E7.2 - 1 0.2.6.4

CR-129226

APPLICATIONS OF ERTS-1 IMAGERY TO AGRICULTURAL RESOURCE EVALUATION

by

William C. Draeger
Andrew S. Benson
Forestry Remote Sensing Laboratory
University of California, Berkeley, California

Introduction

The Forestry Remote Sensing Laboratory at the University of
California has initiated an experiment designed to evaluate the feasi-
bility of using ERTS-1 type data to provide needed agricultural infor-
mation on an operational basis for regional areas. This experiment,
conducted in cooperation with the Statistical Reporting Service of the
U.S. Department of Agriculture, the California Crop and Livestock
Reporting Service, and the California Department of Water Resources,
is being performed in Maricopa County, Arizona and San Joaquin County,
California.

In an effort to accurately determine the degree of detail which
can be extracted from ERTS-1 data, and the optimum use of "subsampling"
in the form of aerial photography and ground truth data for various
agricultural-related tasks, the investigation will progress out in a
step-wise fashion beginning with gross land use mapping, and progress-
ing to very detailed surveys. Three sub-tasks will be performed as
follows:

A. Delineation of Agricultural Land. An evaluation will be
made of the accuracy with which agricultural areas can be delineated
from other land use categories on a periodic (e.g., semi-annual) basis.
Such information is necessary for the monitoring of land use change and
for the planning of more detailed surveys. In addition this sub-task
will assess the feasibility of preparing graphic materials which illus-
trate the extent of agricultural land, and the changes which have taken
place in land use semi-annually.

B. Classification of Agricultural Land. An assessment will be
made of the feasibility of performing periodic tabulations of the pre-
dominant agricultural use of each square mile of land within the general
agricultural areas delineated in task A. This task will entail a break-
down of agricultural areas into general crop type or use groups suggested
by the cooperating user agencies as being of particular interest.

C. Crop Inventory. A determination will be made of the accuracy
with which the acreage of selected crops (e.g., barley, wheat, and
cotton) can be estimated.

In each of the tasks listed above, emphasis is being placed on obtaining a quantitative expression of the accuracy of estimates obtained by the use of remote sensing for the county as a whole, and, where possible, a comparison of these results with those obtained using conventional techniques. Investigations entail the use of both human interpreters and automatic classification and data handling techniques, and an evaluation of the optimum mix of human and machine techniques for each analysis problem. In each case, an attempt will be made to ensure that the types of information compiled (e.g., maps, tabular data, crop acreages, etc.) conform to actual requirements or desires as expressed by those persons currently involved in resource evaluations and planning in the test areas.

Results

Preliminary results of these investigations indicate that quite meaningful stratifications of agricultural lands can be made on ERTS-1 imagery. These strata can be used as the basis for further subsampling using conventional aerial photography for inventory purposes, or with limited ground data in the preparation of water consumptive use estimates. In most cases such stratification is already providing user agencies with information which has heretofore been totally unavailable or out-of-date.

Limited tests of the feasibility of performing specific crop inventories using both human and automatic techniques have been performed. While results are still quite tentative, it appears that both techniques will yield results at least competitive in time, cost, and accuracy with conventional enumeration techniques currently employed by governmental agencies, particularly as the sequential aspects of the ERTS system can be exploited.

Results applicable to subdiscipline 1.A -- Crop Survey and Classification (Agriculture/Forestry/Range Resources).