## GOVERNMENT NOTIFICATION.—No. 172.

The following Report of the Director of the Observatory, for the year 1888, which was laid before the Legislative Council on the 12th instant, is published for general information.

By Command,

FREDERICK STEWART,
*Colonial Secretary.*

Colonial Secretary's Office, Hongkong, 13th April, 1889.

HONGKONG OBSERVATORY,

*8th February*, 1889.

SIR,—For the information of His Excellency the Governor I have the honour to forward my Annual Report for 1888.

2. * * * *

3. A report containing exhaustive investigations of the typhoons of 1886 and 1887 with five plates representing their paths has been printed. Father FAURA was good enough to send me the paths of typhoons in the Philippine Islands in 1887, which were used for that district and the Tokio weather-maps were used for the Japanese Archipelago. This reduced the amount of work that fell to my share, but the typhoons in the Pacific Ocean had to be investigated here as sufficient information does not appear to have been available at the other observatories.

4. Information concerning the typhoons of 1888 has been collected and the observations are being reduced and tabulated. In addition to the observations furnished by stations on shore, the logs of 139 different vessels containing entries on 1712 days (counting those made on board different ships on same date separately) are available. A number of log-books have of course been looked through without entries bearing on typhoons having been found. The final investigation of the typhoons of 1888 will probably be ready next year. It should be remembered that although the typhoons are exhaustively investigated here,—that does not imply the complete elaboration of all that might be done by aid of the meteorological data at my disposal. An immense quantity of information bearing on the meteorology of China is collected here, that is not utilized for lack of clerks to take it in hand, and this cannot fail to affect the results of researches on typhoons for there are certain questions connected with this subject that cannot be answered in the absence of a complete discussion of the climate of China.

5. * * * *

6. * * * *

7. That this requirement is fully recognised everywhere else in the Empire and properly provided for may be seen *e.g.* from the following extract from the Report on the Administration of the Meteorological Department of the Government of India in 1887–88 (Page 16 §7). "In order to facilitate and expedite the working of these arrangements, the Telegraph Department has granted the privilege of Precedence urgency to telegrams referring to stormy weather and the hoisting of storm-signals between the Meteorological Reporter of Calcutta and the Port Officers and Meteorological Superintendents of Cocanada, Gopalpur, Madras, Masulipatam, Negapatam and Vizagapatam. The names of other officers will be added to this list as found necessary for the proper working of the system. Instructions for the preparation and dispatch of the telegrams in proper form, in order to secure priority of transmission to ordinary urgent messages, will be sent by the India Meteorological Office to the various officers permitted to send them."

8. My pamphlet on the *Law of Storms in the Eastern Seas* as well as my reports on typhoons have been widely utilized by scientific and nautical authorities over the world. The former has been repeatedly reprinted and translated into foreign languages *e.g.* together with the *Instructions for making Meteorological Observations, etc.* by order of the Inspector General of the Imperial Chinese Maritime Customs, for the use of residents in China. Writers very rarely make use of such reports without due reference to the Observatory from which they emanated, but in a paper in the Annalen der Hydrographie (Berlin, 1887 XV page 333) the substance of my pamphlet has been republished and even paths of typhoons, which were constructed at the expense of the Colonial Government, have been reproduced

without any reference to this Observatory. However I am informed that this was due to an oversight. The fact that the wind in a typhoon blows from a direction 12 points distant from the bearing of the centre was first ascertained and proved here, but it will of course take some time before masters of vessels become familiar with this result, though its practical importance is being appreciated by degrees.

9. During the past typhoon season, in addition to those hitherto supplied, meteorological observations were telegraphed twice a day from Macao through the cable of the Eastern Extension, Australasia and China Telegraph Company and also from Tokio in Japan through the cable of the Great Northern Telegraph Company. An attempt was made to have them forwarded from Canton, Hoihow (Hainan) etc. through the Chinese telegraph lines, but although they were sent by order of the Chinese authorities as often as there was communication, the experiment was not invariably successful. Messages from Saigon and more information from the Philippines would be useful. It is a pity that while other countries in the Far East are being meteorologically explored, the Philippines remain scientifically almost a terra incognita.

10. As stated in the "Instructions for making Meteorological Observations, etc." meteorological instruments forwarded by observers, who regularly send their registers to this Observatory, are verified here free of cost. During the past year, the following number of instruments has been verified and certificates issued. Barometers: 1, Thermometers: 5, Anemometers: 1.

11. The index errors of barometers read off on board ship are determined whenever required by comparing readings made near this port with the barograms.

12. The number of transits observed during the past year was 232, and the inclination of the axis was determined 91 times. The tick of the sidereal standard clock is heard in the transit room through a telephone. A microphone is placed on top of the case and this is connected with the telephone through an induction coil. Telephones are also used for speaking to the Assistant in the ball-tower at Tsim-sha-tsui through the time wire. The wires in the transit instrument were illuminated by a small electric light. Electric testing apparatus are being procured from England.

13. The rate of the sidereal standard clock during upwards of two years has been investigated. The rate was represented by the following formula, where t means the number of days elapsed since the 12th September, 1885, and $\tau$ the temperature in degrees Fahrenheit:

$$R_c = -0^s.56 - 0^s.00655t + 0^s.00000420\ t^2 - 0^s.063\ (\tau - 70°).$$

The details are published in Astr. Nachr. No. 2868 and also in 'The Observatory' for September, 1888. The mean daily rates during ten day periods in 1888 are exhibited in the following table, where — means gaining and + losing rate. The rates are represented by the following formula:

$$R_c = +\ 0^s.45 - 0^s.00261\ t +\ 0^s.0000120t^2 -\ 0^s.063\ (\tau - 70°)$$

where t is counted from the 28th June, 1888. It will be remarked that the acceleration of the clock-rate has decreased and should now cease according to the formula. The observed rate minus the computed rate is exhibited under the heading $R_o - R_c$. The figures show certain fluctuations of rate of rather long period.

**TABLE I.**

*Rate of Sidereal Standard Clock in 1888.*

| Period. | Temp. | Rate. | $R_o - R_c$. | Period. | Temp. | Rate. | $R_o - R_c$. |
|---|---|---|---|---|---|---|---|
| December 26– 5,..... | 64.°8 | +1.ˢ41 | −0.ˢ23 | July 3–13,..... | 83.°1 | −0.ˢ38 | +0.ˢ03 |
| January 5–15,..... | 66. 2 | +1. 28 | −0. 20 | „ 13–23,..... | 84. 0 | −0. 47 | +0. 01 |
| „ 15–25,..... | 66. 3 | +1. 19 | −0. 20 | „ 23– 2,..... | 85. 6 | −0. 56 | +0. 04 |
| „ 25– 4,..... | 64. 6 | +1. 41 | −0. 05 | August 2–12,..... | 84. 6 | −0. 49 | +0. 07 |
| February 4–14,..... | 65. 1 | +1. 46 | +0. 10 | „ 12–22,..... | 81. 5 | −0. 45 | −0. 07 |
| „ 14–24,..... | 65. 7 | +1. 43 | +0. 17 | „ 22– 1,..... | 83. 2 | −0. 43 | +0. 06 |
| „ 24– 5,..... | 65. 9 | +1. 32 | +0. 12 | September 1–11,..... | 84. 1 | −0. 48 | +0. 09 |
| March 5–15,..... | 65. 9 | +1. 24 | +0. 09 | „ 11–21,..... | 82. 1 | −0. 39 | +0. 05 |
| „ 15–25,..... | 66. 2 | +1. 15 | +0. 08 | „ 21– 1,..... | 81. 0 | −0. 33 | +0. 04 |
| „ 25– 4,..... | 67. 6 | +0. 99 | +0. 06 | October 1–11,..... | 78. 3 | −0. 22 | −0. 02 |
| April 4–14,..... | 69. 3 | +0. 84 | +0. 06 | „ 11–21,..... | 78. 8 | −0. 21 | +0. 04 |
| „ 14–24,..... | 73. 8 | +0. 52 | +0. 07 | „ 21–31,..... | 72. 8 | +0. 15 | +0. 03 |
| „ 24– 4,..... | 79. 2 | +0. 29 | +0. 21 | „ 31–10,..... | 75. 6 | +0. 12 | +0. 16 |
| May 4–14,..... | 79. 5 | +0. 28 | +0. 27 | November 10–20, ..... | 73. 2 | +0. 17 | +0. 05 |
| „ 14–24,..... | 80. 2 | +0. 05 | +0. 12 | „ 20–30,... ..... | 72. 0 | +0. 26 | +0. 06 |
| „ 24– 3,..... | 80. 4 | −0. 17 | −0. 06 | „ 30–10,..... | 70. 9 | +0. 28 | −0. 01 |
| June 3–13,..... | 80. 0 | −0. 24 | −0. 11 | December 10–20,..... | 69. 4 | +0. 23 | −0. 16 |
| „ 13–23,..... | 80. 8 | −0. 33 | −0. 13 | „ 20–30,..... | 65. 2 | +0. 48 | −0. 19 |
| „ 23– 3,..... | 82. 3 | −0. 37 | −0. 04 | | | | |

14. As stated in the time-ball notice published in the *Government Gazette* on the 10th January, 1885, the ball is not dropped on Sundays and on Government Holidays. The ball was dropped every working day in the past year except on the 17th, 18th, and 26th May and 26th June when it was not hoisted on account of thunderstorms, and on the 8th August the mast was found split, where two pieces were riveted together. The ball could not be hoisted on the 8th, 9th and 10th of that month, while under repair by the Public Works Department. There was not a single failure during the year.

**TABLE II.**

*Errors of Time Ball in 1888.*

— means too late. + means too early.

| Date. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1, | ... | −0.s4 | +0.s2 | ... | 0.s1 | 0.s1 | ... | +0.s5 | 0.s1 | 0.s1 | 0.s1 | 0.s1 |
| 2, | ... | −0.6 | +0.3 | ... | 0.1 | 0.1 | 0.s1 | +0.6 | ... | +0.2 | −0.2 | ... |
| 3, | −0.s3 | −0.8 | +0.3 | +0.s5 | 0.1 | ... | 0.1 | 0.1 | −0.2 | 0.1 | +0.2 | 0.1 |
| 4, | −0.5 | 0.1 | ... | +0.6 | 0.1 | +0.2 | 0.1 | 0.1 | 0.1 | 0.1 | ... | −0.2 |
| 5, | 0.1 | ... | +0.4 | +0.6 | 0.1 | 0.1 | −0.2 | ... | 0.1 | −0.2 | 0.1 | −0.2 |
| 6, | 0.1 | 0.1 | +0.5 | +0.7 | ... | 0.1 | 0.1 | ... | +0.2 | −0.2 | 0.1 | 0.1 |
| 7, | 0.1 | 0.1 | +0.5 | +0.8 | 0.1 | 0.1 | 0.1 | −0.3 | +0.2 | ... | +0.2 | 0.1 |
| 8, | ... | 0.1 | +0.3 | ... | 0.1 | 0.1 | ... | ... | +0.3 | −0.4 | +0.3 | 0.1 |
| 9, | 0.1 | 0.1 | +0.4 | +1.0 | 0.1 | 0.1 | 0.1 | ... | ... | −0.5 | +0.4 | ... |
| 10, | 0.1 | 0.1 | +0.5 | +1.1 | 0.1 | ... | −0.2 | ... | 0.1 | −0.6 | +0.6 | +0.2 |
| 11, | +0.2 | 0.1 | ... | +1.2 | 0.1 | 0.1 | −0.2 | +0.3 | 0.1 | 0.1 | ... | 0.1 |
| 12, | 0.1 | ... | +0.7 | +1.3 | 0.1 | 0.1 | 0.1 | ... | +0.2 | 0.1 | +0.3 | 0.1 |
| 13, | 0.1 | ... | 0.1 | +1.5 | ... | 0.1 | 0.1 | 0.1 | +0.3 | 0.1 | 0.1 | 0.1 |
| 14, | 0.1 | +0.3 | +0.3 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | ... | −0.2 | 0.1 |
| 15, | ... | +0.3 | +0.4 | ... | +0.2 | 0.1 | ... | 0.1 | −0.2 | 0.1 | −0.3 | 0.1 |
| 16, | 0.1 | +0.4 | +0.5 | +0.3 | +0.2 | 0.1 | +0.2 | 0.1 | ... | 0.1 | 0.1 | ... |
| 17, | 0.1 | +0.4 | +0.6 | +0.3 | ... | ... | +0.2 | 0.1 | −0.4 | 0.1 | 0.1 | +0.2 |
| 18, | 0.1 | +0.5 | ... | +0.4 | 0.1 | +0.3 | 0.1 | 0.1 | −0.5 | 0.1 | ... | +0.3 |
| 19, | 0.1 | ... | 0.1 | +0.2 | ... | +0.4 | 0.1 | ... | 0.1 | 0.1 | 0.1 | +0.6 |
| 20, | 0.1 | 0.1 | 0.1 | +0.2 | ... | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | +0.7 |
| 21, | 0.1 | 0.1 | 0.1 | 0.1 | ... | 0.1 | 0.1 | 0.1 | 0.1 | ... | 0.1 | −0.2 |
| 22, | ... | 0.1 | 0.1 | ... | +0.4 | −0.2 | ... | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 23, | 0.1 | −0.2 | 0.1 | −0.2 | +0.8 | −0.3 | −0.2 | 0.1 | ... | 0.1 | 0.1 | ... |
| 24, | 0.1 | −0.2 | 0.1 | 0.1 | ... | ... | −0.3 | −0.2 | 0.1 | −0.3 | −0.2 | ... |
| 25, | 0.1 | 0.1 | ... | −0.2 | +1.5 | −0.2 | 0.1 | −0.2 | 0.1 | 0.1 | ... | ... |
| 26, | 0.1 | ... | 0.1 | 0.1 | ... | ... | 0.1 | ... | 0.1 | 0.1 | 0.1 | ... |
| 27, | 0.1 | 0.1 | +0.2 | 0.1 | ... | −0.3 | 0.1 | −0.3 | 0.1 | 0.1 | 0.1 | −0.5 |
| 28, | 0.1 | 0.1 | +0.2 | 0.1 | +0.7 | −0.3 | 0.1 | −0.6 | 0.1 | ... | 0.1 | 0.1 |
| 29, | ... | +0.2 | +0.3 | ... | 0.1 | 0.1 | ... | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 30, | 0.1 | | ... | 0.1 | 0.1 | 0.1 | +0.3 | 0.1 | ... | 0.1 | 0.1 | ... |
| 31, | −0.2 | | +0.4 | | 0.1 | | +0.4 | 0.1 | | 0.1 | | 0.1 |

15. The probable errors of the signal in the different months of 1888 (with the average percentage of clouded sky added in parenthesis) were as follows:—January 0s.12 (48), February 0s.19 (85), March 0s.26 (91), April 0s.41 (86), May 0s.20 (84), June 0s.14 (92), July 0s.13 (59), August 0s.17 (60), September 0s.14 (57), October 0s.14 (53), November 0s.15 (48), December 0s.17(56).—The mean of the probable errors was 0s.18. A new standard clock with mercurial compensation has been ordered from England. When that arrives and is erected and rated the errors will be reduced during periods of persistently overcast weather (on the 14th April last year the sun was observed after 20 days of continually overcast skies). It will then have to be decided whether it would not be as well to cut a certain quantity off the zinc rod,—say a length corresponding to three-quarters of the temperature co-efficient, for no matter how well this is determined, the rate will *ceteris paribus* be more regular the more perfectly the clock is compensated.

16. With reference to a suggestion made concerning tidal and magnetic observations in the 5th paragraph of my last Annual Report, the Secretary of State did not assent to any discontinuation of the magnetic observations, which are ordered to be continued as heretofore. It is intended to re-investigate the induction coefficient of the vibrating magnet next spring. It does not appear that any improvement could be effected in Mr. ROBERTS's tide-tables (which represent the tides very closely indeed) by aid of the amount of trace available at present from the automatic tide-gauge, but next year when three years' trace is available would be the time to have it harmonically analyzed.

17. The following papers have been published in Europe in the course of the past year:—

"Telegraphic determination of the longitude of Haiphong" (Month. Not. R.A.S. Vol. XLVIII No. 5).

"On comet seeking" (Journ. Liverpool Astr. Soc. Vol. VI No. 7).

"The meteorology of south-eastern China in 1886." (Quart. Journ. R. Met. Soc. Vol. XIV No. 67.)

"Rainfall in China in 1887" (Quart. Journ. R. Met. Soc. Vol. XIV No. 67.)

"On the rate of the Hongkong Standard Clock" (Astr. Nachr. No. 2868).

"Crepuscular rays in China" (Nature Vol XXXVII p. 464.)

"Cause of September typhoons in Hongkong" (Nature Vol. XXXVII p. 439.)

"On the rainfall and temperature of Victoria Peak, Hongkong." (Nature Vol. XXXVIII p. 78.)

"Upper and lower wind currents over the torrid zone." (Nature Vol. XXXVIII p. 565.)

"On the grass minimum thermometer" (Nature Vol. XXXVIII p. 619.)

A paper on the mean height of the barometer in Iloilo (Philippines), and a paper on the law of storms in Hongkong and in southern Formosa are in press.

18. In the China Coast Meteorological Register, based on information transmitted by the Eastern Extension and the Great Northern Telegraph Company, which was daily published, is given a summary of the atmospheric circumstances in Luzon and along the coast of China, and information concerning the weather in Japan and in Wladivostock. It contains also information concerning the first appearance and progress of typhoons.

19. Mr. FIGG took all the clockworks of the self-recording Meteorological instruments asunder and had them cleaned and adjusted after which they went as well as before. The anemometer is oiled every ten days with pure sperm-oil. During previous winters some trouble was experienced with the lamps on the barograph and the thermograph, which had a tendency to go out in the course of the night. In hot and damp weather they would burn any length of time. By using only the best kerosine oil to be had in the Colony, having the lamps washed in soda once a week and especially by emptying out all the oil left this difficulty has been overcome. Some extra fine lighthouse oil was procured from London but it was not found better than the kinds to be had in the shops here and cost many times as much. The introduction of the electric light in Kowloon would benefit the Observatory materially.

20. Among scientific men who have visited this Observatory may be mentioned Dr. SCHRADER, the well-known astronomer of Hamburgh, when on his return from an exploration in New Guinea, with whom I conversed about methods practically used in making observations; Captain FLEURIAIS commanding *La Galissonnière* and Lieutenant Perrin; Captain EDLER VON WOHLGEMUTH, Director of the Observatory, JAN MAYEN, who explained to me a great many things connected with navigation; Captain USBORNE MOORE, in command of H.M.S. *Rambler*, the surveying vessel; Lieutenant HARTMANN, formerly connected with the Observatory at Wilhelmshafen; Lieutenant GRATZL, of the Austrian Frigate *Fasana;* Professor MILNE and Mr. KNIPPING, of Tokio; Father FAURA of Manila and others.

21. I continue in friendly correspondence with Mr. WHIPPLE, the principal authority on Meteorological matters in the Empire, who is as well known for his genial disposition as for his extensive information and practical experience. Indeed Mr. WHIPPLE's assistance is not confined to any district and meteorologists over the world are more or less indebted to him for valuable support at some time or other.

22. The crepuscular rays at sunset described in "Nature" Vol. XXXVII page 464, were during the past year carefully observed by a volunteer, who does not wish to be named:

Very faint traces of rays were seen on the 18th of January, the 25th April, the 21st June, the 2nd, 6th and 21st July, the 2nd, 4th, and 6th August.

Well developed rays were seen in the west on the 19th February, the 24th April, the 12th, and 22nd June, the 12th, 13th, 18th, and 20th, July, the 5th, 16th, 28th and 31st, August, the 1st, 11th, 14th, and 29th, September.

Strong rays both east and west, beginning in the former direction were seen on the 19th, 22nd and 23rd July, the 19th August, the 3rd, 4th and 5th September, the 14th October.

Rays stretching right across the whole sky were seen on the 8th and 10th May, the 20th June, the 30th August, the 13th, 19th and 26th September, the 12th October.

The number of observations were therefore: Jan. 1, Feb. 1, Mar. 0, Apr. 2, May 2, June 4, July 10, Aug. 9, Sep. 10, Oct. 2, Nov. 0, Dec. 0. On the 19th of February dark rays were seen above white small-cumulus clouds at an altitude of up to 60°, while the sun was still 5° above the horizon. This was followed by a great thunderstorm, a rather rare phenomenon in that month.

23. With reference to cloud classification, I have received a pamphlet from the Hon. R. ABERCROMBY which suggests several changes in the names of clouds (Comp. Annual Report for 1887 page 3 §13). The descriptions of clouds given therein are scarcely superior to those usually printed in such "Instructions," but the new names suggested would seem to recommend themselves for inter-

national use. They are: cum-cir, for sm-cum, str-cir, for very high str, a common fine weather cloud in Ireland, which had not hitherto been separately denominated, and str-cum, for Roll-cum (in Hongkong str-cum is used in a different sense). Cum-nim is also used, but is defined as nim of rounded shape, while any cloud from which rain is seen falling is called nim. in Hongkong. Cum-str is classed among rare and transient forms, whereas it is really common and even characteristic of certain regions such as the Malacca Straits. An uniformly covered sky is always entered as str in Hongkong. There are some strange explanations given in the same pamphlet such as on page 7, where it is said that cumulus may be formed by "collision between winds, such as land and sea breezes." The distinction "between the direction of propagation of a cyclonic cloud bank and the direction of motion of the clouds within the bank" is claimed as a new feature, whereas it is well known to practical meteorologists more especially within the tropics, where typhoons are observed, approaching in the first instance in the shape of an arch of dark cloud whose direction of motion forms an angle with the direction of the top of the arch. This has been thoroughly explained by FERREL a long time ago.

24. From an examination of thunderstorms in the Colony during the past five years it appears that they are most frequent in May and that they have not occurred in November, December and January. They seldom happen in February. With reference to the daily variation they are more frequent at night than during the daytime in the proportion of 3 to 2. They appear to be most abundant about 1a. and least so about 8a. in the proportion of about 2 to 1.

25. During the past year the temperature was on an average higher than in previous years and rose higher than before on hot days. This appears to have been at least partly due to a more southerly direction of the wind, but indeed the temperature has been rising on the whole since 1884. Whether this is periodical remains to be investigated. There seems fair prospects of finding that it is so. It should be remembered that great care is taken with our thermometrical observations and the results are accurate in proportion. The past year was more damp than usual, the rainfall was heavy and the mean barometer below the average. The amount of sunshine was less and the cloudiness greater than usual. It is generally considered to have been an unhealthy year.

26. The weather in January, 1888, was very warm and dry. There was a great deal of dew but hardly any rain. Dry weather haze was common, but indeed dry haze is always common along the China coast during the NE monsoon. February set in very cold. The water froze at the Peak on one or two nights. Thunderstorms began early and were severe in March. During April the weather was very trying to the health. For the greater part it was overcast, damp and foggy. The end of April was unusually hot. There was a great fall of temperature in the afternoon on the 22nd of May, and in the morning on the 3rd June. The weather in July was hot (90°.1 at 11p. on the 14th) and close and there was very little wind. This was due to distant typhoons. On the 22nd and 23rd water-spouts were seen to the south of Hongkong. On the 20th at 7a., a double solar halo was observed by Mr. MAHOMET ALARAKIA. The radius of the inner was 23° and that of the outer about 45°. The barometric tide was great during dry weather. The beginning and also the end of August were very hot. Rain was frequent during the night and early morning. The first half of October was rather close, warm and damp. The latter part of the month was dry and clear as usual. The force of the wind during November fell far short of the average and the weather was warm in consequence. This continued in December, during which month the amount of cloud and rain was excessive.

27. At the Observatory the cisterns of the barograph and standard barometer are placed 109 feet above mean sea level. The bulbs of the rotating thermometers are swung 108 feet above mean sea level and 4 feet above the ground. The solar radiation thermometer is placed at the same height but the terrestrial radiation thermometer is only about one inch above the grass. The rim of the pluviograph is placed 105 feet above mean sea level and 21 inches above the ground. The cups of the anemograph are 149 feet above mean sea level and 45 feet above the ground. At Victoria Peak the instruments, except the radiation thermometers and the rain-gauge are placed in the look-out. The cistern of the barometer is 1814 feet above mean sea level. The bulbs of the thermometers are about 4 feet above the floor except the maximum thermometer, which is a few inches higher. The radiation thermometers are placed at the same height above the ground as at the Observatory. The rim of the rain-gauge is 8 inches in diameter and one foot above the ground.

28. The Monthly Weather Reports are arranged as follows:—

Table I exhibits the hourly readings of the barometer reduced to freezing point of water but not to sea level, as measured (at two minutes to the hour named) from the barograms.

Tables II and III exhibit the hourly readings of the temperature of the air and of the temperature of evaporation round the Observatory as determined by aid of rotating dry and damp bulb thermometers and the thermograms. Table II exhibits also the extreme temperatures during the day and Table III also the solar radiation (black bulb in vacuo) maximum and terrestrial radiation-minimum temperatures.

Table IV exhibits the mean relative humidity in percentage of saturation and mean tension of water vapour present in the air expressed in inches of mercury for every hour in the day and for every day in the month, calculated by aid of Blanford's tables from the data in Tables II and III.

Table V exhibits the duration of sunshine expressed in hours from half an hour before to half an hour after the hour (true time) named.

Table VI exhibits the amount of rain in inches registered from half an hour before to half an hour after the hour named.

Table VII exhibits the velocity of the wind in miles and its direction in numbers: The velocity of the wind is measured from half an hour before to half an hour after the hour named; but the direction is read off at the hour except when it is very light and changeable, in which case the average direction during the hour is estimated, taking into account the velocity from different quarters. The direction is not noted when the velocity is below 1.5 miles an hour. The vane is to be depended on except when the velocity is uniform (which is of course a rare occurrence) and below 3 miles an hour.

Table VIII exhibits for every hour in the day, the mean velocity of the wind reduced to 4 and also to 2 directions, as well as the mean direction of the wind :—

The number of miles traversed by winds from directions 31, 32 and 1 and half the number of miles from 30 and 2 are termed (N.) The number of miles from 3, 4 and 5 and half the number of miles from 2 and 6 are termed (NE), etc. We have thus :—

$$N = (N) + (NE)\cos. 45° + (NW)\cos. 45°$$

$$E = (E) + (NE)\cos. 45° + (SE)\cos. 45°$$

etc.

which are the components exhibited in this table.

Table IX exhibits the direction (to two points) and force (0–12) of the wind estimated at Victoria Peak and the rainfall measured at 10a. and entered to preceeding day at the Peak and at the Observatory, as well as the duration of rain estimated at the Observatory.

Table X exhibits the readings of the barometer reduced to freezing point of water but not to sea level, and of the thermometers at Victoria Peak.

Table XI exhibits the relative humidity and tension of vapour at 10a., 4p. and 10p. daily at the Observatory and at the Peak.

Table XII exhibits the amount (0–10), name and direction whence coming of the clouds. Where the names of upper and lower clouds are given, but only one direction, this refers to the lower clouds. These observations are made with the unaided vision. BRAUN'S nephoscope, which has lately been again brought out in Sweden, has not been used.

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29. The following annual weather report for 1888 is arranged as follows :—

Table III exhibits the mean annual values (or mean hourly excess above this) obtained by aid of the mean values printed in the monthly reports. The mean hourly intensity of rain is obtained from the sixth table of the monthly reports in connection with the fourth table of this report. The total amount of rain measured daily at 10a. was 104·585 inches at the Observatory and 111·17 at the Peak. The total duration registered at the Observatory was 854 hours. The rainfall was at least 0.01 inch on 173 days at the Observatory, and on 111 days at the Peak.

The excess of the black bulb above the air maximum is given as usual. It would have been much better to compare the former with the temperature registered at noon, but that is not done elsewhere.

Table IV exhibits the number of hours during a portion of which rain was registered.

Table V exhibits the total distance traversed by as well as the duration and average velocity of winds from bi-quadrantal points, obtained from the tables published on the first page of each monthly weather report.

Table VI exhibits the number of days on which certain Meteorological phenomena were noted and also the total number of thunderstorms observed in this neighbourhood during the year.

Table VII shows the frequency of clouds of the different classes.

Table VIII exhibits the values of different quantities as explained in previous reports. The hourly intensities of rain have been obtained from the data in the ninth table of the monthly reports.

Tables IX and X exhibit the monthly and annual extremes. The extremes of humidity and vapour tension have been obtained from the eleventh table of the monthly reports and are therefore as usual not quite complete as the values for only 10a. 4p. and 10p. daily are calculated.

Tables XI and XII are arranged as explained in the report on five-day means for 1886.

## TABLE III.

*Mean Values and Hourly Excess above the Mean of Meteorological Elements in 1888.*

| | 1 a. | 2 a. | 3 a. | 4 a. | 5 a. | 6 a. | 7 a. | 8 a. | 9 a. | 10 a. | 11 a. | Noon. | 1 p. | 2 p. | 3 p. | 4 p. | 5 p. | 6 p. | 7 p. | 8 p. | 9 p. | 10 p. | 11 p. | Midt. | Mean or Total. Observatory. | Peak. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pressure, | +.005 | −.006 | −.014 | −.017 | −.013 | .000 | +.016 | +.031 | +.042 | +.044 | +.035 | +.016 | −.007 | −.027 | −.040 | −.045 | −.041 | −.032 | −.019 | .000 | +.013 | +.022 | +.022 | +.015 | 29.833 | 28.104 |
| Temperature, | − 1.4 | − 1.6 | − 1.7 | − 1.9 | − 2.1 | − 2.0 | − 1.6 | − 0.5 | + 0.5 | + 1.3 | + 2.0 | + 2.4 | + 2.5 | + 2.4 | + 2.2 | + 1.7 | + 0.9 | + 0.3 | 0.0 | − 0.3 | − 0.5 | − 0.7 | − 0.9 | − 1.2 | 72.4 | 67.0 |
| Diurnal Range, | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 7.3 | 6.1 |
| Humidity, | + 4 | + 4 | + 4 | + 4 | + 5 | + 4 | + 3 | + 1 | − 2 | − 4 | − 6 | − 7 | − 7 | − 6 | − 6 | − 4 | − 2 | 0 | + 1 | + 2 | + 2 | + 3 | + 3 | + 4 | 79 | 89 |
| Vapour Tension, | +.002 | .000 | −.001 | −.004 | −.007 | −.008 | −.002 | −.002 | −.004 | −.006 | −.003 | −.004 | −.001 | −.001 | −.002 | −.001 | .000 | +.004 | +.007 | +.008 | +.009 | +.009 | +.007 | +.004 | 0.662 | 0.627 |
| Sunshine (Total), | ... | ... | ... | ... | ... | 10.1 | 89.6 | 155.7 | 176.2 | 191.2 | 194.3 | 187.9 | 189.1 | 195.8 | 188.8 | 169.8 | 102.1 | 13.2 | ... | ... | ... | ... | ... | ... | 1863.8 | ... |
| Rainfall, | 0.456 | 0.459 | 0.442 | 0.342 | 0.602 | 0.437 | 0.424 | 0.402 | 0.464 | 0.280 | 0.290 | 0.294 | 0.488 | 0.458 | 0.215 | 0.235 | 0.265 | 0.340 | 0.274 | 0.241 | 0.376 | 0.345 | 0.220 | 0.365 | 8.715 | 9.264 |
| Hours of Rain (Total), | 40 | 50 | 49 | 56 | 60 | 60 | 47 | 54 | 50 | 33 | 27 | 28 | 27 | 38 | 29 | 34 | 32 | 30 | 29 | 30 | 35 | 35 | 28 | 37 | 938 | ... |
| Intensity of Rain, | 0.137 | 0.110 | 0.108 | 0.073 | 0.120 | 0.087 | 0.108 | 0.089 | 0.111 | 0.102 | 0.129 | 0.126 | 0.217 | 0.145 | 0.089 | 0.083 | 0.100 | 0.136 | 0.113 | 0.097 | 0.129 | 0.118 | 0.094 | 0.118 | 0.111 | ... |
| Wind-Velocity, | − 1.0 | − 1.2 | − 1.1 | − 1.0 | − 0.9 | − 0.9 | − 1.2 | − 0.8 | + 0.4 | + 1.4 | + 1.8 | + 2.2 | + 2.4 | + 2.3 | + 1.9 | + 1.6 | + 1.1 | + 0.1 | − 0.9 | − 1.4 | − 1.4 | − 1.3 | − 1.2 | − 1.0 | 12.5 | 22 |
| Wind-Direction, | − 6° | − 4° | − 6° | − 6° | − 5° | − 7° | −10° | − 2° | − 2° | + 4° | + 8° | +10° | +12° | +12° | + 8° | + 6° | + 4° | + 3° | + 0° | − 4° | − 4° | − 4° | − 4° | − 5° | E 13° S | E 34° S |
| Cloudiness, | + 2 | ... | ... | + 7 | ... | ... | + 2 | ... | ... | 0 | ... | ... | 0 | ... | ... | − 2 | ... | ... | − 5 | ... | ... | − 4 | ... | ... | 68 | ... |
| Solar Radiation, | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 128.4 | 121.2 |
| Excess of do. do., | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 52.1 | 50.9 |
| Terr. Radiation, | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | +3.0 | +1.8 |

## TABLE IV.

*Number of Hours, during portion of which it rained, for each Month in the Year 1888.*

| Month. | 1 a. | 2 a. | 3 a. | 4 a. | 5 a. | 6 a. | 7 a. | 8 a. | 9 a. | 10 a. | 11 a. | Noon. | 1 p. | 2 p. | 3 p. | 4 p. | 5 p. | 6 p. | 7 p. | 8 p. | 9 p. | 10 p. | 11 p. | Midt. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January, | ... | ... | ... | ... | ... | 2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 | 1 | 1 | 1 | 1 | 1 | 2 | ... | ... | 11 |
| February, | 8 | 8 | 8 | 7 | 5 | 4 | 5 | 6 | 6 | 4 | 2 | 2 | 2 | 2 | 4 | 4 | 2 | 2 | 3 | 1 | 2 | 3 | 4 | 5 | 99 |
| March, | 4 | 4 | 4 | 5 | 7 | 8 | 8 | 4 | 6 | 5 | 1 | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 2 | 3 | 2 | 2 | 1 | 1 | 88 |
| April, | 2 | 4 | 4 | 7 | 4 | 6 | 5 | 6 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 5 | 5 | 2 | 3 | 5 | 4 | 4 | 1 | 4 | 84 |
| May, | 6 | 5 | 5 | 6 | 5 | 5 | 3 | 6 | 5 | 3 | 2 | 7 | 6 | 6 | 6 | 4 | 4 | 7 | 6 | 5 | 10 | 6 | 3 | 7 | 128 |
| June, | 6 | 9 | 11 | 10 | 13 | 12 | 7 | 7 | 11 | 7 | 8 | 3 | 4 | 8 | 5 | 7 | 5 | 7 | 7 | 2 | 8 | 7 | 7 | 3 | 174 |
| July, | 4 | 6 | 5 | 5 | 6 | 5 | 1 | 6 | 4 | 2 | ... | 1 | 1 | 3 | 2 | 2 | 3 | 4 | 3 | 2 | 4 | 2 | 1 | 4 | 76 |
| August, | 5 | 5 | 7 | 5 | 8 | 5 | 6 | 7 | 4 | 4 | 4 | 1 | 3 | 2 | ... | 1 | 2 | 2 | 1 | 3 | 1 | 3 | 5 | 7 | 91 |
| September, | 1 | 7 | 1 | 5 | 6 | 7 | 5 | 3 | 5 | 2 | 3 | 4 | 2 | 4 | 3 | 1 | 1 | ... | ... | 2 | ... | 2 | 2 | 2 | 68 |
| October, | 2 | ... | ... | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 1 | 3 | 1 | ... | 1 | 4 | ... | ... | ... | ... | 33 |
| November, | ... | ... | ... | ... | 2 | 3 | 2 | 3 | 2 | 1 | 1 | 1 | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 16 |
| December, | 2 | 2 | 4 | 4 | 2 | 2 | 4 | 5 | 4 | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 4 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 70 |
| Total, | 40 | 50 | 49 | 56 | 60 | 60 | 47 | 54 | 50 | 33 | 27 | 28 | 27 | 38 | 29 | 34 | 32 | 30 | 29 | 30 | 35 | 35 | 28 | 37 | 938 |

## TABLE V.

*Total Distance traversed by, as well as Total Duration and Average Velocity of Winds from eight different Points of the Compass during the year 1888.*

| WIND. | TOTAL DISTANCE. *Miles.* | DURATION. *Hours.* | VELOCITY. *Miles per hour.* |
|---|---|---|---|
| N, | 8367 | 775 | 10.8 |
| NE, | 11015 | 853 | 12.9 |
| E, | 62409 | 3841 | 16.2 |
| SE, | 5108 | 574 | 8.9 |
| S, | 8855 | 853 | 10.4 |
| SW, | 6982 | 562 | 12.4 |
| W, | 4256 | 530 | 8.0 |
| NW, | 2074 | 299 | 6.9 |
| Calm, | 326 | 497 | 0.7 |
| Sums and Mean, | 109392 | 8784 | 12.5 |

## TABLE VI.

*Total Number of Days on which different Meteorological Phenomena were noted and Total Number of Thunderstorms during each month of the year 1888.*

| Month. | Fog. | Electric Phenomena. | Lightning. | Thunder. | Thunder-storms. | Unusual Visibility. | Dew. | Rain-bows. | Lunar Halo. | Lunar Corona. | Solar Halo. | Solar Corona. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January, | 1 | ... | ... | ... | ... | ... | 8 | ... | ... | 1 | ... | ... |
| February, | 2 | 1 | 1 | 1 | 2 | 1 | 2 | ... | ... | ... | ... | ... |
| March, | 12 | 14 | 14 | 12 | 9 | ... | 4 | ... | 1 | ... | 2 | ... |
| April, | 7 | 16 | 16 | 8 | 5 | ... | 5 | ... | 1 | ... | 1 | 1 |
| May, | ... | 21 | 18 | 11 | 4 | 2 | 3 | 3 | 1 | 1 | 1 | ... |
| June, | ... | 19 | 19 | 8 | 3 | ... | ... | 8 | 3 | 7 | 2 | 2 |
| July, | 1 | 26 | 24 | 12 | 3 | 5 | 10 | 4 | 1 | 1 | 7 | ... |
| August, | 13 | 23 | 21 | 9 | 2 | 5 | 15 | 2 | 5 | 2 | 6 | ... |
| September, | 10 | 20 | 17 | 9 | 1 | 1 | 11 | 1 | 5 | 1 | 2 | ... |
| October, | ... | 4 | 4 | 3 | 1 | 2 | 4 | ... | 2 | ... | 1 | 1 |
| November, | 2 | ... | ... | ... | ... | 1 | 10 | ... | 1 | ... | 1 | ... |
| December, | 3 | ... | ... | ... | ... | ... | 7 | ... | ... | ... | ... | ... |
| Sums, | 51 | 144 | 134 | 78 | 30 | 17 | 79 | 18 | 20 | 13 | 23 | 4 |

## TABLE VII.

*Total Number of Times that Clouds of different Forms were observed in each month of the year 1888.*

| Month. | c. | c-str. | c-cum | sm-cum. | cum. | cum-str. | str. | R-cum. | cum-nim. | nim. |
|---|---|---|---|---|---|---|---|---|---|---|
| January, | ... | 4 | 2 | 15 | 82 | ... | 14 | 40 | 21 | 7 |
| February, | ... | 2 | 2 | 11 | 73 | ... | 27 | 25 | 32 | 57 |
| March, | ... | 14 | 1 | 15 | 107 | 2 | 27 | 26 | 37 | 44 |
| April, | ... | 22 | 22 | 27 | 117 | 1 | 8 | 24 | 41 | 53 |
| May, | 1 | 29 | 24 | 32 | 140 | 4 | 9 | 17 | 39 | 44 |
| June, | 3 | 44 | 36 | 26 | 120 | 1 | 4 | 41 | 25 | 54 |
| July, | 7 | 81 | 19 | 14 | 179 | 2 | 4 | 19 | 14 | 14 |
| August, | 8 | 77 | 26 | 10 | 140 | 1 | 13 | 12 | 23 | 25 |
| September, | ... | 64 | 29 | 19 | 147 | 6 | 14 | 8 | 14 | 14 |
| October, | ... | 18 | 19 | 20 | 134 | ... | 11 | 10 | 14 | 10 |
| November, | ... | 13 | 13 | 49 | 144 | ... | 8 | 6 | 2 | 3 |
| December, | ... | ... | 3 | 34 | 103 | ... | 16 | 5 | 14 | 29 |
| Sums, | 19 | 368 | 196 | 272 | 1486 | 17 | 155 | 233 | 276 | 354 |

## TABLE VIII.

| Month. | Barometric Tide. | Mean diurnal variability of Temperature. | Temperature decrease. Height for 1° | Rain Fall. | | Hourly Intensity of Rain. | Mean direction of Clouds whence coming. | | | Number of Days with Clouds below. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Mean 1878–1887 inclus. | 1888. | | Lower. | Upper. | Cirrus. | 2000 ft. | 1000 ft. |
| | *ins.* | ° | *feet.* | *ins.* | *ins.* | *ins.* | | | | | |
| January, | 0.105 | 1.57 | 417 | 1.47 | 0.185 | 0.021 | E | W by S | ... | 14 | 6 |
| February, | 0.105 | 2.32 | 407 | 1.66 | 3.965 | 0.025 | ESE | WSW | ... | 22 | 11 |
| March, | 0.101 | 2.49 | 551 | 3.53 | 10.430 | 0.104 | SE by S | W by S | ... | 23 | 9 |
| April, | 0.101 | 1.98 | 380 | 6.55 | 6.955 | 0.078 | S | W | ... | 28 | 17 |
| May, | 0.082 | 2.19 | 280 | 9.82 | 19.525 | 0.169 | S by W | W | ... | 26 | 6 |
| June, | 0.069 | 1.98 | 263 | 12.67 | 23.865 | 0.184 | S | W by S | NNE | 28 | 7 |
| July, | 0.069 | 0.92 | 276 | 16.41 | 10.550 | 0.277 | SE | ENE | E by N | 9 | 1 |
| August, | 0.075 | 1.28 | 300 | 16.93 | 13.315 | 0.206 | SW by S | ENE | ENE | 12 | 6 |
| September, | 0.085 | 1.28 | 280 | 9.89 | 6.415 | 0.144 | E by N | NE by E | ... | 12 | 1 |
| October, | 0.089 | 1.43 | 248 | 5.06 | 4.515 | 0.205 | E by S | SW by W | ... | 13 | 3 |
| November, | 0.099 | 1.29 | 290 | 1.04 | 0.770 | 0.076 | ENE | W by S | ... | 5 | 1 |
| December, | 0.105 | 1.76 | 290 | 0.49 | 4.095 | 0.058 | E by N | W by S | ... | 12 | 4 |
| Year, | 0.090 | 1.71 | 332 | 85.52 | 104.585 | 0.122 | ... | ... | ... | 204 | 72 |

## TABLE IX.

*Monthly Extremes of the Principal Meteorological Elements registered at the Observatory during the year 1888.*

| Month. | Barometer. | | Temperature. | | Hum. | Vapour Tension. | | Rain. | | Wind Velocity. | Radiation. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Min. | Max. | Min. | Daily Max. | Hourly Max. | Max. | Sun Max. | Terr. Min. |
| January, ... | 30.279 | 29.834 | 72.9 | 42.8 | 5 | 0.576 | 0.035 | 0.155 | 0.075 | 40 | 136.3 | 41.5 |
| February, . | .335 | .822 | 68.6 | 40.6 | 28 | 0.545 | 0.105 | 0.955 | 0.390 | 37 | 134.3 | 36.8 |
| March,..... | .212 | .767 | 77.9 | 54.2 | 59 | 0.749 | 0.272 | 3.580 | 1.570 | 44 | 132.6 | 52.4 |
| April, ..... | .058 | .585 | 84.8 | 58.9 | 68 | 0.847 | 0.442 | 2.815 | 1.580 | 39 | 145.7 | 56.7 |
| May, ..... | 29.915 | .526 | 87.1 | 69.4 | 66 | 0.967 | 0.587 | 5.975 | 2.740 | 36 | 150.5 | 67.7 |
| June, ..... | .751 | .284 | 88.0 | 69.2 | 64 | 0.991 | 0.572 | 8.475 | 2.130 | 48 | 152.6 | 66.7 |
| July, ..... | .799 | .110 | 92.9 | 75.8 | 54 | 1.002 | 0.727 | 3.885 | 1.115 | 40 | 155.3 | ... |
| August, ... | .850 | .340 | 90.4 | 72.2 | 65 | 1.000 | 0.732 | 2.680 | 1.470 | 30 | 151.2 | ... |
| September,. | .941 | .480 | 88.9 | 70.8 | 53 | 0.941 | 0.606 | 1.090 | 0.600 | 50 | 150.4 | 68.9 |
| October, ... | 30.192 | .694 | 83.8 | 64.1 | 27 | 0.921 | 0.241 | 1.595 | 0.700 | 34 | 150.4 | 55.4 |
| November,. | .215 | .663 | 82.6 | 60.8 | 46 | 0.691 | 0.320 | 0.660 | 0.380 | 35 | 143.7 | 52.0 |
| December, . | .274 | .797 | 75.2 | 53.4 | 38 | 0.679 | 0.203 | 1.670 | 0.400 | 35 | 138.3 | 44.5 |
| Year,..... | 30.335 | 29.110 | 92.9 | 40.6 | 5 | 1.002 | 0.035 | 8.475 | 2.740 | 50 | 155.3 | 36.8 |

## TABLE X.

*Monthly Extremes of the Principal Meteorological Elements registered at Victoria Peak during the year 1888.*

| Month. | Barometer. | | Temperature. | | Hum. | Vapour Tension. | | Rain. | Wind. | Radiation. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Min. | Max. | Min. | Daily Max. | Force Max. | Sun Max. | Terr. Min. |
| January, ..... | 28.436 | 28.102 | 67.2 | 44.2 | 31 | 0.535 | 0.116 | 0.87 | 6 | 129.0 | 41.4 |
| February, ..... | .429 | .061 | 65.3 | 35.3 | 61 | 0.530 | 0.151 | 0.76 | 6 | 130.0 | 31.8 |
| March, ..... | .383 | .039 | 71.5 | 50.2 | 67 | 0.691 | 0.289 | 5.10 | 6 | 128.8 | 45.8 |
| April,..... | .253 | 27.935 | 75.9 | 53.9 | 83 | 0.816 | 0.443 | 2.36 | 6 | 144.4 | 51.3 |
| May, ..... | .198 | .869 | 78.1 | 64.3 | 81 | 0.901 | 0.580 | 4.85 | 5 | 149.7 | 63.1 |
| June, ..... | .033 | .622 | 79.3 | 65.3 | 83 | 0.908 | 0.568 | 8.75 | 8 | 141.4 | 63.7 |
| July, ..... | .106 | .465 | 84.2 | 73.3 | 64 | 0.958 | 0.651 | 6.15 | 8 | 151.1 | 70.8 |
| August, ..... | .144 | .704 | 82.2 | 68.8 | 82 | 0.916 | 0.694 | 3.60 | 6 | 148.0 | 66.6 |
| September, ... | .197 | .774 | 82.3 | 66.1 | 70 | 0.892 | 0.601 | 1.15 | 8 | 147.7 | 65.0 |
| October,..... | .402 | 28.012 | 75.9 | 58.3 | 45 | 0.827 | 0.275 | 1.70 | 5 | 140.3 | 53.3 |
| November,..... | .396 | 27.975 | 74.9 | 58.2 | 55 | 0.627 | 0.336 | 0.56 | 5 | 135.1 | 51.4 |
| December,..... | .435 | 28.059 | 69.0 | 47.0 | 59 | 0.595 | 0.264 | 2.36 | 6 | 127.7 | 42.5 |
| Year,..... | 28.436 | 27.465 | 84.2 | 35.3 | 31 | 0.958 | 0.116 | 8.75 | 8 | 151.1 | 31.8 |

## TABLE XI.

*Five-Day Means of the Principal Meteorological Elements observed at the Hongkong Observatory in 1888.*

| Five-Day Periods. | Barometer. | Temperature. | Humidity. | Vapour Tension. | Wind Velocity. | Nebulosity. | Sunshine. | Rain. |
|---|---|---|---|---|---|---|---|---|
| January ..... 1– 5 | 30.189 | 56.0 | 30 | 0.140 | 7.9 | 0.4 | 9.5 | 0.000 |
| „ ..... 6–10 | .063 | 62.5 | 61 | .345 | 10.7 | 0.1 | 9.5 | 0.002 |
| „ .....11–15 | 29.976 | 63.2 | 77 | .450 | 20.0 | 6.9 | 5.0 | 0.001 |
| „ .....16–20 | .962 | 65.0 | 84 | .520 | 13.1 | 5.0 | 7.5 | 0.001 |
| „ .....21–25 | 30.070 | 62.2 | 75 | .422 | 17.6 | 6.5 | 6.2 | 0.000 |
| „ .....26–30 | .054 | 60.6 | 79 | .418 | 15.6 | 9.1 | 1.2 | 0.002 |
| „ .....31– 4 | .183 | 46.5 | 68 | .213 | 12.5 | 7.1 | 3.9 | 0.389 |
| February ..... 5– 9 | .130 | 52.7 | 75 | .300 | 13.0 | 10.0 | 0.4 | 0.065 |
| „ .....10–14 | 29.924 | 59.8 | 89 | .460 | 21.8 | 9.2 | 2.5 | 0.005 |
| „ .....15–19 | .963 | 56.3 | 88 | .400 | 17.8 | 9.7 | 0.7 | 0.023 |
| „ .....20–24 | .961 | 54.5 | 84 | .360 | 10.4 | 10.0 | 0.0 | 0.342 |
| „ .....25– 1 | .986 | 61.0 | 74 | .405 | 14.3 | 5.8 | 5.7 | 0.000 |
| March ..... 2– 6 | .993 | 60.7 | 80 | .435 | 14.2 | 9.9 | 1.0 | 0.235 |
| „ ..... 7–11 | .958 | 61.9 | 77 | .427 | 17.9 | 9.2 | 1.2 | 0.001 |
| „ .....12–16 | .906 | 65.3 | 87 | .542 | 12.7 | 6.3 | 4.4 | 0.005 |
| „ .....17–21 | .970 | 64.1 | 86 | .529 | 10.2 | 9.6 | 1.2 | 0.249 |
| „ .....22–26 | .908 | 66.5 | 85 | .560 | 12.5 | 9.4 | 2.6 | 0.948 |
| „ .....27–31 | .885 | 67.4 | 94 | .631 | 16.2 | 10.0 | 0.6 | 0.648 |
| April ..... 1– 5 | .904 | 64.4 | 85 | .515 | 18.3 | 9.8 | 2.1 | 0.082 |
| „ ..... 6–10 | .714 | 71.1 | 90 | .687 | 15.9 | 9.9 | 1.2 | 0.806 |
| „ .....11–15 | .773 | 70.6 | 89 | .673 | 17.4 | 10.0 | 0.8 | 0.473 |
| „ .....16–20 | .845 | 71.1 | 92 | .703 | 12.9 | 8.4 | 4.6 | 0.026 |
| „ .....21–25 | .794 | 78.2 | 83 | .799 | 8.5 | 6.7 | 7.9 | 0.001 |
| „ .....26–30 | .793 | 79.5 | 81 | .813 | 7.8 | 7.1 | 8.8 | 0.003 |
| May ..... 1– 5 | .787 | 75.5 | 88 | .778 | 15.0 | 9.3 | 3.7 | 0.812 |
| „ ..... 6–10 | .774 | 80.5 | 82 | .857 | 6.2 | 4.0 | 9.2 | 0.017 |
| „ .....11–15 | .794 | 77.9 | 86 | .821 | 12.4 | 8.3 | 3.8 | 0.148 |
| „ .....16–20 | .590 | 79.2 | 87 | .872 | 10.7 | 9.4 | 2.9 | 1.807 |
| „ .....21–25 | .737 | 76.3 | 82 | .745 | 13.1 | 9.6 | 1.9 | 0.383 |
| „ .....26–30 | .716 | 78.1 | 88 | .844 | 8.5 | 9.6 | 3.0 | 0.674 |
| „ .....31– 4 | .655 | 79.4 | 80 | .808 | 13.9 | 8.9 | 4.2 | 0.196 |
| June ..... 5– 9 | .619 | 79.3 | 83 | .840 | 14.4 | 9.3 | 3.5 | 0.096 |
| „ .....10–14 | .495 | 78.9 | 88 | .866 | 22.9 | 9.6 | 1.5 | 1.010 |
| „ .....15–19 | .437 | 80.8 | 85 | .888 | 19.2 | 9.6 | 2.4 | 1.116 |
| „ .....20–24 | .555 | 82.4 | 84 | .932 | 10.9 | 8.1 | 5.4 | 0.492 |
| „ .....25–29 | .643 | 81.1 | 86 | .913 | 12.8 | 9.7 | 2.0 | 1.849 |
| „ .....30– 4 | .688 | 82.0 | 83 | .908 | 6.0 | 6.4 | 7.5 | 0.257 |
| July ..... 5– 9 | .681 | 82.7 | 81 | .904 | 14.9 | 7.3 | 7.2 | 0.383 |
| „ .....10–14 | .568 | 83.9 | 78 | .910 | 16.1 | 7.1 | 7.4 | 0.183 |
| „ .....15–19 | .549 | 82.1 | 82 | .899 | 14.6 | 6.7 | 6.6 | 1.161 |
| „ .....20–24 | .556 | 84.0 | 78 | .913 | 5.2 | 3.4 | 10.6 | 0.000 |
| „ .....25–29 | .530 | 83.2 | 79 | .899 | 5.1 | 5.2 | 8.5 | 0.131 |
| „ .....30– 3 | .551 | 83.3 | 82 | .942 | 6.3 | 4.9 | 8.1 | 0.176 |
| August ..... 4– 8 | .523 | 84.2 | 80 | .940 | 9.1 | 5.0 | 8.5 | 0.204 |
| „ ..... 9–13 | .441 | 79.2 | 88 | .875 | 12.7 | 10.0 | 0.3 | 1.328 |
| „ .....14–18 | .563 | 80.9 | 85 | .896 | 12.1 | 7.0 | 6.6 | 0.564 |
| „ .....19–23 | .788 | 79.5 | 87 | .875 | 5.7 | 6.2 | 7.1 | 0.460 |
| „ .....24–28 | .692 | 81.1 | 82 | .872 | 4.8 | 5.0 | 8.6 | 0.004 |
| „ .....29– 2 | .672 | 83.0 | 78 | .883 | 4.7 | 3.0 | 9.6 | 0.027 |
| September..... 3– 7 | .763 | 81.9 | 82 | .893 | 6.6 | 4.4 | 8.4 | 0.256 |
| „ ..... 8–12 | .768 | 80.1 | 80 | .823 | 10.2 | 6.2 | 5.7 | 0.099 |
| „ .....13–17 | .829 | 80.7 | 78 | .818 | 7.3 | 4.5 | 7.9 | 0.094 |
| „ .....18–22 | .818 | 81.7 | 82 | .890 | 7.1 | 5.6 | 7.5 | 0.305 |
| „ .....23–27 | .796 | 81.2 | 68 | .724 | 14.5 | 5.9 | 6.9 | 0.244 |
| „ .....28– 2 | .754 | 77.1 | 74 | .693 | 24.2 | 8.8 | 2.2 | 0.260 |
| October ..... 3– 7 | .884 | 77.6 | 82 | .780 | 16.5 | 8.5 | 2.8 | 0.138 |
| „ ..... 8–12 | .859 | 77.2 | 84 | .784 | 12.5 | 8.3 | 1.9 | 0.661 |
| „ .....13–17 | .872 | 78.4 | 80 | .776 | 16.3 | 6.8 | 4.2 | 0.005 |
| „ .....18–22 | .898 | 75.4 | 67 | .611 | 14.2 | 5.0 | 7.1 | 0.096 |
| „ .....23–27 | 30.060 | 71.3 | 49 | .376 | 14.2 | 0.6 | 10.6 | 0.000 |
| „ .....28– 1 | 29.957 | 73.0 | 71 | .585 | 8.2 | 1.2 | 9.9 | 0.002 |
| November..... 2– 6 | .939 | 73.8 | 68 | .571 | 5.7 | 6.0 | 5.8 | 0.000 |
| „ ..... 7–11 | .921 | 72.2 | 74 | .585 | 15.7 | 8.0 | 4.1 | 0.133 |
| „ .....12–16 | 30.039 | 70.0 | 71 | .523 | 8.7 | 4.1 | 6.7 | 0.000 |
| „ .....17–21 | 29.829 | 71.8 | 75 | .589 | 8.9 | 4.8 | 6.0 | 0.019 |
| „ .....22–26 | 30.089 | 68.4 | 65 | .454 | 13.5 | 2.6 | 9.1 | 0.000 |
| „ .....27– 1 | .099 | 69.4 | 72 | .521 | 16.4 | 4.5 | 7.6 | 0.001 |
| December ..... 2– 6 | .000 | 69.1 | 75 | .538 | 10.2 | 5.5 | 4.6 | 0.000 |
| „ ..... 7–11 | 29.980 | 69.0 | 80 | .568 | 15.7 | 7.4 | 3.6 | 0.085 |
| „ .....12–16 | 30.008 | 66.8 | 81 | .538 | 16.2 | 8.9 | 1.2 | 0.082 |
| „ .....17–21 | .083 | 61.7 | 77 | .432 | 8.6 | 7.4 | 2.1 | 0.652 |
| „ .....22–26 | .069 | 62.0 | 59 | .331 | 8.8 | 2.3 | 8.8 | 0.000 |
| „ .....27–31 | 29.948 | 62.2 | 71 | .402 | 11.8 | 2.1 | 8.0 | 0.000 |

## TABLE XII.

*Five-Day Means of the principal Meteorological Elements observed at Victoria Peak in 1888.*

| Five-Day Periods. | Barometer. | Temperature. | Humidity. | Vapour Tension. | Wind Force. | Rain. |
|---|---|---|---|---|---|---|
| January ..... 1– 5 | 28.381 | 51.2 | 43 | 0.172 | 3.9 | 0.00 |
| „ ..... 6–10 | .291 | 58.4 | 60 | .312 | 4.2 | 0.00 |
| „ .....11–15 | .193 | 58.6 | 81 | .408 | 4.7 | 0.00 |
| „ .....16–20 | .201 | 61.0 | 87 | .486 | 3.3 | 0.00 |
| „ .....21–25 | .293 | 56.9 | 86 | .411 | 3.8 | 0.00 |
| „ .....26–30 | .266 | 55.0 | 91 | .404 | 4.1 | 0.00 |
| „ .....31– 4 | .316 | 42.6 | 81 | .228 | 4.4 | 0.45 |
| February ..... 5– 9 | .309 | 45.5 | 91 | .282 | 4.3 | 0.02 |
| „ .....10–14 | .151 | 58.6 | 95 | .475 | 4.5 | 0.02 |
| „ .....15–19 | .166 | 53.6 | 93 | .390 | 4.4 | 0.11 |
| „ .....20–24 | .153 | 49.0 | 95 | .331 | 4.1 | 0.30 |
| „ .....25– 1 | .209 | 56.2 | 88 | .418 | 3.7 | 0.00 |
| March ..... 2– 6 | .221 | 57.0 | 87 | .419 | 3.9 | 0.15 |
| „ ..... 7–11 | .194 | 56.3 | 92 | .435 | 3.6 | 0.00 |
| „ .....12–16 | .169 | 63.9 | 90 | .543 | 3.6 | 0.00 |
| „ .....17–21 | .208 | 61.8 | 92 | .524 | 3.8 | 0.23 |
| „ .....22–26 | .157 | 62.0 | 93 | .533 | 3.9 | 1.18 |
| „ .....27–31 | .146 | 65.7 | 96 | .610 | 4.3 | 0.40 |
| April ..... 1– 5 | .157 | 61.0 | 92 | .500 | 4.0 | 0.00 |
| „ ..... 6–10 | 27.993 | 67.5 | 96 | .661 | 4.7 | 1.23 |
| „ .....11–15 | 28.036 | 65.6 | 96 | .620 | 4.9 | 0.12 |
| „ .....16–20 | .106 | 69.0 | 94 | .681 | 3.6 | 0.02 |
| „ .....21–25 | .105 | 72.1 | 94 | .746 | 3.9 | 0.00 |
| „ .....26–30 | .091 | 72.9 | 94 | .772 | 3.8 | 0.00 |
| May ..... 1– 5 | .070 | 70.3 | 96 | .717 | 3.9 | 0.79 |
| „ ..... 6–10 | .090 | 73.8 | 93 | .785 | 3.5 | 0.00 |
| „ .....11–15 | .084 | 72.1 | 94 | .755 | 3.8 | 0.31 |
| „ .....16–20 | 27.913 | 72.6 | 96 | .782 | 4.4 | 1.46 |
| „ .....21–25 | 28.025 | 69.5 | 95 | .701 | 4.2 | 0.64 |
| „ .....26–30 | .019 | 71.6 | 98 | .770 | 4.1 | 0.15 |
| „ .....31– 4 | 27.960 | 72.3 | 95 | .765 | 4.5 | 0.25 |
| June ..... 5– 9 | .927 | 73.2 | 97 | .809 | 4.5 | 0.23 |
| „ .....10–14 | .826 | 72.7 | 98 | .796 | 5.1 | 1.23 |
| „ .....15–19 | .748 | 73.7 | 98 | .824 | 5.2 | 1.04 |
| „ .....20–24 | .875 | 75.0 | 97 | .858 | 4.2 | 0.46 |
| „ .....25–29 | .950 | 74.7 | 98 | .850 | 4.6 | 2.58 |
| „ .....30– 4 | 28.009 | 75.3 | 96 | .851 | 3.9 | 0.22 |
| July ..... 5– 9 | 27.993 | 75.6 | 93 | .841 | 4.1 | 0.14 |
| „ .....10–14 | .875 | 77.5 | 88 | .849 | 4.2 | 0.15 |
| „ .....15–19 | .868 | 76.0 | 92 | .837 | 3.6 | 1.23 |
| „ .....20–24 | .890 | 77.5 | 89 | .859 | 2.0 | 0.00 |
| „ .....25–29 | .859 | 76.9 | 90 | .842 | 3.1 | 0.21 |
| „ .....30– 3 | .888 | 77.3 | 91 | .874 | 3.3 | 0.30 |
| August ..... 4– 8 | .853 | 77.2 | 91 | .859 | 4.1 | 0.31 |
| „ ..... 9–13 | .773 | 73.2 | 96 | .797 | 4.3 | 1.92 |
| „ .....14–18 | .880 | 74.5 | 95 | .828 | 4.2 | 1.03 |
| „ .....19–23 | 28.097 | 74.7 | 92 | .810 | 3.4 | 0.13 |
| „ .....24–28 | .019 | 75.3 | 92 | .820 | 3.4 | 0.00 |
| „ .....29– 2 | 27.987 | 76.5 | 89 | .823 | 3.1 | 0.03 |
| September ..... 3– 7 | 28.078 | 76.9 | 89 | .843 | 2.8 | 0.15 |
| „ ..... 8–12 | .069 | 75.1 | 88 | .780 | 3.5 | 0.03 |
| „ .....13–17 | .121 | 74.0 | 90 | .770 | 3.5 | 0.05 |
| „ .....18–22 | .121 | 75.3 | 92 | .824 | 2.9 | 0.23 |
| „ .....23–27 | .082 | 73.9 | 82 | .700 | 4.5 | 0.04 |
| „ .....28– 2 | .034 | 69.6 | 88 | .642 | 5.2 | 0.37 |
| October ..... 3– 7 | .163 | 70.1 | 94 | .702 | 4.1 | 0.25 |
| „ ..... 8–12 | .144 | 70.7 | 97 | .736 | 4.2 | 0.79 |
| „ .....13–17 | .162 | 71.5 | 94 | .732 | 4.1 | 0.00 |
| „ .....18–22 | .166 | 68.3 | 88 | .635 | 4.3 | 0.06 |
| „ .....23–27 | .309 | 63.6 | 66 | .407 | 4.5 | 0.00 |
| „ .....28– 1 | .217 | 66.6 | 82 | .558 | 2.5 | 0.00 |
| November ..... 2– 6 | .211 | 68.3 | 81 | .576 | 2.4 | 0.00 |
| „ ..... 7–11 | .187 | 65.0 | 88 | .550 | 4.1 | 0.11 |
| „ .....12–16 | .272 | 64.2 | 86 | .535 | 3.2 | 0.00 |
| „ .....17–21 | .104 | 65.1 | 87 | .561 | 3.7 | 0.09 |
| „ .....22–26 | .327 | 63.3 | 77 | .458 | 3.5 | 0.00 |
| „ .....27– 1 | .337 | 63.4 | 83 | .500 | 3.9 | 0.00 |
| December ..... 2– 6 | .239 | 62.5 | 86 | .507 | 2.9 | 0.00 |
| „ ..... 7–11 | .220 | 62.4 | 92 | .530 | 3.9 | 0.16 |
| „ .....12–16 | .234 | 60.4 | 93 | .504 | 3.8 | 0.07 |
| „ ..... .....17–21 | .282 | 55.1 | 90 | .406 | 4.3 | 0.79 |
| „ .....22–26 | .280 | 55.4 | 76 | .351 | 3.4 | 0.00 |
| „ .....27–31 | .179 | 56.7 | 78 | .379 | 3.5 | 0.00 |

30. The observations of magnetic declination and horizontal force were made with the unifilar magnetometer, ELLIOTT BROS. No. 55, and the dips were observed with dip circle, DOVER No. 71. The methods adopted are explained in *Appendix G.* of *Observations and Researches made in 1885.* The value of log $\pi^2$ K was 3.44975 at 27° cent. and the value of P was + 6.608. The mean value of the magnetic moment of the vibrating needle was 0.48203 in British Units and 629.32 in C.G.S. Units.

The times of vibration exhibited in the table are each derived from 12 observations of the time occupied by the magnet in making 100 vibrations, corrections having been applied for rate of chronometer and arc of vibration. The observations of horizontal force are expressed in C.G.S. Units, but the monthly synopsis exhibits X, the horizontal as well as Y, the vertical, and the total forces, which have been computed by aid of the observed dips, and their values are also given in British Units and in Gauss's Units. The declination and dip are decreasing, while the horizontal force is increasing as well as the total force. Observations made before the Observatory was founded show that the dip was increasing during the forty years previous.

OBSERVATIONS OF MAGNETIC DECLINATION AND DIP.

| 1888. | H.K.M.T. | Declination, East. | Observer. | H.K.M.T. | Dip, North. | Needle. | Observer. |
|---|---|---|---|---|---|---|---|
| January, | 16d. 2h. 38m. p. | 0° 43′ 21″ | F.G.F. | 17d. 3h. 33m. p. | 32° 22′.89 | No. 1 | F.G.F. |
| | | | | | 24 .53 | 2 | ,, |
| February, | 14 2 31 p. | 0 43 56 | ,, | 15 3 2 p. | 21 .02 | 1 | ,, |
| | | | | | 21 .40 | 2 | ,, |
| March, | 14 2 40 p. | 0 43 3 | M.A. | 15 3 30 p. | 19 .56 | 1 | M.A. |
| | | | | | 20 .03 | 2 | ,, |
| April, | 16 2 36 p. | 0 39 49 | ,, | 14 3 28 p. | 21 .34 | 1 | ,, |
| | | | | | 20 .06 | 2 | ,, |
| May, | 15 2 33 p. | 0 39 38 | F.G.F. | 17 3 23 p. | 23 .12 | 1 | F.G.F. |
| | | | | | 22 .33 | 2 | ,, |
| July, | 17 2 36 p. | 0 38 9 | M.A. | 18 3 23 p. | 19 .37 | 1 | M.A. |
| | | | | | 16 .78 | 2 | ,, |
| August, | 14 2 28 p. | 0 39 54 | ,, | 15 3 27 p. | 18 .11 | 1 | ,, |
| | | | | | 13 .31 | 2 | ,, |
| September, | 14 2 38 p. | 0 40 11 | ,, | 15 3 2 p. | 20 .18 | 1 | ,, |
| | | | | | 20 .88 | 2 | ,, |
| October, | 15 2 28 p. | 0 42 4 | F.G.F. | 16 3 37 p. | 22 .51 | 1 | F.G.F. |
| | | | | | 19 .30 | 2 | ,, |
| November, | 14 2 45 p. | 0 43 13 | M.A. | 16 3 29 p. | 26 .75 | 1 | M.A. |
| | | | | | 30 .21 | 2 | ,, |
| | | | | 17 3 22 p. | 26 .00 | 5 | F.G.F. |
| | | | | | 22 .32 | 6 | W.D. |
| December, | 14 2 47 p. | 0 39 40 | F.G.F. | 15 3 10 p. | 22 .39 | 1 | M.A. |
| | | | | | 18 .59 | 2 | ,, |
| | | | | 16 3 28 p. | 22 .93 | 5 | F.G.F. |
| | | | | | 22 .24 | 6 | ,, |

OBSERVATIONS OF HORIZONTAL MAGNETIC FORCE.

| DATE. 1888. | H.K.M.T. | Time of one Vibration. | Temperature Cent. | Log mX. | Value of m. | H.K.M.T. | Distance in Centimeters. | Temperature Cent. | Deflection. | Log $\frac{m}{X}$ Mean. | Value of X. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | s | | | | | | | | | | |
| January 16,... | 3h. 3m. p. | 3.5171 | 24°.0 | 2.35929 | 633.93 | 3h. 33m. p. | 30 | 22°.3 | 7° 28′ 6″ | 3.24480 | 0.36077 | F.G.F. |
| | | | | | | | 40 | | 3 8 0 | | | |
| February 14,... | 2 54 p. | 3.5119 | 16 .55 | 2.35952 | 633.51 | 3 24 p. | 30 | 16 .0 | 7 28 35 | 3.24400 | 0.36121 | ,, |
| | | | | | | | 40 | | 3 8 10 | | | |
| March 14,... | 3 23 p. | 3.5186 | 25 .3 | 2.35925 | 633.07 | 4 14 p. | 30 | 22 .4 | 7 26 50 | 3.24364 | 0.36124 | M.A. |
| | | | | | | | 40 | | 3 7 36 | | | |
| April 17,... | 2 46 p. | 3.5181 | 22 .3 | 2.35892 | 632.40 | 3 17 p. | 30 | 21 .1 | 7 26 32 | 3.24307 | 0.36134 | F.G.F. |
| | | | | | | | 40 | | 3 7 27 | | | |
| May 15,... | 2 58 p. | 3.5252 | 30 .2 | 2.35851 | 631.80 | 3 32 p. | 30 | 28 .5 | 7 24 50 | 3.24265 | 0.36135 | ,, |
| | | | | | | | 40 | | 3 6 36 | | | |
| July 17,... | 3 12 p. | 3.5349 | 31 .4 | 2.35666 | 629.20 | 4 7 p. | 30 | 29 .9 | 7 22 45 | 3.24091 | 0.36130 | M.A. |
| | | | | | | | 40 | | 3 5 44 | | | |
| August 14,... | 3 0 p. | 3.5348 | 30 .2 | 2.35623 | 627.99 | 3 50 p. | 30 | 28 .5 | 7 21 51 | 3.23967 | 0.36164 | ,, |
| | | | | | | | 40 | | 3 5 17 | | | |
| September 14,... | 3 16 p. | 3.5392 | 30 .5 | 2.35492 | 626.89 | 4 13 p. | 30 | 29 .1 | 7 21 16 | 3.23948 | 0.36118 | ,, |
| | | | | | | | 40 | | 3 5 15 | | | |
| October 15,... | 2 55 p. | 3.5410 | 29 .3 | 2.35418 | 625.35 | 3 29 p. | 30 | 27 .6 | 7 20 20 | 3.23807 | 0.36145 | F.G.F. |
| | | | | | | | 40 | | 3 4 42 | | | |
| November 14,... | 3 9 p. | 3.5399 | 25 .1 | 2.35359 | 624.47 | 4 5 p. | 30 | 23 .2 | 7 20 22 | 3.23742 | 0.36147 | M.A. |
| | | | | | | | 40 | | 3 4 51 | | | |
| December 14,... | 3 18 p. | 3.5407 | 23 .45 | 2.35313 | 623.95 | 3 47 p. | 30 | 21 .8 | 7 20 21 | 3.23716 | 0.36140 | F.G.F. |
| | | | | | | | 40 | | 3 4 50 | | | |

RESULTS OF MAGNETIC OBSERVATIONS IN 1888.

| Month. 1888. | Declination, East. | Dip, North. | MAGNETIC FORCE. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ENGLISH UNITS. | | | METRIC UNITS. | | | C. G. S. UNITS. | | |
| | | | X | Y | Total. | X | Y | Total. | X | Y | Total. |
| Jnuaary, ..... | 0° 43′ 21″ | 32° 23′ 43″ | 7.8246 | 4.9648 | 9.2668 | 3.6077 | 2.2892 | 4.2728 | 0.36077 | 0.22892 | 0.42728 |
| February, ..... | 43 56 | 21 13 | 7.8340 | 4.9627 | 9.2736 | 3.6121 | 2.2882 | 4.2759 | 0.36121 | 0.22882 | 0.42759 |
| March, ..... | 43 3 | 19 48 | 7.8347 | 4.9586 | 9.2722 | 3.6124 | 2.2863 | 4.2752 | 0.36124 | 0.22863 | 0.42752 |
| April,..... ..... | 39 49 | 20 42 | 7.8368 | 4.9629 | 9.2762 | 3.6134 | 2.2883 | 4.2771 | 0.36134 | 0.22883 | 0.42771 |
| May, ..... | 39 38 | 22 44 | 7.8370 | 4.9694 | 9.2798 | 3.6135 | 2.2913 | 4.2788 | 0.36135 | 0.22913 | 0.42788 |
| June, ..... | (38 53) | (20 24) | (7.8365) | (4.9616) | (9.2751) | (3.6133) | (2.2877) | (4.2767) | (0.36133) | (0.22877) | (0.42767) |
| July, ..... | 38 9 | 18 4 | 7.8360 | 4.9538 | 9.2704 | 3.6130 | 2.2841 | 4.2745 | 0.36130 | 0.22841 | 0.42745 |
| August, ..... | 39 54 | 15 43 | 7·8433 | 4.9511 | 9.2754 | 3.6164 | 2.2828 | 4.2767 | 0.36164 | 0.22828 | 0.42767 |
| September, ..... | 40 11 | 20 32 | 7.8334 | 4.9601 | 9.2717 | 3.6118 | 2.2870 | 4.2750 | 0.36118 | 0.22870 | 0.42750 |
| October, ..... | 42 4 | 20 54 | 7.8392 | 4.9650 | 9.2792 | 3.6145 | 2.2893 | 4.2785 | 0.36145 | 0.22893 | 0.42785 |
| November, ..... | 43 13 | 26 19 | 7.8397 | 4.9827 | 9.2892 | 3.6147 | 2.2974 | 4.2831 | 0.36147 | 0.22974 | 0.42831 |
| December,..... | 39 40 | 21 32 | 7.8380 | 4.9662 | 9.2790 | 3.6140 | 2.2898 | 4.2784 | 0.36140 | 0.22898 | 0.42784 |
| Mean..... | 0° 40′ 59″ | 32° 20′ 58″ | 7.8361 | 4.9632 | 9.2757 | 3.6131 | 2.2884 | 4.2769 | 0.36131 | 0.22884 | 0.42769 |

I have the honour to be,
Sir,
Your most obedient Servant,

W. DOBERCK,
*Director.*

The Honourable
THE COLONIAL SECRETARY,
*&c., &c., &c.*

## GOVERNMENT NOTIFICATION.—No. 173.

The following Notice is published for general information.

By Command,

FREDERICK STEWART,
*Colonial Secretary.*

Colonial Secretary's Office, Hongkong, 13th April, 1889.

## NOTICE.

The Surveyor General is now prepared to consider applications from persons desirous to connect private house-pipes with the Government Water Mains.

FRANCIS A. COOPER,
*Acting Surveyor General.*

Public Works Department, Hongkong 13th April, 1889.

## GOVERNMENT NOTIFICATION.—No. 174.

Tenders will be received at this Office until Noon of Saturday, the 20th instant:—

1. For the supply and delivery of cast-iron junction pipes and surface boxes.
2. For laying water-mains in the City of Victoria.

For forms of tender apply at this Office.
For specifications and further particulars apply at the Surveyor General's Office.
The Government does not bind itself to accept the lowest or any tender.

By Command,

FREDERICK STEWART,
*Colonial Secretary.*

Colonial Secretary's Office, Hongkong, 13th April, 1889.