Agricultural activity sensed by satellites

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This paper reports the results of two projects utilising Landsat multispectral scanner data to identify land use of relevance to agriculture.

The objective of the first project was the redrafting and updating of a map of the cultivated areas of New South Wales first published by the author in 1981, but based on 1975 and 1978 data.(1)

Until early 1984 the Australian Landsat Station produced black and white copies of the infra-red band of all images acquired from the Landsat satellites in operation. Prints at a scale of approx. 1:1,000,000 (about 20cm x 20cm) were prepared, photographed to produce microfiches for distribution, then stored as a "browse file". This "browse file" was used to produce a map of N.S.W. identifying the semi-arid pastoral zone, the regularly cultivated lands, cleared pasture land, forest land and major urban areas for the year 1983. The map was produced at a scale of 1:1,000,000 and then reduced for finishing and reproduction. Images covering autumn (land preparation) and spring (vigorous crop growth) are the most useful for this purpose and in this case the file contained up to ten useful images of each area during these seasons.

The map is sufficiently accurate to be of assistance to persons concerned with agricultural development on a broad scale. Its significance is not that it could not have been prepared by other means but that it records the situation as it was throughout the state in one year, 1983, and that the original tracing was prepared in one and a half man-days. It is doubtful whether there is any other data set in Australia which would permit the rapid preparation of such an economic product.

The second project utilised the full capability of a substantial computing facility and digital image analysis package (2), in an attempt to prepare a detailed land-cover map of the Hunter Valley in N.S.W.

A classification of the whole valley using one image did not show sufficient promise over a test area, and another using two images and 55 land use classes was disappointing in that the drought gave many inland grazing areas a signature similar to the urban signature thus resulting in an unsatisfactory map. A more detailed classification of a smaller area, approx. 100km x 60km, gave a very satisfactory result using three images which were recorded in December 1979 and June and August 1980, a period of drought. Wetlands, not identifiable on aerial photographs, were well mapped by this classification. It also gave area measures identical to those on an appropriate aerial photograph. Two images, provided one was a summer image (to provide contrast between vegetation classes) and one winter (contrast between dryland and urban), gave a useable map, but winter and spring images together or single images were not sufficient.

These projects demonstrate the agricultural potential of satellite scanner data at opposite ends of the range, i.e. the very broad scale but up-to-date map requiring little equipment and the detailed but time-consuming land use classification requiring substantial computing support.

1. de Kantzow, D.R. The history of the margin' in Cropping at the Margin AIAS, NSW, September 1981

2. The package (ERMAN II) facilities and support personnel were provided for the project by IBM (Ault) Ltd.