tern enable the various species to be distinguished as well on panchromatic film.

The Job Ahead

The measurements of crown diameter, canopy density, tree count, and reproduction count have not yet been analyzed. When these results have been added to those of tree height-measurement and species identification, they should provide a preliminary evaluation of the possibilities of large-scale aerial photos. This exploratory study should also provide information on designing a study of this type; such information will prove valuable if further tests are made on a more comprehensive basis.

One of the most important lessons learned from this study is the necessity for standardizing as much as possible the results from different interpreters. The variation in results from interpreter to interpreter emphasizes the importance of this link in the photo interpretation chain, and it points up the danger of drawing conclusions from the results of one interpreter. No general recommendations for photo interpretation techniques can be made until there is assurance that the results will be predictable for most interpreters. Consequently, before additional studies of this nature can be undertaken, more must be learned about this human element, the interpreter, and how to obtain more consistent results with him. A sizeable job lies ahead.

Abstracts of Discussion Symposium Papers of Steen, Kent and Pope

EARL J. ROGERS,
Moderator of Symposium

1. *Steen's* Paper

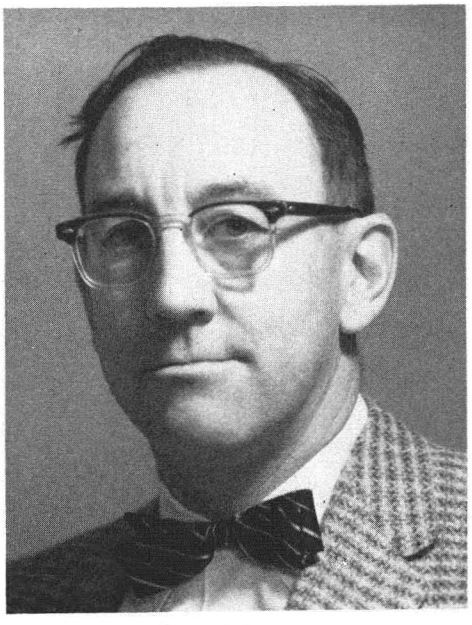
A question was raised about the advantage of technical training to photo interpretation. While no tests have been made it is the belief of Steen that such training would be advantageous where the field of interpretation involves a subject matter in which the interpretor is trained.

A questioner in the audience suggested that the subject matter used in the tests was a concern of difference in difficulty. Some attempts have been made to determine the degree of difficulty of subject matter but according to Steen no conclusions have been reached.

Steen and Moessner reported their opinions as to how long a key is necessary to an interpreter. Each believed that a key is useful only for training in the case of simple subjects because the interpreter soon memorizes all the features in a key. However, this may not be true for more complex and complicated subjects.

The level of probability used as significant was asked for. An answer could not be furnished.

Another question concerned the photo scales used in the tests. Steen reported that tests were made on several, ranging from 1:5,000 to 1:20,000.



Earl J. Rogers

2. *Kent's* Paper

A question was raised about the tones in the color illustrations used. Kent explained that these were much better in the original photos and were very satisfactory.

Another question concerned the use of photos near the edges of prints. Kent pointed out that the usual overlap in aerial photography does not necessitate using the edges of photos.

Mr. Goodale's company has conducted studies in Venezuela involving panchromatic, infrared and color aerial photos. He suggested that the photos and information for this study be exchanged with that for Kent's study. Kent agreed that such an exchange would be beneficial to both parties.

The discussion made evident the need for a controlled study comparing black and white against color photos. Kent stated that such studies were under consideration.

3. *Pope's* Paper

A question was raised about using more precise instruments in measuring tree heights. Pope stated that the errors in measuring height are not instrumental in the main, but are particularly due to photography. Photos are needed that permit seeing the ground and tops of trees. Large-scale photos have parallax factors sufficient to measure heights precisely, but large errors occur which are not instrumental. Simple stereoscopes with height finders like a parallax wedge are adequate for the present.

A suggestion was made that enlargements of smaller scales with a shorter length lens be used. This method has not been studied to date.

Moessner reported that Pope's work seems to agree with results obtained on a TVA study made several years ago. Here large-scale photos did not improve the accuracy of height measurements on stands.

The Concept of Analogous Area Photo Interpretation Keys

GEORGE K. LEWIS,
Assistant Professor, Boston University; and Research Associate, Physical Research Lab., Boston University

ABSTRACT: *All photo interpretation efforts are based upon the concept of analogy. Photo interpretation keys are good examples of the employment of this concept. Analogous area keys, prepared in an accessible area for interpretation of inaccessible areas, are founded upon the assumption that every geographic region in the world has at least one analogous counterpart elsewhere. Geographers, whose specialty is the description of regions, have often used a comparative technique to study similar landscapes in different areas. A simple case is cited to illustrate the preparation of an analogous area key, emphasizing the need for the determination of the significant geographical factors of a region and the precise mapping of these factors on a world-wide scale.*

THE concept of analogy is at the heart of photo interpretation. When the interpreter is working from memory, the analogy is drawn between the image that he sees on the photograph and one which he recalls having seen before, either on other photographs or from field observation. When the interpreter's memory is supplemented by a set of photo interpretation keys or similar devices, the analogy is simply between two images, one on the photo being analyzed, the other in the key or handbook.

If the interpreter is trying to determine the characteristics of a shipyard crane at the Kronstadt Naval Base, he can consult a key made up of photographs taken over British or German or French shipyards where cranes of similar or perhaps even exact makes are in use. The interpreta-