

APPLICATION OF TERRESTRIAL PHOTOGRAMMETRY TO EARTH SCIENCES

by

A.B. al Naqash

Following the recent paper by F. Moseley (1972) on the use of stereoscopic ground photographs in field geology, it was felt that some further information on the use of photogrammetry would be of interest.

Introduction

Photogrammetry can be defined as the science of obtaining reliable survey measurements by means of precisely positioned photography in order to determine geometric characteristics, such as size, shape and position of the photographed object. Terrestrial photogrammetry has become indispensable to any kind of precise surface survey work. It can be said that this science has been employed for detailed geological and geomorphological mapping since 1901 (Pulfrich, one of the founders of stereophotogrammetry). The technique has been usefully applied in the Alps (Finsterwalder, 1954), Canadian Rockies (Konecny, 1964), and Alaskan highlands (Naqash, 1965).

The use of this kind of survey is to prepare accurate large scale topographic maps to assist in the quantitative assessment of the geological phenomena. Therefore, first-order accuracy photogrammetric instruments are required to plot the maps from this kind of photograph; thus, a network of base lines and triangulation stations should be established in order to get a reliable topographic map.

The basic equipment employed in this kind of survey is a Wild P-30 phototheodolite, which is a combination of a T-2 theodolite and a camera carrier. The theodolite section serves a triple purpose, i.e. for angular measurements in locating photographic stations and control points, for distance measurements, and for determining the desired orientation of the survey camera. The phototheodolite should be levelled and directionally oriented with respect to all base exposure stations before any photographs are taken.

Practical Limitations of this Survey

Terrestrial photogrammetry can provide a substantially complete topographic picture, but to achieve this goal the whole terrain must be within view. This means that, if possible, photographic stations should be so situated as to permit full coverage of the terrain. It is an advantage to have little or no forest or woodland because it produces textural differences which cause distortion in the image position of the plotted surface. It should also be mentioned that this method has limitations when used in flat country without oblique vantage points. This is because the image scale of terrestrial photographs is fixed within narrow limits by the actual terrain configuration. Moreover, accuracy in determining planimetry and height is governed by the fact that in terrestrial photogrammetry camera stations lie directly in the plane of the ground, with the result that planimetric errors increase as the square of the distance from the base.

Adnan B. al Naqash, M.S., Ph.D.,
120
1 Bezzaig - Al - Suleikh
Baghdad,
Iraq.

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