

GENERAL OBSERVATIONS.—A transposition in the order of copying some parts of this book has occurred; the latter portion only was rejected, that is the lists of agricultural productions. I did not wish the contents to be left to perish. They are however but of very moderate consequence. Perhaps sect. 17, may be the most valuable. The list of kings is excessively loose, and unsatisfactory. In the Des. Catal. 20 sections are entered; but of these some are only distinct subjects in one paper, and some are not now in the book, *e. g.* there is found a title answering to section 8, but the filling in of the subject is wanting.

(To be continued).

II.—*Remarks on the practical utility of the Sympiesometer as a Marine Instrument; deduced from a series of Observations made with it during a Voyage from England to India.*—By RICHARD BAIRD SMITH, Lieutenant, Madras Engineers.

The voyage from England to India, carrying us through so much variety of climate, affords many opportunities of making interesting meteorological observations. Impressed with this idea I felt anxious that these should not be lost, and on the commander of the vessel in which I was a passenger, kindly offering to place his instruments under my charge, with the view of registering their indications, I gladly availed myself of his kindness, and took every opportunity which circumstances would permit of making my observations as complete as possible. I felt the more happy in thus daily employing a portion of my time, since one of the instruments, Adie's Sympiesometer, was to me perfectly new, and thence exceedingly interesting. I was led from this circumstance to pay closer attention to it, in the hope that I might thus discover the principles on which it was constructed, and determine its value as a practical aid to the seaman.

The conclusions at which I arrived will afterwards be stated; at present, since the Sympiesometer is neither so generally known nor appreciated as it ought, I will endeavour to describe the form of that instrument with which the annexed table of observations was made. By a reference to the elevation attached, it will be seen that the Sympiesometer consists first of a tube A of the form there exhibited. In the lower

portion of this is placed a quantity of highly rectified oil, whose surface is exposed to the free action of the pressure of the atmosphere. Supposing, though it is not the case, that common air filled the upper part of the tube above the oil, then a difference in the level of the latter would be the joint effect of two distinct causes. Firstly, a variation of the temperature would produce a change in the elasticity of the included air, and consequently the oil would rise or fall accordingly. Secondly, changes in the density of the atmosphere resting on the surface of the fluid would likewise produce proportional alterations of its level in the tube. It is only with the latter of these causes which we have to do; some method must therefore be found by which the change due to the former may be eliminated. This is done by the insertion of a scale so graduated that the errors due to thermometric influence are thereby corrected—hence the thermometer B is an essential part of the instrument, and indeed regulates every observation. The first step in each of these is to note the degrees which the thermometer shews, the scale C, which is fixed and exhibiting these thermometric degrees, the scale D, which is moveable by means of the knob E, is then set with its fleur-de-lis opposite the observed point at which B stands, and the indications then read off from C give the tabulated numbers or heights of the column of oil due solely to the pressure of the atmosphere. On the proper construction of the scale C depends the efficiency of the instrument, and it requires a most elaborate series of experiments to determine its different points to that degree of precision requisite in an instrument to be used for philosophical purposes—for practical use, its indications not being then necessarily so minute, the same laborious construction is scarcely requisite. Unless, however, considerable, nay great, care is taken in determining the differences due to the effect of heat, the Sympiesometer is scarcely to be depended upon. G is merely a register for marking the last observation. The whole is contained in a box about 2 feet long, 4 in. broad and 1½ in. deep, so that it is very portable. The preceding theory had suggested itself to me while on board, and on arrival here and making inquiries as to the real principles of the instruments, I found I had to substitute nitrogen gas for the common air in the upper portion of the tube, that having been found to afford the most correct indications; the principle however was correct. The instrument I used was one by the original patentee Adie, which, having been constructed shortly after his invention was made public, was of peculiarly beautiful workmanship. The thermometer was read off to hundredths of a degree, and of course, the scale C was corresponding, each single division being however considered as double, so that in a space divided to fifths, the readings go as far as

tenths. The instruments having been in constant use for 3 or 4 years, a slight concavity had formed in the upper portion of the tube from the trifling evaporation of the oil, allowance was always made for this in every observation, and the due correction applied to the results. The barometer, with which the Sympiesometer was compared, was a very beautiful one, by Troughton; its scale indicated to the hundredths of an inch, and was divided in a manner worthy of its maker. Its attached thermometer was always read off as a check to the other in the Sympiesometer, and thus as far as possible the chance of error removed. Both instruments were placed in the poop cabin with a free exposure, the Sympiesometer attached to the bulk head, which perhaps might make a little difference in temperature, but nothing material, and the barometer, as usual, suspended in jimbols.

In the third and fourth columns of the register, are inserted the latitude and longitude of the ship, at noon of the day of observation, and in the eighth, the direction of the wind is noted. The remarks on the weather include its state during the whole 24 hours, as marked in the ship's log, which for the purpose of making these extracts was kindly placed at my command. The range of the observations extends from lat. $23^{\circ} 57'$ S. to $2^{\circ} 39'$ N. and long. $26^{\circ} 50'$ W. to $80^{\circ} 50'$ E. so that, in tracing isothermal lines on the surface of the earth, a considerable number of distinct points will thus be supplied, from the thermometric columns, and though, to aid in the construction of each line, one element only then is obtained, yet it will not be altogether useless. By a reference to the register of the direction of the wind, it is found, that during the whole time we were between the parallels of latitude 30° and 40° , running down about 90° of longitude, out of 180 observations on the direction of the wind, upwards of $\frac{2}{3}$ are westerly; next to these, the northerly prevailed most, and next again the easterly. Of course these directions vary considerably, but under all circumstances at this period of the year, westerly winds prevail in these latitudes, and are taken advantage of in running down the longitude.

Passing now on to the main subject of this paper, I have first to remark, in regard to the indications of the Sympiesometer, that it invariably fell more on the approach of wind than of rain. It took little notice of passing showers, though succeeding each other with considerable rapidity, but the moment a squall seemed gathering, the level of the oil began to be lowered, and if it continued gradually sinking, we equally invariably had a strong breeze, and if it sunk very low a heavy gale. An objection, which has some weight, has I believe been stated to the Sympiesometer, arising from its being too delicate, and giving

sudden alarms by sinking two or three divisions on the approach of a comparatively trifling squall. This remark I found perfectly just, for the Sympiesometer, by itself, does certainly give alarming indications on trifling occasions, but while the barometer is observed along with it, the remedy is at hand. The latter takes no notice whatever of sudden squalls, though very violent during their short continuance, and I found in Captain Horsburgh's excellent treatise on the navigation to India, that this was, in his opinion, a most serious objection to the barometer. I could not but be struck with the beautiful manner in which the Sympiesometer removes this objection, for it just steps in to offer its aid, at the very point where it was wanted. It invariably foretold the approach of these squalls, indicating their violence by the number of divisions through which it descended, while the barometer stood perfectly, as far as the eye aided by a good microscope could judge, unmoved and heedless. Hence then we concluded, that, if the Sympiesometer fell alone, no danger was to be apprehended, as the squall would soon pass away, and facts invariably supported this conclusion, for we were not once deceived; on the other hand, when the barometer and Sympiesometer fell steadily together, we were sure to have a gale of greater or less violence. In our experience of this we were only once led astray, a very serious depression of the two instruments having been for some time observed, but no wind made its appearance. During the whole of the day however, in which these observations were made, we were enveloped in a thick fog bank which may offer a solution of this apparent contradiction, the elasticity of the air and its consequent power to exert the ordinary pressure being always diminished by the presence of a aqueous vapour. This was on the 5th June, lat. $37^{\circ} 10'$ S., long. $27^{\circ} 57'$ E. Bar. 29.70 inches, Symp. 28.09 per scale. Ther. $64^{\circ} 40'$. The lowest point to which the barometer fell during the voyage was 29.25. inches, and the corresponding point of the Sympiesometer was also its lowest, 27.68 per scale, June 14th, lat. $37^{\circ} 26'$ long. $61^{\circ} 27'$ E. Ther. 62.10 . wind westerly and blowing an exceedingly heavy gale.

The susceptibility of the Sympiesometer enabling it to detect changes unappreciable to our senses, frequently produced a rise in the column while the gale seemed unabated. This was always hailed as a favourable sign, and we seldom were wrong in concluding that the greatest force of the storm was expended, and that before long the wind would lull. One of the most striking instances of the efficient aid the two instruments would afford when observed together, was just before the storm of the 13th of June. A calm and beautiful day was succeeded by

an equally calm and beautiful night, not a cloud was in the sky, and the edges of the full moon were clearly and distinctly defined, with not a trace of any halo or other symptom of unsettled weather; but the Sympiesometer and barometer has been falling steadily and progressively together, and every one seemed to think that for once they would be proved not infallible. About 9 or 10 P. M., however, the clouds began gradually to gather on the horizon, and the waves in the distance shewed their white crests, the sky became troubled, the moon seemed watery-like; every preparation accordingly was made for a storm, and about midnight the wind rose, and gradually strengthened till the noon of the same day, when it blew a heavy gale. On the night of the 14th we were in imminent danger, and had the instruments not given us timely warning few of us might have lived to tell the tale. Few, after this proof of their efficiency, thought of despising their prognostications. The three rules of Mr. Hemmer, in regard to the circumstances which regulate the rising and falling of the mercury in the barometer, I found very distinctly indicated by the Sympiesometer. These are:

1. First when the sun passes the meridian, the barometer, if in the act of falling, continues to do so in an accelerated degree.
2. When the sun passes the meridian, the barometer, if in the act of rising, falls or becomes stationary, or rises more slowly.
3. When the sun passes the meridian, the barometer, which is stationary, falls, if it has not risen before or after being stationary; in which case it usually becomes stationary during the sun's passage.

These three rules all rest on the single fact, that, about noon, the pressure of the atmosphere becomes diminished; this result I clearly observed with the sympiesometer, and my remark, made in ignorance of the above rules, was confirmed by the experience of Captain Edmonds, who had observed this fact frequently during the three years he had used the sympiesometer. My observations are by no means sufficiently extensive for me to state definite quantities, I only remarked the decided tendency of the column of oil to lower its level about noon, and to rise again in the after part of the day. This is clearly connected with the sun's position in the heavens, perhaps the greater quantity of aqueous vapour present in the atmosphere, and due to the increased evaporation produced by his noon-day heat, may offer a solution of this difficulty, or perhaps it may be owing to some change of the electrical state of the atmosphere, due to the variable temperature of its different parts. There are no means of deciding, that I am aware of, what is the true cause of this, and speculation will not tend to settle the point.

The prevalence of different winds endues the atmosphere with vari-

able supporting powers, as I frequently observed the Sympiesometer to fall when the wind changed, and to resume its former level when this returned to its old quarter. I had intended to have discussed the observations with more detail, had time permitted, by the construction of diurnal barometric and sympiesometric curves, with the registered heights for their ordinates, and the hours of observations for their abscissæ, but, before I could have done this satisfactorily, and before the series could be available for purely philosophical purposes, certain corrections must have been applied, which it was not in my power to do; this paper is, therefore, merely intended to give an estimate of the practical utility of this instrument, and the opinion I entertain of it is, that, by itself, it is not of so much importance, but that, worked with the barometer, giving as it does the very information this withholds, I certainly think it a most valuable addition to our list of marine instruments. The original construction of the Sympiesometer must however be good, otherwise it is not to be depended upon, and I am inclined to think much of the prejudice which has arisen against it among naval men takes its origin from the patent having been invaded, and cheap, and inferior articles having been manufactured, and sold. From my own observations I am most favourably impressed in regard to it, and should always like, in every ship, to see the barometer and Sympiesometer lending their aid to correct and strengthen each others indications. The deductions from the table of observations may be condensed into the following general rules, it being taken for granted that the barometer and Sympiesometer are observed together, since this is, we repeat, the only method whereby the greatest benefit can be derived from their indications in guiding the commander of a vessel as to the weather he is to prepare for.

1. The steady simultaneous rising of the two, or their retaining together a permanently high position, presages good and fair weather.

2. Their simultaneous depression indicates a change to bad weather; if they fall very low, a heavy gale, usually accompanied with rain, may be expected.

3. If during the continuance of a gale, however violent it may be, at the moment of observation, the two exhibit a decided tendency to rise, the force of the storm will soon abate, its maximum point being passed. If the Sympiesometer, in consequence of its greater susceptibility of slight variations in the atmospheric pressure, rises alone, not so much confidence is to be placed in the hope that the storm is abated:—such rising is however a good sign, as it was usually soon accompanied by a rise of the mercury in the barometer.

4. If a storm seems gathering, of which the barometer takes no notice, but by which the Sympiesometer alone is affected, a short squall will be the result. No alarm need be entertained, for here the barometer completely checks and corrects the Sympiesometer.

5. A simple change of wind may produce a depression of the Sympiesometer; of this the barometer takes no notice.

6. A slight allowance must be made for the depression at noon.

The preceding six remarks exhibit the whole of the results of practical importance. There exists an impression, that both the barometer and Sympiesometer lose their power within the tropics; unfortunately we had no good opportunity of putting this to a complete test. The Sympiesometer, however, as far as we could judge, *retained* its sensibility, as its indications varied, even during the continuance of the fine weather we had. Why the pressure of the atmosphere should cease to act, or rather to exhibit the proofs of its action, within the tropics, it is difficult to conceive; the indications of the instrument will of course be more vitiated by the increase of temperature, and the larger quantity of moisture present in the air, but that the same cause will produce similar effects, either at the Equator or the Pole, is certain, and, if it is the case that barometric indications are not trustworthy within the tropics, we must look for the cause in some concomitant circumstances. I found the minds of those naval men I came in contact with, firmly impressed with this idea, which they said they based on experience, without being able to account for it, yet there are instances on record, in which, on the approach of storms, or hurricanes, immediately under the line, the mercury has fallen upwards of an inch. The deviations of the mercury from its mean annual height are certainly far greater, and more frequent, towards the Poles, than near the Equator, the reasons mentioned above of increased temperature, and diminished elasticity may, to a certain extent, account for this. Our information is however by no means satisfactory; much must yet be done in meteorology before any thing can be offered worthy of serious consideration. The circumstance has been noticed, simply in consequence of its having been suggested, and as a point on which more decided information would be interesting. The many practical rules, based on experience, whereby seamen judge of the weather, and prognosticate coming storms, or calms, from the appearances of the heavens, are accompanied with considerable interest. The first I noticed, was the indications of wind coming from a certain quarter, by the appearance there of flashes of lightning. To this considerable attention was paid, and it was found generally correct, when the horizon was free from clouds in the quarter whence the lightning proceeded. If however

clouds were there, the indications were always false, the lightning being caused by the discharge of the electric fluid from one of these to the other, whereas in the first case, it seems as if some disturbance in the usual state of the electricity of the atmosphere was taking place, dependant on the effects of currents of air. Here again we are all in doubt and darkness, for we know little of any thing of the correct agency of electricity in meteorology; there is a wide field open for investigations connected with it, and a few hints are even already given us of the important part it plays in several of our atmospheric phenomena. The indications of wind from the appearance of meteors, I found invariably false, although the sailors placed considerable dependance upon them. The appearance of cirri, or Grey Mare's tails in the sky, told us to expect wind, and indeed from their appearance, it is natural to conclude, they are under the influence of the currents in their own regions, which may soon be expected to affect ours. The cirro-cumuli were usually apparent in settled, and fine weather. Some attention was paid to the old, and long established prejudice, in regard to the moon's effect on the weather. The impossibility of explaining this influence satisfactorily, naturally induces scepticism as to its actual existence, and since there is no method of proving whether the moon actually does, or does not affect the weather, except by long, and careful observations, conducted by men acquainted with science, and unprejudiced in their views, we must cast aside opinions, however hallowed by the lapse of time, and base our conclusions on facts and facts alone. Experience seems decidedly to uphold the doctrine, but the question occurs—if so, how does the moon act? Tabulated observations indicate slight diurnal tides in the atmosphere, which we would be led to anticipate, from the action of gravitation, but as to what are the secondary laws, by which the moon exercises such an extensive sway over the weather, it is difficult to say. Her electric influence is scarcely sensible to the most delicate instruments, and indeed, so much difficulty attends our search for the cause of her influence, that we are inclined to consider the whole as a deep rooted, though certainly useful prejudice; the existence of which proves the low ebb of the science of meteorology.

That this apparently most capricious, because to us incomprehensible, branch of natural science, is governed by similar regular laws, to those which have been impressed on every sister science, there can be no doubt; it is our ignorance only which turns order into disorder, beauty into confusion. The human mind, even when gifted with very extensive powers, when it has many marked phenomena presented to its view, finds it difficult, almost impossible, to rest satisfied till some cause has

been found by which these can be explained—it readily grasps at any plausible explanation, and what at first it admitted only as a means of removing dissatisfaction, becomes, when harboured as a frequent guest, a strong and rooted prejudice, and if future experience tends to confirm the idea, it cares not about farther investigation, because certainty would again be succeeded by uncertainty, and the prejudice gradually passes into firm conviction, capable of resisting for a long time any amount of counter evidence. Such may have been the origin of the almost universal opinion in regard to the moon's influence on the weather—for the latter being so exceedingly variable, there is every probability, that numberless coincidences with its changes, and those of the moon, may be expected; but how the same cause can produce such diametrically opposite effects as she has the credit of doing, I confess seems to me exceedingly puzzling; it would be foreign to the subject of this paper to enter on such a question in detail, the subject has been treated at considerable length in the *National Journal of Science, &c.*, by Sir David Brewster, and I was pleased to find the views there taken were similar to those expressed above, but supported by tabular data of long continued observations. My own remarks on the voyage fully confirmed these sceptical views; the prejudice is however by no means an useless one, for it often comes, most opportunely, to offer its aid both to the agriculturalist, and the seaman, for they look forward with hope to the change of the moon, in bad weather, as the harbinger of better, in good weather, as the means of its continuance; at one time, it is expected to bring rain, at another, it is to drive it away; it ushers in the frost, and commences the thaw, and on the whole it has certainly most multifarious and diversified duties imposed upon it; and, if it really performs them, must be looked upon not only as one of our greatest blessings—but as one of the most singular phenomena of creation, puzzling alike to the simple and the sage.

Comparative Register of the Variations of Atmospheric Pressure, as indicated by the Barometer and S ympicometer.

Commenced May 17th, } 1838.
 Finished June 28th. }

From lat. 23° 59' S. to 26° 00'
 " long. 26° 59' W. to 21° 00' W.

Date of observa- tion.	Hour of observa- tion.	Noon latitude.	Noon longi- tude.	Height of barom.	Height of sympes.	Height of ther.	Direction of wind.	Remarks on the weather, &c.
May 17th	12	23.59	26.50	.....	28.41	69.00	S. S. W.	A. M. variable, light winds and cloudy.
	4 P. M.	.....	.....	.....	.40	67.50	S. W.	Noon. light airs and fine.
	6½ "	.....	.....	.....	.50	67.00	S. S. W.	P. M. lt. br. and fine—6h. cloudy—8h. do.
18th	8 A. M.	24.35	25.44	.....	.38	68.00	S. W.	A. M. variable winds and cloudy—8h. do.
	12 "	.....	.....	.....	.24	69.00	S. W.	Noon. do.
	4 P. M.	.....	.....	.....	.30	60.20	S. W.	P. M. do. 6h. cloudy—8h. moderate and fine.
19th	9 A. M.	26.09	21.00	.....	24.24	70.20	W. S. W.	A. M. variable winds and squally—8h. breeze in- creased, and fine—11h. 30m. strong breeze, squally with rain.
	12 "	.....	.....	.....	.16	71.4	W. S. W.	
	4 P. M.	.....	.....	29.80...	.14	71.80	W. S. W.	
20th	4½ "	.....	.....	.80	.14	71.60	N. N. W.	P. M. squally with heavy rain at times—4h. Fresh gales and squally—6h. strong gales and heavy squalls at times—8h. do.—midnight do.
	6 "	.....	.....	.70	.10	71.00	"	
	9½ "	.....	.....	.78	.13	71.00	"	

TABLE continued.

From lat. 27° 00' S. to 30° 45' S.
 " long. 19° 30' W. to 15° 26' W.

May 20th	6	A. M.	27.00	19.30	.78	.20	65.30	w. by s.	A. M. strong gales attended with heavy squalls of wind, and rain—4h. do.—8h. do.
	8	"	"	"	.80	.26	66.00	w. s. w.	"
	12	"	"	"	.80	.20	66.40	"	Noon. more moderate.
	2½	P. M.	"	"	.70	.24	65.40	"	P. M. strong breeze and squally at times—4h. do. more moderate—8h. moderate and cloudy.
	4	"	"	"	.80	.18	65.00	"	MIDNIGHT. Fresh breeze and squally.
	6	"	"	"	.2	.24	65.00	s. w.	A. M. fresh breeze and squally—8h. moderate.
	8½	A. M.	"	"	30.00	.44	65.30	"	Noon. Fine.
	12	"	29.31	18.35	"	.46	65.20	w. s. w.	P. M. Moderate breeze and fine—4h. squally and rain—6h. cloudy—8h. variable winds and cloudy—midnight moderate.
22d	4½	P. M.	28.31	18.35	30.10	28.44	64.40	s. w. by w.	"
	6	A. M.	"	"	.50	.64	63.00	Variable	A. M. variable winds and fine—4h. squally, moderate.
	8½	"	"	"	.22	.66	64.00	"	Noon. Fine.
	10½	"	"	"	.24	.64	64.00	"	P. M. light winds and fine—5h. do.—8h. do.—11h. do.
	12	"	"	16.28	.27	.50	66.00	s. w.	"
	4½	P. M.	"	"	.30	.70	64.20	s. w. by s.	"
	8	A. M.	"	"	.36	.76	63.20	N. w.	A. M. calm and fine—6h. cloudy—7h. light breeze and fine.
	10	"	"	"	.30	.70	.30	"	Noon. Do.
24th	12½	"	30.45	15.26	.30	.70	.00	Variable	P. M. light winds, variable and fine—6h. variable cloudy—7h. squally—8h. cloudy—11h. 30m. variable and squally.
	3	P. M.	"	"	.30	.70	67.00	"	"
	6½	"	"	"	.30	.70	66.20	"	"
	8	A. M.	"	"	.25	.68	65.00	"	"
	10	"	"	"	.20	.66	65.20	N. w.	A. M. variable winds and fine—4h. do.—8h. do. Noon. Do.

TABLE continued.

From lat. 31° 26' S. to 31° 40' S.
From long. 13° 40' W. to 3° 42' W.

Date of observation.	Hour of observation.	Noon latitude.	Noon longitude.	Height of barom.	Height of sympes.	Height of ther.	Direction of wind.	Remarks on the weather, &c.
May 24th	12 A. M.	31.36	13.40	30.18	28.60	66.40	N. W.	P. M., increasing breeze and fine—4h. fine.
	3 P. M.	.....	.....	.14	.58	67.00	"	6h. moderate and cloudy with rain—8h. moderate and fine—midnight, variable and squally.
	4½ "	.....	.....	.14	.58	67.00	"	
25th	6 "	.....	.....	.14	.58	67.00	Variable	A. M. variable winds and squally—4h. cloudy and rain—8h. fresh breeze and fine.
	8 A. M.	.....	.....	.12	.54	66.00		Do.
	1 P. M.	32.56	10.58	.10	.50	67.30	N. N. W.	Noon, do.
26th	6 "	.....	.....	.14	.52	67.00	Variable	P. M. moderate breeze and fine—4h. do.—7h. do.
	8½ A. M.	.....	.....	.12	.50	66.30		MIDNIGHT, Increasing breeze and fine.
	1 P. M.	33.42	7.06	.08	.54	67.30	S. N. E.	A. M. fresh breeze and bazy—4h. do.—8h. do.
27th	3 "	.....	.....	.08	.48	67.10	"	Noon, fresh breeze and fine.
	5 "	.....	.....	.10	.48	67.10	"	P. M. fresh breeze and bazy—6h. do.—8h. fresh breeze with rain—midnight do.
	8 "	.....	.....	.12	.44	70.00	"	
28th	11½ "	.....	.....	.02	.43	68.00	"	
	1 A. M.	.....	.....	.04	.43	69.00	N. W.	A. M. squally with sudden shifts of wind.
	8½ "	.....	.....	.13	.46	65.00	"	4h. moderate breeze and cloudy with rain—8h. do.
29th	10 "	.....	.....	.04	.52	64.20	"	
	12½ "	34.40	3.42	.04	.50	64.00	West.	Noon, Fresh breeze and fine.
	3 P. M.	.....	.....	.04	.54	64.00	W. by S.	P. M. fresh breeze and bazy—4h. moderate do.—8h. do.—midnight moderate and fine.
30th	8 "	.....	.....	.12	.58	64.00	"	

TABLE continued.

From lat. 34° 58' S. to 35° 01' S.
 " long. 0° 33' W. to 0° 04' E.

May 28th	8 A. M.	.....	.....	.....	.20	.64	61.20	w. by n.	A. M. moderate breeze and fine—4h. variable and hazy—8h. do.
	10 "	.....	.....	.....	.20	.66	61.30	"	do.
	1 P. M.	.....	.....	0.33	.15	.58	62.00	N. W. by N.	Noon. do.
	3 "	.....	.....	.....	.12	.60	62.20	"	P. M. increasing breeze and hazy—4h. do.—6h. cloudy and hazy—8h. do.—midnight do.
29th	8½ A. M.	.....	.....	.....	29.97	.46	63.00	N. W. by N.	A. M. moderate breeze and hazy—4h. do. daylight increasing breeze—8h. fresh breeze and hazy.
	1 P. M.	.....	.....	2.40	.92	.38	63.20	NORTH	Noon. Moderate and hazy.
	3 "	.....	.....	.....	.87	.32	63.40	"	P. M. fresh breeze cloudy and rain—4h. do.—
	4½ "	.....	.....	.....	.82	.28	63.00	"	6h. do.—8h. fresh breeze and cloudy—midnight do.
	8 "	.....	.....	.....	.82	.24	65.00	N. W.	
	9½ "	.....	.....	.....	.81	.21	65.20	"	
30th	6 A. M.	.....	.....	.....	.58	.02	64.60	N. W.	A. M. fresh breeze and cloudy—4h. do.—5h. squally and rain—7h. strong breeze with rain—8h. sudden shift of wind to westward with heavy rain.
	8½ "	.....	.....	.....	.75	.02	65.00	"	
	9½ "	.....	.....	.....	.51	.00	63.40	West	
	10½ "	.....	.....	.....	.58	.03	63.00	"	Noon. Variable and cloudy.
	1 P. M.	.....	.....	6.04 E.	.50	27.98	63.20	N. W.	P. M. fresh breeze and fine—4h. strong breeze and fine—6h. fresh gale and squally with rain at times
	3 "	.....	.....	.....	.50	.96	62.30	N. W. by N.	—8h. do. moderate do.
	5 "	.....	.....	.....	.50	.96	62.60	"	
	9 "	.....	.....	.....	.50	.96	64.40	"	
31st	7 A. M.	.....	.....	.....	30.46	28.16	59.50	West	A. M. fresh gales accompanied with heavy squalls at times, and rain—4h. do. with light-
	8½ "	.....	.....	.....	.66	.26	59.10	"	ning.
	9½ "	.....	.....	.....	.68	.22	59.20	"	

TABLE continued.

From lat. 36° 07' S. to 37° 13' S.
 " long. 10° 02' E to 21° 31' E.

Date of observation.	Hour of observation.	Noon longitude.	Noon latitude.	Height of barom.	Height of sympies.	Height of ther.	Direction of wind.	Remarks on the weather, &c.
May 31st	2 P. M.	36.07	10.02	30.76	.28.27	62.00	west	Noon. Strong gales and squalls at times with hail and rain.
	8 "			.94	.37	61.00	"	P. M. Do.—4h. more moderate—6h. squalls—8h. moderate breeze with squalls at times—midnight squally
	8½ "			.93	.38	61.30	"	
June 1st	6 A. M.			.96	.46	56.00	Variable	A. M. variable winds and squally at times—4h. variable and cloudy—8h. variable.
	9 "			.98	.49	55.20	"	Noon. Variable and cloudy.
	1 P. M.	36.22	12.57	.96	.40	58.10	north	P. M. moderate breeze and cloudy—4h. increasing breeze and cloudy—midnight, fresh gales and squally.
	3 "			.92	.35	58.40	"	
	5 "			.88	.33	59.30	"	
	8½ "			.86	.28	59.40	"	
	11½ "			.76	.23	62.00	"	
2d	3 A. M.			.68	.17	62.60	"	A. M. fresh gales, squally at times—4h. more moderate—8h. do.—11h. squally with rain.
	7 "			.70	.15	62.40	"	Noon. fresh breeze with rain.
	8 "			.68	.16	62.20	"	P. M. fresh breeze with rain—4h. more moderate—
	9 "			.70	.20	62.20	"	8h. moderate and fine.
	10 "			.70	.18	62.20	"	Midnight. Moderate and cloudy.
	12½ P. M.	37.08	17.44	.76	.20	63.20	N. N. W.	
	4½ "			.76	.20	63.40	"	
3d	9 A. M.			.72	.22	64.30	Variable	A. M. fresh breeze and cloudy—4h. do.—6h. variable and cloudy with rain—8h. fresh breeze and cloudy with rain.
	10 "			.78	.24	64.30	N. N. E.	Noon. Do. do.
	1 P. M.	37.13	21.31	.76	.20	64.10	N. by E.	

Data continued.

Tromlar, $57^{\circ} 13' S.$ $16^{\circ} 37' 10'' E.$
 " long. $21^{\circ} 31' E.$ to $27^{\circ} 57' E.$

June 3d	3	P. M.	37.13	21.31	.73	.17	61.29	P. M. increasing breeze and squally—2h. fresh gales and fine with heavy following sea—5h. do.—7h. do.—8h. do. and fine—9h. 2d. Strong gales and squally with heavy rain.
	6	"	"	"	.72	.16	63.60	do. do.
	8	"	"	"	.74	.10	67.10	do. do.
	12	"	"	"	.71	.10	67.39	do. do.
4th	5	A. M.	"	"	23.85	.28	65.00	A. M. fresh gales and squally at times—2h. more moderate with lightning to seaward—4h. moderate and fine—8h. squally.
	8	"	"	"	.86	.36	65.20	Noon. Fresh breeze and fine.
	9	"	"	"	.95	.36	68.00	P. M. moderate breeze and fine.
	12	"	37.21	25.10	.92	.31	65.40	do. do.
	1	P. M.	"	"	.92	.34	67.40	do. do.
	3	"	"	"	.98	.32	69.40	do. do.
	5	"	"	"	.97	.32	67.50	do. do.
5th	8	A. M.	"	"	.76	.28	66.00	A. M. light winds and haze—9h. do.—5h. do. and haze—11h. variable winds and slight fog.
	9	"	"	"	.73	.27	66.70	do. do.
	10	"	"	"	.78	.28	65.10	Noon. do.
	12	"	37.10	25.57	.70	.12	61.30	P. M. light variable winds and thick foggy weather—5h moderate breeze and haze—6h. do.—10h. sudden shifts of wind to S. W. variable and cloudy with lightning to N. E.
	3	P. M.	"	"	.72	.12	61.00	do. do.
	4	"	"	"	.79	.12	65.20	do. do.
	6	"	"	"	.78	.00	66.90	do. do.
	8	"	"	"	.78	.13	66.60	do. do.
	8	"	"	"	.76	.12	68.70	do. do.
	11	"	"	"	.78	.20	63.60	do. do.

TABLE continued.

Date of observation.	Hour of observation.	Noon latitude.	Noon longitude.	Height of barom.	Height of sympes.	Height of ther.	Direction of wind.	Remarks on the weather, &c.
June 6th	6 A. M.	.....	.....	29.88	28.34	62.00	s.w. by s.	A. M. moderate and cloudy with lightning to E. and N. E.—4h. do.—8h. squalls with rain.
	8 "	.....	.....	.98	38	61.10	west.	Noon, fine.
	12 "	37.15	31.30	.98	38	61.20	w. by s.	P. M. moderate breeze and fine—4h. do.—6h. do.—
	3 P. M.	.....	.....	30.60	.48	61.20	S. E.	moderate and fine.
	6 "	.....	.....	29.98	.49	61.26	"	Moderate, cloudy.
	8 "	.....	.....	30.00	.38	64.29	"	"
	8 A. M.	.....	.....	.60	.56	61.30	s.w. by s.	A. M. increasing breeze and cloudy—4h. fresh breeze and fine—8h. do.
	12 "	36.59	35.27	29.98	.37	65.29	n. w.	Noon, fresh breeze and fine.
	3 P. M.	36.50	35.27	29.98	28.36	65.40	n. w.	P. M. fresh breeze and cloudy at times—6h. fresh breeze and fine—8h. do.—10h. squally and rain.
	4 1/2 "	.....	.....	.96	.34	65.40	"	"
6 "	.....	.....	.96	.33	66.10	"	Moderate, do.	
8 "	.....	.....	30.00	.27	67.30	"	"	
8th	2 A. M.	.....	.....	29.55	.36	66.50	w. s. w.	A. M. fresh breeze squally and rain at times—4h. moderate and fine—8h. squally.
	8 "	.....	.....	30.06	.50	65.40	"	Noon, moderate and fine.
	10 1/2 "	.....	.....	.14	.46	65.20	"	"
	12 "	36.46	39.15	.06	.42	66.10	"	P. M. moderate and cloudy at times—4h. squally—
	3 P. M.	.....	.....	.04	.44	65.30	"	6h. fresh breeze and cloudy—8h. moderate and fine.
	4 1/2 "	.....	.....	.05	.44	65.10	"	Moderate, fresh breeze and fine.
	8 "	.....	.....	.10	.48	65.29	"	"

TABLE continued.

From lat. 36° 55' S. to 37° 03'		" long. 43° 13' E. to 53° 39'					
June 9th	S. A. M.	.....	.14	66.29	WEST	A. M. fresh breeze and cloudy at times—4h. moderate and fine—8h. do.
	10 "	.....	.12	64.20	"	Noon, fresh breeze and fine.
	12 1/2 "	36.35	.08	64.10	w. by s.	P. M. fresh breeze and fine—4h. more moderate—6h. moderate breeze and fine—8h. do.	
	3 P. M.	.....	.14	64.10	"	MIDNIGHT, do.
	4 1/2 "	.....	.14	66.20	"	"
	7 "	.....	.14	66.20	"	"
	9 "	.....	.16	66.20	"	"
	10th	S. A. M.14	64.10	Variable	A. M. moderate breeze and fine—4h. variable and fine—6h. same—8h. variable and cloudy.
	12 1/2 "	37.69	.12	63.30	"	Noon, variable and heavy.	
	3 P. M.	.....	.10	64.20	"	P. M. light winds and variable—4h. sudden shift of wind with rain—6h. variable and cloudy—8h. do.
	6 "	.....	.10	65.20	SOUTH	MIDNIGHT, moderate breeze and fine.
	8 "	.....	.12	65.40	"	"
11th	S. A. M.	.....	.06	63.30	S.W. by S.	A. M. moderate breeze and fine—4h. do.—6h. fresh breeze and fine.
	10 1/2 "	.....	.06	64.20	"	Noon, fresh breeze and fine.
	12 1/2 "	36.39	30.00	65.10	S.W. by S.	Noon, fresh breeze and fine.	
	3 P. M.	.....	29.96	65.30	"	P. M. do.—4h. do.—6h. do.—8h. strong breeze and fine.
	6 "	.....	.05	65.20	"	"
	8 "	.....	.03	66.00	"	MIDNIGHT, fresh breeze and squally.
12th	S. A. M.	.....	.88	64.10	"	A. M. fresh breeze and cloudy—4h. do.—8h. do. fresh breeze and fine.
	10 "	.....	.86	64.40	"	"
	12 "	37.09	.82	65.20	"	Noon, do.	

Table continued.

From lat. 37° 09' S. to 17° 56' S.
 " long. 52° 29' E. to 61° 27' E.

Date of observa- tion.	Hour of observa- tion.	Noon latitude.	Noon long.	Height of barom.	Height of sympies.	Direction of wind.	Remarks on the weather, &c.	
June 21 st	5 P. M.	37.00	53.39	29.82	27.22	N. by E.	Light breeze and fine—	
	6 "	"	"	.76	.21	"	3h. 40. fresh breeze and fine.	
	8 "	"	"	.74	.12	"	Variable, fresh breeze and fine.	
	9 "	"	"	.70	.05	S. by W.	"	
23 rd	11 th 25 A. M.	"	"	.66	.05	N. by E.	Strong breeze and cloudy—4h. do.—6h. in- creasing breeze.	
	7 "	"	"	.56	.00	"	Noon, strong gales and heavy sea.	
	8 "	"	"	.56	27.23	"	"	
	9 "	"	"	.54	.07	"	"	
	21 P. M.	37.37	57.59	.40	.88	"	Strong gales and squally at times—6h. do.	
	22 "	"	"	.39	.84	"	"	
	6 th "	"	"	.36	.78	"	Moderate, strong gales and heavy squalls.	
	8 "	"	"	.35	.77	"	"	
	11 "	"	"	.39	.74	"	"	
	14 th	3 A. M.	"	"	.25	.68	S. W.	"
	9 th "	"	"	"	.32	.86	"	A. M. strong gales and heavy squalls at times— 4h. do. ship hove to from the strength of the gale—5h. strong gales—5h. more moderate.
	10 th "	"	"	"	.43	.94	W. by N.	Noon, fresh breeze and cloudy.
12 "	"	37.26	61.27	.58	.90	"	A. M. fresh breeze and fine—4h. do.—6h. cloudy	
1 P. M.	"	"	"	.40	.82	W. by N.	"—5h. moderate and cloudy with lightning to N. E.	
8 "	"	"	"	.42	.94	"	Moderate, squally appearance to W.	

From lat. 37° 26' S. to 33° 08'
" long. 61° 27' E. to 71° 06'

TABLE continued.

14th	4 P. M.	37.26	61.27	23.48	27.91	62.00	West.	
	6 "	.....	.....	.48	.94	61.26	"	
	8 "	.....	.....	.50	.96	62.20	Variable	A. M. cloudy.
15th	8 A. M.	.....	.....	.65	28.17	58.00	"	Noon, squally with rain.
	9 "	.....	.....	.64	.18	59.00	"	P. M. fresh breeze and fine--4h. heavy, squally and rain--5h. severe squally.
	12 "	Sum.	.....	.62	.14	59.20	"	
	3 P. M.	Invisible	.....	.55	.16	57.20	West.	
	3 "	.....	.....	.68	.17	57.20	"	
	5 1/2 "	.....	.....	.70	.18	57.40	"	
16th	7 A. M.	.....	.....	.84	.36	53.40	"	A. M. strong breeze and fire.
	8 "	.....	.....	.50	.37	54.10	"	P. M. fresh breeze and squally at times--4h. squally with rain and hail--8h. moderate and cloudy--8 1/2h. squally.
	11 "	.....	.....	.94	.53	58.10	"	
	3 P. M.	.....	.....	.91	.50	57.10	w. by N.	
	4 1/2 "	.....	.....	.58	.48	55.20	"	
	6 "	.....	.....	30.00	.52	55.20	"	
	8 "	.....	.....	.64	.54	55.20	w. S. W.	
17th	3 A. M.	.....	.....	.55	.70	53.40	S. W.	A. M. moderate--8h. cloudy--9h. squally with rain.
	10 "	.....	.....	.30	.76	53.20	"	Noon, moderate breeze and fine.
	12 "	33.08	71.06	.28	.70	54.20	"	P. M. moderate breeze and fine--4h. squally--
	3 P. M.	.....	.....	.30	.76	55.10	South.	6h. cloudy--8 1/2h. squally and rain.
	6 "	.....	.....	.38	.81	55.00	"	
	7 1/2 "	.....	.....	.40	.82	56.40	S. S. E.	

TABLE continued.

From lat. 31° 02' S. to 27° 27'
" long. 73° 53' to 76° 27'

Date of observation.	Hour of observation.	Noon latitude.	Noon long.	Height of barom.	Height of sympes.	Height of therm.	Direction of wind.	Remarks on the weather, &c.
June 18th	8 A. M.	.....	.....	.50	.92	55.10	S. S. E.	A. M. squally with light rains—4h. fine—8h. fresh breeze and squally.
	10 1/2 "	.....	.....	.52	.97	55.49	"	Noon, do. do.
	12 1/2 P. M.	31.02	73.53	.50	.93	58.10	S. E.	P. M. do. do. all night.
	6 "	.....	.....	.46	.86	59.20	"	
	8 "	.....	.....	.48	.92	58.10	"	
	3 1/2 "	.....	.....	.48	.90	58.40	"	
	8 A. M.	.....	.....	39.46	28.86	59.40	E. S. E.	A. M. strong breeze and heavy squalls—Sh. do.
	10 1/2 "	.....	.....	.41	.84	61.40	S. E.	do.
	12 "	27.59	75.17	.40	.77	63.10	"	Noon, do. do.
	6 P. M.	.....	.....	.42	.76	64.40	"	P. M. do. do. all night.
20th	6 "	.....	.....	.42	.74	63.10	"	
	9 "	.....	.....	.40	.74	63.10	"	
	3 A. M.	.....	.....	.30	.64	61.00	Variable	A. M. Fresh breeze with heavy squalls and rain at times—8h. do.
	5 P. M.	25.27	76.27	.26	.51	67.20	S. E.	Noon, do.
	6 "	.....	.....	.22	.52	67.50	"	P. M. fresh breeze and squally—4h. do.—6h. do.—8h. do. with rain.
	8 "	.....	.....	.22	.52	67.40	"	Midnight, strong breeze and squally.
	9 "	.....	.....	.20	.52	67.40	"	
	6 1/2 A. M.	.....	.....	.10	.46	67.20	"	A. M. strong breeze and squally with light rain
8 "	.....	.....	.16	.46	68.00	"	continued till	
10 "	.....	.....	.16	.48	69.00	"	Noon and	

TABLE continued.

June 21st 12 ^h	22.09	78.25	.03	.42	70.10	S. E.	P. M. till 6h, more moderate—Sh. fresh breeze and cloudy.
3 P. M.	.....	.....	.08	.40	69.40	"	MIDNIGHT, do.
6 "	.....	.....	.08	.40	69.40	"	
9 "	.....	.....	.08	.40	69.40	"	
22d 6 A. M.	.....	.....	.12	.44	69.40	"	A. M. fresh breeze and cloudy at times.
8 "	.....	.....	.14	.46	70.29	"	Noon, fresh breeze and fine.
10 ^h "	.....	.....	.16	.48	71.40	"	P. M. do.—Sh. do.—Sh. fresh breeze and cloudy—
11 ^h P. M.	18.41	78.58	.10	.33	72.80	S. E. by E.	10h, squally.
3 "	.....	.....	.10	.37	72.40	"	MIDNIGHT,
6 "	.....	.....	.16	.42	72.40	"	
9 "	.....	.....	.18	.38	73.09	"	
23d 8 A. M.	.....	.....	.12	.52	74.80	"	
1 P. M.	15.11	79.23	.04	.26	75.10	Variable	A. M. strong breeze and squally at times—
3 "	.....	.....	.00	.22	73.40	"	Sh. do. but fine.
6 P. M.	15.11	79.23	.04	.28	75.10	Variable	Noon, do.
9 "	.....	.....	.04	.26	75.09	S. E. by E.	P. M. do.—Sh. do.—6h, more moderate.
24d 8 ^h A. M.	.....	.....	.08	.22	77.00	"	do. moderate breeze and cloudy.
21 P. M.	12.07	79.55	.02	.15	78.00	"	MIDNIGHT, do.
3 "	.....	.....	.00	.19	78.00	"	A. M. moderate and fine—Sh. do.
6 "	.....	.....	.03	.13	78.20	"	P. M. do.—Sh. squally and light rain—6h, fresh breeze and cloudy—Sh. do.—11h, squally.
							Noon, squally and rain.

Tonne recueillies.

Date of observation.	Hour of observation.	Neon Ethylic.	Neon lough.	Height of bar.	Height of synops.	Height of wind.	Direction of wind.	Remarks on the weather. No.
June 24th	9 P. M.	.....	.....	19.67	26.17	75.00	S. W.	
	8 1/2 A. M.	.....	.....	.72	.15	74.00	"	A. M. fresh breeze and squally, and rain at times—Sh. fresh breeze and fine.
	9 1/2 "	.....	.....	.64	.12	75.20	"	Noon, do.
	12 "	8.56	8.57	.50	.10	80.70	Variable	P. M. variable winds and fine.—4h. variable winds and cloudy.
25th	3 P. M.	.....	.....	2.92	27.34	80.40	"	Mistery, squally.
	6 1/2 "	.....	.....	.78	.03	81.00	S. E. by E.	A. M. winds—ch. squally with rain—sh. ft. breeze.
	9 "	.....	.....	30.02	25.03	81.80	"	Noon, cloudy.
	8 A. M.	.....	.....	23.98	.05	82.10	"	P. M. light winds and cloudy with rain—4h. cloudy with rain—5h. variable winds and cloudy.
	10 1/2 "	.....	.....	.98	.04	80.40	Variable	Mistery, light winds and cloudy, with rain.
	1 P. M.	5.55	80.11	.83	.02	81.20	"	A. M. light variable winds with lightning—sh. do.
26th	3 "	.....	.....	.84	.03	82.20	"	Mistery, light winds and cloudy, with rain.
	6 1/2 "	.....	.....	.58	.12	79.40	"	A. M. light variable winds with lightning—sh. do.
	10 "	.....	.....	30.60	.08	82.00	"	P. M. light breeze and sultry—4h. do.
	12 "	4.21	80.07	2.95	.04	82.20	"	Mistery, do.
27th	8 A. M.	.....	.....	.94	.00	82.40	E. by S.	Noon, do.
	12 "	.....	.....	.91	.02	83.20	"	Mistery, do.
	3 P. M.	.....	.....	.95	.01	83.40	"	From latitude 2° 31' long. to 60° 50' E. A. M. light winds and fine, S. do.
28th	8 1/2 A. M.	.....	.....	.98	.01	83.40	"	Noon, do.
	12 1/2 "	2.39	80.50	.92	27.98	83.50	E. by S.	do.
	3 "	.....	.....	.83	.04	81.20	"	do.
	6 "	.....	.....	.92	.98	84.20	"	do.
9 "	.....	.....	.95	.96	83.40	"	do.	