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NASA-CR-149255  
LANDSAT-2 Project 2896E (28750)

Combined 1st, 2nd & 3rd QTRs

New England, Australia; Structures in Granitic Batholiths and Associated Foldbelts in Relation to Mineral Resources

FIRST QUARTERLY REPORT, 28 October 1976

by Dr Hilary J. Harrington, Dept. of Geology, University of New England, Armidale, New South Wales, Australia, 2351  
and Dr Kerry L. Burns, Mineral Physics Division, Commonwealth Scientific and Industrial Research Organisation, P.O. Box 136, North Ryde, Australia, 2113

Progress has been made as shown by the attached list of publications. Strictly, however, the first quarterly report is not due because magnetic tapes were not received from NASA although requested in the original application. Somewhere along the line the request for tapes got lost and removed from the request for data products. Twelve only film chips were received in 1976 from Sioux Falls but were unsatisfactory for the work.

Accordingly eleven tapes were purchased from the U.S. after inspection of the browse file at Technical and Field Surveys, and their cost was an unexpected budget item. They arrived on 28 April 1976 but were on a new format of 1600 bits/inch instead of the expected 800 b.p.i. This necessitated ordering and installing new computer hardware in order to read the tapes. The purchase and installation was not completed till August 1976.

By the time we could read the tapes, a significant backlog of processing had built up in Mineral Physics Division for other investigators beside ourselves. To clear the backlog the installation has been put on shifts. Processing of the New England tapes is underway.

A new problem has emerged in that the film-writing system has to be matched to the colour compositing system at Aerial Photographs Pty Ltd in Melbourne. Dr. Huntington has found one solution, which is to write 70 mm positive chips of the 4 bands, mount them in the projection viewer, obtain a correct colour balance, photograph the result in 35 mm, thus obtaining a transparency showing the colour balance required. The three bands required are then re-written from tape onto 9" x 9" format and sent to Melbourne along with the transparency. This system produces results at a cost of about 4 hours extra time on the film-writing computer plus preliminary experimentation in the projection viewer, colour 35 mm photography and processing.

After discussions with Dr. A. Green we have decided to short-circuit this process in the interests of speed, but we expect the colour balance to be nasty. The images will be written for maximum contrast in black and white, as determined by statistical analysis of the tapes and written as negatives. The site photographer will produce contact positives of matched density which will be sent for colour compositing. A permanent solution seems to require matching the computer processing to the colour processing and is under investigation by Green, Huntington, and Gale Morton of Technical and Field Surveys in Sydney.

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BATHOLITHS AND ASSOCIATED FOLDBELTS IN RELATION TO MINERAL RESOURCES Quarterly Report (New England Univ.) 5 p HC A02/MF A01

CSCL 05B G3/43 00048 Unclas

Original photography may be purchased from EROS Data Center 1085 and Dakota Avenue Sioux Falls, SD 57198

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In the meantime a lot of other geological work has been completed on the assembly of existing information (ground-truth). Prints of about 300 geological maps on several different scales, all detailed, were made and coloured. Structural data were extracted and compiled on transparencies to a common scale of 1 to 250,000. The Armidale office of the Geological Survey of New South Wales has compiled another transparency showing over 600 mines and prospects in the New England region. Two student theses on the Demon Fault have been completed.

The team has been joined by A. Jones whose main objective has been the production of land cover maps from the EROS Data Center images at 1:1,000,000 and 1:250,000. Lithographic film has been used on Bands 5 and 7 to produce high contrast negative and positive images of the same scene. These have been reproduced cheaply in various colour combinations on diazo film, the most favourable combination being as follows:-

Band 5	Positive	Magenta
Band 5	Negative	Yellow
Band 7	Positive	Green
Band 7	Negative	Cyan.

An example of a LANDSAT-1 scene of the Armidale area is attached to this report. Further details of the method will appear in the Bulletin of the Remote Sensing Association of Australia and Photogrammetric Engineering and Remote Sensing.

The resolution of the bulk processed scenes makes field checking rather difficult and this is awaiting the delivery of computer enhanced negatives from C.S.I.R.O. With these it should be possible to analyse each image pixel by pixel which will make checking of the land cover map more reliable.

As an interim measure a land cover map has been produced for the New England Region from bulk processed images purchased from the EROS Data Center. This map will be published early in 1977 in a Regional Atlas of New England being prepared by the University of New England.

The diazo processor has also been used for the production of false colour composites which compare very favourably with photographically produced colour prints and transparencies.

Jones is now visiting the University of Wales and his further work will be in abeyance until August 1977.

Professor R. Green has also joined the team. He and his students have built a vehicle-borne magnetometer for the work and are doing magnetic and gravity surveys across clusters of plutons and across the Mooki, Peel and Demon faults. Some of the results have been written up in theses but are not yet published.

## PUBLICATIONS

Publications that can be regarded as arising from the LANDSAT-2 related investigations are listed below. Several unpublished theses are not listed.

- Berman, M. (1976) "Distance distributions associated with Poisson Processes" J. Stat. Assoc., in press.
- Burns, K.L., J. Shepherd and M. Berman (1977) "Reproducibility of geological lineaments and other discrete features interpreted from imagery: measurement by a coefficient of association" Remote Sensing of the Environment, in press.
- Burns, K.L. and J.F. Huntington (1976) "Signal strength and detectability in human photo-interpretation of discrete natural features" 3rd International Conference on the Geophysics of the Earth and Oceans (ICOGEO), Symposium 9B/4 of the 25th International Geological Congress, "Advances in Exploration Remote Sensing".
- Huntington, J.F., A.P. Raiche and B.J. Embleton (1976) "Applications of a quantitative method for correlating geological lineament patterns" Ibid (abstract).
- Jones, A. About three papers accepted by Photogrammetric Engineering and Remote Sensing and the Bulletin of the Remote Sensing Association of Australia but correct titles not available because Jones is in Wales.
- Shepherd, J. and J.L. Gaskell (1976) "Analysis of fractures and fissure vein mineralization trends in the Drake Volcanics of New South Wales, Australia" Trans. Inst. Min. Met. Section A., in press.
- Smith, R.E. and A.A. Green (1976) "Defining hydrothermal alteration zones in basalts of the Fortescue Group, Western Australia, by Landsat-1 imagery as an exploration guide for Keeneenawan-type copper deposits" 3rd ICGEO, Sydney August 1976 (abstract).
- Previous publications: Publications resulting from earlier investigations are:
- Burns, K.L. (1975) "Satellites in Geology" Minerals Research in CSIRO No. 8, pp 1-3.
- Burns, K.L. and J. Shepherd (1975) "Satellite lineaments in S.E. Australia" Utah Geol. Assoc. Pub.. No. 5, pp 354-368.
- Burns, K.L., J. Shepherd, M. Berman, R. Beattie and J.F. Huntington (1975) "Application of Skylab photography in structural and engineering geology" Invest. Rpt. 706R CSIRO Minerals Research Laboratories 21 pp.
- Duggin, M.J. (1972) "CSIRO and the Australian programme for the Earth Resources Technology Satellite (ERTS)" Invest. Rpt. 95 CSIRO Minerals Research Laboratories.

- Duggin, M.J. (1974) "On the natural limitations of target differentiation by means of spectral discrimination techniques" Proc. 9th Annual Symposium on Remote Sensing of the Environment, Ann Arbor, pp 499-516.
- Duggin, M.J., R.J. Roberts and J.M. George (1975) "The reflectance properties of grazing pastures as determined in the LANDSAT satellite bandpasses and from oblique colour-infrared aerial photography" Proc. 10th Int. Symposium on Remote Sensing of the Environment, Ann Arbor, Vol. 10, pp 1101-1110.
- Duggin, M.J., C.C. Curtain, N. Anderson and C. Yuan (1976) "Factors controlling the application of multichannel remote sensing surveys with particular reference to the ERTS bandpasses" Remote Sensing of the Environment, Vol. 4, pp 301-316.
- Harrington, H.J. (1974) The Tasman Geosyncline in Australia. In A. Denmead and Others, editors, The Tasman Geosyncline - a Symposium. Geological Society of Australia, Queensland Division, pp 383-407.
- Harrington, H.J. (1974) The Break-up and Dispersal of the Tasman Mobile Belt. Geological Society of Australia, Tectonics and Structural Newsletter. 3. pp 12-14.
- Harrington, H.J. K.L. Burns, B.R. Thompson and A.P. Ozolins (1974) "Regional geology of Victoria in relation to satellite imagery: a preparatory study" Invest. Rep. 106, CSIRO Minerals Research Laboratories and Mines Dept. of Victoria, 37 pp, maps and plates.
- Vickers, I. (1975) "Coherent optical techniques as an aid to geological interpretation of aerial and satellite imagery" Invest. Rpt. 109 CSIRO Minerals Research Laboratories.

*H. J. Harrington*

for H. J. Harrington  
H.J. Harrington and K.L. Burns

