

XXIV. *Observations of Eclipses of Jupiter's first Satellite made at the Royal Observatory at Greenwich, compared with Observations of the same, made by Samuel Holland Esquire, Surveyor General of Lands for the Northern District of America, and others of his Party, in several Parts of North America, and the Longitudes of the places thence deduced, by the Astronomer Royal.*

At the ISLAND OF ST. JOHN.					At GREENWICH.				
			Mean time.	Length of tele- scope.		Apparent time.	Length of tel.		Diff. of merid. from Green- wick, West.
			h ' "	Feet		h ' "	Ft.		h ' "
1765	Jan. 27.	Em. I.	9 36 31	10	Feb. 19.	13 46 42	6	Very good ob- servation.	4 11 49
At LOUISEBOURG.									
1766	Mar. 10.	Em. I.	11 21 27	2 & 10	March 5.	7 43 55	6		4 0 16
	Apr. 25.	Em. I.	11 46 50	2 & 10	April 11.	11 56 30	6		4 0 16
1767	Feb. 27.	Im. I.	8 10 17	10	Feb. 27.	11 57 7	6		3 59 35
	Mar. 15.	Im. I.	8 41 19	10	March 22.	14 28 48	6		3 59 48
	April 7.	Em. I.	8 53 11	10	April 9.	7 20 1	6		3 59 55
	April 14.	Em. I.	10 47 44	10	April 14.	14 47 52	6		4 0 26

On

On the SOUTH POINT at the entrance
of the Bay of GASPEE.

			Apparent time.	Length of tel.
			h ' "	Ft.
1768	Jan. 29.	Im. I.	13 57 47	2
	April 25.	Em. I.	9 39 40	2
	May 9.	Em. I.	13 30 54	2

At GREENWICH.

	Apparent time.	Length of tel.		Diff. of merid. from Green- wich, West.
	h ' "	Ft.		h ' "
Jan. 22.	16 24 13½	6	Air very clear.	4 17 56
April 25.	13 57 19	6		4 17 59
May 11.	12 16 46	6		4 17 31

At Capt. HOLLAND'S HOUSE, bearing
S. 56 W. from QUEBEC, distant from
castle of ST. LEWIS 2½ miles.

			Mean time.	
			h ' "	Ft.
1769	Mar. 11.	Im. I.	15 0 45	10
	April 3.	Im. I.	15 10 22	10
	April 19.	Im. I.	13 26 27	10
	June 6.	Em. I.	10 26 22	10
1770	May 1.	Im. I.	12 42 32	10

	h ' "	Ft.		h ' "
Mar. 29.	12 25 7	2		4 44 57
				4 44 28
April 12.	16 16 8	2		4 44 41
June 8.	9 40 56	6		4 44 42
Mar. 16.	17 2 47	6		4 45 13

At KITTERY POINT, in the province of
MAIN, in PISCATAQUA Harbour.

			Apparent time.	
			h ' "	Ft.
1771	April 11.	Im. I.	15 43 30	12
	April 27.	Im. I.	14 1 43	12
	May 4.	Im. I.	15 55 54	12

I suppose the error of the times computed in the Nautical Almanac in 1771, when the weather allowed me to observe no im- mersions of this satellite, to be a mean be- tween the errors in 1770 and 1772.				4 42 58
--	--	--	--	---------

At PORTSMOUTH, in the Province of NEW
HAMPSHIRE.

			Apparent time.	
			h ' "	Ft.
1772	Sept. 18.	Em. I.	9 42 35	12
	Oct. 11.	Em. I.	10 5 4	12
	Nov. 3.	Em. I.	10 23 54	12
	Nov. 12.	Em. I.	6 48 1	12

	h ' "	Ft.		h ' "
Sept. 27.	10 52 43½	3½	Air very clear.	4 43 2
Oct. 13.	9 17 4	3½		4 42 40
Oct. 20.	11 14 18	3½	Air clear.	4 42 51
Nov. 14.	5 59 28	6	Air clear.	4 42 59

The observations here referred to, made by Capt. HOLLAND and others of his party, are to be found in Philosophical Transactions, Vol. LVIII. for the year 1768, and Vol. LIX. for 1769, and other papers, sent to me from Capt. HOLLAND, which I have the honour of presenting to the Royal Society, together with this paper.

I have re-computed the times of Ensign SPROULE's observations made at GASPEE BAY, applying the equation of corresponding altitudes, which he had neglected; and have annexed them to his account of his observations, transmitted to me by Capt. HOLLAND.

It appears, that the observations of Capt. HOLLAND, and his party, were sometimes made with a two feet reflector of SHORT's construction, and sometimes with an achromatic telescope of DOLLOND of 10, and at other times, one of 12 feet. The observations at the ROYAL OBSERVATORY were also made with different telescopes, at different times; sometimes with a two feet reflector of SHORT's construction; sometimes with a treble object glass telescope of DOLLOND, of $3\frac{1}{2}$ feet; but oftener with a 6 feet reflector, of SHORT's construction. These circumstances are always noted against the observations: I have only made use of the observations of the first satellite, as being much more exact than those of the others.

I reckon, that the 6-feet reflector shews an immersion of the first satellite of Jupiter later, and an emersion sooner, by $20''$, than a 2-feet reflector; or by $13''$, than a $3\frac{1}{2}$ -feet treble object glass refractor, or a 10 or 12-feet double object glass refractor of DOLLOND.

LOND. These allowances were accordingly made in deducing all the differences of meridians expressed in the last column of the foregoing table.

The observations made at GREENWICH, opposed to those made in NORTH AMERICA, are either corresponding ones, which however is very seldom the case, or else the nearest to them that were observed. The error of the computed time of the eclipse in the Nautical Almanac was found by the nearest observation at Greenwich, and the time of the Nautical Almanac, thus corrected, compared with the time observed in North America, gave the difference of meridians between the place and Greenwich; farther reduction being first made for the difference of telescopes, if necessary, in the manner already explained. It is however to be understood, that, in this way of deducing the difference of meridians, by comparing an eclipse observed at Greenwich with *another* eclipse observed elsewhere, the interval of time between the two eclipses ought to be very short; otherwise it cannot be supposed, that the errors of the tables should continue the same. Hence it has happened, that many of the North American observations have been lost for this use, for want of observations near enough to them made at Greenwich. In some other cases, indeed, I have been obliged to compare together observations made with a greater interval between them than I should have chosen, but for fear of losing some useful comparisons. As the preceding table affords several determinations of the longitude of most of the places, it may be proper to point out, how the true difference of meridians may be

best deduced. To take a mean of the several results will not be the proper method, except the several observations had been either *all* immersions, or *all* emerfions; but when both immersions and emerfions have been observed, then the best method will be, to take a mean of all the results given by the immersions, and a mean of all the results given by the emerfions, separately; the mean of these two means will be the true difference of the meridians, and will be much more to be depended upon, than if it was deduced from immersions or emerfions only; because this method of comparison removes the constant errors arising from the differences of the telescopes, air, and eyes of the distant observers; these causes of error affecting the separate results of immersions and emerfions, in contrary ways. I shall now only add the difference of meridians deduced from the observations contained in the preceding table, by taking a proper mean between the several results.

Meridian of

Place of observation on ST. JOHN'S island.		} 4 11 49 by single observation.	
LOUISBOURG.		} 4 0 13 by mean of 4 E. 3 59 41 by mean of 2 I.	
SOUTH POINT, entrance of GASPER.		} 4 17 56 by 1 I. 4 17 45 by mean of 2 E.	
Capt. HOLLAND'S house near QUEBEC.		} 4 44 50 by mean of 4 I. 4 44 42 by 1 E.	
KITTEBY POINT, Province of MAÏN, in PISCATAQUA harbour,		} 4 42 58 by mean of 3 I.	
PORTSMOUTH, NEW HAMPSHIRE.		} 4 42 53 by mean of 4 E.	

WEST OF ROYAL
OBSERVATORY
AT GREENWICH.