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DETERMINATION AND EVALUATION OF AEROSURATE POINT STATUS IN THE EFFECT OF RELIEF IN AEROSURATES, MEASUREMENT AND SCALE ESTIMATION. THE IMPACT OF AEROSURAT DEVIATION ON SCALE CHANGE

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Abstract: In order to analyze the geometric dimensions correctness of aerial images, work included in the documents package necessitates the proper application of aerogeodetic and photogrammetric work. This, in turn, aims to improve the accuracy and quality of the work completed, namely aerial pictures.

Keywords: aerial photography, geometric, aerogeodesic, scale, aerial camera.

Introduction

We compute the overall height of the designated spots (Figure 1) by interpolating between the horizontals and lowering them to column 2 of the table.

After that, the relative equilibrium between the locations is calculated and recorded in column 3. The distance **r** between the aerial image's starting point **c** and the points shown on the image is measured and reported in in column 4 of Table 1.

In aerial photography, a table for detecting and evaluating the state of the point under the influence of relief.

H = 1 500 m, A_{av}=710.00m

Table 1

Point number	A, m	h = A–A_{cp}, m	r, mm	δ_h, mm
1	2	3	4	5
A	721.25	11.25	105	+0.7
a	721.87	11.87	109	+0.8
a\	720.78	10.78	91	+0.7
B	719.86	9.86	104	+0.7
b	720.35	10.35	87	+0.6
b\	720.48	10.48	103	+0.7
D	724.91	14.91	113	+1.1
d	724.63	14.63	108	+1.1
d\	725.19	15.19	104	+1.1
E	726.18	16.18	115	+1.2
e	726.21	16.21	105	+1.1
e\	725.47	15.47	106	+1.1

r - distance from the center of the aerial photograph to the point.

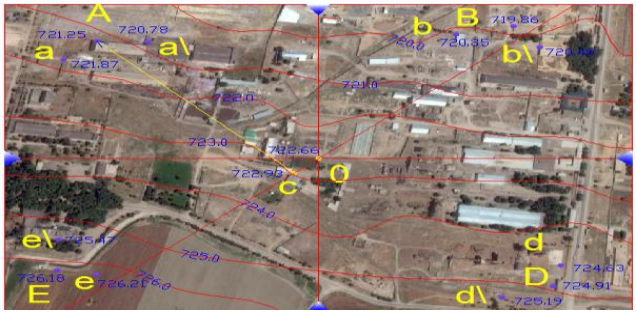

Figure 1. Image of detection of point distortion under the influence of relief in aerial photography.

In aerial photography, we calculate the distortion of the point position under the influence of relief by the following formula:

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$$\delta_h = \frac{rh}{H} = \frac{rh}{mf}$$

A – the total height of the points;
H – shooting height;
h – relative height between points;
r – the distance from the starting point of the aerial photograph to the set point.

From the center of the aerial photograph, we make corrections for relief to the angle of inclination corrected in the direction of the point.

Points consisting of objects that have a good view in the aerial photograph and plan are marked as A a, B в, D d, and E e (Figure 2) and the distance between them is measured and recorded in columns 2 and 3 of Table 2.

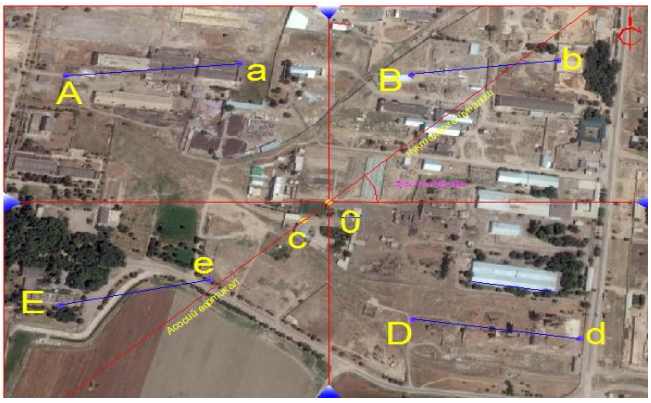

Figure 2. Measurement and scaling in aerial photographs.

Aerial photography scaling table
M= 1:10 000
Table 2

Section	L_{aer}, mm	L_{plan}, mm	m	Average scale denominator
1	2	3	4	5
A a	6.27	3.1	1: 4 944	1: 4 947
B b	5.28	2.6	1: 4 924	
Dd	6.28	3.1	1: 4 936	
Ee	5.42	2.7	1: 4 982	

The following formula is used to calculate the scale of the aerial photograph, which is written in column 4 of the table.

$$m = \frac{L_{пл}\ M}{L_{cyp}}$$

$L_{пл}$- the distance between two points in the plan;
L_{cyp}- the distance between two points in an aerial photograph;
M – The scale of the plan is 1: 10,000.

Aerial photograph deviation α results in varied masses in aerial pictures. On aerial pictures, the most significant scale distortion occurs at the edges. Consider the impact of the aerial photograph's scale change on the effect of the deviation (Figure 3).

We divide the aerial photograph into around 6 sections and calculate the mass in each part's area, which we enter in column 2 of Table 3. The change value of the scale denominator $\Delta\dot{mh}$ is defined.

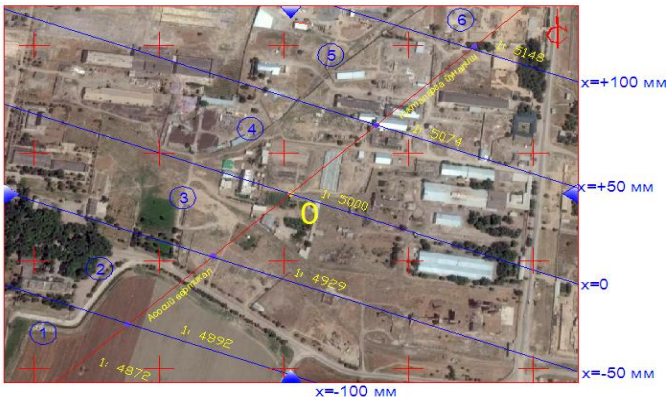

Figure 3. The effect of aerial photography on scale change.

5000, f=100
Table 3

Section	Scale M	$\Delta\dot{mh}$	change of scale denominator, m
1	2	3	4
1	1: 4872	-128	$\frac{1}{4872}$
2	1: 4892	-108	$\frac{1}{4892}$
3	1: 4929	-71	$\frac{1}{4929}$
4	1: 5000	0	$\frac{1}{5000}$
5	1: 5074	+74	$\frac{1}{5074}$
6	1: 5148	+148	$\frac{1}{5148}$

$$\Delta \dot{m}h = \mathbf{M-m}$$

here, M – aerial photographic scale in parts, m-change of scale denominator.

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