sensing developments.

There is no subscription charge; individuals and organizations wishing to receive the "Newsletter" should contact the Promotion Officer at our ACT address, to whom comments, corrections and other enquiries should be directed.

Remember LANDSAT '81 Congress. Canberra, September 1981.

AUSTRALIAN LANDSAT STATION
"NEWSLETTER"
PO BOX 28 BELCONNEN ACT 2616