

GREENWICH

PHOTO-HELIOGRAPHIC

RESULTS.

1910.

RESULTS OF MEASURES
MADE AT THE
ROYAL OBSERVATORY, GREENWICH,
UNDER THE DIRECTION OF
F. W. DYSON, M.A., LL.D., F.R.S.,
ASTRONOMER ROYAL,
OF
PHOTOGRAPHS OF THE SUN
TAKEN
AT GREENWICH, AT THE CAPE, AND IN INDIA,
IN THE YEAR
1910.

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HIS MAJESTY'S COMMAND.



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ERRATA.

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1910.

MEASURES OF POSITIONS AND AREAS OF SUN SPOTS AND FACULÆ, 1910.

Page.

- D 2 Footnote. *Insert* Group 6799, 1910 January 1. Some small faint markings, *f* Group 6793.
- D 14 Footnote. *Insert* Group 6827*. March 16. A very small spot. .
- D 16 Footnote. Group 6832. *Insert* Probably a return of Group 6829.

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1910.

INTRODUCTION.

§ 1. *Measures of Positions and Areas of Sun Spots and Faculæ on Photographs taken at the Royal Observatories of Greenwich, and of the Cape, and in India, at Kodaikánal and at Dehra Dún, in the year 1910; with the deduced Heliographic Longitudes and Latitudes.*

The photographs from which these measures were made were taken at the Royal Observatories of Greenwich or of the Cape; at the Kodaikánal Observatory, Southern India, or at Dehra Dún, North-West Provinces, India.

The photographs of the Sun, taken at Greenwich, were taken either with the Thompson or with the Dallmeyer Photoheliograph. The Thompson Photoheliograph, which was in regular use throughout the year, is a photographic refractor of 9 inches aperture, presented to the Royal Observatory by Sir Henry Thompson, which has been fitted with an enlarging doublet by Ross, and with a camera and shutter for rapid exposure so as to take photographs of the Sun on a scale of about 10 centimetres to the solar radius. The Dallmeyer—which has been occasionally used as well as the Thompson—is an instrument used in the Transit of Venus expedition to New Zealand, and, as now adapted, also gives a solar image of about 10 centimetres radius on the photographic plate.

The photographs have been taken throughout the year on gelatine dry plates, "Lantern" plates supplied by R. W. Thomas & Co. being used, with hydroquinone development.

The photographs from the Cape Observatory were taken under the superintendence of Mr S. S. Hough, His Majesty's Astronomer at the Cape; and those from Kodaikánal under the superintendence of Mr John Evershed, Director of that Observatory. The

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photographs from Dehra Dûn, which have been forwarded by the Solar Physics Committee to fill the gaps in the combined series, were taken under the superintendence of the Deputy Surveyor-General, Trigonometrical Survey of India. At each observatory the instrument employed was a Dallmeyer Photoheliograph giving an image of the Sun about 10 centimetres in radius. The plates and development used have been much the same at each of the four collaborating observatories.

Photographs of the Sun were available for measurement upon each day in 1910, those finally selected for measurement being supplied by the different observatories as under :—

Greenwich	171
Cape	104
Kodaikânal	1
Dehra Dûn	89
Total	365

The measures were made in the manner described in the *Introduction to the Greenwich Photo-Heliographic Results* for 1909, and the results of the measures are printed upon the same plan, the following being the signatures of those persons who measured the photographs for the year 1910 :—

E. W. Maunder	-	-	M	C. F. Lait	-	-	-	CL
A. H. Smith	-	-	AS	F. A. Saville	-	-	-	FS

The zero of position-angles for the Thompson Photoheliograph employed at Greenwich has been determined by the same method as in 1909, and the following table gives the resulting correction for zero of position for the mean of the two wires :—

Thompson Photoheliograph, Greenwich.

Date, Greenwich Civil Time.		Correction for Zero.	Date, Greenwich Civil Time.		Correction for Zero.
1909	December 20. 11 ^{d h}	- 0. 1'	1910	May 28. 12 ^{d h}	+ 0. 19'
1910	January 10. 13	+ 0. 15		28. 12	+ 0. 28
	February 27. 12	+ 0. 5		June 14. 11	+ 0. 21
	12. 11	- 0. 2		28. 11	+ 0. 26
	21. 10	- 0. 5		July 19. 10	+ 0. 28
	March 25. 10	+ 0. 1		August 3. 10	+ 0. 28
	3. 11	- 0. 13		29. 10	+ 0. 12
	April 14. 12	+ 0. 3		September 13. 11	+ 0. 26
	1. 11	- 0. 23		27. 15	+ 0. 40
	May 22. 12	+ 0. 1		October 20. 12	+ 0. 29
	10. 11	+ 0. 2		November 9. 11	+ 0. 20
				December 22. 10	+ 0. 4
			1911	January 30. 11	+ 0. 25

No correction for zero of position of the wires has been applied to the photographs taken at Greenwich until 1910 May 17, when a new camera was fitted to the Thompson Photoheliograph. After that date a correction of $+0^{\circ}.4$ has been applied to the Greenwich photographs up to the end of the year 1910.

The same method was employed with the Dallmeyer Photoheliograph, at the Royal Observatory, Cape of Good Hope, and the following determinations obtained :—

Dallmeyer Photoheliograph, Cape of Good Hope.

Date, Greenwich Civil Time.			Correction for Zero.	Date, Greenwich Civil Time.			Correction for Zero.
1910	March	^d 4. ^h 8	+ 0.18	1910	August	^d 1. ^h 11	+ 0.15
		19. 8	+ 0.21			15. 8	+ 0.24
	April	6. 8	+ 0.14		September	2. 10	+ 0.18
		18. 8	+ 0.16			14. 11	+ 0.12
		29. 8	+ 0.9		October	20. 8	+ 0.7
	May	13. 8	+ 0.20		November	3. 10	+ 0.23
		31. 10	+ 0.20			9. 10	+ 0.6
	June	14. 9	+ 0.30		December	7. 12	— 0.9
		28. 10	+ 0.20			8. 11	— 0.8
	July	20. 11	+ 0.20			17. 10	— 0.9

A correction of $+0^{\circ}.3$ for zero of position has been applied to all photographs taken with the Cape Photoheliograph up to 1910 August 16, when the position of the wire frame was altered. After that date a correction of $+0^{\circ}.2$ has been applied up to 1910 November 10; no correction from 1910 November 10 to 1910 December 6, and a correction of $-0^{\circ}.1$ for the rest of the year.

In the use of the photoheliographs at Kodaikáanal and at Dehra Dún the position-circle has been set to the zero as determined by allowing the diurnal motion to carry a spot, or the Sun's limb, along the horizontal wire, and the accuracy of the adjustment has been tested at short intervals. At Dehra Dún the practice has also been adopted of stopping the driving-clock after the exposure of the plate has been made, and making a second exposure about two minutes later, thus affording a further means for determining the true west point of the plate. No correction for zero of position of the wires has been applied for the reduction of the photographs taken at Kodaikáanal and Dehra Dún during the year 1910.

The method of reduction of the measures of the photographs is the same as that described in the *Introduction to the Greenwich Photo-Heliographic Results* for 1909. The inclination of the Sun's axis to the ecliptic is assumed to be $82^{\circ} 45'$, the longitude of the ascending node for 1910.0 to be $74^{\circ} 30'.2$, and the period of the

Sun's sidereal rotation to be 25·38 days; the meridian which passed through the ascending node 1854 January 1, Greenwich Mean Noon, being taken as the zero meridian.

- § 2. *Ledgers of Areas and Heliographic Positions of Groups of Sun Spots deduced from the measurement of the Solar photographs for each day in the year 1910.*
- § 3. *Catalogue of Recurrent Groups of Sun Spots compiled from the Ledgers of Groups of Sun Spots for the year 1910.*
- § 4. *Total Areas of Sun Spots and Faculae for each day, and Mean Areas and Mean Heliographic Latitude of Sun Spots and Faculae for each Rotation of the Sun, and for the year 1910.*

These three sections are similar in all respects to the corresponding sections for 1909.

F. W. DYSON.

*Royal Observatory, Greenwich,
1911 September.*