STONYHURST COLLEGE

OBSERVATORY.

RESULTS

OF

METEOROLOGICAL AND MAGNETICAL OBSERVATIONS,

BY THE

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month a meteorological summary for each day is dispatched to the Registrar General and also to the Société Météorologique de France.

The Upsala Observatory receives regularly our observations of Upper Clouds, and to Sophus Tromholt are sent any Auroral phenomena that may be visible at Stonyhurst. The amount of Rainfall is published by G. J. Symons, and a Parliamentary Commission, for inquiring into the water supply of this part of the country, have availed themselves of the annual record of our self-acting raingauge.

The special meteorological and magnetic observations, taken in connection with the International Polar Observatories, and commenced last year, were continued without intermission until the end of August, as previously arranged. The absolute magnetic observations have all been reduced, and the results forwarded to Dr. Wild of St. Petersburg, along with complete copies of the daily meteorological observations. Some of the self-recorded magnetic curves have yet to be measured, and the five minute readings of the magnets on term days have to be reduced.

The ordinary magnetograph traces of the Declination, and of the two components of the Intensity, have been uninterrupted during the year, and the absolute determinations of the elements of terrestrial magnetism have been made at the usual times.

In Astronomy the sun drawings on the scale of 10½ inches to the diameter, the measures of the chromosphere, and the spot-spectra observations, have now become part of our daily routine work. The list of sun observations will show the number of days on which results have been obtained. The chromosphere observations appear in "Copernicus," and the others have been brought before

the Royal Astronomical Society. Jupiter's Satellites, the occultations of stars by the moon, and meteor streams, have been observed as usual. The first have been printed by the R.A.S., and the last were forwarded to Mr. Denning.

The return of the Government Transit of Venus Expedition from Madagascar, where the observations were perfectly successful, restored the Observatory staff to its usual strength in February. A paper was read before the British Association by the Chief of the Expedition on the manners and customs of the natives, and on the state of trade in the S.W. of the island. The astronomical observations were forwarded from the Cape of Good Hope to the Radcliffe Observer, who has charge of the reductions, and the magnetic work is still unfinished, owing to more pressing duties.

Through the kindness of the Rev. F. Howlett, we were able in the course of the year to compare our solar drawings with several of his beautiful sketches of the sun's surface.

The magnetic instruments ordered for the Havana Observatory were duly forwarded in May, and a set of meteorological instruments were procured for the newly-founded Observatory at St. Ignatius' College, Malta, the results from which form the Appendix to this Report.

Stonyhurst Observatory.

Lat. 53° 50′ 40″ N. Long. 9m. 52s. 68. W. Height of the Barometer above the sea, 381 ft.

METEOROLOGICAL REPORT.

January, 1883.

Results of Observations taken during the month.		Mean for the last 36 years.
Mean Reading of the Barometer	29·389	29·431
Highest ,, on the 23rd	30·156	30·037
Lowest ,, on the 26th	28·506	28·594
Range of Barometer Readings	1·650	1·443
Highest Reading of a Max. Therm. on the 1st	54·0	51·6
Lowest Reading of a Min. Therm. on the 7th and 20th	27·0	21·0
Range of Thermometer Readings	27·0	30·6
Mean of all the Highest Readings	43·3	42·1
Mean of all the Lowest	33·4	32·6
Mean Daily Range	9·9	9·5
Deduced Monthly Mean (from Mean of Max. and Min.)	38·7	37·2
Mean Temperature from dry bulb	38·2	37·1
Adopted Mean Temperature	38·5	37·2
Mean Temperature of Evaporation	37·2	35·9
Mean Temperature of Dew Point	34·6	33·8
Mean elastic force of Vapour	0·201 in	0·196 in
Mean weight of Vapour in a cubic foot of air	2·3 gr	2·3 gr
Mean additional weight required for saturation	0·4 gr	0·4 gr
Mean degree of Humidity (saturation 1·00)	0·84	0·86
Mean weight of a cubic foot of air	540·1 gr	549·1 gr
Fall of Rain	5·534 in	4·142 in
Number of days on which Rain fell	23	20·1
Amount of Evaporation	2·267 in	0·832 in

	N	NE	E	SE	S	SW	W	NW
No. of days in the month on which the prevailing wind was	0	3	7	2	4	7	8	0
Mean Velocity in miles per hour	0	2·5	13·0	6·7	16·4	13·4	10·7	0
Total No. of miles for each Direction	0	179	2179	320	1574	2259	3289	0

The total number of miles registered during the month was 9800.

The max. Velocity of the wind was 59 miles per hour; direction W. on the 26th at 5 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)	8·3
In the month of January, the highest reading of the Barometer during 36 years, was on the 18th, in 1882, and was	30·480
The lowest ,, ,, 14th, 1865	27·939
The highest Temperature ,, 7th, 1877	59·9
The lowest ,, ,, 15th, 1881	4·6
The highest adopted mean temperature of the month, 1875	42·5
The lowest ,, ,, 1881	29·2

The range of Barometer readings was rather large, and the Rainfall heavy. The prevailing wind W.S.W.

February, 1883.

Results of Observations taken during the month.		Mean for the last 36 years.
Mean Reading of the Barometer	29·547	29·486
Highest ,, on the 23rd	30·341	30·087
Lowest ,, on the 2nd	28·447	28·653
Range of Barometer Readings	1·894	1·434
Highest Reading of a Max. Therm. on the 21st	52·6	51·8
Lowest Reading of a Min. Therm. on the 1st	29·0	23·1
Range of Thermometer Readings	23·6	28·7
Mean of all the Highest Readings	47·3	44·2
Mean of all the Lowest	36·4	34·1
Mean Daily Range	10·9	10·1
Deduced Monthly Mean (from Mean of Max. and Min.)	41·5	38·8
Mean Temperature from dry bulb	41·5	38·8
Adopted Mean Temperature	41·5	38·8
Mean Temperature of Evaporation	39·9	37·0
Mean Temperature of Dew Point	37·9	35·0
Mean elastic force of Vapour	0·229 in	0·192 in
Mean weight of Vapour in a cubic foot of air	2·6 gr	2·4 gr
Mean additional weight required for saturation	0·6 gr	0·4 gr
Mean degree of Humidity (saturation 1·00)	0·85	0·87
Mean weight of a cubic foot of air	545·6 gr	548·3 gr
Fall of Rain	2·968 in	3·737 in
Number of days on which Rain fell	20	18·1
Amount of Evaporation	1·703 in	0·964 in

	N	NE	E	SE	S	SW	W	NW
No. of days in the month on which the prevailing wind was	0	0	2	3	6	6	10	1
Mean Velocity in miles per hour	0	0	7·5	14·3	17·5	16·0	13·4	5·1
Total No. of miles for each Direction	0	0	316	1030	2522	2304	3217	123

The total number of miles registered during the month was 9556.

The max. Velocity of the wind was 57 miles per hour; direction S.S.E. on the 12th at 10 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...		8·4
In the month of February, the highest reading of the Barometer during 36 years, was on the 11th, in 1849, and was		30·452
The lowest ,, ,,	6th, 1867	28·208
The highest Temperature ,,	8th, 1877	58·3
The lowest ,, ,,	1st, 1855	10·1
The highest adopted mean temperature of the month,	1869	44·0
The lowest ,, ,,	1855	28·6

Range of Barometer readings great. The mean Temperature was rather high, the range of Temperature for the month was small. The prevailing wind was from the W.S.W.

March, 1883.

Results of Observations taken during the month.		Mean for the last 36 years.
Mean Reading of the Barometer	29·544	29·468
Highest ,, on the 4th	30·297	30·082
Lowest ,, on the 26th	28·825	28·697
Range of Barometer Readings	1·472	1·385
Highest Reading of a Max. Therm. on the 5th	55·2	56·5
Lowest Reading of a Min. Therm. on the 8th	17·8	23·2
Range of Thermometer Readings	37·4	33·3
Mean of all the Highest Readings	43·7	47·0
Mean of all the Lowest	26·3	34·5
Mean Daily Range	17·4	12·5
Deduced Monthly Mean (from Mean of Max. and Min.)	34·0	39·8
Mean Temperature from dry bulb	34·8	40·0
Adopted Mean Temperature	34·4	39·9
Mean Temperature of Evaporation	32·5	38·1
Mean Temperature of Dew Point	29·4	35·5
Mean elastic force of Vapour	0·170 in	0·207 in
Mean weight of Vapour in a cubic foot of air	2·0gr	2·4gr
Mean additional weight required for saturation	0·4gr	0·5gr
Mean degree of Humidity (saturation 1·00)	0·83	0·85
Mean weight of a cubic foot of air	554·7gr	546·5gr
Fall of Rain	1·029 in	3·137 in
Number of days on which Rain fell	11	17·9
Amount of Evaporation	1·205 in	1·733 in

	N	NE	E	SE	S	SW	W	NW
No. of days in the month on which the prevailing wind was	6	8	5	0	2	0	5	5
Mean Velocity in miles per hour	11·4	5·7	12.5	0	17·2	0	12·1	69
Total No. of miles for each Direction	1645	1101	1505	0	820	0	1452	824

The total number of miles registered during the month was 7347.

The max. Velocity of the wind was 45 miles per hour, direction S.S.E. on the 30th at 3 and 5 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	6·4
In the month of March, the highest reading of the Barometer during 36 years, was on the 6th, in 1852, and was	30·401
The lowest ,, ,, 31st, 1860	28·199
The highest Temperature ,, 25th, 1871	68·0
The lowest ,, ,, 4th, 1866	14·5
The highest adopted mean temperature of the month, 1871	44·0
The lowest ,, ,, 1855	35·6

The mean Temperature was low, and the range of Temperature rather great. Rainfall much below average. Prevailing Wind N.

April, 1883.

Results of Observations taken during the month.		Mean for the last 36 years.
Mean Reading of the Barometer	29·588	29·481
Highest ,, on the 6th	30·252	29·970
Lowest ,, on the 18th	28·984	28·773
Range of Barometer Readings	1·268	1·197
Highest Reading of a Max. Therm. on the 18th	61·8	66·3
Lowest Reading of a Min. Therm. on the 6th	29·0	28·8
Range of Thermometer Readings	32·8	37·5
Mean of all the Highest Readings	55·8	54·1
Mean of all the Lowest	36·4	38·2
Mean Daily Range	19·4	15·9
Deduced Monthly Mean (from Mean of Max. and Min.)	44·6	44·7
Mean Temperature from dry bulb	45·0	44·7
Adopted Mean Temperature	44·8	44·7
Mean Temperature of Evaporation	41·8	41·9
Mean Temperature of Dew Point	38·3	38·7
Mean elastic force of Vapour	0·232 in	0·236 in
Mean weight of Vapour in a cubic foot of air	2·7 gr	2·7 gr
Mean additional weight required for saturation	0·7 gr	0·7 gr
Mean degree of Humidity (saturation 1·00)	0·77	0·80
Mean weight of a cubic foot of air	544·6 gr	541·6 gr
Fall of Rain	2·029 in	2·374 in
Number of days on which Rain fell	11	14·9
Amount of Evaporation	2·123 in	2·501 in

	N	NE	E	SE	S	SW	W	NW
No. of days in the month on which the prevailing wind was	1	9	3	3	2	4	8	0
Mean Velocity in miles per hour	4·9	6·4	14·1	12·1	8·5	4·4	7·8	0
Total No. of miles for each Direction	118	1393	1012	873	719	418	1495	0

The total number of miles registered during the month was 6028.

The max. Velocity of the wind was 43 miles per hour, direction S., on the 18th at 2 p.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	6·4
In the month of April, the highest reading of the Barometer during 36 years, was on the 22nd, in 1855, and was	30·191
The lowest ,, ,, 20th, 1868	28·358
The highest Temperature ,, 14th, 1852	74·1
The lowest ,, ,, 12th, 1862	24·7
The highest adopted mean temperature of the month, 1865	48·5
The lowest ,, ,, 1879	40·7

Barometer rather high, and the range slightly in excess. Range of Temperature small. Prevailing wind W.

May, 1883.

Results of Observations taken during the month.		Mean for the last 36 years.
Mean Reading of the Barometer	29·541	29·506
Highest ,, on the 16th	29·988	29·962
Lowest ,, on the 12th	29·179	28·945
Range of Barometer Readings	0·809	1·017
Highest Reading of a Max. Therm. on the 16th	70·0	71·8
Lowest Reading of a Min. Therm. on the 4th	27·0	31·5
Range of Thermometer Readings	43·0	40·3
Mean of all the Highest Readings	59·7	59·8
Mean of all the Lowest	40·3	42·3
Mean Daily Range	19·4	17·5
Deduced Monthly Mean (from Mean of Max. and Min.)	48·3	49·4
Mean Temperature from dry bulb	49·3	49·6
Adopted Mean Temperature	48·8	49·5
Mean Temperature of Evaporation	45·2	46·3
Mean Temperature of Dew Point	41·3	42·8
Mean elastic force of Vapour	0·261 in	0·276 in
Mean weight of Vapour in a cubic foot of air	3·0gr	3·2gr
Mean additional weight required for saturation	1·0gr	0·9gr
Mean degree of Humidity (saturation 1·00)	0·76	0·76
Mean weight of a cubic foot of air	539·8gr	536·9gr
Fall of Rain	1·053 in	2·542 in
Number of days on which Rain fell	9	15·0
Amount of Evaporation	3·077 in	3·555 in

	N	NE	E	SE	S	SW	W	NW
No. of days in the month on which the prevailing wind was	0	9	0	0	2	2	14	4
Mean Velocity in miles per hour	0	10·3	0	0	12·8	13·5	9·1	6·7
Total No. of miles for each Direction	0	2231	0	0	615	659	3044	645

The total number of miles registered during the month was 7194.

The max. Velocity of the wind was 31 miles per hour, direction S. on the 13th at 9 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	7·3
In the month of May, the highest reading of the Barometer during 36 years, was on the 22nd, in 1855, and was	30·124
The lowest ,, ,, 28th, 1877	28·559
The highest Temperature ,, 19th, 1864	82·5
The lowest ,, ,, 4th, 1855	23·5
The highest adopted mean temperature of the month, 1848	55·1
The lowest ,, ,, 1855	45·0

Both the Barometer and Thermometer agree very closely with the mean for the month. The Rainfall was very light. Prevailing wind W.

June, 1883.

Results of Observations taken during the month.		Mean for the last 36 years.
Mean Reading of the Barometer	29·579	29·520
Highest ,, on the 13th	29·974	29·871
Lowest ,, on the 27th	29·162	29·006
Range of Barometer Readings	0·812	0·865
Highest Reading of a Max. Therm. on the 16th	75·9	76·6
Lowest Reading of a Min. Therm. on the 16th	40·2	39·2
Range of Thermometer Readings	35·7	37·4
Mean of all the Highest Readings	66·3	65·2
Mean of all the Lowest	46·3	48·1
Mean Daily Range	20·0	17·1
Deduced Monthly Mean (from Mean of Max. and Min.)	54·5	54·9
Mean Temperature from dry bulb	53·8	54·7
Adopted Mean Temperature	54·2	54·8
Mean Temperature of Evaporation	50·5	52·0
Mean Temperature of Dew Point	46·9	48·8
Mean elastic force of Vapour	0·320 in	0·357 in
Mean weight of Vapour in a cubic foot of air	3·6gr	3·9gr
Mean additional weight required for saturation	1·1gr	0·9gr
Mean degree of Humidity (saturation 1·00)	0·76	0·79
Mean weight of a cubic foot of air	532·3gr	544·8gr
Fall of Rain	4·314 in	3·850 in
Number of Days on which Rain fell	14	17·4
Amount of Evaporation	3·250 in	3·706 in

	N	NE	E	SE	S	SW	W	NW
No. of days in the month on which the prevailing wind was	0	3	7	0	5	8	6	1
Mean Velocity in miles per hour	0	12·4	6·3	0	7·9	5·8	7·1	7·0
Total No. of miles for each Direction	0	895	1055	0	945	1121	1116	169

The total number of miles registered during the month was 5301.

The max. Velocity of the wind was 29 miles per hour, direction E. on the 27th at 8 p.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	8·3
In the month of June, the highest reading of the Barometer during 36 years, was on the 15th, in 1874, and was	30·219
The lowest ,, ,, 12th, 1862	28·632
The highest Temperature ,, 27th, 1878	87·2
The lowest ,, ,, 30th, 1856	34·2
The highest adopted mean temperature of the month, 1858	59·0
The lowest ,, ,, 1856 and 1860	52·2

Rainfall was heavy; but the number of rainy days was small. Prevailing Wind W.S.W.

July, 1883.

Results of Observations taken during the month.		Mean for the last 36 years.
Mean Reading of the Barometer	29·390	29·501
Highest ,, on the 27th	29·813	29·875
Lowest ,, on the 12th	28·956	28·995
Range of Barometer Readings	0·857	0·880
Highest Reading of a Max. Therm. on the 3rd	79·0	78·9
Lowest Reading of a Min. Therm. on the 23rd	40·9	42·4
Range of Thermometer Readings	38·1	36·5
Mean of all the Highest Readings	67·7	67·9
Mean of all the Lowest	48.2	51·0
Mean Daily Range	19·5	16·9
Deduced Monthly Mean (from Mean of Max. and Min.)	56·1	57·6
Mean Temperature from dry bulb	55·9	57·9
Adopted Mean Temperature	56·0	57·8
Mean Temperature of Evaporation	53·6	55·0
Mean Temperature of Dew Point	51·3	52·5
Mean elastic force of Vapour	0·381 in	0·396 in
Mean weight of Vapour in a cubic foot of air	4·3gr	4·5gr
Mean additional weight required for saturation	1·1gr	1.0gr
Mean degree of Humidity (saturation 1·00)	0·81	0·82
Mean weight of a cubic foot of air	527·5gr	527·1gr
Fall of Rain	3·026 in	4·260 in
Number of days on which Rain fell	20	17·9
Amount of Evaporation	3·326 in	4·048 in

	N	NE	E	SE	S	SW	W	NW
No. of days in the month on which the prevailing wind was	3	1	0	0	4	8	13	2
Mean Velocity in miles per hour	3·7	2·1	0	0	7·9	8·1	10·4	8·6
Total No. of miles for each Direction	264	50	0	0	756	1646	3225	412

The total number of miles registered during the month was 6303.

The max. Velocity of the wind was 32 miles per hour, direction W. by S., on the 17th at 11 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	9·1
In the month of July, the highest reading of the Barometer during 36 years, was on the 24th, in 1868, and was	30·112
The lowest ,, ,, 15th, 1877	28·564
The highest Temperature ,, 22nd, 1873	88·2
The lowest ,, ,, 1st, 1857	36·0
The highest adopted mean temperature of the month, 1852	63·0
The lowest ,, ,, ,, 1879	54·7

Barometer and Thermometer differed little from the mean.

Rainfall considerably below average. Prevailing Wind W. by S.W.

August, 1883.

Results of Observations taken during the month.		Mean for the last 36 years.
Mean Reading of the Barometer	29·534	29·485
Highest " on the 23rd	29·899	29·890
Lowest " on the 10th	28·966	28·949
Range of Barometer Readings	0·933	0·941
Highest Reading of a Max. Therm. on the 25th	78·0	77·1
Lowest Reading of a Min. Therm. on the 11th	41·0	41·8
Range of Thermometer Readings	37·0	35·3
Mean of all the Highest Readings	67·7	67·2
Mean of all the Lowest	48·7	50·9
Mean Daily Range	19·0	16·3
Deduced Monthly Mean (from Mean of Max. and Min.)	56·5	57·5
Mean Temperature from dry bulb	57·2	57·5
Adopted Mean Temperature	56·9	57·5
Mean Temperature of Evaporation	53·8	54·7
Mean Temperature of Dew Point	49·9	52·1
Mean elastic force of Vapour	0·373 in	0·392 in
Mean weight of Vapour in a cubic foot of air	4·1 gr	4·3 gr
Mean additional weight required for saturation	0·7 gr	0·9 gr
Mean degree of Humidity (saturation 1·00)	0·81	0·83
Mean weight of a cubic foot of air	529·1 gr	527·2 gr
Fall of Rain	3·459 in	4·914 in
Number of days on which Rain fell	17	19·3
Amount of Evaporation	1·871 in	3·078 in

	N	NE	E	SE	S	SW	W	NW
No. of days in the month on which the prevailing wind was	0	0	0	0	1	6	24	0
Mean Velocity in miles per hour	0	0	0	0	12·6	8·5	8·9	0
Total No. of miles for each Direction	0	0	0	0	303	1231	5120	0

The total number of miles registered during the month was 6654.

The max. Velocity of the wind was 34 miles per hour; direction W. by S. on the 9th, at 2 p.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	8·3
In the month of August, the highest reading of the Barometer during 36 years, was on the 21st, in 1874, and was	30·114
The lowest ,, ,, 31st, 1876	28·555
The highest Temperature ,, 2nd, 1868	88·0
The lowest ,, ,, 21st, 1864 & 1869	36·0
The highest adopted mean temperature of the month, 1857	61·0
The lowest ,, ,, 1848	52·5

Range of Thermometer rather great. Rainfall low. Prevailing Wind W.

September, 1883.

Results of Observations taken during the month.		Mean for the last 36 years.
Mean Reading of the Barometer	29·370	29·502
Highest " on the 13th	29·887	30·027
Lowest " on the 2nd	28·323	28·828
Range of Barometer Readings	1·564	1·139
Highest Reading of a Max. Therm. on the 17th	72·0	72·1
Lowest Reading of a Min. Therm. on the 30th	37·7	36·9
Range of Thermometer Readings	34·3	35·2
Mean of all the Highest Readings	63·3	62·2
Mean of all the Lowest	48·2	47·1
Mean Daily Range	15·1	15·1
Deduced Monthly Mean (from Mean of Max. and Min.)	54·5	53·4
Mean Temperature from dry bulb	54·5	54·0
Adopted Mean Temperature	54·5	53·7
Mean Temperature of Evaporation	51·7	51·1
Mean Temperature of Dew Point	48·9	48·5
Mean elastic force of Vapour	0·346 in	0·342 in
Mean weight of Vapour in a cubic foot of air	3·9gr	3·9gr
Mean additional weight required for saturation	1·0gr	0·8gr
Mean degree of Humidity (saturation 1·00)	0·81	0·82
Mean weight of a cubic foot of air	528·8gr	531·7gr
Fall of Rain	6·665 in	4·586 in
Number of days on which Rain fell	18	18·5
Amount of Evaporation	3·523 in	2·315 in

	N	NE	E	SE	S	SW	W	NW
No. of days in the month on which the prevailing wind was	4	9	2	0	4	2	9	0
Mean Velocity in miles per hour	7·2	5·3	8·0	0	4·9	15·3	13·7	0
Total No. of miles for each Direction	689	1139	382	0	474	736	2955	0

The total number of miles registered during the month was 6375.

The max. Velocity of the wind was 33 miles per hour, direction S.W. on the 26th at noon.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	7·8
In the month of September, the highest reading of the Barometer during 36 years, was on the 15th, in 1851, and was	30·274
The lowest ,, ,, 2nd, 1883	28·323
The highest Temperature ,, 6th, 1868	85·0
The lowest ,, ,, 6th, 1855	30·7
The highest adopted mean temperature of the month, 1865	59·1
The lowest ,, ,, 1863	50·9

Barometer rather low. Rainfall more than two inches in excess of the mean for the month. Temperature rather high. Prevailing Wind W.

October, 1883.

Results of Observations taken during the month.		Mean for the last 36 years.
Mean Reading of the Barometer	29·478	29·418
Highest " on the 8th	30·083	29·998
Lowest " on the 16th	28·713	28·643
Range of Barometer Readings	1·370	1·355
Highest Reading of a Max. Therm. on the 3rd	62·1	64·5
Lowest Reading of a Min. Therm. on the 22nd	33·1	29·6
Range of Thermometer Readings	29·0	34·9
Mean of all the Highest Readings	55·3	54·7
Mean of all the Lowest	41·6	42·1
Mean Daily Range	13·7	12·6
Deduced Monthly Mean (from Mean of Max. and Min.)	47·5	47·4
Mean Temperature from dry bulb	48·3	48·0
Adopted Mean Temperature	47·9	47·7
Mean Temperature of Evaporation	45·5	45·5
Mean Temperature of Dew Point	42·9	43·1
Mean elastic force of Vapour	0·276 in	0·280 in
Mean weight of Vapour in a cubic foot of air	3·1 gr	3·2 gr
Mean additional weight required for saturation	0·7 gr	0·6 gr
Mean degree of Humidity (saturation 1·00)	0·85	0·85
Mean weight of a cubic foot of air	538·3 gr	543·3 gr
Fall of Rain	5·757 in	5·240 in
Number of days on which Rain fell	19	21·5
Amount of Evaporation	2·232 in	1·716 in

	N	NE	E	SE	S	SW	W	NW
No. of days in the month on which the prevailing wind was	3	4	0	0	3	6	11	4
Mean Velocity in miles per hour	9·4	4·1	0	0	12·9	10·4	12·6	6·6
Total No. of miles for each Direction	675	399	0	0	932	1499	3321	632

The total number of miles registered during the month was 7458.

The max. Velocity of the wind was 37 miles per hour; direction S. by E. on the 15th at 9 p.m., and on the 16th at 5 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	8·1
In the month of October, the highest reading of the Barometer during 36 years, was on the 6th, in 1877, and was	30·282
The lowest ,, ,, 19th, 1862	28·139
The highest Temperature ,, 9th, 1869	72·8
The lowest ,, ,, 21st, 1880	23·1
The highest adopted mean temperature of the month, 1861 and 1876	51·6
The lowest ,, ,, 1880	43·1

Barometer and Thermometer very close to mean. Rainfall rather high. Prevailing wind W. by S.W.

November, 1883.

Results of Observations taken during the month.		Mean for the last 36 years.
Mean Reading of the Barometer	29·306	29·444
Highest ,, on the 1st	29·875	30·045
Lowest ,, on the 25th	28·400	28·573
Range of Barometer Readings	1·475	1·472
Highest Reading of a Max. Therm. on the 28th	56·5	55·6
Lowest Reading of a Min. Therm. on the 11th	23·1	25·4
Range of Thermometer Readings	33·4	30·2
Mean of all the Highest Readings	47·6	46·9
Mean of all the Lowest	35·1	36·2
Mean Daily Range	12·5	10·7
Deduced Monthly Mean (from Mean of Max. and Min.)	41·0	41·2
Mean Temperature from dry bulb	41·0	41·3
Adopted Mean Temperature	41·0	41·3
Mean Temperature of Evaporation	39·5	38·9
Mean Temperature of Dew Point	37·6	37·6
Mean elastic force of Vapour	0·225 in	0·225 in
Mean weight of Vapour in a cubic foot of air	2·6gr	2·6gr
Mean additional weight required for saturation	0·4gr	0·4gr
Mean degree of Humidity (saturation 1·00)	0·88	0·87
Mean weight of a cubic foot of air	550·3gr	544·8gr
Fall of Rain	5 26/2 in	4·283 in
Number of days on which Rain fell	23	19·4
Amount of Evaporation	1·852 in	1·500 in

	N	NE	E	SE	S	SW	W	NW
No. of days in the month on which the prevailing wind was	1	8	0	0	1	7	12	1
Mean Velocity in miles per hour	8·3	2·2	0	0	5·9	16·1	14·9	5·3
Total No. of miles for each Direction	199	416	0	0	141	2707	4298	128

The total number of miles registered during the month was 7889.

The max. Velocity of the wind was 43 miles per hour; direction W.S.W. on the 10th at 3 p.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	7·8
In the month of November, the highest reading of the Barometer during 36 years, was on the 12th, in 1857, and was	30·350
The lowest ,, ,, 1st, 1859	28·007
The highest Temperature ,, 6th, 1872	61·9
The lowest ,, ,, 17th, 1861	19·1
The highest adopted mean temperature of the month, 1881.....	47·0
The lowest ,, ,, 1851.....	36·7

Barometer rather low, and Rainfall heavy. Prevailing wind from W. by S.W.

December, 1883.

Results of Observations taken during the month.		Mean for the last 36 years.
Mean Reading of the Barometer	29·689	29·448
Highest " on the 7th	30·209	30·057
Lowest " on the 11th	28·870	28·605
Range of Barometer Readings	1·339	1·452
Highest Reading of a Max. Therm. on the 13th	51·0	52·8
Lowest Reading of a Min. Therm. on the 7th	20·7	20·4
Range of Thermometer Readings	30·3	32·4
Mean of all the Highest Readings	44·7	42·9
Mean of all the Lowest	34·0	33·4
Mean Daily Range	10·7	9·5
Deduced Monthly Mean (from Mean of Max. and Min.)	39·5	38·1
Mean Temperature from dry bulb	40·1	38·8
Adopted Mean Temperature	39·8	38·5
Mean Temperature of Evaporation	38·2	37·3
Mean Temperature of Dew Point	36·2	35·3
Mean elastic force of Vapour	0·212 in	0·208 in
Mean weight of Vapour in a cubic foot of air	2·4gr	2·4gr
Mean additional weight required for saturation	0·4gr	0·4gr
Mean degree of Humidity (saturation 1·00)	0·93	0·87
Mean weight of a cubic foot of air	550·9gr	5·477gr
Fall of Rain	4·903 in	5·542 in
Number of days on which Rain fell	21	20·5
Amount of Evaporation	1·395 in	1·017 in

	N	NE	E	SE	S	SW	W	NW
No. of days in the month on which the prevailing wind was	5	0	2	0	1	6	15	2
Mean Velocity in miles per hour	11·7	0	6·9	0	1·5	5·5	10·9	4·1
Total No. of miles for each Direction	1405	0	329	0	37	799	6829	196

The total number of miles registered during the month was 9595.

The max. Velocity of the wind was 63 miles per hour; direction W. on the 12th at 1 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	8·7
In the month of December, the highest reading of the Barometer during 36 years, was on the 22nd, in 1849, and was	30·378
The lowest ,, ,, 5th, 1876	28·028
The highest Temperature ,, 9th, 1876	58·1
The lowest ,, ,, 24th, 1860	6·7
The highest adopted mean temperature of the month, 1857	44·6
The lowest ,, ,, 1878	30·3

Barometer slightly above mean, and Rainfall light. Prevailing wind W.

Summary of the Observations

FOR 1883.

		Mean for the last 36 years.
Mean Reading of the Barometer	29·496	29·481
Highest ,, on February 23rd	30·341	30·289
Lowest ,, on September 2nd	28·323	28·273
Range of Barometer Readings	2·018	2·016
Highest Reading of a Max. Therm. on	79·0	81·5
Lowest Reading of a Min. Therm. on	17·8	15·6
Range of Thermometer Readings	61·2	65·9
Mean of all the Highest Readings	55·2	54·7
Mean of all the Lowest	39·7	40·9
Mean Daily Range	15·5	13·8
Deduced Yearly Mean (from Mean of Max. and Min.)	46·4	46·7
Mean Temperature of dry bulb	46·6	46·9
Adopted Mean Temperature	46·5	46·8
Mean Temperature of Evaporation	44·1	44·6
Mean Temperature of Dew Point	41·3	42·1
Mean elastic force of Vapour	0·268 in	0·276 in
Mean weight of Vapour in a cubic foot of air	3·1 gr	3·3 gr
Mean additional weight required for saturation	0·7 gr	0·7 gr
Mean degree of Humidity (saturation 1·00)	0·83	0·84
Mean weight of a cubic foot of air	540·1 gr	539·1 gr
Total Fall of Rain in the Year	45·999 in	47·886 in
Number of days per Month on which Rain fell	17·2	18·4
Amount of Evaporation	27·824 in	27·944 in

The Maximum monthly mean height of the Barometer was in January, 1880, and was ..... 29·928

The Minimum ,, ,, in December 1868, and was ... 28·984

The Maximum yearly mean height of the Barometer was in 1858, and was ..... 29·544

The Minimum ,, ,, ,, ,, in 1866, and was ... 29·389

The greatest monthly range of the Barometer was in November, 1859, and was	2·290
The least ,, ,, in July, 1852, and was	0·505
The highest reading of the Barometer, during 36 years, was on January 18th, 1882, and was	30·480
The lowest ,, ,, on January 14th, 1865, and was	27·939
Extreme range	2·541
The highest temperature was on July 15th, 1868, and was	88·2
The lowest ,, ,, January 15th, 1881	4.6
The highest adopted mean temperature of a month, July 1868	62·4
The lowest ,, ,, February, 1855	28·6
The highest adopted mean temperature of a year, 1868	49·1
The lowest ,, ,, ,, ,, 1879	44·1
The greatest monthly mean weight of vapour, in a cubic foot of air } July, 1852	5·1
The least ,, ,, ,, February, 1855	1·4
The greatest fall of rain in a month, was in October, 1870, and was 13·437 in	
The least ,, ,, ,, March, 1852	0·047
The greatest number of days on which rain fell in one month } July, 1861, December, 1868	31
The least ,, ,, March, 1852	3

The Rainfall for the year was nearly 2 inches below the average. The velocity of the wind (63 miles per hour) at 1 a.m. on the 12th of December was the greatest ever recorded.

DATES OF OCCASIONAL PHENOMENA.

1883.	Frost.	Hoar frost.	Snow.	Hail.
January	3, 5, 6—9, 15, 16, 19, 20, 22—27, 29, 30, 31	7, 8, 16, 21, 31	25, 26, 27, 29	24, 26, 27, 29, 30
February	1, 8, 10, 11, 14, 15, 16, 18	19		11, 12
March	1, 3—28, 30, 31	2, 4, 5, 6, 12, 13	7, 8, 14, 17, 18, 19, 27, 31	16, 24
April	1, 3, 5, 6, 7, 8, 10, 21, 22, 24, 25	1, 4, 9	24	
May	1, 3, 4	5		10, 11
June				
July				
August				
September				
October	21	22		3, 17, 18, 19, 20
November	6, 9—17, 22, 30	6, 10, 11, 12, 17		4, 9, 10, 19, 20, 21
December	1, 4, 5, 6, 7, 8, 9, 15, 16, 17, 23, 26	5		12, 15

1883.	Heavy Rain.	Fog.	Lightning.	Thunder.	Lunar Halo.	Solar Halo.
January	24, 27, 28, 29	6, 7				
February				15	19	16
March						
April		3, 11, 12, 13, 14				
May			25			7, 22, 25
June	15, 25, 26		8, 10, 15, 25, 26, 29	8, 10, 15, 25, 26, 29		2, 9, 14, 18
July	12, 15	29, 31				
August	12	3, 4, 5.	26	12, 14		5, 16, 20
September	26, 27, 28	16, 17	18	15, 18		4
October	17, 19	8, 9	3, 17, 18, 20	3, 17, 18		11
November			9, 22	9		
December	10	18, 24, 26, 27, 28				5

SUN OBSERVATIONS AT STONYHURST IN 1883.

	Sunshine recorded on	Amount of Sunshine recorded.	Drawings of Sun, 10½ inch to diameter on	Other drawings of Sun and Solar notes on	Entire Chromosphere measured on	Chromosphere partially measured on	Spot spectra observed on
January	13 days	35·9 hours	12 days	2 days	2 days		
February	17 ,,	63·0 ,,	14 ,,		9 ,,		
March	27 ,,	145·6 ,,	14 ,,	6 ,,	11 ,,	2 days	
April	23 ,,	154·2 ,,	16 ,,	1 ,,	8 ,,	1 ,,	1 day
May	25 ,,	204·5 ,,	19 ,,	3 ,,	9 ,,	2 ,,	3 ,,
June	26 ,,	169·7 ,,	20 ,,	7 ,,	7 ,,	1 ,,	2 ,,
July	30 ,,	159·4 ,,	19 ,,	4 ,,	4 ,,	1 ,,	1 ,,
August	29 ,,	167·3 ,,	8 ,,	6 ,,	7 ,,		
September	24 ,,	111·0 ,,	12 ,,	2 ,,	4 ,,	1 ,,	3 ,,
October	21 ,,	83·2 ,,	18 ,,	3 ,,	5 ,,		2 ,,
November	23 ,,	55·1 ,,	19 ,,	1 ,,	4 ,,	1 ,,	4 ,,
December	13 ,,	25·9 ,,	9 ,,	1 ,,	2 ,,		

TOTAL AMOUNT OF SUNSHINE RECORDED ON EACH DAY.

Month.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
January	0	2·4	0	0	2·3	0	0	3·2	5·0	0	0	0	0	0	2·7	2·3	0
February	0	0	4·2	3·8	0·3	2·8	2·5	0	3·3	0	3·1	0	2·8	0	2·9	4·9	0
March	8·5	5·8	7·2	7·9	8·8	2·8	8·3	5·7	6·4	1·0	1·7	9·3	2·2	1·8	6·2	1·2	7·6
April	9·5	10·2	5·6	8·8	0	11·7	9·9	9·3	9·8	4·2	1·5	4·6	0	8·8	0	9·8	1·2
May	13·3	3·7	7·3	7·0	3·9	10·5	10·8	4·5	0	13·2	0	4·7	0	11·6	7·9	14·0	10·7
June	0	8·4	14·1	15·3	15·0	14·1	0·4	3·0	11·7	2·3	2·7	3·2	2·4	9·0	0	6·9	7·5
July	9·3	4·7	2·7	4·4	5·5	3·0	3·3	4·0	0·9	3·3	4·5	4·6	11·5	12·4	7·3	0·3	6·6
August	1·3	7·2	9·5	0·5	6·9	4·7	7·1	1·4	10·7	3·5	7·4	5·0	0	6·0	0	6·3	1·8
September	0·8	0·3	0	5·5	7·4	4·1	2·7	9·8	8·0	0	7·7	8·3	9·5	9·1	4·8	4·3	5·0
October	8·4	7·2	3·4	5·2	1·0	8·4	0	0	0	0	0	4·7	0·9	0	6·2	2·6	4·6
November	0	0	2·3	0·7	2·0	4·0	0·3	2·7	2·1	2·2	4·8	6·2	6·4	0·9	0·5	0·6	0
December	3·8	0·1	0	5·2	3·4	1·5	0·5	0	0	0	2·8	0	0·2	0	0	2·1	0·6

TOTAL AMOUNT OF SUNSHINE RECORDED ON EACH DAY.

(*Continued.*)

Month.	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly Total.	Approximate per centage each Month.
January	2·2	0	5·3	0	0	0·5	0	4·6	2·2	0	0	1·2	2·0	0	35·9	19·3
February	4·8	4·6	0	0	7·3	4·9	0	6·1	0·5	0	4·2	...	...	...	63·0	28·1
March	3·8	3·8	0	0	0	7·8	0·3	1·5	5·2	8·5	9·8	0	3·3	9·2	145·6	47·0
April	0·5	0	9·6	2·2	9·3	5·8	5·7	8·7	6·8	0·7	0	0	0	...	154·2	42·8
May	2·7	6·2	0	0	13·5	7·0	7·2	9·8	3·4	12·9	0	8·2	8·8	1·7	204·5	47·1
June	9·7	5·9	0·1	7·7	1·5	8·4	0	3·4	1·0	3·6	0	6·0	6·4	...	169·7	37·7
July	5·8	5·0	0·4	0	8·5	8·9	6·9	3·6	6·1	4·2	11·4	3·8	1·4	5·2	159·4	33·2
August	11·5	9·8	7·1	7·1	4·9	11·5	11·5	5·4	3·3	0·1	5·3	5·0	2·8	2·7	167·3	39·0
September	3·0	3·4	0	0	0·8	3·0	0	1·3	3·3	0	5·2	0.5	3·2	...	111·0	35·3
October	0·8	0	1·6	6·8	2·7	6·0	1·5	4·7	0	0·4	0	1·8	4·3	0	83·2	29·8
November	0	1·8	0	1·9	2·5	4·3	1·6	0·7	0.9	0	1·6	4·1	0	...	55·1	26·2
December	0	0	0	0	0·7	5·0	0	0	0	0	0	0	0	0	25·9	13·9

MONTHLY TABLES FOR EACH HOUR OF RECORDED SUNSHINE.

Local apparent time.	4–5	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–1	1–2	2–3	3–4	4–5	5–6	6–7	7–8
January	0	0	0	0	0·1	2·0	4·2	6·8	9·6	7·7	4·8	0·7	0	0	0	0
February	0	0	0	0·1	2·8	7·8	10·7	10·8	11·1	11·0	5·8	2·1	0·8	0	0	0
March	0	0	0·8	6·3	14·9	18·5	17·6	17·6	16·7	14·9	13·9	13·5	9·5	1·3	0·1	0
April	0	0·8	5·5	10·9	14·2	17·2	16·0	15·1	14·6	14·4	14·4	13·7	10·0	6·6	0·8	0
May	0·6	8·7	10·0	11·7	14·6	15·8	16·5	15·5	16·5	17·2	18·5	18·6	15·0	14·0	10.0	1·3
June	1·3	6·0	9·6	10·7	11·0	12·6	15·0	13·8	13·0	13·3	15·0	12·1	12·3	10·3	9·3	4·4
July	0·5	4·4	7·4	10·6	11·3	10·6	11·0	11·7	13·0	16·0	14·9	13·6	12·5	11·3	8·0	2·6
August	0	0·3	4·9	10·0	11·0	10·6	12·9	15·6	15·9	14·4	15·9	18·0	15·8	14·7	7·2	0·1
September	0	0	0·9	5·1	8·9	10·9	13·5	12·9	12·5	13·6	12·8	9·6	8·5	1·8	0	0
October	0	0	0	4·7	6·6	12·0	12·4	12·5	10·2	9·2	7·4	5·0	2·8	0·4	0	0
November	0	0	0	0	1·9	5·0	6·8	8·7	9·0	9·1	8·3	4·3	0	0	0	0
December	0	0	0	0	0	2·7	4·5	6·6	6·3	3·9	1·9	0	0	0	0	0
Total	2·4	20·2	39·1	70·1	97·5	125·7	141·1	147·6	148·4	144·7	133·6	111·2	87·2	60·4	35·4	8·4

OBSERVATIONS OF UPPER CLOUDS (CIRRUS).

Date.	G. M. T.	Cloud Direction.	Velocity.	Wind.		Direction of Lr. Clds.
				Direction.	Forte (0 to 12).	
January 3	11.30 a.m.	W.	2	W.	2	S.W.
,, 8	9 a.m.	S. by E.	1	N.E.	0	S.E.
,, 9	3 p.m.	S.	2	E.	6	E.
,, 15	11 a.m.	S. by W.	2	S.S.W.	1	E.
,, 18	2 p.m.	N.E.	2	S.W.	1	S.W.
,, 20	4 p.m.	W.	1	W.	1	W.
,, 25	4 p.m.	E.	2	S.	0	S.W.
,, 29	3 p.m.	W.S.W.	2	W.	2	S.W.
,, 31	10 a.m.	S. by W.	2	N.E.	0	N.E.
,, 31	Noon.	S. by W.	2	N.N.E.	0	W.N.W.
,, 31	2 p.m.	S.W.	3	N.N.E.	1	N.W.
February 3	10 a.m.	N.	2	S.W.	2	S.W.
,, 3	Noon.	N.E.	2	S.W.	3	W.S.W.
,, 3	2 p.m.	N.N.E.	3	S.W.	4	W.
,, 9	Noon.	E.	2	S.W.	1	S.S.W.
,, 9	2 p.m.	E.N.E.	2	S.W.	2	S.W.
,, 13	11 a.m.	S.W.	3	S.S.W.	3	S.W.
,, 19	10 a.m.	S.	2	N.	1	N.E.
,, 25	11 a.m.	S.W.	1	W.	1	W.
,, 28	3.30 p.m.	S.	2	S.W.	2	W.
March 1	4 p.m.	S.E.	2	N.E.	0	N.
,, 7	9 a.m.	N.E.	3	N.N.W.	4	N.W.
,, 15	9 a.m.	N.W.	2	N.E.	1	N.W.
,, 17	1 p.m.	N.E.	3	W.	3	W.N.W.
,, 27	8 a.m.	W. by N.	2	N.N.E.	0	E.
,, 27	9 a.m.	W.N.W.	2	N.N.E.	0	N.E.
,, 28	2 p.m.	N.E.	2	W.	2	N.E.
,, 28	4 p.m.	N.E.	3	W.N.W.	2	W.N.W.
April 1	8 a.m.	W.	2	N.N.W.	0	S.S.E.
,, 2	10 a.m.	W. by S.	1	S.S.E.	3	W. by S.
,, 3	2 p.m.	W.N.W.	3	W.S.W.	1	W.N.W.
,, 12	11 a.m.	S.	2	S.W.	1	N.W.
,, 14	10 a.m.	N.W.	1	W.	2	N.W.
,, 16	4 p.m.	W.S.W.	2	W.S.W.	4	W.S.W.
,, 20	2 p.m.	S.S.E.	2	W.	2	W.
,, 20	4 p.m.	S.E.	2	W.	2	W.
May 1	11 a.m.	S.W.	2	N.E.	3	N.E.
,, 3	3 p.m.	N.E.	1	E.N.E.	1	N.N.E.
,, 11	9 a.m.	N.	2	W.	4	N.
,, 15	4 p.m.	W.	2	W.	1	W.
,, 16	4 p.m.	N.W.	1	N.W.	1	N.W.
,, 17	Noon.	N.W.	2	W.	2	N.W.
,, 22	3 p.m.	S.S.E.	2	W.	4	W.
,, 22	4 p.m.	S.E.	2	W.	3	W.
,, 23	Noon.	N.W.	1	W.	3	N.W.

OBSERVATIONS OF UPPER CLOUDS. (*Continued*).

Date.		G. M. T.	Cloud Direction.	Velocity.	Wind. Direction.	Wind. Force (0 to 12).	Direction of Lr. Clds.
May	23	2 p.m.	N.E.	2	W.	3	W.
,,	23	4 p.m.	N. by E.	3	W.	4	W.S.W.
,,	26	4 p.m.	S. by E.	2	W.N.W.	3	W.
,,	30	4 p.m.	N.	2	W.	1	W.
June	2	2 p.m.	N.	1	W.S.W.	1	S.W.
,,	9	2 p.m.	N.E.	2	N.W.	2	N.E.
,,	9	4 p.m.	N.E.	2	W.	1	N.E.
,,	14	3 p.m.	E.	2	W.	1	W.
,,	19	8 a.m.	W.	3	W.S.W.	1	W.
,,	21	11 a.m.	N.	3	N.E.	1	N.E.
July	10	3 p.m.	N.E.	2	W.	2	W.S.W.
,,	14	4 p.m.	W.	1	W.N.W.	3	W.
,,	17	3 p.m.	N.N.E.	2	W.	4	W.
,,	18	2.30 p.m.	N.	1	W.	2	W.S.W.
,,	23	Noon.	N.E.	2	W.N.W.	2	W.
,,	23	2 p.m.	N.N.E.	2	W.	2	W.S.W.
,,	24	1 p.m.	W.	2	W.N.W.	3	W.
,,	28	Noon.	W.N.W.	2	W.N.W.	2	W.N.W.
August	1	5 p.m.	W.	1	W.	2	S.W.
,,	3	3 p.m.	N.W.	2	W.N.W.	2	N.N.E.
,,	6	2.30 p.m.	W.	1	N.W.	1	S.W.
,,	18	11 a.m.	S.	1	W.	2	W.
,,	18	3 p.m.	S.W.	2	W.	2	W.
,,	21	4 p.m.	S.W.	2	W.	1	S.W.
,,	22	10 a.m.	W.N.W.	1	W.	1	W.N.W.
,,	29	4 p.m.	N.E.	2	W.	2	W.
,,	31	6 p.m.	S.W.	2	W.	1	W.S.W.
Sept.	5	9.30 a.m.	S.W.	1	N.	0	N.E.
,,	8	11 a.m.	W.S.W.	2	W.N.W.	4	W.S.W.
,,	11	1.30 p.m.	N.	1	N.	2	E.
,,	12	5.45 p.m.	N.E.	2	N.E.	1	N.E.
,,	13	3 p.m.	S. by E.	3	E.	1	N.E.
,,	28	11.30 a.m.	S.S.W.	2	W.	3	W.
Oct.	1	10.30 a.m.	N.E.	1	N.N.W.	2	N.E.
,,	2	11 a.m.	W.	1	N.N.W.	2	N.
,,	5	4 p.m.	W.	2	N.N.W.	2	N.
,,	6	9 a.m.	N.E.	1	N.N.E.	1	N.E.
,,	12	1 p.m.	W. by S.	2	E.	1	S. by E.
,,	16	10.45 a.m.	N.	3	S.W.	3	W.S.W.
,,	21	10 a.m.	N.E.	2	N.N.W.	1	N.
,,	24	9 a.m.	N.	2	W.S.W.	1	S.W.
Nov.	3	3 p.m.	N.E.	1	W.	2	W.
,,	8	1.30 p.m.	W. by S.	2	W.	2	S.W.
,,	11	10 a.m.	N.W.	1	N.	0	N.W.
,,	11	Noon.	N.E.	1	E.	0	N.E.

OBSERVATIONS OF UPPER CLOUDS (*Continued*).

Date.		G.M.T.	Cloud Direction.	Velocity.	Wind.		Direction of Lr. Clds.
					Direction.	Force (0 to 12)	
Nov.	14	9.45 a.m.	N.N.W.	2	N.	1	N.E.
,,	27	10 a.m.	N.W.	2	W.S.W.	4	N.W.
,,	27	Noon.	N.W.	1	S.W.	2	N.W.
,,	29	10 a.m.	N.W.	2	S.	2	N.W.
Dec.	1	3 p.m.	N.E.	3	S.W.	1	N.E.
,,	2	10 a.m.	N.E.	1	W.N.W.	1	N.E.
,,	5	Noon.	N.N.E.	2	N.	2	N.E.
,,	5	4 p.m.	N.	3	N.W.	1	N.W.
,,	17	Noon.	N.N.E.	2	N.N.W.	3	N.N.E.
,,	17	2 p.m.	N.E.	1	N.	0	N.E.
,,	17	4 p.m.	N.E.	2	N.N.W.	1	N.E.
,,	22	10 a.m.	W.	1	W.S.W.	4	W.
,,	24	9.20 a.m.	W.N.W.	2	S.W.	1	W.
,,	24	10 a.m.	N.N.W.	3	S.W.	1	N.W.

AGRICULTURAL NOTES.

JANUARY was mild and wet, with little sun. Primroses were in blossom during the last week. Ground too heavy for working.

FEBRUARY, with the exception of the last week, was mild and cloudy. Very few wild flowers were in blossom. A little ploughing was done during the last few days of the month.

MARCH was cold, but sunny, with very little rain. A very favourable month for agricultural operations. Ploughing was finished, and nearly all the oats were sown by the end of the month.

APRIL was also a good month for farm work, but rain was much wanted towards the latter part of the month. Potatoes were all in the ground by the 25th.

MAY.—Although this month was bright and sunny, it was cold. Grass looked poor for want of rain, and vegetation was backward.

JUNE.—The want of rain was felt severely in the early part of the month. The latter half was too wet. A little hay was cut during the last week. A very fair crop of clover was got in by the end of the month. Hay was a very light crop.

JULY.—Owing to the frequent falls of rain and the absence of sunshine, very little hay was got in during the month. Oats were looking very poor.

AUGUST was a more favourable month for agriculture, being for the most part warm and sunny. Wheat began to look very much better, and hay was carried in most places by the end of the month.

SEPTEMBER.—The heavy rainfall in this month greatly retarded harvest work. Oats and wheat were cut during the last week, but very little was got in. The crop of oats was very light, but wheat was about average quantity.

OCTOBER.—Rain still retarded the gathering of the harvest. Potatoes, which were lifted in most places by the middle of the month, yielded a very fine crop.

NOVEMBER was a wet month, and although some wheat was sown at the commencement of the month, it was greatly interfered with by the rain. The green crops were housed early in the month.

DECEMBER.—Wheat was not all sown until the 25th, owing to the wet.

OBSERVATIONS OF CROPS.

GRAIN, ETC.					GREEN CROPS.			
Name.	When Sown.	In Flower.	In Ear.	When Cut.	Name.	When Sown.	Above Ground.	Stored.
Wheat	Nov.—Dec.	June 15th	July 7th	Sept.	Potatoes	April	May 2nd	Sept.—Oct.
Oats	Mar.—Apl.	June 15th	July 15th	Sept.	Turnips	May	May 10th	October.
Peas	March 20th	June 10th		August	Beet	May	May 15th	October.
Beans	March 20th	June 15th		Sept.	Mangel	May	May 15th	Oct.—Nov.

OBSERVATIONS OF TREES AND SHRUBS.

FOREST TREES, ETC.			FRUIT TREES, ETC.			SHRUBS.	
Name.	In Bud.	In Leaf.	Name.	In Blossom.	Ripe.	Name.	In Blossom.
Field Elm	May 4th	May 25th	Apple	May 4th	Aug. 21st	Lilac	May 23rd
Oak	May 11th	May 20th	Pear	May 20th	Aug. 21st	Syringa	June 1st
Sycamore	Ap. 23rd	May 15th	Cherry	Ap. 21st	July 25th	Laburnum	May 29th
Lime	Ap. 20th	May 19th	Red Currant	Ap. 19th	July 10th	Red Flowering Currant	Ap. 16th
Ash	May 17th	May 27th	Black Currant	May 1st	Aug. 15th	Dog Rose	June 10th
Beech	Ap. 19th	May 13th	Strawberry	Ap. 22nd	June 20th	Guelder-Rose	June 21st
Horse Chesnut	Ap. 7th	May 24th	Gooseberry	Ap. 10th	Aug. 26th	Woodbine	June 23rd
			Plum	May 9th	Oct. 22nd	Portugal Laurel	July 1st
						Elderberry	June 15th

DATES OF THE FLOWERING OF PLANTS AT STONYHURST IN 1883.

RANUNCULACEÆ.		
Anemone nemorosa	Wood anemone	April 6
Ranunculus ficaria	Lesser celandine	Feb. 16
R. repens	Creeping buttercup	April 20
R. bulbosus	Bulbous buttercup	April 21
Trollius Europæus	Globe flower	May 17
NYMPHÆACEÆ.		
Nuphar lutea	Yellow water lily	June 15
PAPAVERACEÆ.		
Papaver Rhœas	Red poppy	June 25
CRUCIFERÆ.		
Cardamine pratensis	May flower	April 17
C. hirsuta	Hairy bitter cress	April 15
Alliaria officinalis	Garlic mustard	May 18
VIOLACEÆ.		
Viola canina	Dog violet	April 11
Viola odorata	Sweet violet	April 21
POLYGALACEÆ.		
Polygala vulgaris	Milkwort	May 10
CARYOPHYLLACEÆ.		
Lychnis flos cuculi	Ragged Robin	June 2
L. diurna	Red Robin	May 2
Stellaria media	Chickweed	Feb. 7
S. holostea	Great starwort	April 10
HYPERICACEÆ.		
Hypericum quadrangulum	Square-stalked hypericum	June 20
H. perforatum	Common hypericum	June 21
GERANIACEÆ.		
Geranium pratense	Meadow geranium	June 21
G. Robertianum	Herb Robert geranium	May 27
G. lucidum	Shining geranium	April 20
Oxalis acetosella	Wood sorrel	April 12
PAPILIONACEÆ.		
Medicago lupulina	Black medic	May 12
Trifolium repens	White clover	May 9

DATES OF THE FLOWERING OF PLANTS AT STONYHURST IN 1883 (*continued*).

T. pratense	Purple clover	May 12
Lotus corniculatus	Common bird's-foot trefoil	May 4
Vicia cracca	Tufted vetch	June 9
Lathyrus pratensis	Meadow vetchling	June 24
ROSACEÆ.		
Spiræa ulmaria	Meadow sweet	June 18
Geum urbanum	Common avens	May 15
G. rivale	Water avens	April 21
Fragaria vesca	Wood strawberry	May 3
Potentilla fragariastrum	Strawberry-leaved potentil	March 22
P. tormentilla	Tormentil potentil	May 19
P. anserina	Silver weed	May 26
Alchemilla vulgaris	Lady's mantle	May 1
ONAGRACEÆ.		
Circæa lutetiana	Enchanter's nightshade	June 27
LYTHRARICÆ.		
Lythrum salicaria	Purple loosestrife	May 20
SAXIFRAGACEÆ.		
Saxifraga tridactylites	Rue-leaved saxifrage	March 15
S. umbrosa	London pride saxifrage	April 20
Chrysosplenium oppositifolium	Opposite chrysosplene	April 3
S. alternifolium	Alternate chrysosplene	April 5
UMBELLIFERÆ.		
Sanicula europæa	Wood sanicle	May 11
Heracleum spondylium	Common Heracleum	May 18
Bunium flexuosum	Tuberous bunium	May 20
CAPRIFOLIACEÆ.		
Adoxa moschatellina	Tuberous moscatel	April 4
STELLATÆ.		
Galium cruciatum	Crosswort galium	May 9
G. verum	Yellow galium	May 16
G. saxatile	Heath galium	May 20
G. aparine	Cleavers galium	May 21
Asperula odorata	Woodruff asperule	May 9
VALERIANEÆ.		
Valeriana dioica	Marsh valerian	May 4
V. officinalis	Common valerian	May 30

DATES OF THE FLOWERING OF PLANTS AT STONYHURST IN 1883 (*continued*).

DIPSACEÆ.		
Scabiosa avensis	Field scabious	July 10
COMPOSITÆ.		
Tussilago farfara	Common colt's-foot	March 5
T. petasites	Butterbur colt's-foot	April 12
Chrysanthemum leucanthemum	Ox-eye daisy	June 18
Achillea millefolium	Yarrow	June 18
S. Jacobæa	Ragwort senecio	July 10
Arctium lappa	Common burdock	July 23
Carduus palustris	Marsh thistle	June 19
Centaurea nigra	Black centaurea	July 5
Hypochœris radicata	Long-rooted cat's-ear	June 18
Taraxacum dens-leonis	Common dandelion	Jan. 29
PRIMULACEÆ.		
Primula vulgaris	Common primrose	Jan. 30
P. veris	Cowslip	May 19
Lysimachia vulgaris	Common lysimachia	May 5
APOCYNACEÆ.		
Vinca minor	Lesser periwinkle	April 5
BORAGINEÆ.		
Myosotis palustris	Forget-me-not	May 1
Symphytum officinale	Common comfrey	May 13
OROBANCHACEÆ.		
Lathræa squamaria	Toothwort	April 10
SCROPHULARINEÆ.		
Scrophularia aquatica	Water figwort	May 24
Digitalis purpurea	Purple foxglove	June 2
Veronica chamædrys	Germander veronica	May 18
Euphrasia officinalis	Common eyebright	June 6
Rhinanthus crista-galli	Common yellow rattle	May 25
Pedicularis palustris	Marsh red rattle	May 20
LABIATÆ.		
Mentha aquatica	Water mint	July 10
Nepeta glechoma	Ground ivy	April 19
Stachys sylvatica	Hedge stachys	June 5
S. palustris	Marsh stachys	June 9
Ajuga reptans	Creeping bugle	May 19

DATES OF THE FLOWERING OF PLANTS AT STONYHURST IN 1883 (*continued*).

POLYGONACEÆ.		
Rumex acetosa	Sorrel dock	May 5
R. acetosella	Sheep-sorrel dock	May 25
Polygonum bistorta	Bistort polygonum	May 11
EUPHORBIACEÆ.		
Mercurialis perennis	Dog's mercury	March 30
ORCHIDACEÆ.		
Listera ovata	Twayblade listera	May 29
Orchis mascula	Early orchis	May 22
O. maculata	Spotted orchis	May 30
IRIDACEÆ.		
Iris pseudacorus	Yellow iris	May 25
Crocus vernus	Spring crocus (*cult.*)	March 15
AMARYLLIDEÆ.		
Narcissus pseudonarcissus	Daffodil	April 25
Galanthus nivalis	Snowdrop (*cult.*)	Feb. 28
LILIACEÆ.		
Paris quadrifolia	Common Paris	May 13
Scilla nutans	Bluebell Squill	April 12
AROIDEÆ.		
Arum maculatum	Common arum	May 2

THE UPPER GLOW PRECEDING SUNRISE AND FOLLOWING SUNSET.

On November 26, 1883, this unusual glow in the sky first attracted attention, and it has been carefully watched both morning and evening ever since.

The general appearance is always the same.

Before sunrise a faint pink tint is first seen on the Eastern horizon, then this tint strengthens, and sometimes it turns to a crimson hue.

It next rises gradually to the height of about 50°, and occasionally even to the zenith, and is succeeded on the horizon by a greenish-yellow colour some thirty minutes previous to sunrise.

Near the time of sunrise long bands of cirro-stratus clouds are formed parallel to the horizon, and overlapping each other, occupy the position of the previous warm glow, whilst the remainder of the sky may be perfectly free from cloud.

During the day the sun is invariably surrounded by an intense silvery brightness slightly tinged with green, and at a distance of about 20° from the sun this tint sometimes changes gradually into a pink or pale-violet, and fades away at about 45°. This brilliant haze does not interfere in the least with the perfect definition of the solar surface.

After sunset the long bands of cirro-stratus and the greenish-yellow tint of the morning reappear, and as the greenish-yellow haze sinks after the sun below the Western horizon, the pink glow, which first appears some twenty or thirty minutes after sunset, increases in intensity for about ten minutes, and then frequently changes into a most beautiful crimson before it gradually fades away.

On several occasions, both at sunrise and sunset, the portion of the heavens opposite the sun was strongly tinted with violet.

The epoch of Maximum intensity was December 16, 1883, and then the glow was visible for 1h. 50m. after sunset.

The green colour of the moon and of the neighbouring clouds, which was observed more than once, was not one merely of contrast, but was seen by observers who had not previously looked at the pink glow visible in another part of the heavens.

An orange tinted haze, extending about 40° from the moon was also seen on several nights towards the middle of December. It bore no resemblance to ordinary haze, and contrasted strongly with the surrounding sky.

On December 5th and 6th strong absorption bands were noticed in the spectrum between A and D.

(*To be continued in the Report for 1884.*)

PREVAILING WIND, IN DAYS PER MONTH, FROM 1868 TO 1883.

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
January	1·1	4·6	2·9	1·3	5·7	8·4	5·5	1·1
February	1·3	3·2	3·0	1·1	3·8	7·1	6·8	1·9
March	1·2	6·6	3·6	0·6	2·4	5·8	5·2	3·6
April	0·9	7·4	4·4	0·7	2·4	4·9	7·2	1·2
May	0·4	7·6	3·8	0·7	1·8	5·5	9·4	1·7
June	1·1	4·4	3·3	1·1	2·3	6·1	10·1	1·0
July	0·6	4·0	1·6	0·3	2·2	8·3	12·2	1·8
August	0·8	5·3	2·2	1·4	2·1	7·3	9·6	2·2
September	1·8	5·4	2.3	1·1	2·8	6·3	7·8	2·4
October	1·4	5·9	2·7	1·3	3·6	6·9	7·3	2·4
November	1·9	6·4	1·9	1·1	2·5	6·1	6·6	3·4
December	2·1	6·4	1·3	0·9	2·8	7·6	7·1	2·6
Mean.	1·2	5·6	2·5	1·0	2·9	6·7	7·9	2·1

MONTHLY MEAN VELOCITY OF THE WIND, IN MILES PER HOUR, FOR THE DIFFERENT POINTS OF THE COMPASS, FROM 1868 TO 1883.

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
January	2·0	5·3	6·9	5·4	11·7	10·6	9·7	2·6
February	5·3	8·6	10·3	6·9	11·2	10·2	11·6	5·6
March	5·1	7·0	10·0	3·4	9·0	11·8	13·4	8·3
April	6·0	9·1	10·4	5·1	9·1	9·2	11·2	6·4
May	1·5	7·3	7·4	3·4	7·3	10·4	9·1	4·2
June	4·0	6·3	6·8	4·0	7·4	8·5	7·3	5·1
July	0·9	3·9	3·4	0·6	7·0	8·8	8·3	7·9
August	1·8	6·1	5·9	3·0	8·0	9·0	8·3	5·6
September	3·4	5·0	6·4	5·0	8·5	10·9	9·5	4·9
October	4·0	6·1	6·9	4·8	8·8	9·5	11·0	7·7
November	3·7	6·1	5·1	5·0	11·0	10·9	11·4	8·2
December	5·5	5·4	5·2	3·9	11·3	11·8	10·9	5·3
Mean	3·6	6·0	7·1	4·2	9·2	10·1	10·1	5·2

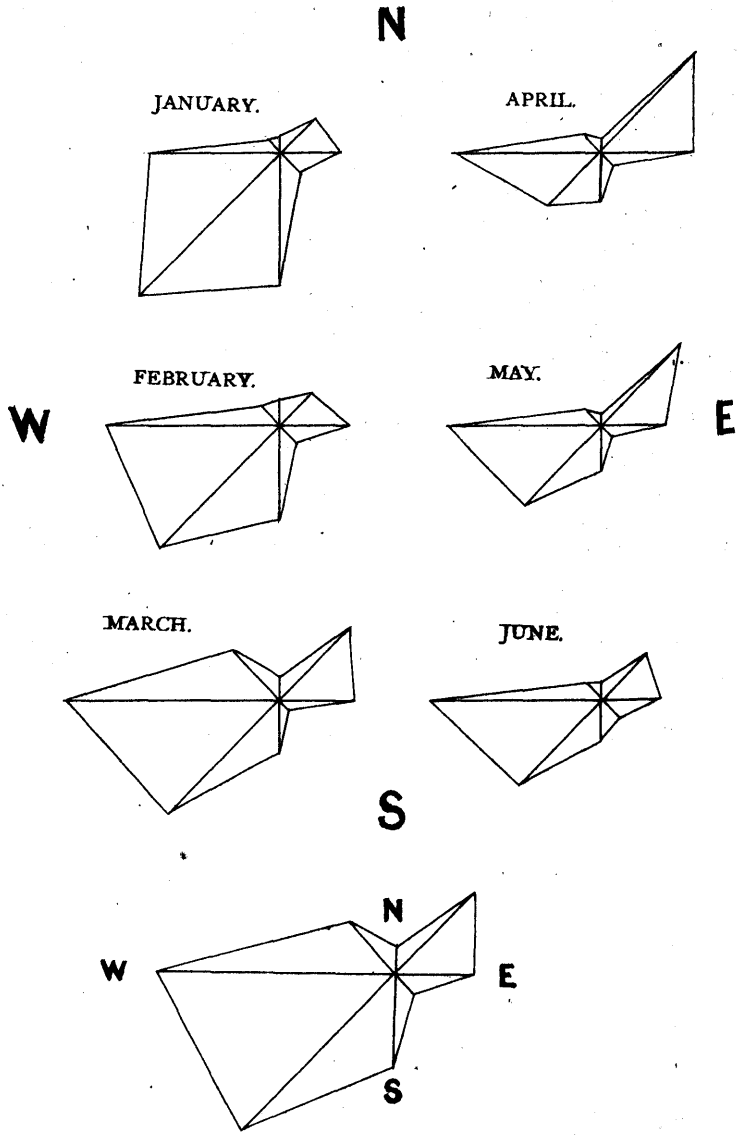
MEANS OF THE TOTAL NO. OF MILES FOR THE DIFFERENT POINTS OF THE COMPASS, FROM 1868 TO 1883.

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
January	133·3	665·1	738·4	282·2	1727·8	2645·5	1074·8	153·9
February	271·0	556·1	875·9	240·7	1218·8	2265·4	2221·6	344·3
March	268·2	1276·1	1010·4	117·3	702·6	2135·5	2740·1	904·7
April	200·2	1697·3	1241·9	215·2	665·6	1065·4	1942·8	387·4
May	66·8	1474·1	908·6	150·5	556·4	1525·1	2184·6	347·4
June	190·6	749·7	688·0	238·3	593·2	1560·0	2266·1	240·3
July	72·6	659·1	247·6	45·4	590·1	2019·2	2768·0	404·8
August	75·8	863·9	449·1	234·3	548·4	1759·9	2290·1	558·6
September	236·3	854·3	503·7	256·5	604·6	1700·3	1773·6	478·9
October	221·6	871·8	688·3	248·0	947·2	1805·8	2046·5	941·6
November	263·2	1082·1	534·4	259·1	139·9	1731·0	2228·7	863·4
December	364·7	981·0	336·9	219·2	1016·5	2384·3	2081·0	458·9
Mean	197·0	977·6	684·4	208·9	775·9	1883·1	2133·8	507·0

GREATEST HOURLY VELOCITY OF THE WIND IN EACH MONTH, FROM 1868 TO 1883.

	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883
January	54	50	42	52	49	46	38	42	30	44	37	29	34	30	41	59
February	55	43	39	45	38	34	46	31	37	36	30	30	42	58	45	57
March	44	43	44	49	41	33	40	43	42	40	39	40	41	39	36	45
April	42	30	31	24	34	35	38	34	30	37	35	33	42	39	36	43
May	33	30	40	32	30	31	23	39	25	36	31	33	32	34	36	31
June	25	29	32	31	29	33	28	33	29	40	24	34	28	30	40	29
July	26	29	26	27	23	31	29	28	32	34	29	34	27	29	29	32
August	34	27	26	38	27	29	31	28	38	30	25	32	26	36	35	34
September	26	39	41	27	37	37	36	53	25	35	43	43	28	22	27	33
October	46	31	42	32	34	33	42	37	42	52	39	40	33	41	37	37
November	38	39	28	34	56	44	35	37	31	54	29	40	42	45	48	43
December	48	47	35	35	39	52	39	38	34	40	39	41	38	43	40	63

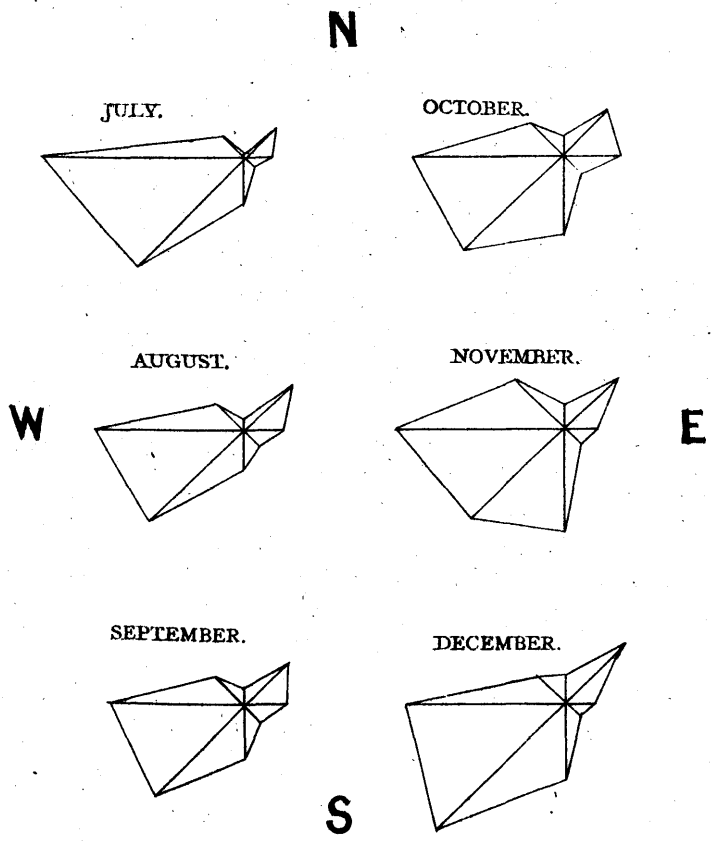
[illegible]

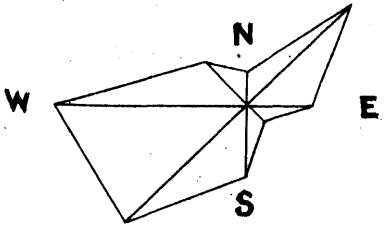


YEARLY MEAN.

Scale double that of the above.

TENSITY OF THE WIND FROM 1868 TO 1883.





MEAN NUMBER OF DAYS FOR EACH WIND.

DIRECTION OF THE GREATEST HOURLY VELOCITY OF THE WIND IN EACH MONTH FROM 1868 TO 1883.

	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883
January	S	S	S	SE	S	S	SW	SW	S	S	W	S	SW	E	W	W
February	W	W	S	W	S	E	SE	E	W	W	S	S	S, SE	S	W	S
March	W	NW	S	W	W	S	SW	W	SW	N	W	W	SW	W	NW	S
April	SW	W	S	E	W	W	S	NE	SW	E	W	SE	S	W	W	S
May	W	E	S	W	SW	W	SW	S	E, W	SW	SW	W	W	S	E	S
June	W	S	W	N	W	W	W	S	S	S	SW	S	W	S	W	E
July	S	S	SW	S	W	NW	SW	W	SW	SE	W	S	S	W	S	W
August	W	W	W	W	W	W	W	SW	SE	SW	S	SW	S	SW	W	W
September	S	W	W	W	SW	SW	SE	S	S	SW	S	S	W	S, E	S, SW	SW
October	W	N	S	S	S	SW	W	W	S	S	S	W	N	NW	S	S
November	S	W	S	E	S	W	W	SW	E	S	NW	W	S	W	W	W
December	W	S	W	S	W	W	W	S	E, SW	W	SW	W	W	S	SW	W

TABLE OF ALL THE WINDS WHOSE VELOCITY HAS REACHED OR EXCEEDED 50 MILES AN HOUR SINCE 1868.

1868. January, S.S.W. 53, S. 54. February, W. 55.

1869. January, S. 50.

1871. January, S.E. 51.

1872. November, S. 56.

1873. December, W. 52.

1875. September, S. 53.

1877. October, S. 52. November, S. 54, W. 50.

1881. February, S. 58.

1883. January, S. by E. 50, W. 55, 59. February, S.S,E. 57. December, W. 56, 63.

Monthly Magnetical Observations taken at the College Observatory, Stonyhurst, 1883.

THE Horizontal, Vertical, and Total Forces are calculated to English measure; one foot, one second of mean solar time, and one grain being assumed as the units of space, of time, and of mass.

The Vertical and Total Forces are obtained from the absolute measures of the Horizontal Force and of the Dip.

In the observations of Deflection and Vibration, taken each month for absolute measure of Horizontal Force, the same magnet has always been employed.

The moment of inertia of the magnet with its stirrup, for different degrees of temperature, and the co-efficients in the corrections required for the effects of temperature and of terrestrial magnetic induction on the magnetic moment of the magnet, were determined at the Kew Observatory by the late Mr. Welsh.

The moment of inertia of the magnet with its stirrup, using the grain and foot as the units of mass and of linear measure, is 5·27303. Its rate of increase for increase of temperature is 0·00073 for every 10° of Fahr.

The weight of the magnet with its stirrup is approximately 825 grains, and the length of the magnet is nearly 3·94 inches. The moment of inertia was determined, independently of the weight and dimensions, by the method of vibration, with and without a known increase of the moment of inertia.

The temperature corrections have always been obtained from the formula $q(t^\circ - 35^\circ) + q'(t^\circ - 35^\circ)^2$, where t° is the observed temperature and 35° Fahr. the adopted standard temperature. The values of the co-efficients q and q' are respectively ·0001128 and 0·000000436.

The induction co-efficient μ is 0·000244.

The correction for error of graduation of the Deflection bar at 1·0 foot is +0·00004 ft., at 1·3 + 0·000064 ft.

The observed times of vibration are entered in the Table without corrections.

The time of one vibration has been obtained each month from the mean of twelve determinations of the time of 200 vibrations.

The angles of deflection are each the mean of two sets of readings.

In deducing from these observations the ratio and product of the magnetic moment m of the magnet, and the earth's horizontal magnetic intensity X, the induction and temperature corrections have always been applied, and the observed time of vibration has been corrected for the effect of torsion of the suspending thread; but no correction has been required for the rate of the chronometer, or for the arc of vibration, the former having been always under $2^{s}\cdot0$, and the latter never over 50′.

The average deflection of the magnet caused by a twist of the torsion circle through 90°, has been about 8′·5 of arc.

In the calculations of the ratio $\frac{m}{X}$, the third and subsequent terms of the series $1 + \frac{P}{r^2} + \frac{Q}{r^4}$ + &c., have always been omitted.

The adopted value of the constant P is 0·002988.

The Declination observations have been taken once a week. Each reading has been corrected by the photographic curves for all irregular disturbances, as well as for daily and monthly range.

OBSERVATIONS OF DEFLECTION FOR ABSOLUTE MEASURE OF HORIZONTAL FORCE.

Month.	G. M. T.			Distances of centres of Magnets.	Temperature.	Observed Deflection.			$\text{Log}\frac{m}{X}$
	D.	H.	M.	FOOT.	°	°	′	″	
January ...	2nd	11	48 a.m.	1·0	51·0	13	31	59	9·07046
	,,	0	17 p.m.	1·3	50·3	6	7	31	9·07038
	15th	11	36 a.m.	1·0	43·5	13	32	50	9·07040
	,,	0	6 p.m.	1·3	46·1	6	7	49	9·07045
February...	1st	0	2 p.m.	1·0	35·0	13	33	53	9·07038
	,,	0	26 p.m.	1·3	35·4	6	8	13	9·07020
	15th	11	49 a.m.	1·0	47·6	13	32	45	9·07067
	,,	0	15 p.m.	1·3	47·1	6	7	27	9·07008
March ...	1st	11	32 a.m.	1·0	61·2	13	31	48	9·07110
	,,	0	26 p.m.	1·3	61·1	6	7	37	9·07134
	15th	11	39 a.m.	1·0	44·1	13	33	31	9·07078
	,,	0	12 p.m.	1·3	45·9	6	7	42	9·07039
April	1st	11	55 a.m.	1·0	51·5	13	34	40	9·07132
	,,	0	23 p.m.	1·3	52·1	6	7	26	9·07041
	15th	11	54 a.m.	1·0	50·2	13	32	9	9·07049
	,,	0	22 p.m.	1·3	50·1	6	7	23	9·07022
May	1st	11	45 a.m.	1·0	54·9	13	31	9	9·07029
	,,	0	10 p.m.	1·3	55·6	6	7	22	9·07057
	15th	2	38 p.m.	1·0	65·8	13	28	27	9·06966
	,,	2	13 p.m.	1·3	65·9	6	5	35	9·06920
June	1st	11	42 a.m.	1·0	57·8	13	30	39	9·07021
	,,	0	6 p.m.	1·3	57·7	6	6	44	9·06998
	15th	11	37 a.m.	1·0	55·1	13	30	27	9·06996
	,,	0	3 p.m.	1·3	54·7	6	6	36	9·06961
July.....	1st	10	59 a.m.	1·0	65·9	13	31	39	9·06931
	,,	11	26 a.m.	1·3	66·1	6	6	14	9·06949
	15th	11	57 a.m.	1·0	56·3	13	29	11	9·06935
	,,	0	14 p.m.	1·3	57·1	6	5	57	9.06901
August ...	1st	11	56 a.m.	1·0	59·9	13	29	35	9·06986
	,,	0	20 p.m.	1·0	60·7	6	5	57	9·06927
	15th	11	25 a.m.	1·3	57·2	13	29	0	9·06931
	,,	11	53 a.m.	1·3	57·4	6	5	29	9·06848
September.	17th	11	37 a.m.	1·0	68·2	13	27	15	9·06919
	,,	0	2 p.m.	1·3	69·2	6	4	59	9·06876
October ...	15th	11	57 a.m.	1·0	58·2	13	25	44	9·06765
	,,	0	15 p.m.	1·3	58·4	6	4	26	9·06726
November.	15th	11	30 a.m.	1·0	45·0	13	25	25	9·06656
	,,	0	36 p.m.	1·3	45·0	6	4	19	9·06615
December.	17th	11	28 a.m.	1·0	40·4	13	26	44	9·06742
	,,	11	54 a.m.	1·3	40.5	6	5	3	9·06682

m represents the Magnetic Moment of the Deflecting Magnet.
X represents the Earth's Horizontal Magnetic Intensity.

VIBRATION OBSERVATIONS FOR ABSOLUTE MEASURE OF HORIZONTAL FORCE.

Month.	G. M. T.	Temperature.	Time of one vibration.	Log m X	Value of m.
	D. H. M.	°			
January ...	2nd...10 7 a.m.	50·7	5·72025	0·20116	0·43230
	15th... 9 48 a.m.	40·9	5·71854	0·20136	0·43241
February...	1st ...10 50 a.m.	33·3	5·71853	0·20040	0·43187
	15th...10 32 a.m.	54·7	5·72340	0·20096	0·43219
March	1st ...10 20 a.m.	65·9	5·73354	0·19982	0·43173
	15th...10 3 a.m.	41·5	5·72119	0·20030	0·43197
April	1st...10 39 a.m.	47·9	5·71752	0·20066	0·43228
	15th...10 7 a.m.	49·5	5·71793	0·20050	0·43200
May.....	1st ...10 4 a.m.	52·1	5·71932	0·20062	0·43205
	15th... 4 55 p.m.	63·6	5·71227	0·20050	0·43199
June	1st... 9 55 a.m.	56·1	5·71955	0·20072	0·43193
	15th...10 14 a.m.	55·6	5·71848	0·20095	0·43189
July.....	1st... 9 49 a.m.	65·3	5·72952	0·19997	0·43121
	15th...10 12 a.m.	55·5	5·72951	0·19974	0·43098
August ...	1st...10 24 a.m.	57·3	5·73994	0·19830	0·43047
	15th... 9 37 a.m.	55·7	5·72987	0·19977	0·43090
September.	17th...10 38 a.m.	63·3	5·75205	0·19715	0·42985
October ...	15th...11 4 a.m.	57·0	5·74458	0·19759	0·42941
November.	15th...10 37 a.m.	45·0	5·74998	0·19607	0·42731
December.	16th...10 8 a.m.	40·5	5·74848	0·19599	0·42764

DIP OBSERVATIONS.

Month.	G. M. T.	Needle.	Dip.			Mean.	Observer.
	D. H. M.		°	′	″		
January	2nd...11 40 a.m.	1	69	13	27		J. R.
	,, ... 0 35 p.m.	3	69	15	43		,,
	15th... 9 45 a.m.	1	69	14	11		,,
	,, ...11 10 a.m.	3	69	14	57	69 14 35	,,
February	1st ... 1 48 p.m.	1	69	16	8		,,
	,, ... 2 11 p.m.	3	69	16	34		,,
	15th...10 16 a.m.	1	69	15	1		,,
	,, ...11 21 a.m.	3	69	15	27	69 15 48	,,
March	1st ...10 37 a.m.	1	69	15	47		,,
	,, ...11 53 a.m.	3	69	19	4		,,
	15th...10 28 a.m.	1	69	16	28		,,
	,, ...11 30 a.m.	3	69	18	8	69 17 19	,,
April	1st... 9 45 a.m.	1	69	19	34		,,
	,, ...10 45 a.m.	3	69	17	43		,,
	15th... 9 45 a.m.	1	69	17	30		,,
	,, ...11 15 a.m.	3	69	20	23	69 18 48	,,
May	1st ...11 30 a.m.	1	69	14	22		,,
	,, ... 0 35 p.m.	3	69	17	22		,,
	15th...10 57 a.m.	1	69	15	1		,,
	,, ...11 44 a.m.	3	69	21	4	69 16 57	,,
June	1st ...11 35 a.m.	1	69	23	22		,,
	,, ... 0 2 p.m.	3	69	23	7		,,
	15th...11 30 a.m.	1	69	20	22		,,
	,, ... 0 15 p.m.	3	69	20	8	69 21 45	,,
July	1st ...11 30 a.m.	1	69	18	52		,,
	,, ... 0 6 p.m.	3	69	21	57		,,
	15th... 9 31 a.m.	1	69	17	8		,,
	,, ...10 40 a.m.	3	69	22	19	69 20 4	,,
August	1st ...11 30 a.m.	1	69	22	12		,,
	,, ... 0 25 p.m.	3	69	17	46		,,
	15th... 9 30 a.m.	1	69	18	19		,,
	,, ...11 35 a.m.	3	69	18	52	69 19 18	,,
September...	18th...10 35 a.m.	1	69	19	10		W. C.
	,, ...11 15 a.m.	3	69	18	50	69 19 0	,,
October	16th...11 5 a.m.	1	69	21	30		,,
	,, ...11 47 a.m.	3	69	23	11	69 22 21	,,
November ...	16th...10 50 a.m.	1	69	17	46		,,
	,, ...11 25 a.m.	3	69	19	11	69 18 29	,,
December ...	18th...10 40 a.m.	1	69	20	10		,,
	,, ...11 14 a.m.	3	69	19	30	69 19 50	,,
	Means		.....			69 18 41	

MAGNETIC INTENSITY.

	X. or Horizontal Force.	Y, or Vertical Force.	Total Force.
January 2.....	3·6767	9·7009	10·3749
,, 15.....	3·6769	9·7012	10·3742
February 1.....	3·6736	9·7078	10·3795
,, 15.....	3·6753	9·7022	10·3751
March 1.....	3·6669	9·7000	10·3698
,, 15.....	3·6717	9·7111	10·3760
April 1.....	3·6720	9·7234	10·3936
,, 15.....	3·6738	9·7309	10·4013
May 1.....	3·6737	9·7293	10·3757
,, 15.....	3·6858	9·7541	10·4272
June 1.....	3·6755	9·7728	10·4412
,, 15.....	3·6778	9·7754	10·4255
July 1.....	3·6753	9·7462	10·4164
,, 15.....	3·6793	9·7512	10·4224
August 1.....	3·6697	9·7145	10·3845
,, 15.....	3·6766	9·7355	10·4068
September 17...	3·6652	9·7080	10·3756
October 15.....	3·6735	9·7577	10·4248
November 15 ...	3·6708	9·7189	10·3890
December 16 ...	3·6722	9·7337	10·4033

8724

3·6741

DECLINATION OBSERVATIONS.

Month.	G. M. T.				Uncorrected.				Corrected.			
					Observation.			Monthly Mean.	Observation.			Monthly Mean.
	D.	H.	M.		°	′	″	° ′ ″	°	′	″	° ′ ″
January ...	2nd...	9	23	a.m.	20	1	8		20	2	51	
	8th...	9	16			5	37			3	37	
	15th...	9	9			0	43			2	26	
	22nd..	9	13		19	56	25		19	58	25	
	30th...	9	18		20	1	36	20 1 6	20	3	6	20 2 5
February..	1st...	9	20			0	21			1	2	
	5th...	8	57		19	59	38			0	2	
	13th...	9	9		20	2	41			4	41	
	15th...	9	8			1	39			3	56	
	19th...	9	14		19	56	51			0	17	
	26th...	9	6		20	0	26	20 0 16		3	25	20 2 16
March ...	1st...	9	6			3	41			4	49	
	5th...	9	18			1	5			4	14	
	15th...	9	9		19	56	29			1	21	
	20th...	9	10			52	32		19	57	25	
	26th...	9	8			59	9	20 1 35	20	4	1	20 2 25
April	1st...	9	13			57	4		19	59	55	
	9th...	9	6		20	3	43			8	35	
	15th...	9	13		19	55	30			0	57	
	17th...	8	58			58	36			4	37	
	23rd...	9	16		20	1	35	19 59 17		(1	35)	20 3 8
May	1st...	8	49			1	11			2	54	
	9th...	9	13		19	49	40		19	53	6	
	15th...	9	19			55	8			57	8	
	22nd..	9	10		20	2	45			(20	2	45)
	28th...	9	17			2	42	19 58 17		7	15	20 0 38
June	1st...	9	4		19	53	40		19	57	6	
	4th...	9	9			53	39			56	48	
	11th...	9	13			54	49		20	0	50	

DECLINATION OBSERVATIONS (*Continued*).

Month.	G. M. T.	Uncorrected. Observation.	Uncorrected. Monthly Mean.	Corrected. Observation.	Corrected. Monthly Mean.
	D. H. M.	° ′ ″	° ′ ″	° ′ ″	° ′ ″
June	15th... 9 10 a.m.	19 52 45		19 57 5	
	18th... 9 1	47 39		47 49	
	25th... 9 8	46 9	19 51 47	51 11	19 55 8
July	1st... 9 14	51 20		(51 20)	
	10th... 9 11	20 1 43		20 2 7	
	15th... 9 13	19 54 50		19 56 15	
	23rd... 9 19	56 37	19 56 8	58 37	19 56 28
August ...	1st... 9 0	58 46		(58 46)	
	7th... 9 4	59 30		20 6 39	
	15th... 9 4	52 2		19 55 11	
	21st... 9 12	56 45		59 36	
	27th... 8 59	52 55	19 56 0	57 47	19 59 36
September	3rd... 9 5	58 40		58 41	
	10th... 9 1	53 11		58 54	
	17th... 9 6	59 5		59 57	
	25th... 9 3	57 15	19 57 3	59 15	19 59 12
October ...	1st... 8 56	53 50		56 7	
	8th... 9 10	59 41		20 1 22	
	15th... 9 3	51 9		19 59 28	
	22nd.. 9 0	56 40		58 23	
	29th... 9 14	56 55	19 55 39	20 1 1	19 57 18
November	5th... 8 57	58 17		0 0	
	13th... 9 5	56 44		0 10	
	19th... 9 9	57 5		2 32	
	26th... 9 13	56 50	19 57 14	0 33	20 0 49
December.	3rd... 9 10	58 23		19 57 49	
	10th... 9 5	56 34		57 36	
	17th... 9 2	59 26		59 40	
	24th... 8 59	56 32		(56 32)	
	31st... 9 11	58 10	19 57 49	58 49	19 58 7
Yearly mean			19 57 41		19 59 46

MAGNETIC DISTURBANCES.

JANUARY.—The Declination magnet was somewhat irregular in its movements during the first two days of the year, then remained remarkably quiet on the 3rd and 4th, and was considerably affected by a disturbing force shortly before 8 p.m. on the 5th. On this latter date the Vertical Force was slightly above its mean value, and this component of the Intensity attained a considerable maximum at 8.17 p.m. on the 7th. The disturbance of the Declination on the 5th lasted until 4 o'clock the next morning, and for the three following days there were unusual irregularities in the curve, especially in the afternoons. At 4.2 p.m. on the 17th, the magnet was considerably North of its mean position, and similar movements occurred at 6.54 p.m. on the 18th, about 7 p.m. on the 20th, and at 9 p.m. on the 22nd. On the 17th the diminution in the Westerly variation of the needle was accompanied by a rather notable increase of the Vertical Force. The chief disturbance of the month occurred during the evenings of the 25th and 26th, the movements of the Declination magnet being very much alike about 8 p.m. on the two days, and there was also some resemblance between the curves of the Horizontal Force magnet at the same dates. The Vertical Force was large and irregular on the 25th. The remainder of the month was slightly disturbed.

FEBRUARY.—This month opened with a severe magnetic storm, the rapid movements of the needle commencing at 6 p.m. on the 1st. The greatest Eastern deviation occurred at the same hour on the following day, the change being then very rapid, as there was an increase of 28′ 39″ in the West Declination in sixteen minutes. The Vertical Force was greatly disturbed on the 1st, the range being 0.0041 in British units. On the 2nd the same irregularities recurred in the Vertical Force trace, but were not so exaggerated as on the previous day. The magnet returned to rest on the morning of the 5th, but there were two Easterly excursions on the afternoon of the 5th, which were repeated on the 6th. The needle was again rather unsteady during the afternoon of the 14th, and the early morning of the 16th, and there was a slow motion Eastward, followed by

a slow return to the normal position, between 6 p.m. on the 17th and 2 a.m. on the 18th. A considerable disturbance began shortly after 8 p.m. on the 21st, and culminated in a very rapid Easterly motion of 47′ 45″ between 6.2 and 6.21 p.m. on the 22nd. The Horizontal Force was also very irregular between 6 and 7 p.m., and the Vertical Force first increased gradually until shortly after 6 p.m., and then fell until 1.42 a.m., the range being 0·0035. The magnets were fairly quiet for the twenty-four hours that followed the noon of the 23rd, but at 1.40 p.m. on the 25th the chief storm of the month commenced. The range between the minimum at 8.51 p.m. on the 24th, and the maximum at 3 a.m. on the 25th, was 1° 11′ 37″. The Vertical Force changed 0·0091, and the Horizontal Force 0.0212, between 8.30 and 10 p.m. on the 24th, and again considerably between 1.30 and 3.30 a.m. on the 25th. Shortly before 2 p.m. on the 27th the irregularities again appeared, and lasted until the close of the month. The Vertical Force and Horizontal Force were very irregular from about 4 p.m. until midnight on the 27th, and also during the afternoon of the 28th.

MARCH.—The first four days of the month were much disturbed, but there were no very marked displacements. During the night of the 6th, the disturbing force acted at intervals, producing three successive deviations towards the East. The morning of the 8th, and the night which followed, were disturbed. The Horizontal Force was irregular between 8 and 10 p.m. At 4.20 a.m. on the 13th, the magnet moved rather suddenly towards the West, with a decrease of the Vertical Force followed by an increase, and then it remained unsteady until 2 p.m. At 3.30 a.m. on the 21st, a trembling of the magnet announced the beginning of a disturbance which lasted three days. On the 22nd, the Vertical Force was in excess of its mean value during the afternoon, and this was repeated at the same time on the following day. A rapid movement towards the East occurred at 8.10 p.m. on the 26th, and the magnet did not come to rest before the morning of the 30th. During the last few hours of the 26th, and the afternoons of the two following days, the Horizontal Force was much disturbed, especially on the 27th. The Vertical Force was also very much affected during the whole of this magnetic storm, but especially during the night hours of the 26th and 27th. The range, between the maximum at 5.30 p.m. on the 27th, and the minimum at about 11 p.m., was more than 0.0090, the trace having left the paper.

APRIL.—A storm commenced at 9 a.m. on the 3rd, and was very violent during the afternoon. The Horizontal Force increased considerably and was very unsteady. At 11.44 p.m. of the same day the magnet moved rapidly towards the East, describing an arc of 42′ 58″ in

sixteen minutes, and returning as quickly to its former position. There was very little irregularity in the curves during the remainder of the first half of the month, but the second half was more disturbed, especially during the afternoon of the 24th, and the whole of the 25th. From 5 p.m. on the 24th until after midnight the Horizontal Force was most affected, and on the Vertical Force trace the action of the disturbing force was most apparent at about 11.30 p.m.

MAY.—The first disturbance of any great extent during this month occurred at 7.5 p.m. on the 20th, and after midnight the movements of the needle became very abnormal, and this continued for more than twenty-four hours. The Horizontal Force was considerably affected on both days, and the Vertical Force slightly diminished. The remainder of the month was as quiet as the beginning.

JUNE.—On the afternoon of the 2nd both the Declination and the Horizontal Force were a little disturbed, and the Declination was irregular also on the morning of the 3rd. The needle trembled considerably between 4 a.m. and noon on the 6th, and then remained very quiet until the early morning of the 17th, when disturbing forces made their appearance, and continued in action for rather more than two days. The Horizontal Force magnet felt the disturbing force most during the afternoons of the 17th and 18th. The curves of the Declination and Horizontal Force on the 27th were rather irregular, and the month ended with a slight disturbance mostly felt by the Horizontal Force magnet.

JULY.—A slight disturbance began at 10 p.m. on the 1st, and lasted a few hours. The Vertical Force was somewhat increased on the afternoons of this and the following day, and the Horizontal Force was affected principally at midnight on the two days. Between 5 a.m. and 9 p.m. on the 8th, the Horizontal Force and Declination magnets were rather more unsteady than usual, and the mornings of the 10th and 11th were a good deal disturbed. The Horizontal Force trace gave several indications of disturbing action between the 8th and the morning of the 12th. Between midnight on the 11th and 12.42, the Declination moved 39′ 24″ from the West, and then gradually returned to its former position. On the 14th, a succession of slight irregularities culminated in a considerable Easterly movement at 3.14 p.m. This afternoon the Horizontal Force curve was somewhat abnormal, as it was also, but to a less degree, on the afternoons of the 15th, 16th, and 18th. The Declination was unsteady throughout the 18th and the early morning of the 19th. The daily range of the Declination was most clearly shown on the curves from noon on the 21st to noon on the 23rd, the needle moving perfectly regularly during the whole time. The 24th was not so steady, but nothing remarkable was

noticed on the Declination curve before the end of the month. The Horizontal Force curve showed some irregular movements during the afternoons of the 24th, 26th, and 27th. On the 30th the Vertical Force was changing throughout the whole day, and the Horizontal Force also, especially in the afternoon.

AUGUST.—The month opened with the magnet in a troubled state, the Horizontal Force curve being far from regular. The movements about 7 p.m. on the 6th, and during the night of the 7th, were rather rapid. Towards midnight on the 10th a disturbance commenced which lasted thirty hours. The Horizontal Force was most disturbed on the evening of the 11th. On the 18th the Declination magnet moved 23′ 17″ towards the West between 10 p.m. and 10.33, and this was accompanied by an oscillation of the Horizontal Force magnet.

SEPTEMBER.—The first notable disturbance of the month took place between 10 p.m. and 2 a.m. on the night of the 5th. At 2.45 a.m. on the 16th the greatest storm of the year commenced suddenly on the Declination and Horizontal Force curves, and consisted mainly of a rapid succession of small oscillations. 1° 5′ 53″ was the extreme range between the maximum at 4.20 a.m, and the minimum at 8.31 a.m. The Horizontal Force showed the action of the disturbing force more from the beginning of the storm until 10 a.m. than at any subsequent period. The Vertical Force was very little affected at first, but between 4 and 8 a.m. it became very irregular and fell considerably, the minimum being reached about 6 a.m. It remained steadily above its mean value during the afternoon of the 16th, but became violently agitated and diminished in value from 40 m. after midnight until 6 a.m. on the following day, at which time it was returning quietly to its normal position. The Declination increased 50′ 8″ between 3.20 a.m. and 4.21 on the 17th, and six hours later the needle was again at rest. Between midnight and 6 a.m. the Horizontal Force curves were rather alike on the two days of the storm. The evening of the 18th and the morning of the 19th were again somewhat abnormal, and the Declination curve was irregular from 8.30 p.m. on the 24th until 6 a.m. on the 26th. There were some large oscillations on the evening of the 27th.

OCTOBER.—The storm of the 5th began gradually at about 5.25 a.m., and it was particularly remarkable for a rapid oscillation of the Declination magnet, which first moved 1° 11′ 37″ towards the West between 6.4 and 6.16, and had already swung back 1° 13′ 3″ at 6.27. The Horizontal Force was oscillating rapidly about 6 p.m., and the Vertical Force increased in value and changed quickly during the afternoon. There was some irregularity in the curves during the afternoon and night of the 15th,

and this was considerably increased during the night of the 16th, when the Horizontal Force was first affected. The afternoon of the 18th was also disturbed. Between 6 and 10 p.m. on the 19th the magnet moved four separate times towards the East, and these movements were repeated on the 20th at an earlier hour, and much more emphatically. There were previous indications of these oscillations on the 18th at about the same time. The general result on the curve was very striking.

NOVEMBER.—The disturbance that began on the afternoon of the 1st increased almost to a storm at 10 p.m. on the 2nd. The Horizontal Force was much affected. The maximum range of the Declination on the 3rd was 47′ 59″, between the minimum at 2.45 a.m., and the maximum at 4.55. The magnet returned to its normal state about 2 p.m. The diminution of the Vertical Force was considerable, the lowest reading occurring between 1 and 3 a.m. From 9 p.m. on the 19th to 6.48 p.m. on the 20th a disturbing force was at work, and similarly from 1.28 a.m. on the 22nd until about 2 p.m. on the 23rd.

DECEMBER.—There was a marked diminution of the West Declination about midnight of the 9th, and on the evening of the 12th, a disturbing force was evident, but no great movement of the magnet occurred before the evening of the 17th, when the West Declination diminished by 30′ 54″ between 7.40 and 8.56, followed by an undulation of the Horizontal Force curve.

AURORÆ OBSERVED AT STONYHURST COLLEGE OBSERVATORY.

1883.

APRIL 3rd.—At 8.40 p.m., G. M. T., two or three white streamers were seen in the West, altitude about 40°. From 8.45 till 9.15 a moderately bright auroral glow was observed, until hidden from view by rising clouds. It was in the form of a circular arc, extending from W.S.W. to N. The vertex reached a point a little below the constellation of Perseus.

During this time black clouds lay on the W. horizon, remaining motionless in one position; a circumstance with regard to clouds which has been remarked in other auroral displays. At 9.15 they slowly arose and hid the glow from sight. As they moved upward they threw out streaks, exactly as if radiating along lines of force from a centre. There was not a breath of wind when the clouds rose, the cups of the anemometer remaining motionless. With a wide slit the green line was seen in a hand spectroscope. In the glow the stars seemed to scintillate more than usual.

At 10.5 two parallel bands of light shot up from the N. horizon, terminating at α and δ Cassiopeiæ respectively.

At 10.12 a broader band of light, but somewhat fainter, rose from a point a little W. of the others, and ended in Perseus near Algol; the two bands first seen then grew brighter, but did not rise higher. They gradually disappeared, and at 10.20 were no longer visible.

APRIL 24th.—9.10 p.m. The first appearance of the aurora was in the form of a glowing cloud, white in colour, which was seen in the head of the constellation Lynx. In shape it exactly resembled a cirro-cumulus cloud. A few minutes afterwards an arch formed, which appeared to be made up of the same cloud-like masses. Its breadth was about 10°, and the height of the vertex from the horizon was about 75°, being situated near κ Draconis. Where this arch rested on the horizon there were two condensations of brilliant whiteness, situated the one nearly N.N.E., and surrounding the stars μ ν o Herculis; and the other W. by S., being in the neighbourhood of

the small stars in the head of Monoceros. One or two outlying brilliant patches were also seen near the pole star. The light of the arch became alternately more and less brilliant, and as the brilliancy of the Eastern condensation gradually faded away, its evanescence was accompanied by a corresponding increase in the glow in the Western skies. By 9.25 the arch had totally disappeared, except a white glow that still showed in the W. by S.

9.20. Two thin white streamers rose to ε Cassiopeiæ.

9.28 A broad band formed extending from Cassiopeiæ to Auriga. Its colour varied from a greenish-white to a pale red. At times it appeared to come in flashes.

9.34. A band formed in the N.W. and reached the upper stars in Auriga.

9.40. A pale auroral light was still visible, extending for about 30° on either side of the N. point, and gradually growing fainter as the distance from the horizon increased. Some very faint streamers radiated at times from this auroral glow.

11.0 The light of the aurora was just visible.

MAY 11th.—At 10.23 p.m., a narrow white cloud was observed forming an arch commencing at a point on the horizon near α Aurigæ, passing through β Ursæ Min., and reaching the horizon at a point half-way between ε and α Cygni. Its breadth was about 3° or 4°. Several straight white clouds projected from the outer edge of this arch in its Western part, reaching about 25° degrees towards the South, and having a fan-like appearance. Until 10.30 several thin white cloudy streaks formed, and vanished rapidly within the arch.

At 10.28 the arch broke up, and a broad white band slowly formed. It started near Jupiter, and, passing half-way between Ursa Maj. and Polaris, reached almost to the S.E. horizon.

Between 10.30 and 10.45 white clouds were forming and spreading in streaks all over the hazy sky.

At 10.45 the brilliancy of these clouds, and also the glow in the N.W., became somewhat intensified. This brilliancy gradually diminished.

At 11 a straight narrow cloud rose near Jupiter, and for a period of three minutes showed a gradual increase in brightness near the horizon; afterwards gradually vanishing.

At 11.15 the general brightness was somewhat subdued, with the exception of one streak of clouds, brighter than the rest, which stood up from the N.W. horizon.

MAY 14th.—A DAYLIGHT AURORA.—At 8.45 p.m., in a strong twilight, two beautiful well-formed arches of cirrus appeared. There was no wind at the time; their direction of motion, however, was S. by W.

These arches were made up of streaks of cirrus perfectly distinct, with each fibre stretching parallel to the magnetic meridian. The first arch had a span from S. to E., and attained an altitude of 80°. The second stretched from N. by E. to W. by S., and had likewise an altitude of 80°. The convexities of the two arches, thus turned towards each other on either side of the zenith, had a very beautiful effect. The altitudes given above refer to the lower edge of the arches, as the streamers which composed the N. one passed at its vertex beyond the zenith. The length of the streamers was about 15°.

During this time large black cumulo-stratus clouds lay on the horizon from N. to W., taking the fantastic shapes which clouds assume during auroræ.

At 9.15 the appearance was changed. The first arch now stretched from S.W. to E. of N., and the cirrus, instead of being in streaks, was in the form of small cumulus clouds. These clouds remained, however, perfectly distinct and separated from one another, and were somewhat greater in length than breadth. The altitude of the arch reached 87°. The lower edge of the second arch had sunk to an altitude of 45°, but the parallel streamers which formed it still passed beyond the zenith. Its span was from N. to W.

AUGUST 30th.—At 8.51 p.m. G.M.T. an auroral arch, surrounding the constellation Ursa Major, was noticed. This lasted only a few moments. The altitude of the vertex was about 80°. The N. and W. horizon were also very bright to a height of about 15°, but a great part of this glow may have been due to twilight. Some very faint bands were seen later, and at 10.30 the aurora was still visible. Dark black clouds and haze hung on the N. and W. horizon, and at 9.10 these clouds suddenly arranged themselves in long masses, with bright interstices resembling streamers, and radiating from a point about N.W.

SEPTEMBER 8th.—An auroral glow was seen in the N. and N.W. from 9.0 to 10.30 p.m. G.M.T., its altitude being about 30°. At 10.30 it was fainter.

OCTOBER 4th.—Between 7.0 and 8.0 p.m. G.M.T. there was a glow in the N. and N.W. which was most probably auroral.

OCTOBER 5th.—At 8.15 p.m. G.M.T. the N. horizon was brightly lit up, the upper limit of the glow extending to within 2° of Cor Caroli.

At 8.27 streamers began to rise under Ursa Major, none reaching higher than 35°. At this time the glow extended from N. to W., and was especially bright in the N. by W.

At 8.40 the light began to spread more to the W. and E., and there were occasional streamers.

At 8.40 a broad white streamer passed through γ, δ Ursæ Maj., to a point between α and κ Draconis.

Also a less brilliant streamer through η Draconis to about A.R. 13h. 40m. decl. 54°.

At 8.43 a fainter streamer through the foot of Urs. Maj., to α Urs. Maj.

With regard to the glow, it was noticed that at 9.20 it brightened in the N. by W., and seemed affected with a tremulous motion. It was most brilliant between 8.45 and 9.0 p.m.

Throughout the whole of this display the most intense portion was confined to that part of the horizon exactly under α, β, γ, δ of Urs. Maj.

The peculiar dark hazy clouds which accompany auroræ were also observed; and likewise the scintillation of the stars in the glow was very marked.

COINCIDENCE OF THE AURORÆ WITH SOLAR OUT-BURSTS AND MAGNETIC STORMS.

A careful collation of the observations of aurora during the year 1883, with the sun-pictures and the magnetic curves, suggests the following remarks. Auroral displays coincide in every instance with periods of solar disturbance, and there have as yet been no auroræ remarked during periods of solar quiet. Similarly in every case of aurora the magnets were disturbed, although the disturbances synchronous with the auroræ of May 11th, August 30th, and September 8th were not of a violent character. The auroræ of April and May coincide fairly with a large group of spots which appeared on the following limb of the sun on April 11th, and was followed until nearly the end of May. Similarly the auroral displays of August and October synchronise with a spot which was followed from August 29th until early in October. The intermediate aurora of September 8th, may have been connected with a large spot first seen on September 9th, and which later became a scattered group, and died out about November 13th. We may also remark that the displacements of the bright lines in the spectrum of the chromosphere favour the supposed connection between auroræ and solar disturbance. Thus the observations of April 2nd and 25th showed considerable displacements of the C line, especially on the 2nd inst. There is also some evidence to show that the auroræ and magnetic storms synchronise rather with particular classes of spots than with solar disturbances generally.

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APPENDIX.

RESULTS

OF

METEOROLOGICAL OBSERVATIONS

TAKEN AT

ST. IGNATIUS' COLLEGE,

MALTA,

BY THE

REV. J. SCOLES, S.J.

June 1 to December 31, 1883.

THE instruments in use at St. Ignatius' College for meteorological observations were presented by the Rev. E. I. Purbrick in the spring of the present year, and were placed in position before the end of April. Some difficulty having been experienced in managing the wet bulb during the month of May, the observations for that month have been omitted. The set of instruments consist of a standard Fortin barometer, wet and dry bulb thermometers, maximum and minimum thermometers for screen, a minimum for grass, a black bulb maximum in vacuo, a Stevenson screen, a rain gauge and anemometer. These instruments are by L. Casella, of London, and the barometer and thermometers have been verified at Kew.

The barometer cistern is 85 ft. above sea-level measured from an Ordnance bench mark on the College wall. The rain gauge is 58 ft. above the sea, the thermometer screen 61 ft., and the anemometer 122 ft. above the same level. This last instrument is fully exposed to the winds from N.W. round by N. to E., but is somewhat sheltered by the rising ground from winds coming from S.E., S., and S.W.

The temperature of the sea has been taken at a depth of 7 ft. at 3 or 4 p.m., with an ordinary bath thermometer, which has been compared from time to time with the other thermometers.

Observations of temperature, &c., have been taken regularly at 5.30 a.m., 8 a.m. noon, 3 p.m., and 8 p.m., for the purpose of studying the changes of dew-point, and also to obtain as close an estimate as circumstances allow of the true mean temperature.

One result has been to show that the heat is considerably reduced in May, June, and July by a sea-breeze rising about 9 a.m., and lasting till some time after noon. In August and September, when the sea is warm, the duration of this wind is much less, and the land breeze begins much earlier in the evening. These months are in consequence unpleasantly hot and oppressive.

Another result has been to show a tendency of northern winds to attain their maximum strength during the hours of midday, while the southern winds tend to blow strongest during the night. This effect is most marked in the hottest months, and is hardly noticeable after November: it is of course a local phenomenon.

During July and August, the black bulb thermometer was read at the same time as the other instruments, and the following mean readings will give some idea of the power of the sun's rays:

JULY.		In screen.	AUGUST.		In screen.
5·30 a.m.	71·1°	70·4°	5·30 a.m.	69·4°	76·3°
8· a.m.	124·9°	79·8°	8· a.m.	121·1°	77·9°
Max.			Max.	137·0°	
Noon	135·8°	83·3°	Noon	132·5°	81·5°
Max.	139·3°	86·7°	Max.		84·3°
4· p.m.	124·6°	84·0°	4· p.m.	118·4	81·8°
8· p.m.	74.2°	76·4°	8· p.m.	72·6	74·6°

In July the black bulb usually reaches its maximum temperature a little time after noon: in other months, the maximum is reached between 11 a.m. and noon.

The scirocco is a very unpleasant wind blowing from the S.E. It blows from time to time all the year through, but is more persistent during September and October than at other times. Its characteristic is a high dew-point relatively to other winds, and it is at times very damp. The following results have been taken from the journal:

	June.	July.	August.	September.
No. of Readings	6	7	6	3
Dew-point	64·6° to 69·5°	67·8° to 71·6°	67·2° to 72·2°	63·2° to 69·5°
Mean dew-point	67·0°	69·6°	69·4°	67·3°
Humidity	74 to 89	55 to 94	68 to 85	64 to 84
Mean humidity	82	73	76	73

	October.	November.	December.
No. of Readings	3	12	12
Dew-point	57·5° to 66·5°	48·6° to 63·7°	45·7° to 59·1°
Mean dew-point	61·8°	56·4°	54·6°
Humidity	59 to 87	59 to 98	66 to 95
Mean humidity	77	76	82

Comparing these numbers with the mean dew-points for September, October, and November, it appears that during these months the mean dew-point of the scirocco does not differ much from that for the whole month.

The lebeccio rivals the scirocco in its unpleasant effects, but it has favoured us with only one visit, and that at the beginning of September.

In fifteen readings the dew-point varied from 61·6° to 72·2°, the mean being 67·7°. On the other hand, the degree of humidity varied from 36 to 94—this last figure being reached when the dew-point was 69·6°. Under the influence of this wind, the temperature of evaporation

reached its maximum of 78·0°. The highest dew-point, 73·5°, was also observed during the calm between the cessation of the lebeccio and the first breath of the maestrale, or N.W. wind, which followed.

In contrast with these two winds, the N.W. wind has given us, on July 13, a dew-point 53·2°, with degree of humidity as low as 24, and on December 14, a dew-point 29·8°, with degree of humidity 36.

Thunderstorms occurred on 3 days in August, during 1 night in September, on 3 days in October, and on 5 days in November. Hail was observed once in December.

On the 30th of November, after a succession of rainy evenings, a strangely fine glow was seen after sunset, giving an exceedingly wild and threatening appearance to the masses of cloud. This has continued through the month of December, and at the present date the glow which follows sunset attains a maximum brilliancy about thirty minutes after the sun has gone, it then fades down to a red band on the horizon; at one hour after sunset, a second glow forms, closely resembling a red aurora in the west, which lasts about twenty minutes, and then night sets in.

J. Scoles, S.J.

St. Ignatius' College, January 8, 1884.

NOTES FOR THE SEPARATE MONTHS.

JUNE.—The Dew-point, which during the latter half of May moved with considerable regularity from 50° to 60°, has shown a much greater amount of oscillation during this month, descending nearly to 50° on the 9th, 11th, and 28th, while it nearly reached 70° on the 14th, 26th, and 27th, with the S.E. wind.

In Sunshine the thermometer has oscillated between 130° and 140°, making a mean of 135·2°. At Kew in England 130° and 132° were recorded on the 12th, 13th, and 14th.

The falling off in the rate of increase of temperature between 8 a.m. and midday is as well marked during this month as it was during May.

The temperature of the sea has risen from 69° on the 2nd to 73° on the 29th.

Lightning was seen during the night of the 30th.

JULY.—Thunder and lightning on the 1st.

The temperature of the Dew-point has varied so much and so irregularly that its diurnal variation has been all but obliterated. It reached a maximum of 72·9° on the 14th at midday, and fell to 48·5° on the 18th at 4 p.m.

In Sunshine the highest temperature recorded was 146·5°, the lowest 132°, the mean being 139·3°.

The temperature of the sea reached 81° on the 13th, and was 79·5° on the 31st.

Some waterspouts were seen early in the morning on the 1st, about five miles off the coast, moving from N.W. to S.E.

Faint lightning was seen on the evening of the 29th.

AUGUST.—During the first half of this month the Dew-point varied much and irregularly between 57° and 71°; during the second half it rose steadily with small variations from 57° till it reached 72° on the 31st, with the wind S.E.

The highest maximum temperature in Sunshine was 144·5° on the 16th; the lowest 131·8° on the 7th.

The temperature of the sea fell from 80° on the 4th to 76° on the 28th.

Thunderstorms occurred on the 26th and 29th about 5 a.m. Thunder and lightning without rain falling here on the 23rd at 2 p.m. Lightning without thunder on the 21st and 22nd at 9 p.m.

SEPTEMBER.—The month opened with four oppressively hot days, the dry bulb ranging above 90°, and the Dew-point keeping about 70°. On the 5th, at 5·30 a.m., the Dew-point had sunk to 51·8°, with a dry wind from S.W., the lowest value for the month; but at 8 a.m. the same day it had risen to 73.5°, from which value it slowly fell to 52·7°, under the influence of a strong N.W. wind. The highest and lowest Dew-point temperatures thus occurred within three hours.

The highest maximum temperature in Sunshine was 143·9° on the 3rd, the lowest 126·9° on the 26th.

The temperature of the sea was 79·5° on the 3rd, but it fell to 74° by the 10th, at which figure it remained till the end of the month.

A severe thunderstorm occurred on the night of the 13th.

OCTOBER.—The Dew-point has ranged during this month from 70° on the 1st to 53·9° on the 6th, and again from 69·4° on the 22nd to 44·5° on the 25th. On the 23rd, at 5.30 a.m., the air was very nearly saturated with vapour at 66·3, the degree of humidity being 97.

The highest maximum temperature in Sunshine was 138·2° on the 1st; the lowest 117·4° on the 25th.

The temperature of the sea fell from 74° to 70°; the mean of the observations is 72°.

Lightning was seen on the 4th, 10th, 11th, 12th, 13th, 15th, and 30th; it was accompanied by thunder on the 12th, 13th, and 15th.

Thunder without lightning was heard on the 11th and 26th.

NOVEMBER.—The Dew-point rose to 63·7° on the 5th and 9th, falling to 45·6° on the 12th. On the 19th it rose again to 59·3°, but from the 20th to the 30th it kept close to 50°.

The highest maximum in Sunshine was 128·2° on the 8th. There was no Sunshine on the 4th, and very little on the 24th, 28th, and 29th.

The temperature of the sea fell from 70° to 68°, but the mean for the month is 68°.

Thunderstorms occurred on the 4th, 9th, 18th, 25th, and 28th.

Lightning was seen on the 2nd and 3rd.

The rainfall appears to be greater than usual—its duration was 48 hours.

DECEMBER.—The Dew-point remained at 50 till the 5th, falling then to 40°, and next to 38°. It rose to 59·1° on the 9th, the highest for the month. It then fell for the storm of the 13th, and on the 14th reached 29·8, wind N.W., temperature 56°, humidity 36°; the effect on vegetation very severe. On the 22nd, 58° was again reached, but during the last week 40° was steadily kept to.

The Barometric depression of the 13th was remarkable for the violence of its winds. During the three hours from noon to 3 p.m. a velocity of 45 miles per hour was maintained, and one of the violent gusts from W.N.W. threw down part of a stone wall in the play-ground.

Maximum in Sunshine 110·2° on 25th.

The sea has fallen from 67° to 61°.

Minimum on ground: 38·7°, 37·1°, and 36·5° on the 29th, 30th, and 31st respectively.

The high Barometric reading of the 23rd was accompanied by a noticeable depression of sea-level; this was repeated on the 1st of January.

ST. IGNATIUS

Lat. 35° 55′ N. Long. 14° 29′ E.

Results of Observations taken during the Months.	June.	July.
Mean Reading of Barometer ..... inches	30·000	30·005
Highest ,, ,, ,,	30·168	30·115
Lowest ,, ,, ,,	29·796	29·884
Range of Barometer Readings ..... ,,	0·372	0·231
Mean Range from 8 a.m to 8 p.m. ..... ,,	0·017	0·013
Highest Reading of Max. Therm.	87·8	96·7
Lowest ,, Min. Therm.	60·0	65·0
Range of Thermometer Readings	27·8	31·7
Greatest Range in 24 hours	24·9	26·2
Mean of all the highest Readings	80·1	86·7
Mean of all the lowest Readings	64·7	69·5
Mean Daily Range	15·4	17·2
Mean Temperature (deduced from Max. and Min.) ...	71·6	77·1
Mean Temperature (deduced from Dry Bulb)	71·7	77·6
Adopted Mean Temperature	71·7	77·4
Mean Temperature of Evaporation	66·7	69·8
Mean Temperature of Dew-point	62·6	64·5
Mean Elastic force of Vapour ..... inches	0·568	0·607
Mean Weight of Vapour in a cubic foot of air ... grains	6·16	6·54
Mean additional weight required for saturation. ,,	2·37	3·58
Mean degree of Humidity	72	65
Mean Weight of a cubic foot of air ..... grains	520·1	514·8
Fall of Rain ..... inches	0	0
Number of days on which Rain fell	0	0
Mean amount of Cloud (an overcast sky = 10)	1·7	0·4
Total number of miles of Wind indicated	6428	5622
Mean Velocity of Wind per hour ..... miles	8·9	7·6
Maximum Temperature in Sunshine	141·5	146·5
Highest observed Dew-point	69·5	72·9
Lowest observed Dew-point	50·4	48·5
Range of Sea Temperature } at depth of 7 feet	67 to 73	73 to 81 and 79·5
Mean of Sea Temperature } at depth of 7 feet	70	78
Minimum exposed on board	54·7	58·0

)LLEGE, MALTA.

Barometer Readings reduced to 32° at Sea Level.

August.	September.	October.	November.	December.
30·017	29·998	30·065	30·078	30·048
30·112	30·108	30·283	30·299	30·378
29·924	29·769	29·790	29·812	29·737
0·188	0·339	0.493	0·487	0·641
0·004	0·003	0·000	0·004	0·016
91·6	93·0	81·8	73·1	68·5
64·1	62·9	54·8	51·2	42·8
27·5	30·1	27·0	21·9	25·7
23·0	23·4	14·9	17·5	17·0
84·3	80·5	73·0	67·5	69·4
69·4	67·1	62·8	57·1	50·9
14·9	13·4	10·2	10·4	9·5
75·6	73·8	67·1	61·9	55·7
76·3	74·0	66·8	60·5	54·2
76·0	73·9	67·0	61·2	55·0
69·3	68·1	62·5	57·1	50·7
64·5	63·8	58·9	53·6	46·5
0·607	0·592	0·498	0·412	0·318
6·52	6·46	5·45	4·59	3·61
3·18	2·61	1·85	1·45	1·29
68	71	76	77	74
516·4	518·2	526·8	532·3	538·5
0·042	0·384	2·668	6·239	4·979
2	5	12	11	12
1·3	2·3	3·4	4·4	4·8
6080	7309	6275	6748	8846
8·2	10·2	8·4	9·4	11·9
144·5	143·9	138·2	128·2	110·2
72·2	73·5	69·4	63·7	59·1
56·6	51·8	45·5	45·6	29·8
79·5 to 76	79·5 to 74	74 to 70	70 to 68	67 to 61
78	75	72	68	64
58·0	569	47·8	45·6	36·5