

step, Greenwich to Mokattam, was divided into three subsections, one for the cable in the centre, and two for the land lines at the Greenwich and Mokattam ends.

Although, as already stated, the results have not been finally accepted for Sydney, and upon which of course depends the longitude of Mount Cook, yet it will be as well to record here the results so far as tabulated by Mr. Baracchi, the gentleman who conducted the operations at Port Darwin for the Australian Observatories:—

			H.	M.	S.
Longitude of Singapore, determined by Professor Oudemans (1870),					
Flagstaff of Government Hill	...	...	6	55	22.714
Reduction to Captain Darwin's station	...	...			1.510
Longitude of Singapore (Captain Darwin's station)			6	55	24.224
Difference Port Darwin–Singapore	...	...	1	47	57.512
Longitude of Port Darwin (Baracchi's station)			8	43	21.736
Difference Melbourne–Port Darwin	...	...		56	31.640
Longitude of Melbourne (observatory)			9	39	53.376
Difference Sydney–Melbourne	...	...		24	55.098
Longitude of Sydney (observatory)			10	4	48.474
Difference Mount Cook, Wellington–Sydney	...	...	1	34	16.984
Longitude of Survey Observatory, Mount Cook, Wellington			11	39	5.458

In transmitting signals between distant points the sending and receiving are not instantaneous, a measurable interval of time being occupied by the galvanic current in overcoming the retardation of land and cable lines. Between Sydney and Wellington this amounted to nearly half a second, giving for the velocity of the current about 3,500 miles a second. Were there no such retardation, and the transmission of signals instantaneous, then the apparent difference between the times of the two meridians would be the same for signals sent from west to east as from east to west. But the apparent difference is always greater in the former case. This is due to the fact that the nominal time of the eastern clock being in advance of the western, the retardation of signal increases the apparent interval between the two clocks by its own amount; while for signals going west the retardation of signal has the opposite effect, diminishing the apparent interval, because the western clock is ever making up, so to speak, on the time of the eastern. In other words, the signals going east have to overtake the clock time, while those going west are met by it.

As the true position of the Mount Cook Observatory might get obliterated or become uncertain owing to the prison buildings now in progress, a diagram showing the connection with the stations of the trigonometrical survey is attached to this report, so that, in any future determinations of longitude, comparison may be had with that now determined. The position of the transit pier will, of course, be carefully marked on the ground by a stone block should it be found necessary to remove the Observatory.

The most cordial acknowledgments are due to Mr. Russell, Government Astronomer, Sydney, and Mr. Shapley, the Superintendent of the Cable Company, for their invaluable services to the colony in this work, given, as they were, without fee or reward; also to Dr. Lemon for skilful advice and direction, and for the services of Mr. Gell and other officers of the Telegraph Department, rendered with the greatest readiness and goodwill.

Latitude.—The computation of the latitude of Marsland Hill, New Plymouth, through the triangulation from Mount Cook, Wellington, having revealed a discrepancy of 10" from the latitude obtained from astronomical observation, Mr. T. Humphries, by means of the 12-inch alt-azimuth, observed stars N. and S. of zenith at Marsland Hill and Pukearuhe, two stations on the north side of Mount Egmont, and at Hawera and Patea, two stations south of that mountain, with the result that the stations on the north side of Mount Egmont both show the astronomical latitudes to be about 10" in excess of geodesic latitudes, while the two stations south show an excess of 20" each. These discrepancies clearly point to the deflection of the line of gravity by the mountain mass, and also to