

snow-fields, with trigonometrical stations 5,000, 6,000, and 7,000 feet in height. It is only possible to work in this high region two or three months in autumn. In 1880 the triangles were advanced as far as practicable from the Westland side, and this year they were extended on to a connection with the triangulation of Canterbury Plains. The initial base was at Paringa, on the West Coast, and the base of verification in the valley of Upper Rakaia. Both were measured by Mr. Mueller by means of steel band and straining apparatus.* Mr. Roberts's work, on being calculated, gave the computed length of base at Upper Rakaia only 1.1 link per mile different from the measured distance, a result eminently satisfactory under the great difficulties of the work. The close in heights was equally satisfactory. Thus, Mr. Roberts's heights of five trigonometrical stations in Upper Rakaia, referred to mean sea-level at Okarito, West Coast, differed only 5.5 to 6.6 feet from Mr. C. W. Adams's heights, referred to mean sea-level at Timaru, East Coast, as datum. The comparison of the heights of the five stations is as follows:—

	C. W. Adams.	G. R. Roberts.	Difference.
Prospect Hill	2,914.8	2,920.3	+ 5.5 feet.
Whale Back	2,196.1	2,201.7	+ 5.6 feet.
Totara Peak	6,442.8	6,449.3	+ 6.5 feet.
Manuka Peak	5,514.6	5,521.2	+ 6.6 feet.
Mount O'Connor	5,289.8	5,296.3	+ 6.5 feet.

By another independent series of triangles from East Coast the mean discrepancy in heights was only 2.2 feet; but the series giving the difference as above is deemed the more accurate. The difficulties of taking observations on these extreme altitudes, and the trouble of getting reliable observations for altitude on the Canterbury Plains, render the near agreement of the heights observed by Mr. Adams and Mr. Roberts at their common points a matter of gratification to all who delight in good work. Such results are not obtained by chance; they are the outcome of the devoted labours of two most able surveyors. Distance from Timaru to Prospect Hill in a direct line, 80 miles; 8-inch theodolite used for the greater portion of the distance, 5-inch for the remainder. Distance from Okarito to Prospect Hill in a direct line, 55 miles; 6-inch used in observations.

HEIGHT OF MOUNT COOK.

The Westland triangulation has extended down the coast past Mount Cook, and observations to the summit peak were taken by Mr. Roberts from twenty-four trigonometrical stations at distances varying from 20 to 70 miles. The observations from eighteen of these stations have been computed by Mr. Mueller, and the height of Mount Cook above mean sea-level is found to be 12,349 feet. This is the mean of all the computations, and no single observation differs more than 5 feet from the height given. The other observations have yet to be computed, but they are not likely to affect the result more than a foot, if so much. The height of Mount Cook hitherto accepted has been 13,200 feet, as given by the Admiralty surveyors, or 851 feet higher than the determination of trigonometrical survey. There can be no doubt that the Admiralty determination gives too great a height to the monarch peak of New Zealand mountains. For the future the height will have to be taken as nearly 1,000 feet less than what all the published maps now give it.

There have been other determinations of the height of Mount Cook, but, as none of the observers hereafter mentioned have had opportunities of taking observations of the mountain equal to those of Mr. Roberts, their results are not weighed against his, but are simply mentioned as contributory to an interesting subject.

	Feet.
Reconnaissance survey of Otago, 1857-58, J. T. Thomson. This determination was from observations taken from the Waitaki Valley by means of a 4-inch theodolite, distances from 60 to 110 miles between points of observation and Mount Cook. (Otago Provincial Gazette, 1859, No. 91, page 275, Appendix C.)	12,460

* The band was supported on trestles and porters about 3 feet above the surface of the ground. The advantage of this method over the measurement on the surface is that the line does not require so much preparation, and those engaged in the measurement make the contacts with much greater ease than crouching to the ground.