45. *On Block Movements of the Earth's Crust.*

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(Rec. April 1, 1931. Comm. by T. TERADA, M.I.A., April 13, 1931.)

1. In the present paper, the writer intends to investigate the block movement of the earth's crust in Bôso Peninsula referring to the data of the vertical displacements of triangulation points which were measured after the Earthquake of 1923.¹⁾

For investigating the block structure of the district and determining the extent and form of each constituent block, the present writer employed a method described as follows. Taking pairs of triangulation points, we measure the distance s and the difference of vertical displacements δh between the two triangulation points, together with the azimuth θ of the direction of the line connecting the same pair of triangulation points, with reference to some definite direction, for instance, N. δh is divided by s , the distance between the two triangulation points, and the quotient is equal to $\tan \phi$, where ϕ denotes the angle of inclination of the line connecting the corresponding pair of triangulation points.

When a number of triangulation points are situated on the same block, θ 's and $\tan \phi$'s measured between every two of these triangulation points are connected by a relation expressed by an equation

$$\tan \phi = \tan \phi_m \cos (\theta - \theta_m), \quad (1)$$

where ϕ_m and θ_m denote the magnitude and the direction of the inclination of the block, respectively.

2. The present method was applied to the data of vertical displacements of triangulation points distributed in Bôso Peninsula. We notice groups of triangulation points, such that in each group, the gradients of vertical displacements or $\tan \phi$'s for different pairs of triangulation points are determined by the relation of the equation (1), that is, they are on the same block. One of these groups of triangulation points which are regarded to be lying on the same block is shown in Fig. 1 by $\bigcirc$, the relation (1) for the group being represented by the curve in the figure drawn with estimated values of θ_m and

1) Military Land Survey Department, Bull. I.E.I.C., **11** (1930), No. 4.

Fig. 1.

$\tan \phi_m$. Marks ●, in the figure, correspond to those triangulation points which are not on the same block as those represented by ○. In this way, many groups of triangulation points which are regarded as belonging to the respective blocks are determined in Bôso Peninsula. θ_m 's and ϕ_m 's of these groups of triangulation points are shown by directions and magnitudes of arrows in Fig. 2.¹⁾ In this figure, the area which may be regarded to form a coherent block is bounded by tentative boundary lines of fine dots. On examining the distribution of arrows in Fig. 2, we recognize several regions in every one of which the directions of arrows for different blocks are approximately the same. The boundaries of these regions are tentatively drawn with thick dots. The discussion of the geological and geophysical significances of these boundaries will be reserved for a future communication.

3. The present method for determining the extent of the blocks of the earth's crust may be applicable for some allied data, for instance, for the data of vertical displacements of bench-marks. In this case, however, the method is valid when the leveling route is turning sharply from a bench-mark to another. Apparent discontinuity in vertical displacements of bench marks along such sharply turning leveling routes may be rightly understood under the light of the present method of block determination.

The detail and the further investigations will be described in Vol. 9, No. 3 of the Bulletin of Earthquake Research Institute.

The present writer wishes to express his sincere thanks to Professor Torahiko Terada for his kind advices and guidance.

1) Double arrows, in Fig. 2, mean that the scale of magnitude of ϕ_m 's are halved in comparison with those of single arrows. The scale of magnitude of ϕ_m is such that 1 cm. in length of the arrow corresponds to about 24'' of the inclination.

Fig. 2.