gives, in the Southern Hemisphere, when the moon's declination is south, the day tide at H higher than the night tide at H^1.

Seven days later when the moon is on the Equator the day and night tides are equal in height (Fig. 2) at all ports. Again, in fourteen days from the new moon the position of the moon is at M_2 (Fig. 1), and it is now full moon, during this interval of time, since the moon transits about fifty minutes later each day, the morning tide at the beginning of a lunation becomes the night tide at the end of it.

Further, a consequence of the inclination of the plane of the Equator being greater than the inclination of the plane of the moon's orbit to the place of the ecliptic is, for the Southern Hemisphere, that new moon occurs in the summer months south of and during the winter months north of the Equator, as is obvious from Fig. 3, which shows the relative positions in June and December.

These considerations give a general rule for the diurnal inequality as follows: That in both hemispheres the day tides are highest in the summer, and the night tides in the winter.

The tides on the New Zealand coast follow the general rule, but there are places where the diurnal inequality sometimes becomes so large that there is only one tide in the twenty-four hours, and at Singapore, although this port lies close to the Equator, the diurnal inequality is very large.

For the future the computation of the predictions will not be continued by the computing division at this office. Arrangements have been made to have the curves for six ports—viz., Auckland, Wellington, Lyttelton, Dunedin, Bluff, and Westport—run off by the tide-predicting machine at the National Physical Laboratory, England. The computing staff at this office will perform the analyses for these ports annually to determine the tidal constants required for setting the machine.

The harmonic analyses involve an enormous amount of numerical calculation. By the introduction of the printed computation forms the work is performed in a systematic and mechanical manner, but as it is found that certain abridgments of the numerical work can be introduced without impairing the accuracy of the results a certain amount of saving will be made in future reductions.

The tidal station at New Plymouth was visited, and the mean sea-level has been derived from the records of the automatic tide-gauge for a period of one year.

Inspections of the tidal stations at Auckland, Wellington, Lyttelton, Dunedin, Bluff, and Westport were made, and the automatic tide-gauges connected by levelling to standard tide-poles and to permanent bench-marks at these ports. My thanks are due to the Harbour Board authorities at these places for assistance in this part of the work.

A comptometer computing-machine was installed in the computing division during the year.

Magnetic Survey.

It is now twenty years since the field-work of the Magnetic Survey was undertaken in the Dominion, and in order to detect the secular changes in the magnetic elements it is desirable that a number of the original stations, particularly those in the immediate vicinity of the seaports, should be reobserved.

The Magnetic Observatory at Hagley Park, Christchurch, and the substation at Amberley, were visited in connection with a general inspection last March.

The work of the observatory in connection with the running of the recording instruments has been continuous, and valuable records of the magnetic elements have been secured.

The measurement of the curves and the reduction of the results for publication has fallen into arrears, principally on account of the observatory being understaffed. Prior to the war full tables of the hourly values of the declination and horizontal force were published in the annual report of this Department, but since 1914 the only results published were the monthly means for 1915 and 1916 of these elements and the seismological records for 1915 in the *New Zealand Journal of Science and Technology*. The full records together with the other arrears mentioned will soon be ready, and will be published when the present positions with respect to shortage of paper is relieved.

The mean annual values of the magnetic elements as far as they are available at present are shown in the table below:—

Table of the Mean Values of the Magnetic Elements at Christchurch Observatory.

Date.	Declination E. of N.	Annual Change.	Horizontal Force.	Annual Change.	Vertical Force.	Annual Change.	Inclination South.	Annual Change.	Date.
	° ′	′	C.G.S. Unit.	γ	C.G.S. Unit.	γ	° ′	′	
1902	16 15·1	+ 3·2	0·22694	— 25	0·55277	+ 9	67 40·8	+ 1·5	1902
1903	16 18·3	+ 3·5	0·22669	— 25	0·55286	+ 19	67 42·3	+ 1·8	1903
1904	16 21·8		0·22644		0·55307		67 44·1		1904
		+ 2·63		— 22		+ 28		+ 1·78	
1910	16 37·6	+ 1·4	0·22511	— 27	0·55474	+ 23	67 54·8	+ 1·4	1910
1911	16 39·0	+ 2·5	0·22494	— 23	0·55497		67 56·2	+ 2·0	1911
1913	16 44·0	+ 0·8	0·22449	— 35	0·55478	+ 40	67 58·2		1913
1914	16 44·8	+ 2·2	0·22414	— 27					1914
1915	16 47·0	+ 2·8	0·22387	— 32		+ 2		+ 1·65	1915
1916	16 49·8	+ 3·2	0·22355	— 27					1916
		+							
1917	16 53·0	2·8	0·22328	— 23	0·55486	+ 34	68 04·8	+ 1·9	1917
1918	16 55·8		0·22305		0·55520		68 06·7		1918

The mean variation of the declination for the period 1902–18 is found to be increasing at the rate of 2·54′ per annum.