



**FORESTRY ASPECTS OF THE
1966 ANNUAL CONVENTION OF THE
AMERICAN CONGRESS ON SURVEYING AND MAPPING
AND AMERICAN SOCIETY OF PHOTOGRAMMETRY**

by

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A joint convention of ACSM and ASP was held in Washington, D.C. from March 6 to 11 inclusive at the Washington Hilton Hotel. Over 2600 members of both societies and guests attended plenary and concurrent technical sessions. During these sessions about 130 technical papers were presented and discussed, covering a wide range of topics dealing with recent research, development and application of photogrammetry, photo interpretation and photogrammetric mapping in various fields.

The Exhibition Hall contained displays on the latest developments in instrumentation, services and supplies related to photogrammetry, surveying, mapping, photographic sensors, graphic arts, photo interpretation, data collection and processing.

Some 20 papers presented during the technical sessions may be of particular interest to foresters engaged in the application of aerial photography. Summarized papers may be divided into three broad groups: a) papers dealing directly with forestry, b) photo analysis of natural resources and c) general photogrammetry techniques and equipment.

A. Forestry

"Space photography versus aerial photography for application to forestry" was presented by Richard C. Wilson, U.S. Forest Service. Photography from earth-orbital space platforms can provide synoptic

overviews of huge forest regions that are superior to conventional aerial mozaics. It can utilize short periods of good weather to image extensive forest areas. In contrast, for several decades at least, more conventional aerial photography should continue to be superior for identification and measurement of details. Ideally, space photography for overall forest mapping may complement use of aerial photography for appraising forest details.

Robert C. Aldrich, U.S. Forest Service, presented a paper on "Some potential forestry applications of 70 mm color photography," which could help gain more detailed information on national timber supply and to determine quantity, quality and tree species. Fast shutters and rapid pulse rate of 70 mm cameras, the ability to view 70 mm films in rolls, and new high-speed color films with improved acuity and resolution will contribute to successful photo sampling at scales as large as 1:600. Two major limitations remain unsolved: a) the inability to determine photographic scale accurately without costly ground work, and b) poor camera stabilization resulting in photographic errors caused by tip and tilt.

Another approach to the estimation of timber volume from large scale photographs was covered in a paper by A. H. Aldred and L. Sayn-Wittgenstein, Canada Department of Forestry, "Estimation of timber volume on large-scale 70 mm photographs", presented by L. Sayn-Wittgenstein. Tree volume equations based on photo-measured variables were compared with aerial stand volume tables, considering the influence of different sources of error and the effectiveness of several photo-measured variables.

B. Papers on natural resources.

Dr. P.C. Badgley, National Aeronautics and Space Administration, discussed the "Unique advantages of orbital remote sensing for the study of natural resources" for the discovery, inventory, evaluation, development and conservation of natural and cultural resources: mineral districts, soils, crop, timber, water, housing and transportation networks. Rapidity, continuity of observations, greater freedom from weather disturbances, synoptic views for regional syntheses, reduced data-acquisition times, reduced cost and better quality data of several types are some of the unique advantages.

It was my privilege to present a paper describing "The use of photo interpretation in land inventories."

The method presently used for inventory of forest and wild land in Canada is based on stereoscopic analysis of the surface pattern and recognition of landforms, drainage, erosion, vegetation, land use and phototone. The land's productive capacity within a broad climatic region is determined from consideration of local topography, slope, aspect, origin of parent material, soil texture, depth to bedrock and moisture regime. The method is rapid, economical and, because of physiographic base, will permit any degree of future refinements.

Dr. Ethan D. Churchill, Inter-American Institute of Agricultural Sciences of the O.A.S. presented a paper on "Integrated inventory of tropical resources utilizing aerial observation and imagery", describing a relatively new approach of assessing several resources simultaneously. This method requires a predirected reorientation and planning, and then a closely and dynamically supervised execution of the field and office inventory, compilation and analyses. This entails

a re-examination of classification units, mapping units, aerial photographic interpretation, aerial observation, field survey and office techniques for geographic, geologic, hydrologic, pedologic, vegetation, agricultural, sociologic and economic aspects with an approach to integrated classification units, mapping units and survey techniques. The approach is applicable at different levels of intensity of inventory for development planning and management. The Resources for Development Staff of the Inter-American Institute of Agricultural Sciences is engaged in the further development of such an approach.

"Geologic photo interpretation in Antarctica" was described and illustrated with excellent slides by Professor H.T.U. Smith, University of Massachusetts. The effectiveness of photogeologic interpretation under Antarctic conditions depends on the characteristics of the available photography and on the nature of the terrain itself. Trimetrogon photos made primarily for cartographic purposes provide a good starting point, but for best results must be supplemented by vertical and/or oblique photographs at larger scales along favourable flight lines at more suitable angles, and both in color and black and white. The terrain factors involve size, shape, and spacing of snow-free and ice-free areas; amount of cover by surficial deposits; distinctiveness of lithologic units and of their sequence; and degree of structural complexity.

William T. Schneider, U.S. Geological Survey presented a paper on "Airphoto interpretation of the water resources of the Florida Everglades", where aerial photography is playing an important role. Color, infrared, and panchromatic photographs show salient features that permit

evaluation of the overall water resources picture. The fresh water-saltwater interface, drainage patterns, ecologic changes resulting from flood and drought, quantities of flow, and other hydrologic features are easily observed or measured from the photographs. Such data permit areal extension of very limited point observations of water resources data, and will assist in providing the necessary guide-lines for decisions in water management in the Everglades.

C. General photogrammetry, techniques and equipment.

Several excellent papers dealt with general aspects of aerial photography and with specific problems of photo interpretation and photogrammetric equipment.

"Clean photogrammetry" - presented by Theodore L. Fick, Photogrammetry and Mapping Division of GIMRADA, described contamination control in photogrammetric system - exclusion of airborne particles, control of heat, moisture, electricity, noise, vibration, and chemicals in the interior of certain rooms containing highly precise equipment.

Charles W. Schlager, Defence Intelligence Agency, discussed the "Growing importance of map substitutes." The requirement for map substitutes and the use of the photo map, the problems encountered in presenting these products, development of orthophotography and results of current operational testing, were briefly explained.

"Cost analysis of aerial surveying operations" based on statistical analysis of more than 200 aerial surveying projects ranging from \$500.00 to \$250,000.00 in value, was presented by Antonio M. Aguilar, Kansas University.

"Spectral zonal aerial photography" by Edward Yost and Sondra Weuder~~er~~oth, Fairchild Camera and Instrument Corp., presented by E. Yost, discussed recent research in spectral zonal photography. This research has achieved a practical system (Spectral Zonal Reconnaissance System) based upon concepts of abridged spectrophotometry and colorimetry for photographing the 3800 to 9500 A^o spectrum. The results of a series of experiments to determine the accuracy of many classes of geographical characteristics and examples of the chromatic differentiation of conditions of vigor of deciduous foliage and certain classes of camouflage were illustrated.

Engineering uses of photo interpretation were discussed in two papers: "Engineering surveys for Arkansas River and tributaries - multiple - purpose plan, Arkansas and Oklahoma" by John M. Shields, Engineering Division, U.S. Army and "Summary of survey on engineering uses of photo interpretation" by Robert D. Leighty, U.S. Army Cold Regions Research and Engineering Laboratory.

Image comparison, tonal contrast, color photography and remote sensing have always been interesting topics to photo interpreters. Lt. Robert B. Stenstrom, Rome Air Development Center, presented a paper on "Image comparison with 70 mm exploitation equipment", describing a comparative analysis procedure for the evaluation and interpretation of 70 mm multilayer color and spectrally filtered black-and-white films. Four procedural steps, characterizing a typical spectral image evaluation exercise, are delineated through analysis of varying targets on various scaled color films. Basic equipment - (performance and image) - quality parameters are first established, followed by

machine-aided interpretation and verification of results through standard image-certification procedures.

Professor Olin W. Mintzer, Ohio State University in his paper "A method of evaluating phototonal contrasts" reported on the results of tests performed on a method devised for evaluating phototonal contrasts in panchromatic photography. Several filters were used in a series of aerial photographs taken of a test site in Ohio at a scale of 1:9600. In evaluating photo tonal contrasts, the photo tones of the test area were matched with various numerically scaled grey-tone cards to determine the photo tones observed and densitometer was used to determine the tone contrasts to check the values obtained by cards.

A color system for photogrammetry and photo interpretation was described by N. Gorham Parks, Eastman Kodak Company, using Kodak special Ektachrome MS aerographic Film (Estar Base) Type SO-151, processed in a rewind equipment to a negative. From these color negatives, either color or black-and-white diapositive plates, paper prints, or film transparencies can be processed utilizing standard exposing and processing equipment.

The remote infrared sensing equipment and techniques are still a puzzle to the majority of photo interpreters. In his paper "Considerations for declassification of airborne infrared remote sensing devices" Dr. Gwynn H. Suits, University of Michigan, explained that a significant advance to the natural sciences and consequently to the related national programs could be attained by the use of the new observational research tools. Current security restrictions governing

a class of airborne infrared imaging devices and the data derived from them inhibit the exploitation of this kind of remote sensing tool for these purposes.

Several papers dealt with current developments in photogrammetric equipment and aerial cameras. Dwin R. Craig, Fairchild Hiller Corporation in his paper "Synthetic Aperture Contour Camera" described a unique aerial camera system producing photographs in which points of equal elevation on the ground are readily recognized and contours can be seen with the unaided eye. A time exposure, with precise image motion compensation, generates a synthetic aperture due to forward motion of the aircraft, simulating a giant lens which is sharply focused in the plane of the contour. Objects on contour are sharply defined whereas all others are blurred. The basic principles illustrated with photographic results from a laboratory model were presented indicating the possibility of a real time mapping system.

"The use of a zoom lens in aerial photography" was discussed by Dr. Robert A. Woodson, Director of optical instrumentation, J.A. Maurier, Inc. A zoom lens having a servo-controlled focal length could provide specified scale photographs when flying at various constant or variable altitudes. The use of zoom lens with a mapping camera was analyzed, pointing out some of the problems that must be solved, as control of distortion throughout the zoom range, maintenance of sharp focus during zoom, recording of both focal length and altitude data on the film, etc.

Analytical treatment of strip and panoramic photography was presented by Edson W. Skiff, Technical Director of Nuclear Research Instruments, while the use of the Vinten 70 mm camera was explained by Alexander Easson, Computing Devices of Canada, Ltd. in his paper "A building block concept in 70 mm photographic reconnaissance system design."

The exhibits' area and displays of photogrammetric equipment, mapping and reproduction devices, examples of technical services in the field of aerial photography, photogrammetric mapping and photo interpretation attracted many participants during the evening hours and between the technical sessions. Highly qualified technical staff was available to demonstrate operation of photogrammetric equipment or to answer any questions regarding the working procedures.