CHAPTER VI. ABNORMAL CHANGES IN HEIGHT OF WATER OF KAGOSHIMA BAY DUE TO THE SAKURA-JIMA ERUPTION OF 1914.

42. Tide-gauge observations at Kagoshima. The first systematic determinations of the height of sea-surface in the harbour of Kagoshima were made by the public-works department of Kagoshima Prefecture for $2\frac{1}{3}$ years from Jan. 1903 to April 1905, and also for 1 month from May 12th to June 12th, 1909, the water level having been read off at 10 minutes intervals throughout the day and night by means of a graduated tide-gauge rod erected at the harbour office quay, whose zero corresponded to 14,61 *shaku* below the Military Survey Bench-Mark, No. 2469, set up on the adjacent strand street of Ogawa-machi (小川町). The highest water level during the above mentioned time intervals was 11.3 *shaku* and was attained on Sept. 11th, 1904. In Table XXX is given the monthly height of sea-level for the interval between Jan. 1903 and April 1905 deduced by averaging for the successive months the mean of the daily maximum and minimum tide gauge readings. Table XXXI contains the list of the monthly values obtained by averaging only the daily high tide levels, while Table XXIX gives the absolutely highest springs rise attained during the successive months.

After the recent great eruption of Sakura-jima, the tide observation at Kagoshima was resumed from Feb. 14th, 1914, in the same manner as before. Since May 1915, a self-recording tide-gauge apparatus, set up by the Department of the Interior at the inner side of the break-water of the harbour, is in the working order. As will be seen from the following §§, a comparison of

the results of the above mentioned tide-gauge observations indicates a considerable elevation of the mean sea-level *relative* to the coast after the eruption in Jan. 1914.

43. Annual variation in height of mean sea-level. Before proceeding further, let us first consider the annual variation in the height of the bay-water surface previous to the eruption. According to Table XXV (based on Table XXX) and fig. 35, the mean sea-level at Kagoshima during 1903–1905 was lowest in February and highest in September, with the difference of 1.10 *shaku* (=33 cm); the amount and course of the annual variation in question being practically identical to those for Ōsaka. It is superflous to remark that the marked withdrawal of sea at the time of the spring tide in March is the effect of the low water combined to the depression of the mean sea-level in that part of the year. Again,

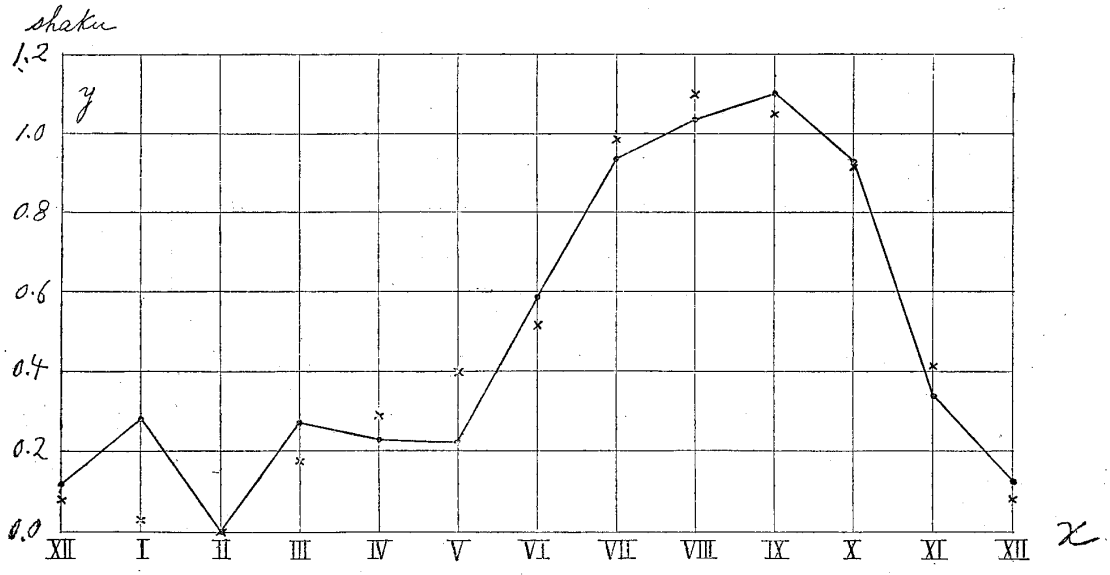


Fig. 35. Annual Variation of Mean Sea-level.
(•)....Kagoshima. (×)....Ōsaka.
y=mean height of sea-level corresponding to the month x, referred to that of February as zero. (1 *shaku*=30.3 cm=1 foot very nearly.)

the great flood tide in September, known in Japan as "hassak-jiwo"*, is evidently the result of a spring tide, whose mean level corresponds to the maximum height of the sea surface in its annual variation. For the sake of reference, in Tables XXXII and XXXIII are given the mean monthly values respectively of the barometric pressure and the air temperature at the meteorological observatory of Kagoshima (height above sea-level=120 m) in 1903–5 and in 1914; the height of sea surface varying, on the whole, inversely to the barometric pressure and directly with the temperature.

TABLE XXV. MEAN MONTHLY SEA-LEVEL AT KAGOSHIMA PREVIOUS TO THE ERUPTION, COMPARED WITH THAT AT ŌSAKA.

Place. / Month.	Kagoshima. (1903—1905.)	Ōsaka. (1903—1912.)	Place. / Month.	Kagoshima. (1903—1905.)	Ōsaka. (1903—1912.)
	shaku	*shaku*		*shaku*	*shaku*
I	0.28	0.03	VII	0.94	0.99
II	0.00	0.00	VIII	1.03	1.10
III	0.27	0.18	IX	1.10	1.05
IV	0.23	0.29	X	0.93	0.91
V	0.22	0.40	XI	0.34	0.41
VI	0.59	0.54	XII	0.12	0.08

44. Apparent elevation of bay water level. In the northern part of the bay of Kagoshima the sea-level underwent an elevation relative to the coast, which became manifest first on the occasion of the spring tide on the 13th of March, 1914, when the tide-gauge indicated a rise of water to 12.2 *shaku*. This was much in excess of the high flood to be expected even in the autumnal "hassak-jiwo", and 2.1 and 1.5 *shaku* over the highest March sea-level in

* Literally, tide on the 1st day of the 8th month of the year, in the old lunar calendar, corresponding to a new moon at the commencement of September.

1903 and that in 1904 respectively. The consequence was that, in the low districts about the mouth of the Kōtsuki-gawa at the S. end of the city, the ground was covered by sea water at the times of high tides. Along the N.W. and the N. parts of the coast of Kagoshima Bay, where the water rise was much greater, embankments and stone walls were damaged at several places, extensive rice fields being thereby devastated.

45. Highest monthly tide level in Kagoshima harbour. (See fig. 37.) Table XXIX gives a comparison of the highest monthly springs rise at the quay of Kagoshima harbour in the interval of Feb. 1914 to Jan. 1916, with that observed previous to the eruption, from Jan. 1903 to April 1905; the figures in the last column being the excess for the different months of the year of the former over the latter, or the apparent elevation of the high-water level after the eruption, approximately freed from the influence of the annual variation in the height of water.

According to Table XXIX, the excess of the high water level of spring tide after the eruption over that before it, which was slight in February 1914, was increased during the next 5 months from 1.3 to 1.8 *shaku*, with the mean of 1.46 *shaku*, reaching the maximum amount of 2.7 *shaku* in August of the same year. Since then, till the end of 1915, the difference remained mostly between 1.5 and 1.9 *shaku*, with the average of 1.6 *shaku*. The water level was highest in the months of August, September, and October, as follows:

13.5 *shaku*	.....	in Aug. 1914.
13.1 „	.....	Sept. 1915.
12.9 „	.....	Oct. 1914.
12.7 „	.....	Sept. 1914. Aug. 1915.

The apparent increase in the height of sea surface after the eruption in general, or the attainment of maximum elevation in August to October in particular, depended evidently on the elevation of the mean sea-level, and not on any increase in the range of the daily tidal oscillation or the vertical distance between the high and low waters, whose maximum monthly values, before and after the eruption, are given in the following table:—

TABLE XXVI. MAXIMUM DAILY TIDE RANGE IN KAGOSHIMA HARBOUR, BEFORE AND AFTER THE ERUPTION OF 1914.

Year. / Month.	Before the Eruption.		After the Eruption.		
	1903.	1904.	1914.	1915.	1916.
	shaku.	*shaku.*	*shaku.*	*shaku.*	*shaku.*
I	10.7	10.4	—	—	10.5
II	10.1	10.9	8.3*	9.7	
III	9.2	10.2	10.6	8.9	
IV	9.7	9.6	10.4	10.6	
V	10.2	9.8	—	10.2	
VI	10.1	10.0	—	10.0	
VII	10.6	10.1	—	9.8	
VIII	10.1	10.4	—	10.7	
IX	9.2	10.1	—	8.6	
X	9.1	9.9	—	9.6	
XI	9.0	9.6	—	10.0	
XII	9.9	9.6	—	10.3	

* Observation was re-started on the 14th of Feb. (1914).

From the above table it will be noticed in the first place that, according to the observation in 1903 and 1904, the daily range of tide in September and October, when the high water level reached the maximum limit of 11.3 *shaku*, was 9.1 to 10.1 *shaku*, being

less than the corresponding amount of 10.1 to 10.9 *shaku* in January, February, June, July, and August. Again, in 1914 and 1915, the cases of maximum high-water elevation and the great daily tide range did not necessarily occur in one and the same month. Thus, in September 1915, the water surface reached an exceptionally high level of 13.1 *shaku*, while the maximum daily tide range was only 8.6 *shaku*.

46. Mean monthly sea-level in Kagoshima harbour. (See fig. 36.) In Table XXX are given the sea-surface heights for the successive months during the two years after the great eruption under consideration, obtained by averaging the means of the daily highest and lowest water levels. The values (bracketed in the list) for the interval of May 1914 to Jan. 1915 are imperfect, as the tide-gauge readings during these months were limited, except in the case of spring tides, to the day time and a few hours after dusk and before dawn.

The last column of Table XXX gives a list of the excess or elevation of the mean sea-level after the eruption over that for the corresponding month averaged from the heights in 1903-1905. During the first three months following the eruption the increase of the mean sea-level height was 1.42 to 1.30 *shaku*, with the mean of 1.37 *shaku*. The amount of elevation was 2.25 *shaku* in February 1915, thence slightly decreasing toward the end of the year. On the average the level elevation was augmented by about 0.75 *shaku* (=23 cm) in the course of one complete year after the eruption, being again decreased approximately by about 0.46 *shaku* (=14 cm) during the next 10 months as follows:—

Interval.	Amount of Level Change.	*Do.*, calculated (§ 51).
Feb. — April, 1914.	1.37 *shaku.*	— *shaku.*
Feb. — March, 1915.	2.12	2.11
April — June, „	1:81	1.90
July — Sep., „	1.61	1.71
Oct. 1915 — Jan., 1916.	1.66	1.52

Unfortunately the tide-gauge observation was not complete between May 1914 and Jan. 1915, but it is probable that the maximum limit of the level elevation at Kagoshima was some 3 *shaku* or about 0.9 m and reached between Aug. and Dec., in 1914.

47. Mean monthly high-water level in Kagoshima harbour. Table XXXI gives the mean highwater level deduced by averaging the maximum daily heights of sea surface for the different months, both before and after the eruption, namely, between Jan. 1903 and April 1905, and between Feb. 1914 and Jan. 1916. The mean amount of the level elevation after the eruption is approximately equal to those of the mean sea-level considered in the preceding §, being 1.42 *shaku* for Feb.–April in 1914, and 1.97 to 1.56 *shaku* in Feb. 1915–Jan. 1916, as follows:—

Time Interval.	Average Elevation.
1914: Feb.—April, ...	1.42 *shaku.*
1915: Feb.—April, ...	1.97
„ May—June, ...	1.82
„ July—Sept.	1.60
1915, Oct.—1916, Jan.....	1.56

48. Digression on sea-level variation at Hososhima. A remarkable change in the height of sea-level *relative* to the coast similar to that along Kagoshima Bay was not indicated at neighbouring districts, as will be seen from the following table, giving the yearly mean

sea-level height for the 17 years, 1898 to 1914, at the tide-gauge station of Hososhima, in the province of Hyuga, about 134 km to the N.E. of Sakura-jima.

TABLE XXVII. MEAN YEARLY SEA-LEVEL* AT HOSOSHIMA, 1898—1914.
(IN METRE.)

Year.	Height of Sea-level.	Year.	Height of Sea-level.
	m		*m*
1898	(−) 2.554	1907	(−) 2.598
1899	538	1908	587
1900	556	1909	603
1901	564	1910	626
1902	575	1911	614
1903	555	1912	597
1904	576	1913	583
1905	554	1914	584
1906	574		

* Vertical distance of sea surface measured below a point fixed in the tide-gauge room.

It will be seen from the above table that the mean height of the sea-level in 1914 was not at all higher, but was, on the contrary, about 2 cm (=0.066 *shaku*) lower than in 1903 and 1904. Again, from Table XXVIII, giving for the 4 years 1911 to 1914 the mean monthly height of sea-level, it will be observed that the latter is subject in a given month of the year to a fluctuation of the maximum amount of 15 cm (=0.5 *shaku*). The amount of the level increase at Kagoshima (§ 46) was several times greater than this limit of fluctuation for Hososhima.

TABLE XXVIII. MEAN MONTHLY SEA-LEVEL AT HOSOSHIMA, 1911—14.

Vertical distance of sea surface measured below a point fixed in the tide-gauge room.

Year. / Month.	1911.	1912.	1913.	Mean.	1914.
	metre.	*metre.*	*metre.*	*metre.*	*metre.*
I	2.765	2.720	2.666	2.717	2.816
II	2.828	2.661	2.667	2.719	2.718
III	2.651	2.688	2.722	2.687	2.613
IV	2.680	2.726	2.664	2.690	2.656
V	2.684	2.641	2.604	2.643	2.586
VI	2.563	2.513	2.491	2.522	2.539
VII	2.508	2.571	2.492	2.524	2.496
VIII	2.474	2.458	2.351	2.428	2.445
IX	2.435	2.416	2.473	2.441	2.404
X	2.482	2.546	2.485	2.504	2.498
XI	2.606	2.639	2.621	2.622	2.558
XII	2.688	2.585	2.762	2.677	2.677
Mean.	2.614	2.597	2.583	2.598	2.584

49. Change in sea-level height after Anei eruption, 1779. The eruption in the 8th year of Anei (1779) was also followed by the overflowing of sea-water along the coast of the bay of Kagoshima, as is evident from the following translation of an account by the famous traveller Tachibana Nankei, who visited the scene of disturbance about 4 years after the catastrophe:—"After the great eruption of Sakura-jima in the Anei period, the bay water was elevated 5 or 6 *shaku* at Kagoshima, and to over 10 *shaku* at some other places. The low strand streets, namely, Shimomachi, Tsukimachi, etc., of Kagoshima, were at times of spring tides covered by sea water, such that it was impossible to wade through even with high *geta* (wooden clog). The garden of the house of one Oyama Koemon, where I put up, was also on those cases filled

Fig. 36. Variation in Height of Mean Monthly Sea-level at Kagoshima, before and after the Sakura-jima Eruption of 1914.

A....1914–1916. B....1903–1905.
(1 *shaku* = 30.3 cm = 1 foot very nearly.)

(Doubtful part is indicated by dotted line.)

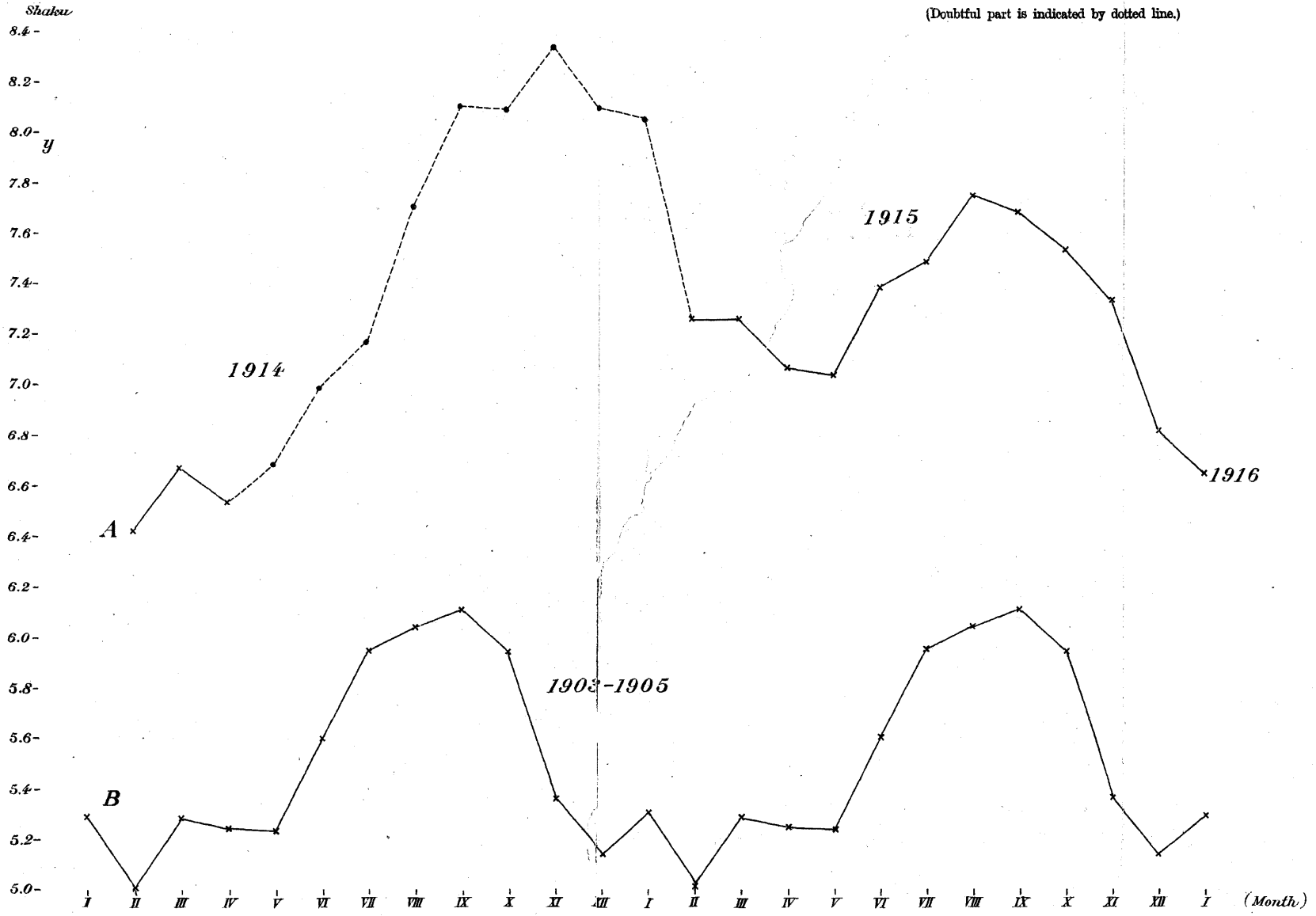
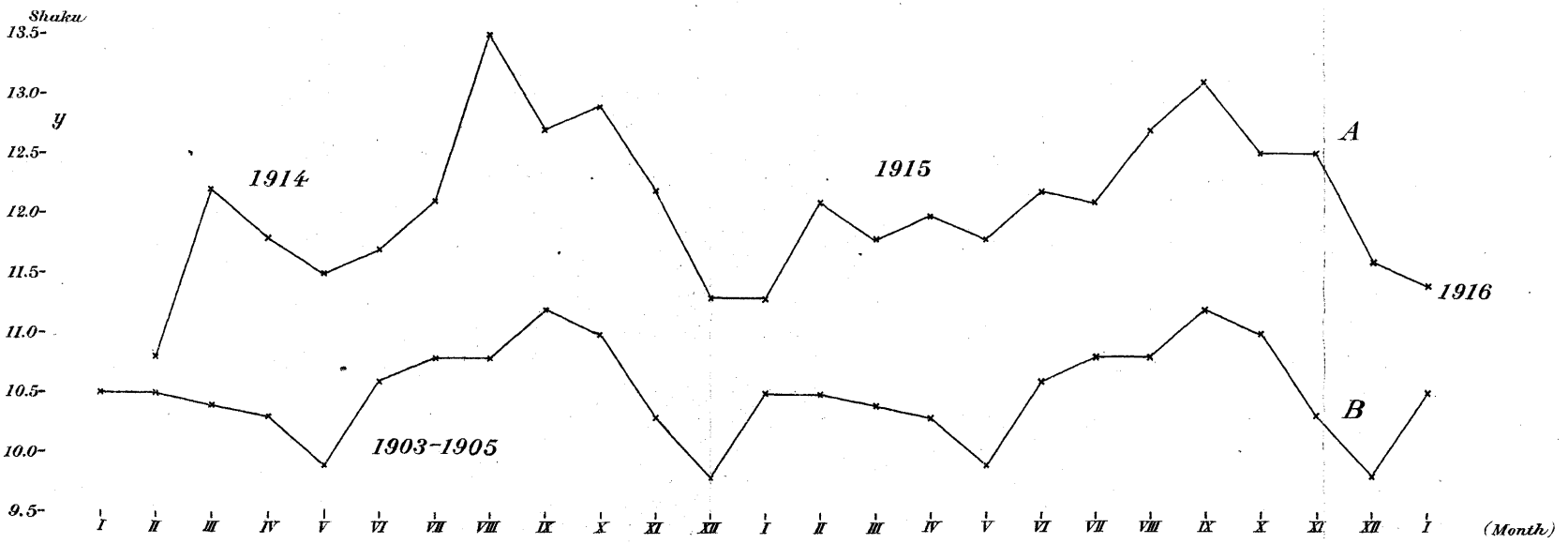


Fig. 37. Variation in the Maximum High-Water Level at Kagoshima during the Successive Months, before and after the Sakura-jima Eruption of 1914.

A....1914-1916. B....1903-1905.



(1 *shaku* = 30.3 cm = 1 foot very nearly.)

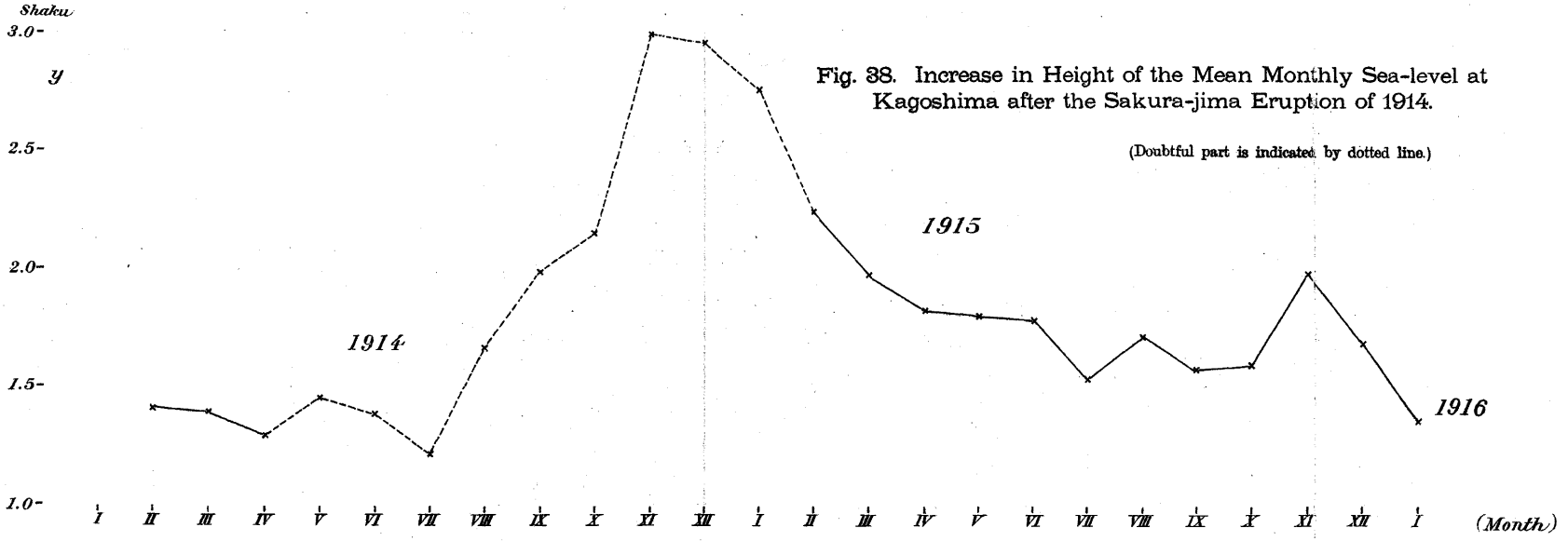


Fig. 38. Increase in Height of the Mean Monthly Sea-level at Kagoshima after the Sakura-jima Eruption of 1914.

(Doubtful part is indicated by dotted line.)

with sea water. The efforts of the reighning lord of Satsuma to provide against the intrusion of sea water by the erection of embankments were ineffectual, and there were, in the neighbourhood of Kajiki, some villages entirely destroyed by tides or obliged to remove to higher grounds. The cause of the remarkable elevation of the sea surface may be in the depression of the ground of the two provinces of Satsuma and Ōsumi, in consequence of the outflow of rock and ash from Sakura-jima. Anyhow it was highly curious that the elevation of sea-level was limited to Kagoshima Bay." From the foregoing account it will be seen that the remarkable elevation of sea-level, whose maximum effect was shown in the neighbourhood of Kajiki, Kokbu, etc., on the northern coast of Kagoshima Bay, continued for, at least, 4 or 5 years after the great eruption of 1779. The subsequent course of the phenomena of elevation of the sea surface is not known, but, as stated in a subsequent §, it is probable that the sea-level regained its original height first after the lapse of several dozens of years.

50. Cause of sea-level elevation in Kagoshima Bay. The apparent or relative elevation of the sea-level attending the recent eruption of Sakura-jima (§§ 44–47) was of course not confined to the harbour of Kagoshima alone, but was manifested along the coast of Sakura-jima and of the northern portion of Kagoshima Bay, as was the case after the Anei eruption (§ 49). The maximum amount of the sea-level elevation was about 3 feet at Kagoshima, 3 to 4 feet at the vicinity of Shigetomi (about 14 km north of Kagoshima), and about $3\frac{1}{2}$ feet at Kokbu and Kajiki; the change being also very marked at several places in Sakura-jima. Thus, at the village of Komen, situated on the north coast of the island, two houses which stood on the beach had to be removed in consequence of the increase in height of tides. Again, at the

neighbouring village of Shirahama, the tide reached in Autumn of 1814 the house ground, whose side stonewall is 7 feet in height, and which is separated by a piece of cultivated field about 12 feet in width from the beach road now permanently under water. The vicinity of Nojiri at the S.W. part of the island also suffered much from a similar rise of the sea water. It seems that the maximum amount of sea-level elevation at Sakura-jima was some 2 metres and much greater than along the coast of Kagoshima Bay.

When the effect of the sea-level elevation became marked first in March 1914, the change was generally attributed to the closing of Seto Strait, which was believed to have much influence in impeding the tidal motion in the bay. Prof. A. Imamura supposed, however, the phenomenon in question to be the expansive effect of the bay water due to the heat communicated by the hot lava masses which flowed into the latter; while the present author attributed the elevation of the sea-level to the depression of the ground in and around Sakura-jima in consequence of the great eruption. That the influence both of the blocking up of Seto Strait and the heating of the water by the lava streams must have been very slight may be inferred from the fact that the amount of sea-level elevation immediately after the commencement of the eruption was much smaller than that 6 months later on. Further, the Anei eruption of Sakura-jima did not close Seto Strait, indicating that the blocking up of the latter, which probably modified to some extent the course of the current in the northern part of the bay, was not the necessary and sufficient cause of the sea-level elevation. Again, as will be seen form No. 3 of this Volume, the surface sea-water temperature in Kagoshima Strait on and about the 18th of January, 1914, one week after the commencement of the eruption, was 16°.7 C, or 1°$\frac{1}{2}$ C higher

than that for the corresponding epoch in 1910–1912; the difference having, however, practically disappeared in the course of the further 3 months, namely, in and after April, 1914. That the eruption was followed by the depression of the ground, which was the real cause of the apparent sea-level elevation, will be seen from Chapter VII.

The restoration of the depressed level of the volcanic district to the original height may be followed by an elevation, as the result of the revival of the subterranean tension which would assert an upward pressure to the ground from below. In other words, the island of Sakura-jima and the neighbouring region may be supposed to execute a long-period oscillation in level change which follows the variation in the magnitude of the volcanic effort, an eruption taking place at the culmination of the elevation phenomenon. In fact, at Kagoshima and along the northern coast of the bay, the sea-water surface seems to have suffered a continual depression for half a century or so previous to the recent outbreak of Sakura-jima. Thus, 50 or 60 years ago at Hamano-ichi (濱之市), near Kokbu, the spring tide used to flood the low ground as far as the main road of the town, about 200 metres from the recent beach line. This, however, gradually ceased to be the case, the sea-level having since apparently been lowered, especially to a striking amount during a few years preceding the great outburst of Sakura-jima in 1914, such that the traffic in the small square harbour, about 250 m in extension, and almost dried up, had recently to be carried on with wagons instead of boats. Again, according to the account of Professor Tamari and others, the sea water had used to run up the rivers Inari-gawa (flowing through the northern part of the city of Kagoshima), Biu-gawa (別府川, near Shigetomi), and Shikine-gawa (near Shikine) 50 or 60

years ago through much greater distance than lately. All these facts evidently indicate an apparent recession of the sea-level, or the real elevation of the ground, which had began at the middle of the 19th century or at an earlier date, and became much pronounced immediately before the recent eruption. After the latter event, the sea-level have again been elevated.

The eruption of Jan. 12th, 1914, began at about 10 a.m., while the strong earthquake shock took place at 6.30 p.m. on the same day, the small "tsunami," or tidal waves, which occurred about 1 hour later on having probably been caused by the depression of the bottom ground. This might possibly mark the commencement of the phenomenon of the apparent sea-level elevation under consideration.

51. On future course of depression. As will be seen from §§ 45 and 46, the amount of the apparent sea-level elevation, or the depression of the ground, reached the maximum limit at the end of 1914. Its subsequent rate of decrease, namely, the reduction in the amount of the "sea-level elevation" with the increase of the time (x), may probably be assumed to be one of rectangular hyperbola, as is the case with the frequency variation of the after-shocks of a great earthquake, both relating to the recovery or settlement to the ordinary condition of equilibrium of a portion of the disturbed earth's crust. Making calculations from the mean values for the interval of Feb. 1915 to Jan. 1916, given at the end of § 46, we obtain the equation

$$y\,(x+23.04)-49.45=0,$$

in which y is expressed in *shaku*, and x in months, whose origin of reckoning ($x=o$) corresponds to February 1915. According to the above relation, the value of y would be reduced to 0.5 *shaku*

(=15 *cm*) in $x=76$ months, and to 0.1 *shaku* (=3 *cm*) in $x=472$ months, that is to say, respectively about 7 and 40 years after the commencement of the eruption in Jan. 1914. These estimations, though very roughly approximate, seem to indicate that the depression of the relative sea-level, or the elevation of the ground, to the position just before the eruption would take yet several dozens of years, a conclusion well in accord with what has been stated in

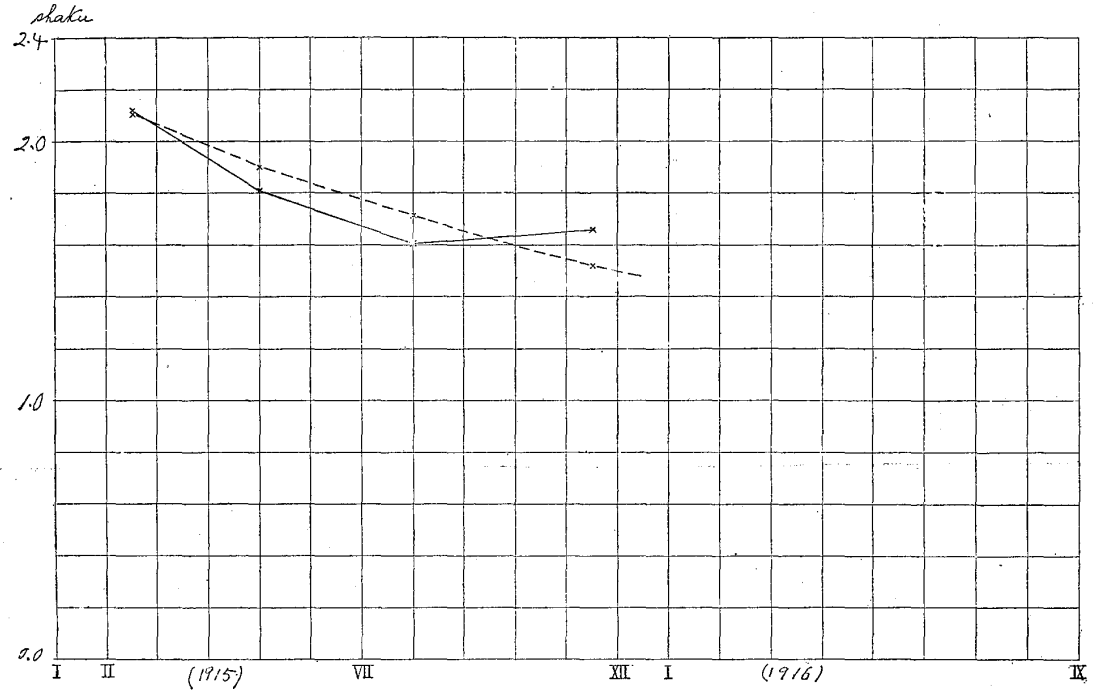


Fig. 39. Gradual Reduction since the commencement of 1915 in the Height of the Elevated Mean Sea-level at Kagoshima.

(1 *shaku*=30.3 cm=1 foot very nearly)

the preceding §. In Fig. 39, the broken line relates to the actual mean increase of the sea-level height, while the dotted curve has been drawn according to the empirical equation above obtained.

TABLE XXIX. HIGHEST SEA-WATER LEVEL IN KAGOSHIMA HARBOUR BEFORE AND AFTER THE SAKURA-JIMA ERUPTION OF 1914.

Year. / Month.	Before the Eruption.				After the Eruption.	Difference.
	1903.	1904.	1905.	Mean.	1914–16.	
	shaku.	*shaku.*	*shaku.*	**1903–5** *shaku.*	**1914** *shaku.*	*shaku.*
I	11.2	9.8	10.4	10.5	—	—
II	11.0	10.3	10.3	10.5	10.8	0.3
III	10.1	10.7	10.5	10.4	12.2	1.8
IV	10.0	10.2	10.6	10.3	11.8	1.5
V	10.0	9.7		9.9	11.5	1.6
VI	10.6	10.5		10.6	11.7	1.1
VII	10.7	10.8		10.8	12.1	1.3
VIII	10.6	11.0		10.8	13.5	2.7
IX	11.1	11.3		11.2	12.7	1.5
X	10.7	11.3		11.0	12.9	1.9
XI	10.3	10.2		10.3	12.2	1.9
XII	9.7	9.9		9.8	11.3	1.5
				1903–5	**1915**	
I				10.5	11.3	0.8
II				10.5	12.1	1.6
III				10.4	11.8	1.4
VI				10.3	12.0	1.7
V				9.9	11.8	1.9
VI				10.6	12.2	1.6
VII				10.8	12.1	1.3
VIII				10.8	12.7	1.9
IX				11.2	13.1	1.9
X				11.0	12.5	1.5
XI				10.3	12.5	2.2
XII				9.8	11.6	1.8
				1903–5	**1916**	
I				10.5	11.4	0.9
II				10.5		

TABLE XXX. MEAN MONTHLY HEIGHT OF SEA-LEVEL IN HARBOUR OF KAGOSHIMA BEFORE AND AFTER THE SAKURA-JIMA ERUPTION OF 1914.*

Year. / Month.	Before the Eruption.				After the Eruption.	Sea-level Elevation.
	1903.	1904.	1905.	Mean.	1914–16.	
	shaku.	*shaku.*	*shaku.*	**1903–5** *shaku.*	**1914** *shaku.*	*shaku.*
I	5.81	4.85	5.19	5.29	—	—
II	—	5.04	4.98	5.01	6.43	1.42
III	5.36	5.38	5.10	5.28	6.68	1.40
IV	5.15	5.26	5.31	5.24	6.54	1.30
V	5.24	5.22		5.23	(6.69)	(1.46)
VI	5.54	5.66		5.60	(6.99)	(1.39)
VII	5.85	6.04		5.95	(7.17)	(1.22)
VIII	5.78	6.29		6.04	(7.71)	(1.67)
IX	5.93	6.29		6.11	(8.11)	(2.00)
X	5.93	5.95		5.94	(8.10)	(2.16)
XI	5.35	5.35		5.35	(8.35)	(3.00)
XII	5.12	5.13		5.13	(8.10)	(2.97)
				1903–5	**1915**	
I				5.29	(8.06)	(2.77)
II				5.01	7.26	2.25
III				5.28	7.26	1.98
IV				5.24	7.07	1.83
V				5.23	7.04	1.81
VI				5.60	7.39	1.79
VII				5.95	7.49	1.54
VIII				6.04	7.76	1.72
IX				6.11	7.69	1.58
X				5.94	7.54	1.60
XI				5.35	7.34	1.99
XII				5.13	6.82	1.69
				1903–5	**1916**	
I				5.29	6.65	1.36
II				5.01		

* Figures within brackets are only roughly approximate.

TABLE XXXI. MEAN MONTHLY HIGH-TIDE LEVEL IN HARBOUR OF KAGOSHIMA BEFORE AND AFTER THE SAKURA-JIMA ERUPTION OF 1914.*

Month. \ Year.	Before the Eruption.				After the Eruption.	Difference.
	1903.	1904.	1905.	Mean.	1914–16.	
	shaku.	*shaku.*	*shaku.*	**1903–5** *shaku.*	**1914** *shaku.*	*shaku.*
I	9.29	8.33	8.70	8.77	—	—
II	—	8.48	8.40	8.44	(9.85)	1.41
III	8.68	8.78	8.42	8.63	10.08	1.45
IV	8.45	8.58	8.57	8.53	9.92	1.39
V	8.57	8.63		8.60	(9.82)	(1.22)
VI	8.98	9.06		9.02	(10.20)	(1.18)
VII	9.26	9.40		9.33	(10.37)	(1.04)
VIII	9.08	9.58		9.33	(10.85)	(1.52)
IX	9.15	9.61		9.38	(11.00)	(1.62)
X	9.14	9.30		9.22	(10.77)	(1.55)
XI	8.67	8.78		8.73	(10.49)	(1.76)
XII	8.60	8.62		8.61	(9.80)	(1.19)
				1903–5	**1915**	
I				8.77	(10.25)	(1.48)
II				8.44	10.41	1.97
III				8.63	10.55	1.92
IV				8.53	10.54	2.01
V				8.60	10.46	1.86
VI				9.02	10.80	1.78
VII				9.33	10.77	1.44
VIII				9.33	11.07	1.74
IX				9.38	11.01	1.63
X				9.22	10.78	1.56
XI				8.73	10.63	1.90
XII				8.61	10.07	1.46
				1903–5	**1916**	
I				8.77	10.08	1.31
II				8.44		

* Figures within brackets are only roughly approximate.

TABLE XXXII. MEAN MONTHLY BAROMETRIC PRESSURE AT KAGOSHIMA. (Reduced to 0°C.) 1903–5; 1914.

Month. \ Year.	1903.	1904.	1905.	Mean.	1914.
I	755.7	757.8	753.4	755.6	756.83
II	756.7	755.6	753.9	755.4	754.74
III	752.4	752.6	754.0	753.0	752.99
IV	752.2	753.0	751.6	752.3	751.14
V	751.2	749.5	750.9	750.4	750.26
VI	746.5	748.5	746.1	747.5	747.96
VII	747.6	747.1	747.7	747.4	747.55
VIII	750.3	746.9	747.7	748.6	746.13
IX	750.1	749.0	751.4	749.6	749.67
X	751.9	752.7	753.2	752.3	754.49
XI	755.3	755.6	756.0	755.5	755.38
XII	756.2	756.6	755.3	756.4	755.82
Mean.	752.2	752.1	751.8	752.2	751.91

TABLE XXXIII. MEAN MONTHLY AIR TEMPERATURE AT KAGOSHIMA. 1903–5; 1914.

Month. \ Year.	1903.	1904.	1905.	Mean.	1914.
I	8.0° C	6.1° C	9.9° C	8.0° C	7.68° C
II	7.8	8.7	6.3	7.6	8.85
III	13.1	10.9	10.9	11.6	12.95
IV	15.8	16.6	14.8	15.7	14.65
V	17.8	18.4	18.9	18.4	19.76
VI	20.4	22.0	22.3	21.5	22.70
VII	23.8	26.2	25.8	25.3	27.57
VIII	27.1	26.4	25.2	26.2	26.99
IX	24.6	23.3	23.3	23.7	24.39
X	19.1	18.8	19.0	19.0	19.02
XI	13.0	11.9	14.5	13.1	14.91
XII	7.6	9.1	11.9	9.5	9.65
Mean.	16.5	16.5	16.9	16.6	17.43