

In October an important communication was received from the Lords Commissioners of the Admiralty showing the great convenience it would be to H.M. ships and also to the mercantile marine to have Indian and Colonial Tide-tables included in the Admiralty Tide-tables, and asking for advance proofs of the Tide-tables of New Zealand ports. The Government at once acceded to the suggestion of the Admiralty and arrangements were made to put the work in hand. The Tidal Abacus of Sir G. H. Darwin, F.R.S., was obtained, as well as a supply of the computation forms to use with it. And orders were placed for a Mercedes adding-machine, an arithmotype or printing Brunsviga calculating-machine, and harmonic analysers (1) designed by Professor O. Henrici, (2) designed by Dr. O. Mader. With this equipment it is expected that much quicker progress than is usual will be made with the analysis and prediction of the tides.

There are now in operation, with continuous records, automatic tide-gauges at Auckland, Wellington (for a description of the Wellington tide-gauge see Transactions of the New Zealand Institute, Vol xli, 1908, p. 407), Lyttelton, Port Chalmers, Dunedin, Bluff, Westport, and Greymouth; while at Napier and Wanganui the records are irregular owing to exposed positions of the gauges. At many of the other ports fixed gauges are in use, and it is hoped that at many of these ports as well as at some of the outlying islands automatic tide-gauges will be established, so as to provide data for future investigations of this important subject.

Attached to the report is a diagram drawn from the records of the Wellington tide-gauge (belonging to the Wellington Harbour Board) for the period November, 1907, to April, 1908; and also showing the total miles and direction of the wind per day, readings of barometer, and dates of phases, apogees, and perigees of the moon, with the corresponding declinations.

In another part of the report will be found some interesting plates reproduced from excellent photographs taken by Mr. H. E. Girdlestone, of the Wellington field staff, to whom I am indebted. They depict scenes in the vicinity of the summits of Mounts Ruapehu, Tongariro, and Ngauruhoe, and give in very clear detail views of that wonderful region of thermal activity combined with alpine grandeur, which has of late been brought, owing to the completion of the North Island Main Trunk Railway, within easy reach of all.

#### OPERATIONS FOR 1910-11.

The work in hand for the staff during the coming year amounts to over a million and a quarter acres, in addition to areas likely to come in from time to time during the season, and probably approximating 190,000 acres—2,839 square miles of minor and secondary triangulation, and 270 miles of road-surveys. Full details of above will be found in the various Chief Surveyors' reports (see Appendix No. 1).

There will also be some 213,472 acres of Native lands to be dealt with, and, as recent legislation has cast upon this Department the duty and responsibility for the conduct of all Native-land surveys, no doubt a good deal of this work will have to be let by contract, as our present staff will be unable to keep pace with requirements.

The extension of the Standard Survey in the chief towns will be steadily pushed on as opportunity offers.

Mr. H. McCardell, Acting Chief Draughtsman at the Head Office, reports as follows for the year 1909-10 :—

The routine duties appertaining to this office have been carried out satisfactorily.

The following plans have been completed for photo-lithography: The Boroughs of Wanganui, Hastings, Westport, Tauranga, Waipawa, and Waipukurau Town District, also six sheets showing the boundary between the Canterbury and Westland Land Districts.

The map of the Chatham Islands has at last been completed, and a new edition published, after a thorough revision by Mr. A. Shand, a well-known resident of the Islands, to whom the thanks of the Department are due.

A portion of the South Island showing additional magnetic stations was also drawn for the annual report.

During the year 192 townships (both private and Government) were examined, reported on, and when satisfactory, recommended for the approval of His Excellency the Governor, under section 16 of the Land Act, 1908.

(1) Philosophical Magazine for July, 1894, p. 110.

(2) Elektrotechnischen Zeitschrift, 1909, Heft 39; Zeitschrift für Instrumentenkunde, Januar, 1910.