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NEW OPPORTUNITIES IN SOIL SURVEY FOR REMOTE SENSING

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Abstract

The basic problem in any field survey is to delineate bodies of similar objects and to make sure that the boundaries between map units are accurate and meaningful. Remotely sensed data cannot replace on-site investigations in soil surveys because the same color patterns, reflectance values, etc., do not always relate to the same kind of soil, even in a local survey area. But remotely sensed data is an extremely valuable tool in extending on-site observations and in locating and extending the boundaries between many map units. Field scientists should have ready access to maps of various scales and origin to aid in locating and extrapolating the boundaries between map units. Any data such as black and white or color infrared photography, Landsat MSS data, or side-looking radar is never fully satisfactory in any area. Yet a combination of these data can supplement each other and give the field surveyor another view of the survey area. There is little need to justify the use of black and white high altitude photography, color infrared photography, or Landsat data in soil survey. All have been found useful under varying conditions. The future use of color infrared images and Landsat data in soil survey will depend primarily upon the ability to provide up-to-date data quickly and at low cost.

The National Cooperative Soil Survey has 511 active progressive surveys underway in 1980. About 90 to 100 new surveys are scheduled to start each year for the next 5 years. The average area for each survey now being mapped is 800,000 acres and for new surveys about 700,000 acres. We have a potential for using color infrared photography or Landsat MSS data, or both, for about 70 million acres each year. An agreement has been reached by several U.S. Government Agencies to obtain high altitude photography on about one-third of the United States each year. Black and white 20 x 20 inch sheets and color infrared contact prints will be available at a cost of about .002 cents per acre, or for about $1300 for black and white and $1650 for color infrared photography for a 700,000 acre county. New photography will be available every 3 years and the use of color infrared photography in soil surveys probably will increase considerably.

The use of Landsat data in soil survey will depend upon ease of obtaining satisfactory maps, the cost of the maps, and overcoming the skepticism about the value of the data by many users. A question that we should examine is how refined do we want to make Landsat data. Soil surveyors are used to interpreting the variation in shading on aerial photography, but are not used to interpreting the symbolization and the square blocks of highly refined Landsat data. We need to examine the question of how we should present Landsat data to soil surveyors, the scales needed, and whether or not we need a cartographically correct map. Unless Landsat data can compete with the high quality color infrared and black and white photography in cost per acre, availability, and reduction in field time, its use will be severely limited.

Raymond Daniels received his B.S. in 1950, M.S. in 1955 and his Ph.D. in 1957 from Iowa State College. Author of 61 technical publications in the fields of stratigraphy, geomorphology, and soil science. Active member of Soil Science Society of America. Geological Society of America, and American Quaternary Association. Major interest is in the relations among stratigraphy, geomorphology, hydrology, and soils. Major thrust of work is to improve use of soil survey data and to serve as liaison between other agencies (SEA-AR, USGS, etc.) and Soil Conservation Service. From 1977-present he is the Director of Soil Survey Investigations, Soil Conservation Service.

PROCESSING, STORAGE, RETRIEVAL AND ANALYSIS OF RESOURCE DATA IN THE EIGHTIES

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Ralph Bernstein has a BSEE and MSEE from the University of Connecticut and Syracuse University respectively, and joined IBM in 1956. He was manager of the IBM Federal Systems Division Gaithersburg, MC. He was Principal Investigator on the Landsat-1 Program where he demonstrated the feasibility and accuracy of digitally processing and correcting Landsat MSS and RBV data. He received the NASA Medal for Exceptional Scientific Achievement for this effort. During his career he has been involved in numerous image processing R&D activities, development of various systems, and geoscience applications. As an author of many papers, contributor to several books, holder of several patents, he has received the IBM Outstanding Contribution Award and is listed in American Men and Women of Science. Currently he is a Senior Engineer at the IBM Palo Alto Scientific Center.