105. *Deformation of the Earth Crust and Topographical Features.*

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After the recent destructive earthquake in Oku-Tango Peninsula, a thorough revision of the trigonometrical survey was carried out by the Military Land Survey Department, over a wide area of Kwansai Districts, extending far into those regions which may be assumed to have been intact from the disturbance of the recent earthquake. From the result of the survey, the horizontal displacements¹⁾ of 25 trigonometrical points were calculated by the Authorities of the Department and already published in Vol. 7, Part 1 of the Bulletin of the Earthquake Research Institute. The present authors, availing of these data, calculated the horizontal strain components for each of the triangles of the triangulation network and investigated the modes of geographical distribution of these components as well as of the different allied quantities thence deduced, such as divergence, rotation, shear and the axes of the strain ellipse. Among the results obtained by this investigation, a rather remarkable fact was discovered that the distribution of the divergence Δ of the horizontal displacements shows a certain correlation with the existing topographical features of the land.²⁾ Thus, it is found that the area with a positive Δ generally corresponds to a mountainous district, while the area with a considerable negative Δ falls in with a depression of land, for example such as the Lake Biwa. A similar relation seems to be traced in the case of Kwantô Districts which was already studied by Fujiwhara and Takayama³⁾ in connection with the recent Kwantô Earthquake.

As a continuation of the above investigation, the similar method of analysis was applied to the case of the crustal deformation in the region surrounding the volcano Sakurazima. For this purpose the data

1) I.e. the integral displacement which may be believed to have taken place during the last 40 years.

2) The details of these investigations are published in Bull. E.R.I., **7** (1929), 223-239.

3) S. Fujiwhara and Takayama, Bull. E.R.I., **6** (1929), 149.

regarding the horizontal displacements were taken from Omori's report¹⁾ on the eruption of 1914. The strain components were calculated in the similar manner as in the previous paper cited, and thence the divergence was obtained for each of the triangles, as is written down in Fig. 1. Drawing the lines of equal Δ as shown in Fig. 1 one may remark that the area with a large positive Δ falls within the outline of the volcanic island, while the large negative Δ corresponds to the water area.²⁾

On the other hand, Fig. 2 shows the vertical displacement obtained from the comparison of the two precise levellings carried out before and immediately after the eruption of 1914.³⁾ A comparison of Fig. 2 with Fig. 1 will show that the upward displacement in Fig. 2 corresponds, on one hand, to positive Δ in Fig. 1 and, on the other hand, to the topographical elevation of the land; and vice versa.

In the case of Oku-Tango District we have already found that the divergence shows a similar correlation with the *post-seismic* vertical displacement. These results taken together seem to corroborate our hypothesis regarding the mechanism of the crustal movement, as proposed in our previous papers, i.e. to the effect that the vertical movement is mainly determined by the process of the isostatic adjustment connected with the divergence of the horizontal displacement and also that the deformation of the crust still continues generally in the same sense as in the recent geological ages.

1) F. Omori, Bull. E.I.C., 8, No. 2 (1916).

2) The result of the hydrographical survey in the Bay of Kagosima given in Omori's paper, Pl. 72, shows also a *predominance* of depression of the sea bed on the N-side of the volcano, though with a local elevation of a limited area. If we take this data into account in Fig. 2, the agreement with Fig. 1 may be in some measure improved. It seems, however, from the result of our previous investigation, Proc. 4 (1928), 296, 364, that the vertical displacement of the sea bed wants a special treatment of its own. It is from the latter reason that the hydrographical data are not taken into account in Fig. 2.

3) The comparison of the results of the precise levelling, 1914-15, with those of the later levelling, 1918-19, showed that the remarkable depressions of the districts surrounding the volcano are being gradually recovered., Bull. E.I.C., 8, No. 4 (1920). Unfortunately we have not the corresponding data of triangulation to be compared with this recovery phase of the vertical motion.

Fig. 2. Vertical displacements in cm.; + elevation, - depression. Results of the triangulation and also of the levellings are taken together into account.