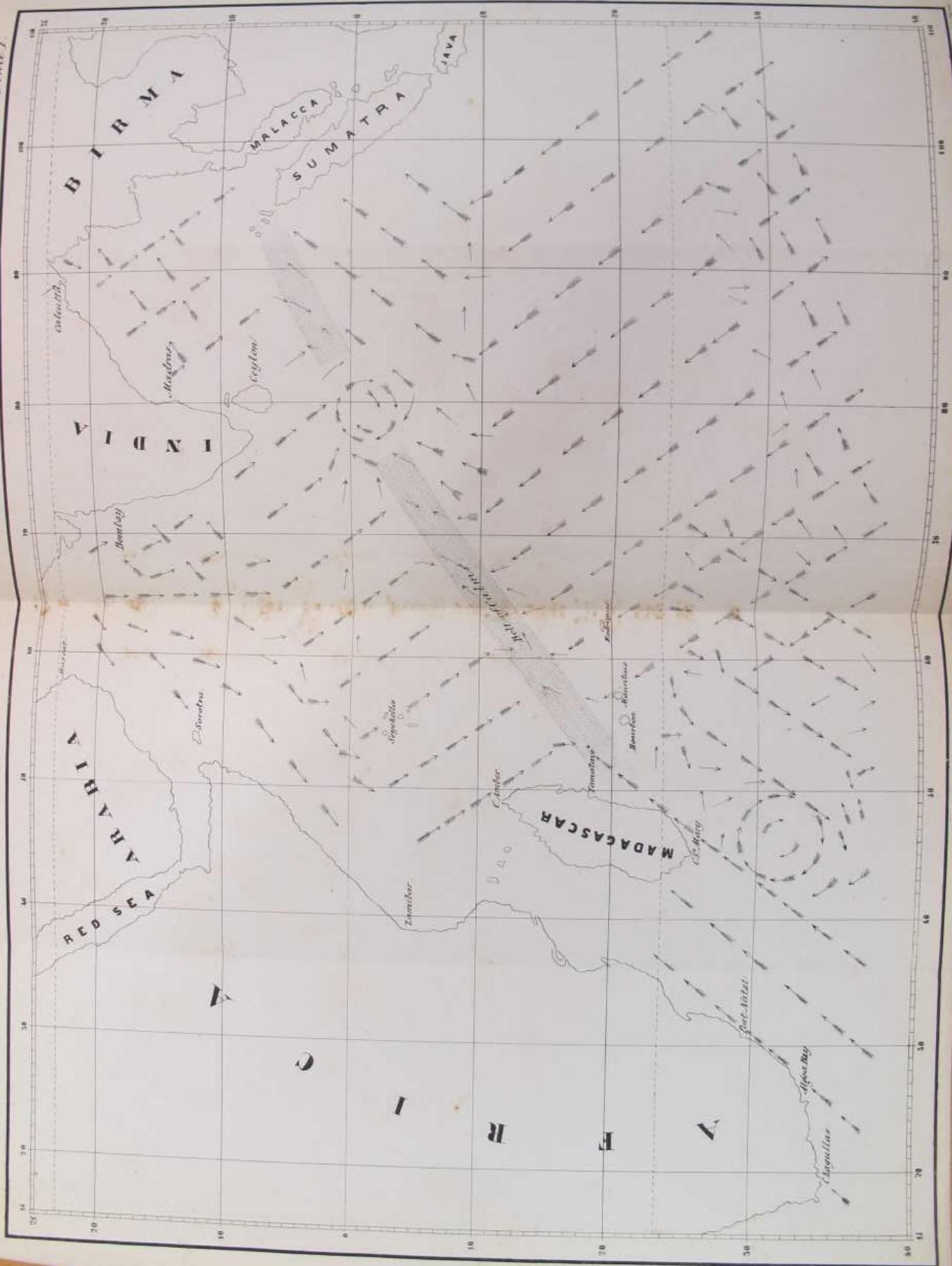




CHART SHOWING THE PREVAILING WINDS IN THE INDIAN OCEAN,

IN MARCH 1855.

Plate I



CONTRIBUTIONS
TO THE
METEOROLOGY AND HYDROGRAPHY
OF THE
INDIAN OCEAN.

PART I.

A METEOROLOGICAL JOURNAL
OF THE
INDIAN OCEAN
FOR THE
MONTH OF MARCH, 1853,
WITH A
SUMMARY OF THE RESULTS OF THE OBSERVATIONS, &c.
ILLUSTRATED BY CHARTS AND DIAGRAMS.
BY
CHARLES MELDRUM, A. M.



PRINTED BY L. A. DENNY,
MAURITIUS, MDCCCLVI.



PAGE.	LINE.			
I	24	for	defore	<i>read</i> before.
IV	30	"	for	" far.
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XI	9	"	analagous	" analogous.
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XXIV	12	"	8	" 9
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3	5	"	S.W.S.E.	" S.W. & S.E.
"	20	"	·92	" 29·92.
4	17	in columns of bar. & ther, (No. 25.) <i>read</i> 29·80 & 81.		
5	13	<i>omit</i> P.M. in column of remarks.		
"	31	for	7·30 (No. 78.)	<i>read</i> 75·30.
6	5	"	20·50 (No. 1.)	" 20·10.
"	7	force of wind (No. 26.)		
7	17	for	10·26 (No. 33.)	" 00·26.
"	29	"	S.W.bE.	" S.W.bW.
8	31	"	29·0 (No. 55.)	" 29·90.
10	36	ther. at Port Louis 82·6 & 82·5.		
13	35	for	78·85 (No. 12.)	<i>read</i> 78·55.
14	8	"	57·39 (No. 1.)	" 57·29.
"	19	in remarks <i>omit</i> Midt, gale. F. 8.		
15	41	for	68·00 (No. 26.)	<i>read</i> 768·00. *
16	34	bar. & ther. at Port Louis, 30·101 to ·039 & 82 to 83·5.		
19	39	for	28·02 (No. 57.)	<i>read</i> 82·02.
"	40	"	16·49 (" 48.)	" 61·49.
20	29	"	S. 84 (" 12.)	" 84.
22	7	"	26·67 (" 53.)	" 29·67.
"	36	"	25·31 (" 54.)	" 35·31.
23	34	"	84·17 (" 55.)	" 34·17.
25	7	"	28·55 (" 59.)	" 29·55.

* In all the readings of the bar. of No. 26, after the 18th of March, the first figure (7) ha. been omitted.

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ADVERTISEMENT.

I owe an apology for the delay that has occurred in getting this publication through the press. The Work was announced, twelve months ago, in the Preface to the last Number of the Transactions of the Meteorological Society. But though a portion of the manuscript had been in the printer's hands for some time previously, and though the remaining portion could be supplied to him at a moment's notice, yet I have endeavoured in vain to get the work completed sooner, and it is not without much trouble that I have at length succeeded in getting it published at all.

This is but one of the many difficulties that present themselves in the prosecution of an undertaking of this kind in a small and remote Colony. But it is one which I hope to be able to avoid in future.

*Royal College, Mauritius,
1st August 1856.*

C. M.

I. INTRODUCTION.

IN 1851, shortly after the Meteorological Society of this Colony was established, the writer of the following pages had the honor to submit to the President, and to parties in India, certain remarks on the importance of concerting a scheme of co-operation for collecting, at different Ports, abstracts of the observations made on board vessels navigating the Indian Ocean, with a view to the publication of the material that might thus be amassed; so that meteorologists in different parts of the world might have an opportunity of discussing the facts, and of thus extending the bounds of meteorological science, in connection with these seas.

Some months afterwards, Dr Thom, who arrived in the Colony as Chief Medical Officer, was elected President of the Society. Having resided in the Island at a former period, during which he collected the materials for his valuable work on the "Nature and Course of Storms in the Indian Ocean South of the Equator," and being keenly alive to the importance of accumulating a mass of data sufficient to form a solid basis for induction, he combined in an eminent degree the qualifications necessary for inaugurating on the spot a system similar to that which had been suggested, and was perhaps more likely to make the attempt than any other person. Accordingly, on finding, after a few months' trial, "how impossible it is for one individual, or even two, to collect all the observations and extracts procurable at this Port, and necessary for investigating the connection that subsists between the ordinary winds and their stormy disturbances so common in the Indian Ocean at one season of the year," he resolved, after frequent conversations on the subject, to propose, for the adoption of the Society, a plan of co-operation, the object of which should be to collect a mass of information relative to the meteorological and hydrographical conditions of the Indian Ocean. His proposition was laid before the Society, and adopted, on the 12th May, 1853, and as the present publication is, in some measure, the result of the scheme which was then propounded, I cannot do better, in explanation of its nature and objects, than quote the remarks made by him on that occasion :—

" Of all modern sciences," remarked Dr Thom, " that of Meteorology is most dependent on the co-operation of numbers of observers,—nay it is indispensable to its progress, and it is the only basis on which a solution of the problems which the Society has before it can be obtained. Individuals may singly pursue the subject, attain an indistinct view of the laws which govern our atmospheric phenomena, and consider it sufficient to justify theories and to enable us to guess at all the processes of nature from a few imperfect glimpses of her surface operations and perceptible phenomena. Nay, the very "Law of Storms", as it is called, and of which superficial observers talk so confidently, is yet so imperfectly developed, that many philosophers of eminence deny the truth of it as a whole ; and to settle this point, the great nation of America is teaching a lesson, in this as in many others things, to her venerable ancestor, and has devised a comprehensive system of observation on the currents of the air all over the world, that reflects credit on her enterprising and intelligent people, and makes every Englishman proud to see that the neglect of his Fatherland does not extend to all the descendants of the Saxon race.

" The theory of Redfield, as propounded and elucidated by Reid, has not been fully established in all its details ; nor is it quite clear that the law of rotation of the tropic predominates in the angry gyration of the winds towards the polar regions. Nay, even in the neighbourhood of the equator, it is alleged that recent observations are opposed to

DR. THOM'S PROPOSITION.

II

the fixedness of the law of revolution as laid down by Cyclonologists. Now, I, for one, believe that, in tropical latitudes, the Law of Storms, as it is now accepted, will be fully verified by future observation. Still, as many inquirers are not satisfied, and some say it is all wrong, we must yield to others that respectful attention which we claim for our own opinions, and is due to all who labour in the search of truth, even when they are mistaken in their view. It is therefore our duty,—a self imposed and I hope agreeable duty, to search out, by further observation, for an additional and well arranged set of facts to establish the theory of Storms and prove to the most sceptical not only its truth, but the simplicity of the primary forces concerned in those terrific commotions to which our seas are subject. This will be a task of more toil and dry detail than many will like to undertake, for it will have nothing to attract the uninitiated, or indeed the world in general. It will be a labour unseen, and perhaps hardly understood by the public. It will admit of no display to the superficial dabblers who skim along the surface and confidently spread as truths what is yet little more than loose conjectures, admitted to be so by the best Cyclonologists. The perfect completion of the work to which I refer will bring no distinction or credit to any individual, for it must be achieved by many fellow-labourers, without the chance of pre-eminence to one more than another. In all probability the fruits of our combined research will be gathered by some one who has never spent an hour in collecting that which he will be free and welcome to appropriate in the cause of science; for the Society has begun, and I have no doubt will go on diligently, to give to the world the simple narrative of facts which it is accumulating. Therefore, what I propose will be for the common use of all the students of nature, to draw their own deductions, and perhaps discover from the data which we may furnish to them, new and important laws which may be applied to the good of man.

" In an undertaking, such as I am about to recommend to you, nothing but the abstract love of knowledge, a desire to extend our comprehension of the Great Author of all things in what He has tangibly revealed to us on the face of nature, and a hope to advance a science of so much practical value to our race as Meteorology, will animate you, and reward you for your toil. For toil it will be; and those who have to spend the best part of the day, in the drudgery of their daily avocations, under the relaxing and debilitating influence of a tropical climate, will best appreciate this, when they have extra work of dry and uninteresting details to occupy their early and late hours, which most people require for rest and social enjoyment. But there are so many members of the society who do this, that I presume there will be no difficulty in finding a number willing to join in a plan which requires division of labour to make it of great value.

" I propose that we arrange a system of general observation on the direction, force, and veering of the atmospheric currents, with their temperature and aqueous tension; on the barometric pressure in its daily and annual oscillations; on the oceanic currents and tides, and on the weather in general, at every point, whence information can be procured, over all the Indian Ocean, from Van Dieman's Land to the Meridian of Greenwich, West of the Cape of Good Hope, and across the Equator into the Bay of Bengal and Arabian seas, when we have the opportunity of doing so.

" The chief and paramount object is to have the information which we may be able to collect from every possible source, arranged and collated in the form of simultaneous observations for every day in the year; so that a comprehensive view of the movements and conditions of the aerial and liquid covering of that part of the globe engaging our attention may be obtained, almost at a glance, and at a particular hour—say noon;—in fact, to have a Meteorological Journal of the whole of the Indian Ocean for one or more years, by which we can successively trace the variations &c. of the wind in the middle of our ocean, as well as on the coasts of the great continents surrounding it, under all the regularly recurring influence of the sun in his elliptic movements. By such a vast and consecutive accumulation of data as a guide, we might follow up the changes of the monsoons, from day to day, discover the date of their mean strength, determine the limits of their domain, and chart out the localities where they prevail with most force and steadiness, points of the greatest practical importance to navigation and commerce and consequently to our fellowmen. It would enable us to explain the extent of the disturbing agencies of continents and islands during their seasonal increments and loss of heat, on the general currents of air over the open ocean; a question which is yet very

imperfectly understood, but is beginning to attract much attention. On the coasts of India this influence of heat and cold is well known, and its operation will be found, by more extensive observation, to be no less important in diverting the winds of the middle of the South Indian Ocean to a degree that amounts to complete deflection—a deflection tending to run into great circles whose centres or vortices occasionally acquire the violence of heavy gales, or hurricanes.

" By such a record we could not only define the locality, extent, and stationary or progressive nature of a hurricane, but also ascertain the state of the winds all over our seas, during its devastating sweep. We could trace the condition of the atmosphere from the first indication of stormy commotion and approach to a satisfactory knowledge of how it ends—for the breaking up of cyclones is yet a mere matter of conjecture, and far more obscure than their origin.

" At a given hour or day, by a rough chart projected from the information proposed to be gathered, the state of the winds, weather, etc., might be seen over all the Indian Ocean. The tracts with fine weather, smooth sea, and blue sky, could be separated from those shrouded in mist and clouds, and visited by electrical phenomena, where incessant condensation of aqueous vapour is going on, or a revolving tempest is raging with overwhelming violence. Most important of all, the condition of the surface currents rushing to and from the vortex, both before and after the gale, might be discovered. We should certainly be able to clear up much that is now mere hypothesis, regarding the phenomena that are so remarkable on the borders of the two great opposing winds—the N. W. monsoon, and S. E. trade wind, where they encounter, in the South Indian Ocean, in wild gyration, and with almost a constant display of electrical forces.

" A most obscure subject, the cause of the westerly wind at the Equator, in direct opposition to the two trade winds of the opposite hemisphere, might become more intelligible; for it is difficult to explain why the earth's rotation, near the tropics, should be the cause of easterly winds, and of westerly at the point where this agency is at its maximum rate.

" The proposition may appear too difficult for so small a body as ours, without an efficient support, but we may make the attempt, for, where the will is, the means also will be forthcoming. There can be no discredit if we fail in endeavouring to carry out an extensive inquiry, whose object has, if it be successfully achieved, prospective and undeniable benefit to man,—both in an intellectual and physical point of view. All things human must have a beginning, and time will enable us to mature our first feeble essays,—perhaps induce other colonial Societies to co-operate with, help, and direct us. Even those of Europe, which stand at the head of scientific research, will, I have no doubt, come forward to our assistance, when they see that we have the will, and I trust energy to do our utmost, under all the difficulties which a remote island, like Mauritius, has, and always will have, to contend with, and in spite of the special circumstances which unhappily retard our best efforts. But I despair not of seeing many of you cordially joining in doing something worthy of an Island that may justly be called the gem of the Indian Sea.

" The project for attaining the objects proposed, and gathering simultaneous observations from every possible point, is to consider every ship as a floating observatory, and transfer the extracts from her sea-journal, along with others of the same date, to a separate sheet or sheets of paper, so that the whole of the information appertaining to one day may be collated together in regular succession. To the collated journal of observations gathered from the ships visiting our port, in the manner which I now propose, we could add those obtained from our own and other observatories, on the shores of the Indian Seas.

" The form for recording the extracts from log-books, of each day's observation, in what may be called our Anemological Journal (for the state of the atmospheric currents is our primary inquiry,) may be decided on hereafter; but of course it will be nearly that at present adhered to by the Society in its registers, viz., columns for the date,

position, force, and direction of the wind, height of the barometer, the thermometer, the rate, direction, and temperature of the oceanic currents; and, under the head of "General Remarks," the direction of the seud, or drift of the upper clouds, the electrical phenomena, the modification of the clouds, colour of the sky, fall of rain, state of the sea, and weather in general, or any other remarks which may be called for. On ordinary occasions, by using the Admiralty numbers, and the Greenwich letters for expressing in brief terms the state of the weather, &c., a single line across a sheet of foolscap will in general contain all the important points that require to be noticed. Extraordinary disturbances of the atmosphere will of course require a full record.

" At the end of fixed periods, the extracts collected by the different parties engaged in the undertaking, might be put together in their proper place. And as all the observations for the same day only, are on a separate sheet of paper, it matters not how many are concerned in getting information. All that is to be attended to, is to see that the pages which refer to that day are attached to one another. This plan would work equally well if the observers were scattered over the world. Imagine what a mass of information as to the simultaneous and daily condition of the atmospheric currents over all the possessions of England such a plan would yield? How easy and effectually it might be gleaned!—but vain to hope for!

" As the tract of ocean over which our inquiry will extend is rather extensive it will require, at least, the co-operation of four or five persons, and an allotted division of labour to each. As 600 vessels annually arrive at Port Louis, and the average voyage of each through the Indian seas may be reckoned at 40 or 45 days, it is easy to estimate the amount of information brought to our doors and ready to be gathered, if we could find labourers. In one year, from this source alone, 24,000 daily observations at all parts of our ocean might be amassed. One might collect all extracts from the sea-journals of the ships passing between this island and the Cape of Good Hope as far West of that promontory as the Meridian of Greenwich; so as to have all the information that is possible regarding the nature of the Cape storms as well as the neighbouring parts of the Indian seas. Another would consider all from the coasts of Africa and Madagascar, North of this Island and as for East as the Meridian of 60° , as his field; a tract much frequented by our colonial vessels in their voyages to the Mozambique Channel, Comora Islands, Agalega, Seychelles, Muscat, &c. The Indian Ocean, East of 60° , as far as the Bay of Bengal, Indian Archipelago, and Coasts of New South Wales would form another division; and the tract of variable and westerly winds bordering on the trades from the Cape to Van Dieman's Land might occupy the attention of a fourth.

" Should you receive this project with favour, and a sufficient number of members will volunteer to share the labour and concert a system of definite and uniform operations, the sooner we commence the better; say from the beginning of May when the S. E. trade in our hemisphere may be considered as re-established, in its ordinary latitudes, during the Northern declination of the sun; so as to ascertain its relative strength, steadiness, and direction in the middle of the ocean and near the coasts, till the sun re-crosses the Line and causes new currents and disturbances of the highest interest to our Island and Shipping, as well as to amateurs in Meteorology.

" I would also recommend that we should communicate with the scientific men and Societies who take a special interest in Meteorology at Bombay, Calcutta, Ceylon, Swan River, and Melbourne, the Cape of Good Hope, &c., and ascertain if they will co-operate with us, on the system proposed, or with such modifications as may be mutually agreed on by all the parties concerned. It is just possible that a circle of observation may be established at the most frequented ports of the Indian Ocean. An exchange of the recorded matter and observations between the different places, would, by the uniform plan suggested, enable each, not only to possess all the information collected by itself relative to the state of the winds and weather for the same day, but also that collected at any one station, others over an extent of our globe far beyond what could be collected at a distant fixed or floating observatory along with its own. Or a central place might be decided on, where the matter furnished by the circle might be arranged, printed, and distributed to the cut-posts.

“ By an Anemological Journal of this kind, we might trace all the changes of direction, temperature, and humidity of the atmospheric currents, from day to day, for a whole year over our seas—and perhaps over half a hemisphere. I will venture to say that it would enable us to advance as much, in twelve months, towards the elucidation of the obscure parts of Meteorology, as has been done in the last century. All that is required is a unison of action by a comparatively small number of individuals scattered over the regions of our earth.”

The project described in the preceding paragraphs was carried into operation at the time specified, and conducted by the President and two or three of the Members, till April 1854, when the state of Dr. Thom's health obliged him to proceed to England, where he arrived two days before his death. After his departure, the scheme was prosecuted with as little interruption as the circumstances in which the Society was then placed would permit; and it is being carried on still, though not perhaps so vigorously or extensively as it was under his able and zealous direction.

According to the plan agreed upon, the abstracts for the same day, collected by each observer, and appertaining to the part of the Ocean allotted to him as his field, should have been collated, and a copy of the whole been taken and preserved by the Society, for whatever purpose might be deemed proper. But circumstances prevented this arrangement from being accomplished. None of the abstracts made by Dr. Thom had been copied, up to the period of his departure; and as he had expended much time and labour in procuring them, and was extremely anxious to know the results to which an analysis of them would lead, as confirmatory or otherwise of his views, he of course brought his manuscript with him, regretting that his collection of data was not more extensive, and requesting to be, from time to time, supplied with more. Neither was a copy taken by the Society of the abstracts collected by the other observers, the originals remaining in the possession of those to whom they belonged, on the understanding that they were to be at the disposal of the Society for the purpose of being copied and published whenever such a step should be deemed desirable.

In addition to the material amassed by those who co-operated with Dr Thom, there was a large collection of abstract logs which had been made by clerks paid by the Society for the purpose, and which, being the Society's property, could be turned by it to whatever account might be thought proper.

Being, therefore, one of those who entered into Dr Thom's design, and having long wished to see a similar plan adopted and prosecuted to a practical issue, on learning, some time ago, that the Admiralty had voted to the Society an annual grant of £ 50 for enabling it to publish its papers on the spot, I took the liberty of urging the desirableness of applying the grant to the object for which it was designed, and succeeded in carrying a resolution to the effect that measures should be taken for publishing at intervals a portion of the abstract logs in our possession. At a subsequent meeting, however, various objections were raised, and the resolution was cancelled. At a following meeting the subject was again discussed, and the resolution again passed. But, on a third or fourth occasion, after various proposals were made, such as that the manuscript should be printed at the Cape, or in India, or in England, it was at length determined that it should not be printed at all, at least by the Society.

In the meantime, I had proceeded a certain length in preparing for the press a portion of the data which I had collected, under the belief that it would be published in conformity to the resolution that had been adopted on the subject. Nor have I been wholly disappointed; for though the original resolution was set aside, yet the Society liberally offered to pay the expense attendant on the publication of the matter which I had previously prepared; and it is owing to this favor that I am now enabled to lay these pages before the public.

The field of research which was allotted to me is that part of the Ocean extending from the coasts of Africa and Madagascar, to the Northward of Mauritius, as far East as the meridian of 60° . But having been collecting similar information for a long time previously, I did not confine myself to that tract alone, but, as usual,

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copied every log-book which I could procure. I had already collected a considerable number of abstracts for the four months of 1853 which had just passed, and when it was resolved to apply the Admiralty grant to the publication of such data, instead of commencing with the 1st of May, the date at which the scheme came into operation, I commenced with the 1st of March, both because I was anxious to examine the monsoon changes which take place in the course of that and the succeeding month, and because my material for that period was in a more advanced stage. The following pages, then, are devoted to the month of March. The observations for April will soon appear in a similar publication. And though the undertaking is of a very laborious nature, and involves considerable expense, yet, now that a commencement has been made, I hope to be enabled to conduct the work till it shall have embraced at least a period of twelve consecutive months, that is, down to March, 1854.

In the arrangement of the observations the plan adopted is essentially the same as that which was proposed by Dr Thom.

Its characteristic feature is, that all the abstracts for the same day are grouped together, the different groups succeeding one another in chronological order. Each abstract comprises the several observations made at the same locality, or on board the same vessel, in the course of every twenty four hours. It extends in a single line across the page, and exhibits:—

- 1st. The number of the vessel, or of the place of observation :
- 2nd. The latitude and longitude of the place of observation, or of the vessel
at noon :
- 3rd. The direction and force of the wind :
- 4th. The barometric pressure :
- 5th. The temperature of the air :
- 6th. The state of the sea with respect to swell, current, cross sea,
heavy sea, &c.
- 7th. Remarks on the weather, sea, &c.

At page 8 of the Journal, for example, it will be found that, on the 10th of March, the number of abstracts for that day, or of localities at which observations were made, is 30. The first vertical column, on the left, contains numbers denoting the different vessels or places of observation, the names of which are given in a Table prefixed to the Journal. The next two columns give the latitude and longitude. Then follow three columns for the direction and force of the wind. The 7th and 8th columns contain observations made with the barometer and thermometer; the 9th column observations on the state of the sea; and the last two columns remarks on the weather, from midnight to noon, and noon to midnight, respectively.

All the abstracts are given in Civil Time, and those for each day are arranged according to the latitudes of the places of observation, the highest North latitude standing first in order, and the others in succession, Southward to the Equator, and thence to the highest South latitude on the list. On the 10th of March, for example, the highest position in the Northern hemisphere, which is $20^{\circ} 12' N.$ and $88^{\circ} 20' E.$ stands first in the group of abstracts for that day, and the highest in the Southern hemisphere, namely, $36^{\circ} 55' S.$ and $133^{\circ} 43' E.$ stands last, the others lying, in the order of their latitudes, between these two extremes.

Below the letters N. and E., standing at the commencement of the columns of latitude and longitude, the positions of the vessels in the Northern hemisphere are given, and below the letters S. and E. in the continuation of the same columns, are given the positions of the vessels in the Southern hemisphere; so that the line of demarcation across the page, occasioned by the insertion of the last mentioned letters, corresponds more or less with the Equator.

This arrangement has the advantage of presenting the various phenomena in the order best adapted for studying them; for a glance at the Tables suffices to show approximately the limits of the trades and monsoons, the prevailing winds in other

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parts of the Ocean, the temperature in reference to latitude, the localities visited by gales, &c., nearly as well as if they were delineated on a chart.

Each group of abstracts is separated from that which follows by a line drawn across the page, and the commencement of each group is indicated by inserting, within brackets, on the margin, the day of the month to which it belongs.

The direction and force of the wind are given for every eight hours, namely, from midnight to 8 A. M., from 8 A. M. to 4 P. M., and from 4 P. M. to midnight. The force is denoted by numbers placed after the points of the compass from which the wind was blowing. The numbers employed for this purpose are those recommended by the Admiralty. They are the natural numbers from 0 to 12 inclusive, and the forces indicated by them are as follows:—

0	denotes	Calm.		
1	"	Light Air	just sufficient to give	Steerage-way.
2	"	Light Breeze		{ 1 to 2 knots.
3	"	Gentle Breeze	with which a well-conditioned man-of-war, under all sail, and clean full,	{ 3 to 4 knots.
4	"	Moderate Breeze	would go in smooth water from	{ 5 to 6 knots.
5	"	Fresh Breeze		Royals, &c.
6	"	Strong Breeze		Single-reefs and top-gallant sails.
7	"	Moderate Gale	in which the same ship could just carry close-hauled	Double reefs, jib, &c.
8	"	Fresh Gale		Triple-reefs, courses, &c.
9	"	Strong Gale		Close-reefs, and courses.
10	"	Whole Gale	with which she could only bear	Close-reefed main-topsail & reefed foresail.
11	"	Storm	with which she would be reduced to	Storm-staysails.
12	"	Hurricane	to which she could show	No canvass.

It will be seen that, in the 7th and 8th columns, the observations made with the barometer and thermometer at *noon* alone are inserted. The reason is, that, with very rare exceptions, these are the only observations of the kind recorded in log-books as at present kept. Many log-books, indeed, contain no barometrical or thermometrical observations at all.

It must be observed, however, that the observations in these two columns, corresponding to No. 1 in the first column, are different, in this respect, from the rest, inasmuch as there are two of each, one for $9\frac{1}{2}$ A. M., and the other for $3\frac{1}{2}$ P. M., showing the atmospheric pressure and temperature for these hours at Port Louis.

The following signs are employed in the 9th column to indicate the state of the
specimen:

<u>—</u>	denotes	Smooth sea.
<u>Λ</u>	"	Heavy sea.
<u>(</u>	"	Swell.
<u>—</u>	"	Current.
X	"	Cross or confused sea.

A point (.) under any sign denotes a high degree.

The rate and set of the current, and the direction of the swell, &c., are given in every case in which they have been found recorded in the log-books.

Thus: —

S. W. 3' indicates a current from S. W., at the rate of 3' per hour.

A W. " a heavy sea from West.

A. W. " a heavy swell from South.

In the columns of remarks the following letters and abbreviations are used to denote the state of the weather, the setting and taking in of sail, &c.

DESCRIPTION OF THE JOURNAL.

(1) Letters denoting the State of the Weather, &c.

b	denotes	Blue sky	q on q	denotes	Squall on Squall.
B	"	Cloudless sky.	r	"	Continuous rain.
c	"	Cloudy.	s	"	<i>Swell.</i>
d	"	Drizzling rain.	t	"	Thunder.
f	"	Fine weather.	u	"	Ugly threatening appearance.
g	"	Gloomy weather.	wr	"	Weather.
h	"	Hail.	+g	"	Increasing.
l	"	Lightning.	-g	"	Decreasing.
m	"	Mist, haze, or fog.	V. Lab.	"	Vessel labouring.
o	"	Overcast sky.	V. Lab.	"	Vessel labouring very heavily.
p	"	Passing showers.	A point under a letter denotes an extraordinary degree.		
q	"	Squally.			

EXAMPLES.

bc—Blue sky with detached clouds. Bf—Cloudless sky and fine weather. qr—Squally rainy weather. qr1t—Very hard squalls accompanied by heavy rain, lightning, and very heavy thunder.

(2) Letters indicating the setting and taking in, &c., of sail.

1 R	denotes	Single-reefed.	F T S	denotes	Fore topsail.
2 R	"	Double-reefed.	M T S	"	Main topsail.
c R	"	Close-reefed.	M R Y	"	Main royal-yard.
F S	"	Fore-sail.	T G S	"	Top-gallant-yard.
G S	"	Gallant-sail.	T G Y	"	Top-gallant-yards.
M S	"	Main-sail.	M T G S	"	Main top-gallant-sails.
S S	"	Stay-sail.	1 R T S	"	Single-reefed top-sails.
T S	"	Top-sail.	2 R T S	"	Double-reefed top-sails.
			c R T S	"	Close reefed top-sails.
			&c.		&c.

The total number of vessels, from the log-books of which the abstracts for this month have been obtained, is fifty-five, and the average number for each day is somewhat more than 30,—the abstracts for the Southern hemisphere being, as may be seen from the Journal, much more numerous than those for the Northern hemisphere.

Most of the log-books were procured by personally applying for them on board ship, and some idea of the labour that has been incurred, first, in copying them, next, in arranging and re-copying the material for the press, and, lastly, in conducting it through its succeeding stages, may be formed by referring to the Tables, and bearing in mind that the work had all to be performed by one individual.

Yet, notwithstanding the care and toil that have been expended, it is but too evident that the information obtained, when viewed in connection with the extent of the field, and with the varied and complicated phenomena of which it is the theatre, is of a very meagre and imperfect character.

I allude not so much to the fewness of the abstracts, though that, too, is a subject of regret, as to the quantity and quality of the information which most of the log-books supplied. Thirty different stations, scattered over the wide surface of the Indian Ocean, would probably, however full and numerous the observations made at each, be insufficient to furnish all the data necessary for a complete investigation of the laws that regulate its aerial and aqueous movements, with all their attendant phenomena; and far more inadequate must be the observations now published. There cannot be a doubt, however, that if the vessels had been supplied with instruments, and the necessary observations made with a special object in view, they would have afforded a body of information which could hardly fail to lead to the solution of some of the most important problems in Meteorology; for, though few in number, it so happened that they were confined within

certain limits, and often at short intervals from each other, in localities where great atmospheric changes are known to originate.

It will be seen, as already observed, that many of the abstracts contain no observations of the barometer and thermometer, and that when such observations are given, it is only for noon *. The instruments, too, were not compared with any standard, so that the observations are comparatively of little value.

There is, therefore, much room for improvement in this respect. The most important hours for observing with the barometer are, as commanders of vessels are well aware, $3\frac{1}{2}$ A. M. and P. M., and $9\frac{1}{2}$ A. M. and P. M. These observations give the maximum and minimum pressures for the day. Two observations with the thermometer, one at sunrise, and the other at $2\frac{1}{2}$ P. M., would give, approximately, the minimum and maximum temperature. And the instruments should, if possible, be verified at the commencement and end of the passage.

With regard to hydrography there is almost a perfect blank. No observations whatever were made on the temperature of the surface water, except by a single vessel—the Swedish frigate *Eugenia*. The *Eugenia*, also, was the only vessel that made regular observations on the currents; the *Natal*, *Chieftain*, and one or two others, having supplied the rest of the information given under that head.

It is hardly necessary to state that no deep sea-soundings were made, and no observations on the specific gravity of the sea-water, or its temperature at different depths.

There is, also, an equal want of hygrometric information. No data are given for ascertaining the tension of the aqueous vapour of the atmosphere, the degree of humidity, the rate of evaporation, the fall of rain, &c.

Even the remarks on the weather are not what could be wished. It is not of course to be expected that the officers of mercantile vessels, whose time is so much occupied with the more pressing duties of their profession, should make and record all the observations to be looked for from vessels fitted out for scientific expeditions; but much important information might be given, with very little trouble, which is generally not found in log-books as now kept. The remarks on clouds, rain, lightning, &c., are often too vague to be of much use. When the weather is cloudy, instead of simply saying so, it would be more satisfactory to state the proportion of clouded sky, the number 10 being taken for completely overcast, and to mention the description of cloud, as nimbus, cumulus, stratus, &c., with the point of the compass from which it may be moving, and to note the appearance and direction of the upper clouds, when two or more strata are visible. Then, when rain falls, it would be desirable to state its duration, and the direction of the wind at the time, and, if possible, to give the amount of the fall. When lightning is seen, it might be mentioned whether it was zig-zag lightning, sheet-lightning, or ball-lightning, and, when thunder is heard, how long the rolling lasted, and what intervals elapsed between the lightning and the thunder, &c. It is also particularly important that the shiftings of the wind at all places, but more especially on the limits of the trades and monsoons, should be carefully noted, as well as the exact position of the vessel at the time when she enters or leaves these regions. And, probably, the force and direction of the wind might be more accurately ascertained and recorded than is often found to be the case.

The Journal, therefore, is not what one could wish it to be, but what the character of the log-books has rendered it. If the commanders had been aware that the meteorological information furnished by them was to be published, it would doubtless have been much more full and extensive; for, in cheerfully placing it at my disposal, they almost without exception regretted that it was not more adapted for the object in view; thereby

* A few log-books contained more frequent observations, particularly the log-book of the Swedish frigate *Eugenia*; but the exceptions were so very few that it was not considered necessary to introduce additional columns for them.

showing their readiness to afford all the assistance in their power, whenever they find that their log-books, instead of being thrown aside, as useless lumber, are likely to be serviceable to navigation. It is needless to look to the officers of the mercantile navy, as a class, for that taste which prompts to meteorological research for its own sake, and for which many of their number are distinguished; and it is not surprising that they did not impose upon themselves the labour of making observations, which, so far as they could see, would never be made use of; but it may be said that they would all cordially co-operate in obtaining whatever information they might be requested to supply. Now no such request was made in this case. No pre-concerted plan was adopted and carried into effect. The matter, therefore, of which the Journal is composed, is a spontaneous expression of meteorological observations as usually made on board British merchantmen; and regarding it in that light alone, it is not perhaps without interest, as it shows existing defects, and may assist in paving the way for improvement. At all events, what has now been said will account for the imperfect form in which the Tables appear. The observations with the barometer and thermometer are entered for noon only, because nearly all of them were made at that hour. No separate column is given for the current, since the observations were so very few that it was found they could be inserted in the column for the swell, &c., without any inconvenience. There is no column for the temperature of the water, for the simple reason that no such observations were made. Neither, for a like reason, is there a column for the observed magnetic variation.

Yet, it is probable, that an extensive collection of even such imperfect observations as these, would, if published, largely contribute towards the promotion of Meteorology.

At the conference of Meteorologists from Great Britain, the United States, France, Belgium, Denmark, the Netherlands, Norway, Sweden, and Portugal, held at Brussels in August and September, 1853, for the purpose of concerting a general plan of Meteorological Observation at sea, a form of log intended to embrace all the observations required was agreed upon, and the conference expressed a hope, "that whatever observations may be made will be turned to useful account, and not be suffered to lie dormant for want of a department to discuss them."

It does not appear that this admirable scheme has yet come into general operation; but, supposing that the majority of the vessels now afloat were engaged in carrying it out, would the observations, after being collated and reduced, be published, or merely the general results that might be obtained by a discussion of them?

There can be little doubt that it would be satisfactory to publish the observations entire; for they would form, as it were, a mine in which Meteorologists, both now and in future times, might labour in common, and thence gradually evolve the laws that regulate the oceanic and atmospheric currents; whereas, if the observations were not to be published, they would be subjected to the examination of a few individuals only, and it is possible that the results obtained, and the views adopted, would be more or less different from those which the same data might afford and suggest to others; while a mere summary of results would not form the same foundation for generalization, as the observations themselves, or furnish equivalent means for the elimination of error and for progressive advancement and discovery. A body of well-ascertained facts would constitute a source of permanent and ultimate reference, and, swelling in magnitude, become a basis upon which Meteorological science could be securely reared.

The observations made at the British Magnetic and Meteorological observatories, established at different stations in both hemispheres, are published in large volumes, copies of which are liberally sent to all parts of the civilized world. Would it not be desirable to print and circulate, in like manner, and for a like purpose, the observations which are being made at sea? If it is important to publish the mass of observations made at fixed points on land, and which relate to the climate and Meteorology of particular localities, would it not be equally important to publish the observations made over extensive tracts of ocean, seeing that the Meteorological phenomena occurring there, on a grander and more uniform scale, may be studied to more advantage, and that a knowledge of them could hardly be either of less interest to science or of less utility in practice?

With a system of abbreviations, by the aid of which the remarks in log-books, description of the weather, &c., might be greatly condensed and simplified, a volume equal in size to one of those in which the Meteorological observations made at Greenwich, Toronto, or St. Helena, are usually published, might contain 30,000 days' observations at sea, and a few such volumes would suffice to embrace the total number of observations considered requisite for the Indian Ocean in the prosecution of the system of investigation so ably and successfully conducted by Lieutenant Maury, of America.

If the observations for each day were grouped together in succession, they would form a Meteorological Journal, analagous to the daily Meteorological Registers for stations on land, and furnish material for the construction of Wind and Current Charts, as well as serve the purposes to which the observations made at fixed observatories are, or may be, applied; and by, extending the system to other seas and oceans, similar Journals might be prepared and published for each; so that, in the same way as there are published Meteorological Journals for Greenwich, Bombay, the Cape, &c., there might also be similar Meteorological Journals for the North and South Atlantic, the North and South Pacific, the Mediterranean, &c. And the observations made at sea and on land, when thus brought to light, and placed side by side, would mutually illustrate each other, and greatly contribute towards the developement of the physical laws by which the movements of the air and ocean, and the various phenomena connected with them, are respectively governed.

It is in conformity to these views that the following attempt is made to compile from log-books and every available source, a Meteorological Journal of the Indian Ocean. Like all first attempts of the kind, it is necessarily rude and imperfect; even more so than it might have been; but it is possible that the scheme may be improved, and assume wider dimensions. The vessels which contributed the information are a very small number of those that were in the Indian Ocean in the course of the period over which the Journal extends. Many doubtless were bound to one or other of the ports of India, or thence to various destinations, without having touched at Mauritius at all; and even of the logs of those that did come to the harbour of Port Louis, I was not able to procure and copy more than one half. Much, therefore, may yet be done in adding to the number of abstracts. I have here given, on an average, only 30 for each day, but it may be that, by obtaining those which were collected by Dr. Thom and others, the number will be considerably increased. And if abstract logs were similarly prepared and published at Bombay, Calcutta, Madras, Cape Town, Melbourne, and other frequented ports on the shores of the Indian seas, we should probably acquire, in a few years, more information respecting the winds and currents which prevail there, than has been acquired in as many centuries.

Much, too, remains to be done in the way of obtaining information from fixed observatories on the neighbouring coasts and islands. The only observations of this kind contained in the Journal are for Port Louis. Observations at the Cape, Algoa Bay, Natal, Cape St. Mary, Bourbon, Rodrigues, Nossi Béh, Zanzibar, the Seychelles, &c., would greatly enhance the value and interest of those made at sea, and are, therefore, an important desideratum.

II. SUMMARY OF RESULTS.

The daily average number of observations, or, in other words, of vessels in which the observations were made, is, as already stated, *thirty*; and the space over which these vessels were scattered, extended, generally, from 20° N. and 39° S. to 90° E. and 15° E., in a belt of from 20° to 30° in longitude, stretching obliquely across the Ocean, from the Southward of the Cape of Good Hope to the Bay of Bengal.

Very few of the observations were made to the Westward of 60° and Northward of 15° S., or to the Eastward of 75° and Southward of 15° S.

With so few and imperfect data, it is useless to expect to obtain precise and accurate results respecting almost any of the Meteorological phenomena that presented themselves in the space within which the observations were taken; while with regard to other parts of the Ocean, the Journal affords no data whatever.

LIMITS OF THE S. E. TRADE-WIND.

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But information far short of absolute correctness may be of no small practical utility, as well as of scientific interest. Observations which are not sufficiently numerous or precise for the complete investigation of a phenomenon may, nevertheless, place its existence beyond all doubt, and afford a rough view of the laws which it obeys. A general knowledge of this sort serves to point out the direction to be given to future observations, each fresh accumulation becoming the basis for another step in advance, till truth is at length fully attained.

Any attempt at a discussion of the observations given in the Journal must be confined chiefly to those made on the winds, as being by far the most numerous.

Much is still unknown regarding the limits of the trades and monsoons, their strength and direction, the veerings and deflections of the winds on their borders, the belts of calms and variables between them, the origin and progress of storms, &c.

I shall, therefore, endeavour to give the general results of the observations, as bearing upon some of those subjects, reserving a more full and detailed discussion for another occasion, when the data will be more numerous, and the period more extended. At present the object is briefly to draw attention to a few of the more salient points, which will, I venture to hope, be found to possess sufficient interest to stimulate inquiry on the part of others.

A few additional remarks on the temperature and pressure of the air, the fall of rain, the occurrence of lightning, and the state of the sea, will comprise all that can be said on those subjects on the present occasion.

It scarcely needs be mentioned that the remarks about to be made refer exclusively to the month of March, 1853, and to the observations contained in the Journal for that period.

1. *The Limits of the S. E. Trade-Wind.*

On referring to the Journal, it will be seen that, during the first five or six days of the month, the S. E. Trade Wind extended much nearer to the Equator on the Eastern than on the Western side of the Ocean.

If the positions of the vessels, and the direction of the winds, on each of those days, be projected on a chart, the equatorial limits will be found to have stretched obliquely across the Ocean, from the vicinity of Mauritius to 7° or 8° S. and 85° E.

During the next seven days, the equatorial limits gradually receded still further to the Southward, on both sides of the Ocean, but with nearly the same relative distances from the Equator, till the Trade almost entirely disappeared.

On the 13th, 14th, and 15th, calms prevailed over several hundred miles around Mauritius, the Trade setting in far to the Southward and Westward of that tract, and appearing also to the Northward and Eastward of it.

From the 14th to the end of the month, the Trade seems to have approached as near to the Equator on the Western as on the Eastern side of the Ocean, but to have blown more strongly and steadily on the latter.

The following Table gives the polar and equatorial limits for each day, so far as they can be determined from the data available. They have been laid down both from a comparison of the several observations, and from noting where each vessel fell in with the Trade, or lost it, so that they may, in general, be regarded as nearly correct, so far as they go.

As a remarkable difference was perceived between the equatorial limits, on the opposite sides of the Ocean, during the first part of the month, it was considered desirable to lay down, as nearly as possible, the limits on each side; and this has accordingly been done.

LIMITS OF THE S. E. TRADE WIND.

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TABLE shewing the daily Polar and Equatorial Limits of the S. E. Trade Wind in the Indian Ocean, during the month of March, 1853.

Date.	WESTERN LIMITS				EASTERN LIMITS				REMARKS.	
	Equatorial.		Polar.		Equatorial.		Polar.			
	Lat.	Long.	Lat.	Long.	Lat.	Long.	Lat.	Long.		
March.	S.	E.	S.	E.	S.	E.	S.	E.	Limits well defined on the Western side.	
	16·49	56·21	27·56	49·06	07·51	85·38	25·56	95·54		
	16·07	56·17	29·03	49·43	07·53	85·11	25·18	93·18		
	20·10	57·29	29·37	50·00	08·37	84·43	25·50	91·18		
	16·05	68·85	29·48	50·52	09·15	84·00	25·52	88·58		
	17·39	65·27	25·35	49·30	12·00	84·00	25·45	88·13		
	18·31	62·26			15·00	84·00	25·42	84·43		
	19·44	59·14	20·50	57·29			25·22	80·57		
	20·10	57·29	20·12	59·54			24·52	77·17		
	19·59	58·58	33·27	58·00	12·58	80·30	24·59	76·59		
	25·58	47·58	37·50	37·00	14·04	80·04			Extensive calms around Mauritius, and the Trade appearing far to the Eastward.	
	20·40	56·12	38·13	25·41	15·03	77·31				
	07·52	65·25	38·46	26·00						
	07·53	64·20	36·43	40·20					Western limits well defined.	
	07·01	63·25	37·45	41·23						
	08·00	60·00	30·00	54·00						
	08·00	60·00	30·00	54·00						
	07·30	59·15	30·00	54·00						
	07·55	58·05	30·00	54·00	08·40	89·03				
	08·22	57·45	29·57	56·18						
	08·12	57·25	27·53	57·07						
	07·43	60·44	28·45	57·47						
	06·45	61·49	26·58	44·32						
	07·34	58·00	20·10	57·29	08·20	79·41			No data to shew whether the Trade extended beyond Mauritius on the South.	
	08·00	59·00	20·10	57·29	07·13	72·23				
	08·36	71·00	20·10	57·29						
	09·51	70·01	20·10	57·29						
	08·12	58·40	20·10	57·29						
	08·20	58·45	33·04	53·21	09·00	84·00				
	08·30	58·45	31·30	56·50	09·00	85·00				

It appears from the Table, that the mean equatorial and polar limits for the month were 11° S. and 29° S., respectively, giving a mean breadth, in latitude, of 18° .

From the 1st to the 13th, the Western equatorial limits were, on an average, 19° $20'$ S., or about 8° more to the South than the mean limits for the month. The mean Western polar limits were $29^{\circ} 17'$ S.

The mean Eastern equatorial limits for the same time were $11^{\circ} 24'$ S., leaving a difference between them and the Western limits of also 8° ; and the mean Eastern polar limits, so far as they can be ascertained, were about 25° S.

From the 12th to the 16th, inclusive, the Trade Wind appeared, on the Western side, as far South as 38° ; that is, 9° beyond the mean polar limits.

After the 16th, it gradually receded, till, by the 25th, the polar limits were in the vicinity of Mauritius.

DEFLECTION OF THE S. E. TRADE WIND TO

But, on the 30th, it is again found as far South as $33^{\circ} 04'$.

We thus perceive several distinct vibrations of the Trade-Wind in the course of the month, on its equatorial and polar borders. The Western equatorial limits gradually receded from about 16° S., on the 1st and 2nd, to 26° S., on the 12th, and there seems, upon the whole, to have been, at the same time, a similar contraction of the polar limits, till at length the Trade almost entirely disappeared. It is then found to have suddenly extended both North and South over 18° in the one direction and 18° in the other. After the 16th, again, the polar limits began gradually to recede, till they at length reached the vicinity of Mauritius. And then, on the 30th, they are once more found far to the Southward, as if about to undergo a similar contraction.

From an examination of the charts which have been projected, (one for each day of the month), but which cannot be given here, owing to the expense of getting them lithographed, it would seem that the Northern limits approached nearest to the Equator between the meridians of 65° and 75° .

2. Deflection of the S. E. Trade-Wind to North and N. E., on its Equatorial Borders,

As a general rule, the S. E. Trade, on approaching the Equator, veers to North and N. E., forming a South and then S. W. wind, which lasts from a few hours to several days, according to the longitude.

This is observed on almost every day of the month, and of the many examples of it that might be adduced the following are given by way of illustration.

The *Chieftain* (No. 43), in search of whale, had a W. S. W. wind, on the 12th of the month, in $7^{\circ} 58'$ S. and $66^{\circ} 10'$ E. This wind lasted till the 14th, when it became more Southerly. Its direction on the 15th and 16th, as given in the log, is Srd. On the 17th, in $6^{\circ} 43'$ S. and $62^{\circ} 35'$ E., it is S. S. W. and S. W.; on the 18th, in $6^{\circ} 45'$ S. and $60^{\circ} 55'$ E., it is S. S. W. to South; on the 19th, in $7^{\circ} 30'$ S. and $59^{\circ} 15'$ E., it is Southerly; on the 20th, in $7^{\circ} 55'$ S. and $58^{\circ} 05'$ E., it is S. S. E. and Southerly; and on the 21st, in $8^{\circ} 22'$ S. and $57^{\circ} 25'$ E., it is S. S. E. to S. E., all day. But, on again approaching the Equator, the S. E. wind became South and then S. S. W. and S. W., as on the 27th, in $7^{\circ} 47'$ S. and $59^{\circ} 20'$ E., and continued so till the end of the month, when, in $8^{\circ} 20'$ S., the S. W. wind became Southerly and then S. E.

The *Ahmoody* (No. 27), from Bombay to Mauritius, got the wind at W. S. W., on the 9th, in $12^{\circ} 25'$ S. and $82^{\circ} 22'$ E. On the same day it veered to S. S. W., and remained at that point till near noon of the 11th, in $12^{\circ} 58'$ S. and $80^{\circ} 30'$ E., when it became S. S. E.—She then carried the Trade to Mauritius.

The *City of Palaces* (No. 78), from Bombay to Mauritius fell in with a W. S. W. wind on the 14th, in $6^{\circ} 01'$ N. and $76^{\circ} 30'$ E., which continued till the 25th, in $8^{\circ} 20'$ S. and $79^{\circ} 41'$ E., when the wind veered from S. S. W. to South and S. E. This S. E. wind accompanied her to Mauritius.

The logs of the *Bland*, *Julia*, and other vessels, illustrate the same law.

From a comparison of the observations it appears that this deflection of the S. E. Trade to North and N. E. takes place to the Eastward of 58° only, and that the space over which the S. W. wind blows is greater on the Eastern than on the Western side of the Ocean, gradually narrowing from about 86° E. to 60° and 58° E.

The limits of this S. W. wind, as indicated by the Journal, are given in the following Table. The number of vessels which experienced it, its mean direction, and its force, are also given. The extreme limits in latitude, so far as the observations point them out, are contained in the two columns of "latitude"; and those in longitude, when not both indicated in the columns under that heading, are given in the column of "remarks."

NORTH AND N. E., NEAR THE EQUATOR.

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TABLE shewing the Limits, Direction, and Force of the S. W. Wind produced by the deflection of the Trade to N. E., on its Equatorial Borders.

Date.	Southern Limits.		Northern Limits.		No. of Observa- tions	Mean Direc. of Wind.	Force of Wind.	REMARKS.
	Lat.	Long.	Lat.	Long.				
March.	S.	E.	S.	E.				
1	09° 13'	80° 41'	02° 28'	72° 08'	4	WSW	1,5	
2	05° 45'	66° 54'	01° 54'	75° 51'	3	SSW	1,2	
3								
4								
5	09° 32'	83° 55'			1	SbW	2	
6								
7	15° 07'	75° 10'			1	WSW		
8	15° 43'	75° 36'			1	WSW	1,2	
9	12° 25'	82° 55'			1	SSW	1,2	
10	12° 32'	82° 22'			1	SSW	1,3	
11	12° 58'	80° 30'	05° 44'	84° 50'	2	SW	2,4	
12	07° 58'	66° 10'	06° 52'	86° 51'	2	WSW	1,4	
13	07° 58'	85° 33'	05° 15'	71° 42'	3	SbW	2	
14 {	07° 52'	65° 25'	01° 39'	73° 57' } 6		WSW	1,2,5	
	08° 16'	85° 09'	06° 01N	76° 30' }				
15	07° 53'	64° 20'	03° 43N	77° 00'	3	WSW	2,5	
16	09° 35'	84° 13'	01.40N	77° 39'	4	WSW	2,5	Western limit, 62° 35'E.
17	06° 43'	62° 35'	00° 11'	78° 00'	3	SW	2	
18	06° 45'	60° 55'	01° 20'	78° 29'	2	SSW	2,4,5	
19	02° 51'	79° 32'			2	WSW	5	
20	04° 06'	79° 36'			1	WSW	4	
21	05° 36'	80° 00'	01° 46N	82° 20'	2	WSW	6	
22	06° 17'	80° 15'	01° 05N	85° 26'	3	WbS	4,6	
23	07° 13'	72° 23'	00° 49'	85° 19'	4	WSW	2,4,6	
24	07° 13'	72° 23'	02° 44'	82° 06'	3	SW	2,6	
25	06° 22'	62° 14'	04° 17'	86° 30'	3	WSW	2,6	
26	07° 22'	58° 35'	00° 25'	85° 06'	4	SW	2,6	Eastern limit, 86° 39'E.
27	07° 47'	59° 20'	02° 57'	85° 46'	5	SW	2,4,6	" 86° 05'E.
28	08° 52'	85° 46'	07° 52'	59.08	3	WSW	1,5	
29	09° 20'	85° 30'	08° 12'	58.40	3	SSW	1,2	
30	08° 20'	58° 45'	05.36N	84.50	2	SSW	1,2	
31	09° 00'	85° 00'	08° 30'	58.45	3	SSW	3	

It will be seen that the extreme Eastern limit for the month is 86° 39' E., and the extreme Western 58° 35' E., the limits in latitude being 6° 01' N. and 15° 43' S.

The mean Southern limits are 8° 32' S., and the mean Northern limits 3° 38' S.

The average breadth in latitude is 5° 16', and in longitude 16° 04'.

Between the meridians of 75° and 85° the average breadth in latitude is about 10°, but it diminishes towards the meridian of Mauritius.

The prevailing direction is W. S. W., and the mean direction about S. W. b. W.

The mean daily force is 2.5.

The wind was lightest from the 1st to the 10th, and strongest from the 21st to the 29th, when it again became light.

DEFLECTION OF THE S. E. TRADE WIND TO

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This S. W. wind was found by every vessel that came within the daily limits given in the Table. On the 14th, for example, the *City of Palaces* had fresh breezes from W. S. W., in $6^{\circ} 01' N.$ and $76^{\circ} 30' E.$; the *Futtah Sultan* moderate breezes from S. W., in $01^{\circ} 39' S.$ and $73^{\circ} 57' E.$; the *Nautilus* light winds from W. b. S. and West, in $1^{\circ} 37' S.$ and $66^{\circ} 54' E.$; the *Dart* light winds from W. S. W. and West, in $5^{\circ} 15' S.$ and $71^{\circ} 42' S.$; the *Chieftain* light winds from Srd in $07^{\circ} 52' S.$ and $65^{\circ} 25' E.$; and there are no vessels to shew that the prevailing wind in the space between the *City of Palaces* and the *Chieftain* was not from the S. W. quadrant.

The observations made by one of the vessels enumerated, the *Queen* (No. 97), are not given in the Journal, as they were not obtained till after the manuscript had been printed. She fell in with W. S. W. winds on the 15th, in $0^{\circ} 39' N.$ and $89^{\circ} E.$, and had them till the 20th, in $8^{\circ} 40' S.$ and $89^{\circ} 93' E.$, where she got the S. E. Trade.

3. Deflection of the S. E. Trade to South and S. W., on its Southern Borders.

One of the most remarkable features presented by the charts is the constant prevalence of a N. E. wind on the South-Western limits of the Trade-Wind.

There is hardly a day on which this N. E. wind is not found somewhere between the meridians of 14° and 70° , blowing in strong gales over an extensive tract.

On the 1st of the month, we find four vessels (Nos. 71, 36, 38, and 73), situated between $34^{\circ} 46' S.$ and $44^{\circ} 50' E.$, and $31^{\circ} 38' S.$ and $57^{\circ} 48' E.$, experiencing N. E. and E. N. E. winds in moderate and fresh breezes during the whole day; and no other wind is observed in that space; while to the Northward of it, as far as $16^{\circ} 49' S.$ and $56^{\circ} 21' E.$, the S. E. Trade is blowing strongly and steadily, as shewn by the observations taken at five different places variously remote from one another.

Turning to the chart for the 2nd, or to the group of abstracts for that day, this N. E. wind is still seen in the same locality, blowing in fresh breezes; but it now extends as far North as $24^{\circ} 35' S.$ and $49^{\circ} 27' E.$. Between that point and $35^{\circ} 01' S.$ and $49^{\circ} 0' E.$ there were six vessels* which had it constantly, and no other wind was observed within the same limits. The S. E. Trade was at the same time blowing a little farther to the North.

These N. E. winds are found on every succeeding day down to the 14th, when they disappear. They gradually advanced, towards the East and North, to about $17^{\circ} S.$ and $70^{\circ} E.$. On the 5th, for example, they are seen stretching from $22^{\circ} 37' S.$ and $57^{\circ} 09' E.$ to $33^{\circ} 40' S.$ and $52^{\circ} 10' E.$ as shewn by seven vessels; and, on the 6th, they extend to $18^{\circ} 31' S.$ and $62^{\circ} 26' E.$; but, from want of observations, their Northern limits on some of the following days are not easily ascertained.

On the 14th, they are not seen; the space which was occupied by them is now occupied by the S. E. Trade. But, on the 15th, one vessel (No. 55), in $39^{\circ} 13' S.$ and $27^{\circ} 07' E.$, is found with a N. E. wind; and on examining the observations for the following days it will be found that this second N. E. wind, like the former, gradually progressed to the Eastward, till, by the 29th, it reached at least the 67th meridian. On the last two days of the month it is again encountered far to the Westward by seven or eight vessels.

The following Table exhibits the limits of this N. E. wind, so far as that can be done by the data at my disposal. The limits in latitude are given in the columns of "latitude," and when the limits in longitude are not given in the columns of "longitude" they are stated in the column of "remarks."

The number of daily observations, the mean daily direction, and the daily minimum and maximum force, are also given.

* The observations of one of these vessels, the *Ide* (No. 88), are not given in the Journal.

SOUTH AND S. W. ON ITS POLAR BORDERS.

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TABLE shewing the Limits, &c., of the N. E. Wind produced by the deflection of the S. E. Trade to S. W., on its Polar Limits.

Date.	From.		To.		No. of Observations	Mean Direc. of Wind.	Force of Wind.	REMARKS.
	Lat.	Long.	Lat.	Long.				
March.	S.	E.	S.	E.				
1	31° 38'	57° 48'	34° 46'	44° 50'	4	ENE	4,5	
2	24° 35'	49° 27'	35° 01'	49° 00'	6	NE	5,6	East. limits, 34° 20' S. & 52° 23' E.
3	25° 25'	57° 05'	34° 52'	54° 17'	5	NNE	5,8	
4	23° 58'	57° 22'	32° 59'	50° 25'	5	East	4,8	West. limits, 25° 18' S., 49° 31' E.
5	22° 37'	57° 09'	33° 40'	52° 10'	7	ENE	4,9	Do. 27° 26' S., 45° 20' E.
6	18° 31'	62° 26'	34° 43'	53° 45'	7	ENE	4,6,9	Do. 25° 48' S., 49° 50' E.
7	20° 58'	56° 48'	36° 02'	55° 15'	7	ENE	6,7,9	Do. 25° 26' S., 50° 17' E.
8	21° 10'	65° 55'	34° 45'	55° 14'	6	ENE	6,8,9	
9	29° 57'	56° 49'	35° 38'	56° 10'	5	NEbN	4,6,9	Do. 30° 33' S., 50° 34' E.
10	24° 24'	74° 09'	30° 01'	58° 21'	3	NE	2,4,6	
11	24° 22'	73° 54'	33° 27'	58° 00'	5	ENE	2,4,9	Do. 29° 48' S., 57° 45' E.
12	17° 41'	70° 16'	23° 50'	70° 13'	3	NbE	1,2,5	
13	17° 21'	69° 13'	26° 05'	58° 02'	4	ENE	1,2,4	
14								Extensive calms. The SE trade setting in to the Southward of the 29th parallel.
15	39° 13'	27° 07'			1	ENE	4,6	
16	32° 20'	31° 30'	39° 43'	30° 35'	3	NE	4,6	East. limits, 37° 45' S & 41° 23' E.
17 {	29° 53'	31° 02'	39° 54'	34° 03'	4	NE	2,4,7	No observations from 22° to 39°
17 {	22° 12'	57° 24'	25° 29'	59° 10'	4	EbN	2,4	{ S. and 57° to 34° E.
18	21° 36'	58° 00'	39° 52'	36° 10'	4	ENE	2,6,9	West. limits, 34° 46' S., 30° 15' E.
19	35° 30'	34° 00'	39° 49'	38° 13'	5	NE	2,4,9	{ Extent in longitude, 36° 06' S & 27° 02' E to 39° 13' S & 47° 20' E.
20	36° 37'	34° 05'	39° 13'	48° 43'	4	ENE	1,4,6	West. limits, 37° 02' S., 28° 50' E.
21	37° 42'	29° 00'	39° 35'	49° 45'	4	ENE	2,6,8	Do. 38° 33' S., 38° 00' E.
22	29° 51'	47° 05'	39° 38'	52° 49'	4	NNE	4,6,9	Do. 38° 16' S., 39° 00' E.
23	28° 45'	57° 45'	38° 43'	57° 29'	4	ENE	2,5,6	The Northern limits from the 24th to the 29th were probably nearer to the equator than those stated.
24	30° 54'	43° 04'	37° 48'	57° 29'	3	NE	2,5,6	
25	30° 24'	59° 51'	37° 46'	58° 55'	2	NNE	6,7	
26	31° 49'	61° 52'	38° 28'	62° 28'	2	NE	4,6,8	
27	28° 28'	41° 55'	38° 20'	60° 50'	5	NE	2,4,6	East. limits, 31° 12' S., 61° 32' E.
28	31° 09'	62° 57'	36° 06'	46° 08'	4	NE	4,6,9	
29	30° 31'	64° 01'	36° 17'	67° 07'	5	North	4,6,9	
30	28° 04'	33° 41'	38° 50'	21° 50'	7	NE	4,7,9	
31	28° 55'	33° 37'	38° 54'	40° 20'	8	NNE	5,6,7	{ Extent in longitude, 28° 30' S., & 25° 45' E. to 34° 49' S & 47° 06' E.

The Table shews, as already hinted at, three different occasions on which a N.E. wind is found gradually advancing from the South-Western extremity of the Ocean to the Eastward.

Of these three successive winds or currents from the same quarter, the *first* advanced from 34° 46' S. and 44° 50' E., on the 1st., to 24° 24' S. and 74° 09' E., on the 10th, giving a range in longitude of 29° 19'; the *second* from 39° 13' S. and 27° 07' E., on the 15th, to 36° 17' S. and 67° 07' E., on the 29th, giving a range in longitude of 40°; and the *third*, which extended from 38° 50' S. and 21° 50' E. to 28° 04' S. and 33° 41' E., on the 30th, extended from 28° 55' S. and 33° 37' E. to 38° 54' S. and 40° 20' E., on the 31st, which gives an advance to the Eastward of about 7°.

The mean Eastern limit of the *first* is 63° 24' E., and the mean Western limit 52° 00' E., so that its mean extent in longitude is 11° 24'. Its mean Northern limit is 23° 17' S., and its mean Southern limit 32° 45' S., giving a mean extent in latitude of 9° 28'.

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The mean Eastern limit of the *second* is $56^{\circ} 05' E.$; its mean Western limit $42^{\circ} 00' E.$; and its mean longitudinal extent $12^{\circ} 05' E.$ Its mean Northern and Southern limits are $30^{\circ} 23' S.$ and $38^{\circ} 40' S.$, respectively, and its mean extent in latitude $8^{\circ} 17'$.

The mean limits of the *third*, for the two days on which it was observed, are $38^{\circ} 52' S.$ to $28^{\circ} 29' S.$, and $23^{\circ} 47' E.$ to $42^{\circ} 58' E.$, shewing a mean of $10^{\circ} 23'$ in latitude, and $19^{\circ} 11'$ in longitude.

So far, therefore, as can be judged from the Journal the mean extent of this N. E. wind, for the month, is $9^{\circ} 22'$ in latitude, and $14^{\circ} 13'$ in longitude, and the wind which is confined to this average space has a mean range in longitude of at least 35° , it being found to advance from the West towards the East.

Its extreme Northern and Southern limits are about $18^{\circ} S.$ and $39^{\circ} S.$, and consequently its range, from North to South, about 21° .

The prevailing direction of the wind is E. N. E. and N. E., and its mean direction between N. E. and N. E. b. E.

Its mean daily force is 5·2.

4. Connection between the S. E. Trade and the N.E. Wind, on its Polar Limits.

On comparing the polar limits of the Trade-Wind, and the Northern limits of the N.E. winds to the Southward of them, we find that as the former recede towards the Eastward and Northward, the latter advance in the same direction. From the 1st to the 11th of the month, the polar limits of the Trade became more and more Northerly, till they reached Mauritius, or were found even beyond it, and during those days the N.E. wind advanced from 34° or $35^{\circ} S.$ to 18° or $19^{\circ} S.$ in the same meridians. When, again, the S.E. wind appeared far to the Southward and Westward, after the 12th, the N.E. wind made its appearance still farther to the Westward; and as the Trade receded towards the Equator, till it reached Mauritius a second time, on the 25th, the N.E. wind seems to have followed it. And the commencement of another repetition of the same thing probably occurs on the 30th and 31st, for the S.E. Trade is found at $33^{\circ} 04' S.$ and $53^{\circ} 21' E.$, and the N.E. wind to the Westward of it.

The two winds are, on the first seven days of the month, seen so near to each other, that, on looking at the charts, the immediate impression is that the one is a continuation of the other; and on examining the logs of the vessels, from day to day, the S.E. Trade is in some cases actually found to have veered to East and N.E.

I have, therefore, considered the N.E. wind to be merely a deflection and continuation of the S.E. Trade. It is not quite clear, however, that it is so, for many of the vessels, on losing the S.E. Trade, had calms and variables for at least a few hours previously to their getting the N. E. wind, no gradual veering from S.E. to East and N. E. having been experienced.

It may be, and there are some indications that seem to favor the supposition, that these N.E. winds are the N.W. monsoon, which, having overleaped the intervening S.E. Trade, makes its re-appearance on the surface, and is deflected towards the S.W. by the heated land which lies in that direction.

5. On the S. W. Wind found to the Southward of the S. E. Trade-Wind.

The N. E. winds, beyond the polar limits of the Trade-Wind, are invariably accompanied by a current of air moving from the opposite direction, which always makes its appearance to the Westward of the N. E. current.

This S. W. wind presents itself on every day of the month, except from the 14th to the 21st, and on the 31st, when (the N. E. wind being far to the Westward,) the Journal does not shew whether the S. W. wind appeared still farther to the West, or not, as no observations taken to the Westward of the 13th meridian were extracted from the log-books. But, on every other day, when the N. E. wind extended considerably far to the East, a S. W. wind was constantly found to blow beyond its Western limits, and to follow the progression of the N. E. wind to the Eastward; and it is probable,

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The extreme Eastern limit observed is $58^{\circ} 53'$ E., on the 11th, and the extreme Western 14° E., on the 8th; so that the range in longitude was at least 44° .

The extreme Northern limit observed is $19^{\circ} 43'$ S., on the 8th, and the extreme Southern $39^{\circ} 27'$ S., on the 26th; which gives a range in latitude of $19^{\circ} 44'$.

The mean Eastern and Western limits are $42^{\circ} 15'$ E. and $27^{\circ} 07'$ E., respectively, giving a mean extent in longitude of $15^{\circ} 08'$.

The mean Northern and Southern limits are $28^{\circ} 48'$ S. and $35^{\circ} 30'$ S.; and hence the mean extent in latitude is $6^{\circ} 42'$.

From an average of nearly 4 daily observations, the mean daily force of the wind appears to have been about 4·8.

The prevailing direction of the wind was S. S. W. and S. W., and the mean direction nearly S. W. Comparing the mean force of the S. W. wind with that of the N. E. wind to the East of it, the latter (5·2) appears to be somewhat greater than the former, but the difference may be owing to the fewness or inaccuracy of the observations.

The mean directions of the two winds seem to have been nearly diametrically opposite.

These S. W. winds, like the N. E. winds to the Eastward of them, extend obliquely across the part of the Ocean where they prevail, namely, from the Southern extremities of Africa towards Cape St. Mary and Mauritius, and sometimes blow over an extensive tract. On the 8th, for example, they extended from the Cape of Good Hope up to Mauritius. To the Southward of the 30th parallel, they seldom appear farther to the East than the meridian of 48° , their Eastern limits being found at their Northern extremity, about the meridian of 59° . There is, therefore, a strong presumption that they are caused by the high temperature which prevails at that season of the year in the Islands of Mauritius and Bourbon, and in Madagascar and Southern Africa.

It will be seen, on comparing the limits of the S. E. Trade Wind and of the N. E. and S. W. winds which prevail to the Southward of it, that the changes of position which they undergo are closely related. When the S. E. Trade sets in far to the Westward, as on the 14th and 15th, it occupies the whole Ocean to the Eastward and Northward of 30° E., the N. E. and S. W. winds not appearing at all. In a short time, however, the N. E. wind, as on the 16th, makes its appearance to the Southward of the 30th parallel, near the meridian of 30° , and the Trade is pushed to the Eastward and Northward. The N. E. wind then continues to advance, and, by and bye, as on the 21st, the S. W. wind sets in to the Westward of it, and the Northern and Eastern limits of the two daily increase, in proportion as the Southern and Western limits of the Trade decrease.

6. Direction and Force of the S. E. Trade.

In order to ascertain, approximately, the mean direction and force of the S. E. Trade, the number of hours during which it blew on each day, from East, E. S. E., S. E., S. S. E., and South, respectively, has been determined; and as each of these winds blew in different parts of the Ocean, the point which gives the greatest number of hours is regarded as the point of maximum direction.

The daily maximum and minimum force is given for each of the five points, so that an approximate value of the mean force is obtained by taking half the sum of the two forces.

It is scarcely necessary to observe that in determining the direction of the S.E. Trade, as well as of the other systems of winds, no allowance is made for magnetic variation.

The value obtained for the mean force of the wind depends much upon the number of observations. If these were sufficiently numerous they would indicate at least the relative forces of the different winds, and it is for this purpose that the force is determined, as nearly as possible.

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TABLE shewing the Direction and Force of the S. E. Trade Wind, in March, 1853.

Date.	Direction.					Force.					Mean Daily Force.
	East.	E.S.E.	S.E.	S.S.E.	South.	East.	E.S.E.	S.E.	S.S.E.	South.	
	hrs.	hrs.	hrs.	hrs.	hrs.						
1	16	60	48	24	20	9.1	7.1	8.4	6.3	4.1	4.4
2	28	60	40	16	12	6.2	6.1	6.2	7.2	2.1	3.8
3	4	32	56	16	8	8.1	6.1	7.2	5.2	1	4.6
4	62	6	36	28	20	8.2	7.2	7.2	6.1	1	4.7
5	32	44	34	16	20	8.2	6.1	6.3	7.2	5.2	4.1
6	68	32	32	24	8	9.1	7.1	6.2	7.1	6	4.1
7	40	32	8	0	0	9.1	9.2	7.2			5.0
8	8	8	16	0	0	9.4	3.2	6.2			4.3
9	0	20	16	8	4		8.4	7.1	5.1	1	4.3
10	12	8	0	12	8	2.1	2		2.1	2.1	1.6
11	28	12	4	40	12	4.1	4.1	4	4.3	5.1	2.8
12	24	28	88	60	20	4	4.2	5.2	4.2	4.2	3.0
13	28	24	84	20	48	6.2	4	4.2	4.5	5.2	3.5
14	16	72	40	32	40	2.1	5.2	4.2	4.1	5.2	2.8
15	40	36	64	36	32	4.1	5.1	8.2	5.1	2.1	3.0
16	36	92	72	32	12	6.1	7.2	7.2	5.2	2	3.4
17	32	88	32	0	4	7.1	5.1	5.3		2	3.7
18	44	100	60	4	24	6.2	5.2	5.1	1	5.2	3.5
19	32	68	84	24	16	9.1	5.2	5.1	5.2	4	3.8
20	16	16	112	40	0	4.1	5.1	6.2	6.2		3.5
21	28	44	40	36	0	6.2	6.1	4.1	6.2	2	3.5
22	44	4	46	16	16	4.1	4.1	4.1	6.2	1	3.0
23	44	0	8	8	44	4.1		1	1	1	1.4
24	16	4	4	20	16	5.2	2	5.1	2	4.1	2.6
25	20	0	24	20	16	1		6.2	2	2	2.5
26	8	8	0	12	28	4.1	2		8.1	2.1	3.1
27	12	0	36	0	24	4.1		5.1		6.4	3.8
28	16	0	32	0	8	6.1		6.5		6	4.5
29	16	8	32	0	36	6.1	6.5	5.1		2.1	3.5
30	40	28	16	0	28	6.1	4.1	2.1		6.1	2.7
31	20	0	104	28	20	5.2		6.2	6.2	5.2	3.7
Means.	28	32	41	19	18	3.6	3.4	3.6	3.5	2.8	3.4

The Table shews:—

- 1o. That the prevailing direction of the Trade, in March, 1853, was S. E.
- 2o. That the mean direction was E. 39° S.
- 3o. That the mean daily force was 3.4.
- 4o. That the point from which the wind blew, in greatest force, was the East, and in least force, the South.
- 5o. That, with regard to the Trade, the stormiest days of the month were from the 1st to the 9th, inclusive, and the calmest days the 10th and 23rd.

The Easterly winds prevailed to the Westward of 60° E.

The Trade blew with greatest steadiness to the Eastward of 66° E. and Southward of 15° S.

7. *Limits, &c., of the N. W. Monsoon.*

The Southern limits of the N. W. monsoon, during the first fourteen days of the month, stretched obliquely across the Ocean from about 17° S. and 46° E. to the Equator in about 80° E., and thence towards the North of Sumatra.

At noon of the 3rd, for example, it was blowing steadily at the following stations:—

as shown by six vessels:—

No. 42, $14^{\circ} 18'$ S. & $46^{\circ} 41'$ E.,	W. N. W., 4.
No. 50, $13^{\circ} 37'$ S. & $57^{\circ} 18'$ E.,	N. W., 4, 6.

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- No. 12, $10^{\circ} 52' S.$ & $61^{\circ} 59' E.$, N. N. W., 2.
 No. 41, $05^{\circ} 50' S.$ & $68^{\circ} 12' E.$, W. N. W., 2.
 No. 43, $03^{\circ} 14' S.$ & $69^{\circ} 50' E.$, N. W., 1.
 No. 33, $01^{\circ} 37' S.$ & $77^{\circ} 26' E.$, N. W., 2, 4. (See Plate IV.)

After the 14th, the mean Southern limits were $5^{\circ} 22' S.$; but they still extended farther to the South on the Western than on the Eastern side of the Ocean. (See Plate V.)

The Northern limits appear to have been to the North of the Equator during the whole month, at least on the Eastern side; and to have extended, from the 1st to the 16th, obliquely up to $14^{\circ} N.$ and $90^{\circ} E.$ In fact, a N. W. wind is found, on almost every day, blowing over the Southern part of the Bay of Bengal, from Ceylon to the Straits of Malacca; and I suppose it to be the monsoon—the vessels situated to the Southward and Westward of that space having the wind from the same quarter.

On this supposition, the mean Northern limits on the East side are $9^{\circ} 27' N.$ and $88^{\circ} 07' E.$

The mean Southern limits on the West are $10^{\circ} 52' S.$ and $58^{\circ} 33' E.$

The mean extent in latitude appears to be about 12°

TABLE shewing the Limits, Direction and Force, of the N. W. Monsoon, in March, 1853.

Date.	Northern Limits		Southern Limits.		No. of Observa- tions	Mean Direc. of Wind.	Force of Wind.	REMARKS.
	Lat.	Long.	Lat.	Long.				
March.	N.	E.	S.	E.				
1	14° 55'	93° 54'	12° 20'	75° 05'	3	WNW	1,5	Eastern limit, $48^{\circ} 05' E.$
2	14° 56'	93° 38'	16° 07'	56° 17'	5	NW	1,8	Do. Do. $46^{\circ} 43' E.$
3	14° 56'	93° 38'	14° 18'	46° 41'	7	NWbN	2,6	Southern limits increasing from the 1st to the 11th.
4	14° 56'	93° 38'	14° 40'	46° 26'	7	NW	2,6	
5	01° 32'S	80° 27'	15° 15'	45° 46'	6	NW	2,6	
6	14° 53'	92° 12'	15° 38'	45° 00'	7	NWbN	1,6	
7	16° 38'	92° 19'	15° 42'	45° 57'	7	NNW	2,5	
8	16° 26'	89° 30'	12° 14'	82° 59'	8	NW	2,4	Western limit, $65^{\circ} 45' E.$
9	14° 15'	94° 23'	16° 43'	72° 53'	8	NWbN	1,5	Do. Do. $46^{\circ} 00' E.$
10	15° 36'	89° 38'	17° 08'	72° 18'	10	NW	1,5	Do. Do. $66^{\circ} 25' E.$
11	00° 51'	88° 11'	20° 10'	57° 29'	5	NW	2,4	
12	10° 46'	87° 46'	20° 10'	57° 29'	3	NNW	2,5	
13	09° 16'	87° 29'	20° 10'	57° 29'	6	NW	1,5	
14	09° 26'	97° 10'	20° 10'	57° 29'	6	NW	2,5	{ Southern limits considerably nearer to the Equator, after the 14th.
15	07° 53'	97° 51'	01° 19'	64° 48'	6	NW	1,6	
16	14° 23'	88° 44'	00° 18'N	64° 44'	6	WNW	1,6	
17	05° 22'	100° 07'	01° 12'N	65° 27'	3	NW	2,4	
18	12° 03'	87° 19'	07° 13'	72° 23'	5	NW	1,5	
19	11° 00'	86° 43'	13° 12'	48° 18'	8	NW	2,4	
20	09° 45'	86° 22'	07° 13'	72° 23'	6	NNW	2,6	
21	03° 36'	82° 08'	02° 37'N	85° 56'	4	NW	2,6	
22	04° 42'	82° 57'	01° 05'N	85° 26'	6	WNW	2,6	Western limit, $64^{\circ} 47' E.$
23	05° 09'	84° 37'	00° 49'	85° 19'	4	NW	2,6	Do. Do. $65^{\circ} 02' E.$
24	04° 48'	64° 46'	02° 44'	85° 43'	6	WNW	1,6	Do. Do. $65^{\circ} 13' E.$
25	09° 08'	66° 13'	04° 17'	86° 30'	4	WNW	2,6	Do. Do. $64^{\circ} 16' E.$
26	08° 01'	66° 13'	05° 17'	63° 23'	5	NW	2,9	Do. Do. $64^{\circ} 16' E.$
27	06° 39'	66° 26'	(2° 57'	85° 46'	3	WNW	3,9	Do. Do. $63^{\circ} 19' E.$
28	05° 11'	66° 51'	04° 52'	85° 11'	3	WNW	4,6	Do. Do. $62^{\circ} 34' E.$
29	03° 29'	67° 03'	05° 47'	85° 25'	3	NW	2,5	Do. Do. $62^{\circ} 06' E.$
30	02° 35'	60° 58'	08° 00'	85° 25'	3	NWbW	2,6	Do. Do. $61^{\circ} 28' E.$
31	01° 57'	59° 58'	00° 49'	77° 36'	4	WNW	2,5	Do. Do. $60^{\circ} 58' E.$
Means.	9° 27'N	88° 07'E	10° 52'S	58° 33'E	5	NW	3.7	

The N. W. monsoon, on approaching the S. E. Trade, is sometimes deflected to South and S. W., becoming a North and N. E. wind. For example, the *Paquebot Mexicain*, from India towards Reunion, had the N. W. monsoon on the 11th, in $17^{\circ} 32' S.$ and $72^{\circ} 09' E.$; on the 12th, the wind became North, and, on the 13th, N. N. E., N. E., and East; and, on the 14th, she got the S. E. Trade. Again, the *Atlet Rohoman*, from Calcutta towards Mauritius, after having had the monsoon for several days, got the wind on the 9th, first from North, and then from N. N. E.; on the 12th, the wind became East; and, after a few hours' calm, she got the S. E. Trade.

9. The N. E. Trade-Wind.

The N. E. Trade seldom appears to the Eastward of 66° E., South of 10° N. On some days, as on the 17th and 18th, it seems to take the place of the N. W. monsoon, to the Eastward of Ceylon. On the 17th, four vessels, from $7^{\circ} 51' N.$ and $89^{\circ} 27' E.$ to $2^{\circ} 17' N.$ and $78^{\circ} 55' E.$, have North and N. E. winds, during the whole day; and this is observed also on the 18th. But with the exception of these and one or two other days, there are few signs of the N. E. Trade in the Bay of Bengal, or to the Eastward of the 66th meridian.

The winds in the Northern part of the Bay were generally from N. W. and S. W.

From the 25th to the end of the month a strong S. E. wind prevailed from about 6° N. and 84° E. to 14° N. and 87° E., blowing towards the East coast of India.

To the Westward of 66° E., the N. E. Trade was generally found on every day on which vessels made their appearance there; but this was seldom the case, there having been only four vessels in all, which passed so far to the Westward and Northward, in the course of the month; viz., the *Mazeppa*, the *Sir George Anderson*, the *Nautilus*, and the *Romp*.

The *Mazeppa* left Mauritius for Muscat on the 20th of January. From the 25th of that month, in $13^{\circ} 27' S.$ and $56^{\circ} 16' E.$, to the 9th of February, in $0^{\circ} 21' N.$ and $59^{\circ} 54' E.$, she had the N. W. monsoon. During the greater part of the 9th, and the early part of the 10th, the weather was calm. On the latter day, however, in $01^{\circ} 19' N.$ and $59^{\circ} 04' E.$, she met with a fresh breeze from N. E., and this N. E. wind accompanied her steadily up to $16^{\circ} 45' N.$ and $59^{\circ} 11' E.$, on the 9th of March.

The *Sir George Anderson* left Mauritius for Socotra on the 29th of January. On the 21st of February, in $0^{\circ} 47' N.$ and $62^{\circ} 18' E.$, the wind was N. N. W. throughout, in fine breezes. On the 22nd, in $1^{\circ} 56' N.$ and $59^{\circ} 54' E.$, it became North and N. b. E.; and she then carried a N. E. wind to Socotra, where she arrived on the 10th of March.

The *Nautilus* sailed from Mauritius on the 1st of March, bound to Socotra. She fell in with the N. W. monsoon on the 2nd, in $16^{\circ} 07' S.$ and $56^{\circ} 17' E.$, and lost it on the 10th, in $4^{\circ} 35' S.$ and $67^{\circ} 02' E.$, the wind being for a few hours variable. On the 11th, in $3^{\circ} 39' S.$ and $66^{\circ} 47' E.$, she got a light wind from N. N. E., which lasted for three or four days. From $1^{\circ} 37' S.$ and $64^{\circ} 54' E.$, on the 14th, to $0^{\circ} 08' N.$ and $64^{\circ} 44' E.$, on the 16th, the wind was in light airs from West, which, as she advanced towards the North, became a fine breeze from N. W. and N. b. W., as on the 19th, in $3^{\circ} 06' N.$ and $66^{\circ} 08' E.$. She then had a N. W. wind to the end of the month, during which time she made little progress, for her position on the 24th was $4^{\circ} 48' N.$ and $64^{\circ} 46' E.$, and, on the 31st, $1^{\circ} 57' N.$ and $59^{\circ} 58' E.$. On the 1st of April, however, in $1^{\circ} 59' N.$ and $59^{\circ} 29' E.$, she got the wind at North, and, steering thence to the Northward and Westward, she had a fine N. E. breeze the whole way to Socotra.

The *Romp*, from Muscat to Mauritius, got the wind from N. E., on the 18th of March, in $17^{\circ} 52' N.$ and $62^{\circ} 45' E.$, and she carried it to $9^{\circ} 08' N.$ and $66^{\circ} 13' E.$ on the 25th, when it became North and N. W. This N. W. wind lasted to the 4th of April, when the vessel's position was $4^{\circ} 41' S.$ and $70^{\circ} 16' E.$. The wind then became S. W. and S. S. W., and continued so till the 10th, when, in $8^{\circ} 23' S.$ and $70^{\circ} 45' E.$,

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the weather became calm, with variable winds and squalls. On the 13th, in $10^{\circ} 26' S.$ and $68^{\circ} 36' E.$, she got the S. E. Trade.

It would seem, then, that the N. E. Trade prevailed during the month, from $1^{\circ} 40' N.$ to at least $18^{\circ} N.$, to the Westward of $66^{\circ} E.$; but that to the Eastward of that meridian the prevailing wind, on the North side of the Equator, was N. W.

The logs of the *Romp* and *Nautilus* seem to indicate that in the line between the N. E. and N. W. winds, and coinciding more or less with the meridian of 66° , the wind was due North.

With regard to the mean force and direction of the N. E. Trade, the observations are too few to enable one to obtain an approximate value. The former, however, appears to have been 3, and the latter to have been N. E., between 55° and $65^{\circ} E.$

8. Belts of Calms.

Although the observations show, upon the whole, the existence of a belt of calms to the North of the equatorial borders of the S. E. Trade, and another to the South of its polar borders, yet they are not sufficiently numerous for determining the exact limits of these belts.

Between the N. E. and S. E. Trades lies the region of the N. W. monsoon, and also, on the Eastern side, the region of the S. W. wind or monsoon, the limits of which have been given at page XV.

Now, between the S. E. Trade and N. W. monsoon, to the Westward of $60^{\circ} E.$, where the S. W. wind is rarely found, most of the vessels met with calms and light variable airs, which lasted from a few hours to a few days.

Also, to the Northward of the monsoon, and between it and the N. E. Trade, similar calms and variables were found, but it often happened that the Trade gradually veered to North and N. W., without any calms, the N. W. monsoon appearing to be merely a continuation of the Trade.

Again, between the S. E. Trade and S. W. monsoon, on the East side of the Ocean, calms were sometimes experienced. Generally, however, the Trade seems to have veered to South and S. W., without any interruption. But to the Northward of the S. W. wind, between it and the N. W. monsoon, calms and variables were much more frequent.

Calms and variables were also experienced on the polar limits of the S. E. Trade; but it more frequently happened that, though the wind became variable, or shifted, it blew in strong breezes and gales.

Rather than attempt to lay down the position of the belts of calms, I shall give a few statements from some of the log-books.

Equatorial Calms.—The *Alfred* lost the S. E. Trade on the 24th, in $6^{\circ} 45' S.$ and $61^{\circ} 49' E.$. The wind became very light and variable from East, E. N. E., N. W., and S. W., with calms. On the 30th, in $1^{\circ} 43' S.$ and $72^{\circ} 31' E.$, she got the N. W. monsoon.—Here, then, the breadth of the calm belt was $5^{\circ} 02'$.

The *Paquebot Mexicain* got the Trade in $17^{\circ} 39' S.$ and $67^{\circ} 52' E.$ on the 14th. For several days previously, she had the N. W. monsoon, which, on the 12th, became North, in light airs, and, on the 13th, N. N. E. and N. E. She then had calms for a few hours, after which the S. E. Trade set in. Her course was due West.

The *Nautilus* lost the Trade on the 2nd, in $16^{\circ} 07' S.$ and $56^{\circ} 17' E.$, the wind becoming E. b. S. from S. E. She had calms for eight hours, and then a breeze sprung up from N. W. At noon of the following day, in $13^{\circ} 37' S.$ and $57^{\circ} 18' E.$, she had

the monsoon in strong breezes.—She also had light variable winds for some hours between the N. W. monsoon and the N. E. Trade.

The *Julia* got the Trade on the 30th, in about $9^{\circ} 30'$ S. and 85° E. On the preceding three or four days the wind was S. W. and West in strong breezes, and previously to getting the Trade she had variable airs and calms for a few hours.

The *Bland* got the Trade on the 31st, in $11^{\circ} 04'$ S. and $79^{\circ} 07'$ E. For several days before, she had a strong S. W. wind, which, on the 29th, became S. S. W. and then South. At 4. P. M. of the 30th, "the wind flew round to N. W. with heavy rain," and on the morning of the 31st, she got the S. E. Trade.

Polar Calms.—The *Roscoe* had variable airs from $29^{\circ} 27'$ S. and $65^{\circ} 12'$ E. on the 30th March, to $26^{\circ} 19'$ S. and $67^{\circ} 50'$ E. on the 3rd April, when she got the S. E. Trade.

The *Natal* got the Trade on the 30th March, in $32^{\circ} 20'$ S. and $54^{\circ} 13'$ E. The wind veered from N. W. to West, W. S. W. and South in strong breezes.

The *Jessie Smith* lost the Trade on the 22nd, in $26^{\circ} 57'$ S. and $46^{\circ} 18'$ E. The wind from S. S. E. became East in steady breezes. On the 24th, in $26^{\circ} 58'$ S. and $44^{\circ} 32'$ E., she had calms and light airs from East; on the 25th, in $28^{\circ} 28'$ S. and $43^{\circ} 17'$ E., strong breezes and gales from W. N. W.; and, in the latter part of the 26th, and on the 27th, in $28^{\circ} 28'$ S. and $41^{\circ} 51'$ E., calms and variables.

The *Eugenia* lost the Trade on the 21st, in $28^{\circ} 38'$ S. and $50^{\circ} 08'$ E., the wind veering from E. S. E. to E. b. N. in fresh breezes. On the 22nd, in $29^{\circ} 51'$ S. and $47^{\circ} 05'$ E., the wind was for 16 hours from N. E. b. E. and N. N. E. in fresh breezes, and then from West to North in moderate breezes, with calms.

The *John King* lost the Trade on the 6th, in $28^{\circ} 02'$ S. and $45^{\circ} 50'$ E.; the wind was blowing in increasing gales from E. S. E. and it "veered to W. S. W., with heavy squalls". She had then a S. W. gale for several days.

10. Hurricanes and Gales.

The relative mean forces of the different systems of winds above described were apparently as follows :—

N. E. Trade.....	3
N. W. Monsoon	3.7
S. W. Wind towards the Indian Archipelago	2.5
S. E. Trade	3.4
N. E. Wind to the Southward of the S.E. Trade	5.2
S. W. Wind	4.8

It seems, therefore, that the two latter winds are the strongest; that the N. W. monsoon is stronger than the S. E. Trade; and that the S. W. wind which blows towards Sumatra, &c., is the weakest.

Again, if the N. W. monsoon be regarded as a continuation of the N. E. Trade, caused by the combined influence due to the sun's elevation and the heated land of the Indian Archipelago, Australia, &c., it may be said to extend over a greater space than the S. E. Trade, and to put a greater mass of air in motion.

Hence the monsoon pushes the S. E. Trade back towards the Tropic. The two opposing winds are in conflict, and the weaker gives way to the stronger. It is, therefore, in the belt of calms and variables which separates them, that storms and hurricanes are most likely to occur.

Now, the position of this belt is constantly changing. It follows the sun. When the land in the Southern hemisphere begins to be heated up by the sun's rays, the N. W.

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monsoon begins to set in, and it advances more and more to the Southward, in proportion as the heat increases, till, in the month of March, it attains its highest limit, after which it gradually recedes and at length disappears, the S. E. Trade taking its place. But though the monsoon, from October to March, is, upon the whole, advancing towards the South, and the Trade receding, the two winds fluctuate backward and forward within certain limits, according to temporary fluctuations of temperature, both alternately occupying the same space.

If, then, the hurricanes of the Indian Ocean, as here maintained, occur in the space between the N. W. monsoon and the S.E. Trade, the localities of these hurricanes should vary according to the season—according to the sun's declination—and observation shews that such is the case. The monsoon begins to blow in the latter part of October, or in the beginning of November; the hurricane season of the South Indian Ocean begins at the same time; and, in the early part of that season, the hurricanes occur far to the Eastward and Northward of Mauritius, in the vicinity of the Equator. But as the sun's Southern declination increases, they gradually attain higher latitudes, and make their appearance in localities farther to the Westward, till at length they come down as far as Mauritius, or even beyond it. In November, 1851, for example, a very severe hurricane occurred in 6° to 16° S. and 80° to 90° E., and, in March of the same year, an equally severe one took place in about 25° S. and 60° E. Now, these storms were the two extremes of a series of gales which took place in intermediate localities and at intermediate times in the course of the season; and a similar series of storms or gales is, in general, observed annually, the first storm occurring in the early part of the season in the neighbourhood of the Equator, and the last, towards the end of the season, in the neighbourhood of the Tropic; while, at a still later period, storms occur again, nearer to the Equator, as the sun advances to the North.

In the hurricanes of the South Indian Ocean the wind moves in a circular direction, from West to East by the North, and from East to West by the South, or with the hands of a watch. This is termed their Law of Rotation. They have at the same time a progressive motion in a course of from about E. N. E. to W. S. W., which is termed their Law of Progression. Now, the explanation of these laws, about which writers on storms have so widely differed, will, I think, be afforded by an examination of the connection between the ordinary prevailing winds, as influenced and determined by the action of heat.

The N. W. monsoon, on approaching the belt of equatorial calms, appears to have, as already remarked, a tendency to veer to North and N. E., becoming, first, a North, and then a N. E. wind; and the S. E. Trade, to the Eastward of 60° E., veers to S. and S. W., forming a wind, first, from South, and then from S. W. These veerings, then, would evidently give rise to a wind rotating according to the law which obtains in the Southern hemisphere.

This is the explanation which was given of the Law of Rotation by Dr. Thom, on hypothetical grounds; and the observations given in the Journal show that the two opposing winds, especially the Trade Wind, do actually veer in the manner which he supposed.

I am not aware, however, that any satisfactory explanation has been given of the Law of Progression.

Why is it that the hurricanes of the South Indian Ocean generally travel from E. N. E. to W. S. W.?

This question will, I think, be answered in the course of these researches.

It has already been observed that the N. W. monsoon extended farther to the South on the Western than on the Eastern side of the Ocean. Its Southern limits, during the first half of the month, stretched obliquely from about 17° S. and 46° E. up to the Equator in 80° or 85° E. And the Northern limits of the S. E. Trade extended, at the same time, from 20° S. and 50° E. to 11° S. and 80° or 85° E., where it was deflected towards the N. E., forming a S. W. wind.

Between the two opposite systems of winds is the belt of calms and variables.

Now, if the hurricanes of the South Indian Ocean take place on the borders of the monsoon and of the S. E. Trade—and it appears certain that they generally do so—it is manifest that a storm originating near the Equator in about 85° E., would, if it progressed at all, move along the belt of calms which separates the two winds. But the position of the belt of calms is determined by the limits of the Trade and monsoon, which extended, during a considerable part of the month, from the vicinity of the Equator, in 85° E., down towards Mauritius; and that is exactly the course which hurricanes generally take at that season of the year.

The position of the belt of calms is indicated in Plate I, facing the title page. On the one side of it is represented the region of the S. E. Trade, and on the other that of the N. W. monsoon. The Trade, on nearing the Equator, is deflected towards Sumatra &c., forming a S. W. monsoon. Now, it often happens that the N. W. monsoon, in veering to North and N. E., penetrates into this S. W. wind, while, somewhat farther to the Westward, the S. W. wind still pursues its course; and it is easily conceivable how a rotatory wind may thus be generated. I have, therefore, represented the supposed formation of a circular gale, in this manner, where the belt of calms crosses the Equator, and it is more than probable, that, if such a gale had actually been formed there, it would, if it did not remain stationary, move along the belt of calms.

The Journal shows distinctly that the monsoon and Trade, and consequently the belt of calms between them, had, during a considerable portion of the month, the relative positions assigned to them in the Chart, and it is these relative positions that determine the usual tracks of hurricanes.*

Some writers often speak of the hurricanes of the South Indian Ocean as passing down across the Trade, and have recourse to extraordinary causes to account for the supposed phenomenon. But it does not follow, that, because hurricanes may originate about 8° or 9° S. and 80° or 85° E., and come down towards Mauritius, they travel through or across the Trade. They do not pass through the Trade, but along its equatorial edge, which, in the hurricane season, often extends considerably farther to the Southward on the Western than on the Eastern side of the Ocean, as shewn by the Journal, and represented in Plate I.

If the usual tracks of hurricanes coincide with the equatorial limits of the monsoon and Trade, it is plain that the cause or agent which determines the one will also determine the other; that is, that whatever causes the N. W. monsoon to extend to Mauritius, or beyond it, also determines the hurricane tracks.

What is it, then, that gives rise to the N. W. monsoon? and why does it extend so far to the Southward in the meridians of 50° and 60° ?

The answers to these questions are furnished by considering the distribution of the land, and the influence of solar heat. The monsoon is caused by the increase of temperature which takes place, in the summer months of the Southern hemisphere, in Australia, Madagascar, and Southern Africa; its equatorial limits being determined by the positions of the localities in which the temperature attains its highest elevation, in different parts of the Ocean, from Eastward to Westward. In other words, the belt of calms, or of maximum temperature, in the Indian Ocean, is drawn to the Southward by the influence of the heated land, as well as by the direct action of the sun. If there were no land at all, the maximum isotherm would extend due East and West, in a parallel corresponding to the sun's declination; but the heated land, on either side of the Ocean, causes the zone of maximum temperature to extend farther to the Southward, along its whole extent, than it would have done in the absence of that land, and to attain a still higher latitude towards the coasts of Africa, where the heat is greatest; and hence the oblique position of

* The edges of the calm belt and of the Trade and monsoon, are sharper in the Chart than they are in nature, where they are irregular, jagged, and indented. The Chart gives merely the average limits.

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the equatorial edges of the monsoon and Trade, and of the belt of calms, or tracks usually followed by hurricanes.

If it be asked why these hurricanes travel from E. N. E. to W. S. W., and not in the contrary direction, it may be answered that they travel towards the Westward, because the temperature is more elevated on the African side of the Ocean, and because the N. W. monsoon, which is, upon the whole, stronger than the S. E. Trade, impinges upon the N. E. quadrant of the storm with a force greater than that with which the Trade impinges upon the S. W. quadrant.

With regard to the continued action of the storm for several days in succession, it may be inferred, that, if it is originally set in motion by the Trade and monsoon, the same forces may keep it in motion; for, in progressing towards the Westward, the Trade and monsoon still continue to act as at first. It is not necessary to suppose that the monsoon moves down, sideways, from 10° S. and 85° E. to Mauritius, in proportion as the storm advances. The equatorial edge of the monsoon may have had a slanting direction across the Ocean before the storm commenced, and also during the whole time it lasted; the motive power, instead of requiring to be renewed, at each successive step, residing in the monsoon itself, along the whole extent of its Southern limits. But even if it were necessary to suppose that the monsoon did advance, sideways, to the Southward and Westward, according as the hurricane moved in the same direction, this would only show that an elevation of temperature had taken place, in the direction of Mauritius and Madagascar, which caused the monsoon to extend to the Southward and Westward, pushing the Trade back towards the Tropic, and thus producing a storm or hurricane.

The object of these remarks is simply to direct attention to what the Journal indicates, viz.: that the localities of the hurricanes of the South Indian Ocean, and their laws of rotation and progression, depend upon the observed relative strength, positions, and veerings, of the Trade and monsoon, and upon the known effects of heat. Whether or not they observe, in other respects, that precision and regularity which have been ascribed to them by writers on the subject, is a question the consideration of which must be deferred to another occasion. It is not impossible that further investigation will show that they are not quite so regular in their movements as some suppose, and that several of the views entertained respecting them have been put forward somewhat prematurely.

Besides the position of the belt of calms, and the regions of the N. W. monsoon and S. E. Trade, Plate I. represents the deflection of the Trade towards Sumatra, forming the S. W. monsoon referred to at page XIV. It also shows the N. E. and S. W. winds which prevailed to the Southward of Mauritius and Madagascar, with the supposed formation of a circular gale between them; and, on the North side of the Equator, the N. E. Trade is seen to the Westward of 65° E., while to the Eastward of that meridian, the prevailing winds, North of the 10th parallel, are N. W. and S. W.

The various systems of winds represented in the Chart are explained by the effects of heat. The S. W. wind toward Sumatra is caused by the heat which prevails there at that season of the year; and a similar cause will account for the other S. W. monsoon which blows up towards the Southern coasts of Africa, Madagascar, and Mauritius. This influence of heated adjacent land seems to be exemplified, also, in the case of the N. E. Trade. So far as the few observations which were made in that part of the Ocean go, it would appear, that, while the wind blows from N. E. towards Africa, it blows towards the coasts of India chiefly from N. W., its direction in about 65° E. being North, or intermediate.

The Chart and Journal seem to indicate that the N. W. monsoon is a continuation of the N. E. Trade, and the S. W. monsoon, toward Sumatra, a continuation of the S. E. Trade. Is not the S. W. monsoon of the Northern hemisphere, from April to October, also a continuation of the S. E. Trade? If the N. W. monsoon is not caused by a deflection and prolongation of the N. E. Trade, and the S. W. monsoon by a similar deflection and prolongation of the S. E. Trade, whence comes the air that feeds them? When the N. W. monsoon of the Southern hemisphere prevails, the N. E. Trade is found blowing down to the vicinity of the Equator, and a little beyond it are the Northern limits of the monsoon. Whence, then, is the air which sustains the monsoon derived, unless from the N. E.

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Trade which prevails in its immediate vicinity, and has, like itself, a Southerly course ? Similarly, when the S. W. monsoon prevails in the Northern hemisphere, the S. E. Trade blows down to the Equator, or beyond it, and the Southern limits of the monsoon are in the immediate neighbourhood of the Northern limits of the Trade, both winds moving in a Northerly direction. The S. W. monsoon sets in at Ceylon and on the Southern shores of India, in the early part of April, and it gradually advances to the Northward, reaching Bombay about the 15th of May, and places farther to the North at later dates, it being caused by the rarefaction which takes place over the extensive plains and deserts of Asia, as the sun's meridian altitude increases. Now, whence does this great rush of air proceed, unless from the S. E. Trade ? The Trade blows in greatest force in the winter of the Southern hemisphere, in consequence of the elevated temperature which prevails to the North of the Equator, and after passing over into the Northern hemisphere it is deflected to the N. E., and blows, like the S. W. monsoon near Sumatra, towards the localities of maximum heat.

As the monsoon progresses to the Northward, the N. E. Trade recedes before it, or rather, the Trade, on reaching the line of maximum temperature, is rarefied and ascends. Thus, between the two opposite winds, there is a zone of calms and variables, analogous to that between the S. E. Trade and N. W. monsoon in the Southern hemisphere, and theory would lead us to infer that this zone, also, is the scene of storms and hurricanes, which, in the Bay of Bengal and in the China Seas, revolve in a direction contrary to that of the hurricanes of the Southern hemisphere, and have a progressive motion from E. S. E. to W. N. W.; for, the heated land of Asia lying to the West of those seas, the belt of calms and variables in them would extend toward the land, in the direction indicated; and the monsoon being stronger than the Trade, and impinging upon the S. E. quadrant of the storm, the latter would be impelled towards the W. N. W., whither the elevated temperature in that direction would also have a tendency to draw it. In short, the great agent in the production both of the ordinary winds, and of their stormy gyrations, seems to be HEAT.

It does not appear that any hurricane was experienced on the South side of the Equator during this month ; but gales were of frequent occurrence between the Cape of Good Hope and the parallel of Mauritius, as far as 65° or 70° E. These gales generally took place between the S. W. and N. E. currents of air which prevailed in that part of the Ocean, and as a knowledge of them cannot but be highly important to the navigator, as well as interesting to all, I shall give a few details regarding them, making such remarks on the winds and weather experienced at the same time in other parts of the Ocean, as may appear necessary. On some days, also, the N. W. monsoon, in coming down towards the 20th parallel, seems to have veered to North and N. E. ; and, the S. E. Trade blowing at the same time, to the Southward of Mauritius, and the S. W. monsoon of the Cape blowing towards Madagascar, a circular wind of great extent was occasionally formed. In order to give a connected view of these phenomena, I shall briefly state the leading results of each day's observations at noon.

1st. March.—On the 1st. of the month, we find the following vessels experiencing the S. W. and N. E. winds so often alluded to :

No. 51, at Algoa Bay, S.W.		No. 71, $34^{\circ} 46'$ S. & $44^{\circ} 50'$ E., N.E., 4
No. 66, at Natal,	S.W., 5	No. 36, $34^{\circ} 20'$ S. & $48^{\circ} 25'$ E., E.N.E., 5
		No. 38, $34^{\circ} 13'$ S. & $50^{\circ} 55'$ E., N.E., 4
		No. 73, $31^{\circ} 38'$ S. & $57^{\circ} 48'$ E., E.N.E., 5

To the Northward of this N. E. wind, as far as $16^{\circ} 49'$ S. & $56^{\circ} 21'$ E., the S. E. Trade was blowing strongly, as seen at five stations.

On the East side of the Ocean, the S. E. Trade is found by four vessels from 25° $56'$ S. and $95^{\circ} 54'$ E. to $7^{\circ} 51'$ S. and $85^{\circ} 38'$ E.

The observations made North of the 15th parallel, and West of the 60th meridian, four in number, show the N. E. Trade in the Northern, and the N. W. monsoon in the Southern hemisphere.

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2nd March.—The direction and force of the winds on this day, to the West of 62° E., are represented in one of the diagrams of Plate II. The number at or near the point of the barb is the number denoting the vessel, and the number at the feathered end denotes the force of the wind, which was blowing towards the point to which the arrow is directed.

When the wind has blown from two points, within a brief interval, both directions are given.

On this day, the S. W. and N. E. winds are found at the following stations:

No. 49, 34° 35' S. & 18° 30' E., S.bW. to S.bE., 6	No. 36, 33° 20' S. & 51° 57' E., N. E., 5
No. 51, at Algoa Bay, S.W. & South S.W., 6	No. 71, 35° 01' S. & 49° 00' E., NLY., 5
No. 22, 30° 23' S. & 32° 51' E., S.W., 6	No. 38, 34° 20' S. & 52° 53' E., N.E.bN., 5
No. 66, at Natal,	No. 88, 29° 03' S. & 49° 43' E., E.bN., 5
	No. 73, 28° 15' S. & 57° 30' E., E.N.P., 6
	No. 9, 24° 35' S. & 49° 27' E., E.bN., 0

No. 8, in 23° 35' S. & 52° 30' E., has the wind E.S.E. in fresh breezes; and, at Port Louis, it is from S. E. round to N. E. and North; while to the North of Mauritius the N. W. monsoon is experienced by three vessels, Nos. 50, 42 and 12, in strong and moderate breezes.

3rd March.—The positions of the vessels, and the direction and force of the wind, for this day, are represented in Plate IV.

We have still the S. W. and N. E. currents of air of the preceding two days, at the localities subjoined:

No. 71, 34° 51' S. & 48° 45' E., N.N.E. & S. W., 6,7	No. 71, 34° 51' S. & 48° 45' E., N. N. E. & S. W., 6,7
No. 49, 34° 35' S. & 17° 15' E., S.S.W., 4	No. 36, 34° 52' S. & 54° 17' E., N.N.E., 5
No. 51, at Algoa Bay, S. W. & S.E.	No. 38, 34° 14' S. & 54° 07' E., N. b E., 6
No. 22, 30° 13' S. & 32° 30' E., S.W., 6	No. 88, 30° 08' S. & 50° 33' E., East, 5
No. 66, at Natal, W.S.W., 4	No. 73, 25° 25' S. & 57° 05' E., E.N.E., 6

To the Westward of No. 73, two vessels, Nos. 8 and 9, have the wind from E. S. E. and S. E. in strong breezes.

The N. W. monsoon is seen stretching from the neighbourhood of Mauritius to 14° 56' N. and 93° 38' E., and the S. E. Trade prevailing to the East of the 80th meridian.

4th March.—We have the S. W. and N. E. winds as follows:

No. 49, 34° 38' S. & 18° 30' E., S.bE., 6	No. 36, 33° 04' S. & 55° 22' E., E. b N., 4
No. 51, at Algoa Bay, S.W., 7	No. 71, 32° 59' S. & 50° 25' E., N. E., 4
No. 22, 31° 05' S. & 31° 44' E., S.S.W., 4	No. 38, 32° 47' S. & 55° 10' E., East, 2
No. 66, at Natal, S.W., 2	No. 8, 26° 33' S. & 48° 50' E., E. b N., 5

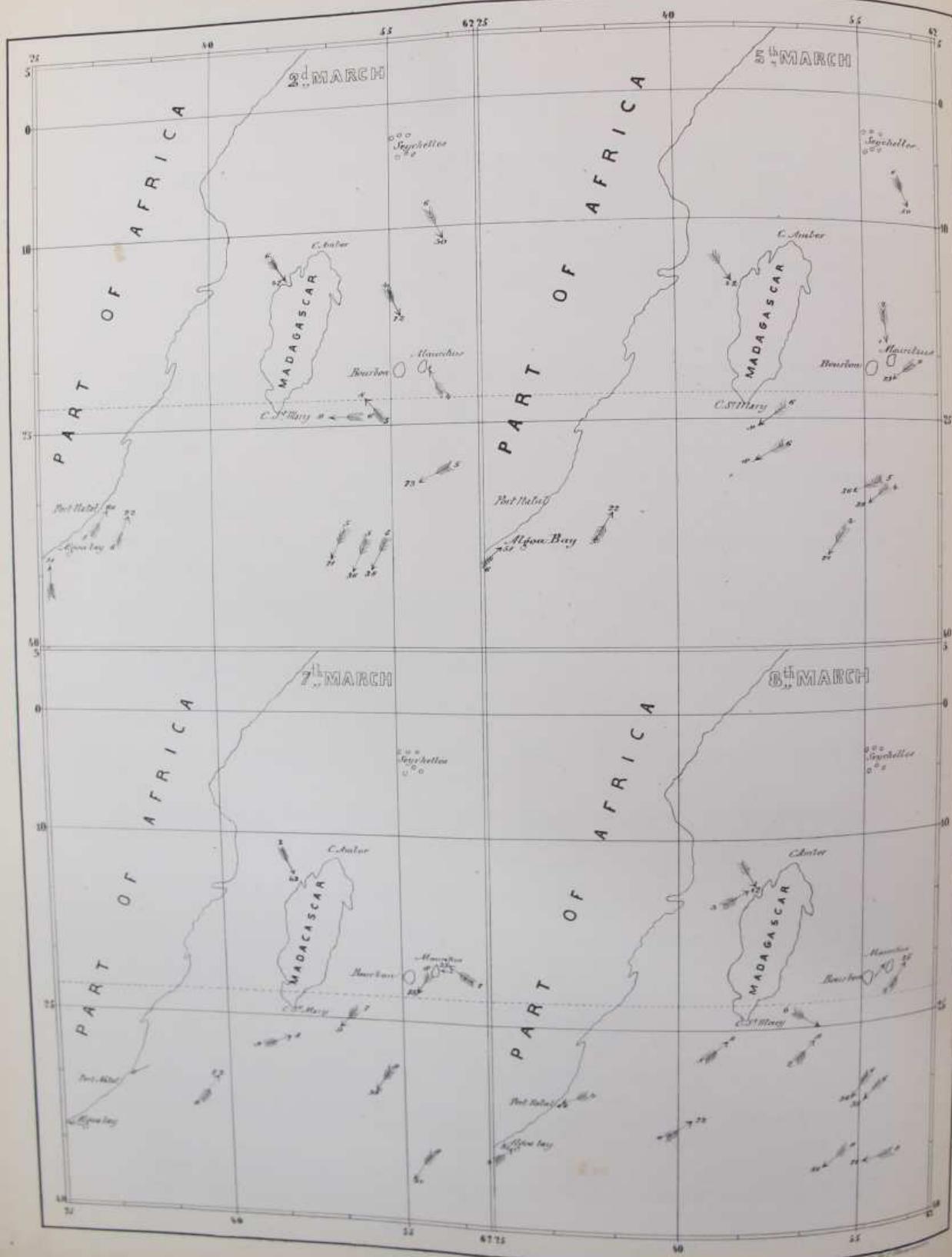
The Trade and monsoon occupy the same localities as yesterday.

5th March.—I have represented the direction and force of the wind on the 5th, to the West of 62° E., in the second diagram of Plate II.

The N. E. wind is found stretching from Mauritius, to 33° 40' S. and 52° 10' E.; and a S. W. wind is still found to the Westward of it, though the number of observations is fewer than on the previous day.

DIAGRAMS SHOWING THE DIRECTION & FORCE OF THE WIND,
TO THE N^W & S^E OF MAURITIUS, ON THE 2nd, 5th, 7th & 8th MARCH, 1853.

Plate II.



No. 49, $35^{\circ} 20' S.$ & $17^{\circ} 30' E.$, S.S.E., 4	No. 71, $33^{\circ} 40' S.$ & $52^{\circ} 10' E.$, N. E., 4
No. 51, at Algoa Bay, S.W. to N. W., 5	No. 38, $31^{\circ} 49' S.$ & $55^{\circ} 07' E.$, N. E., 4
No. 22, $30^{\circ} 43' S.$ & $34^{\circ} 29' E.$, S.S.W., 5	No. 36, $30^{\circ} 58' S.$ & $54^{\circ} 43' E.$, E.b N., 5
	No. 8, $27^{\circ} 26' S.$ & $45^{\circ} 20' E.$, E.N.E., 6
	No. 9, $25^{\circ} 35' S.$ & $49^{\circ} 30' E.$, E.N.E., 6
	No. 73, $22^{\circ} 37' S.$ & $57^{\circ} 09' E.$, E.N.E., 9

The S. E. Trade is blowing in strong breezes and moderate gales, from $25^{\circ} 45' S.$ and $88^{\circ} 13' E.$ to $17^{\circ} 39' S.$ and $65^{\circ} 27' E.$, and the N. W. monsoon is found extending from Mauritius to $01^{\circ} 32' S.$ and $80^{\circ} 27' E.$ blowing at 60° E. in strong breezes.

6th March.—The following are the localities where the S. W. and N. E. winds were observed on this day :

No. 22, $30^{\circ} 13' S.$ & $36^{\circ} 23' E.$, S.S.W., 6	No. 71, $34^{\circ} 43' S.$ & $53^{\circ} 45' E.$, N.E.bE., 4
No. 8, $28^{\circ} 02' S.$ & $45^{\circ} 50' E.$, S.W., 5	No. 38, $31^{\circ} 23' S.$ & $54^{\circ} 45' E.$, East, 8
	No. 36, $29^{\circ} 40' S.$ & $53^{\circ} 40' E.$, E. b E., 9
	No. 9, $25^{\circ} 48' S.$ & $49^{\circ} 50' E.$, E.N.E., 8
	No. 73, $21^{\circ} 28' S.$ & $56^{\circ} 58' E.$, E.N.E., 9

At Natal, Algoa Bay, and $34^{\circ} 58' S.$ & $18^{\circ} 31' E.$, the wind was S. E. in moderate breezes.

From $25^{\circ} 42' S.$ and $84^{\circ} 43' E.$ to Mauritius, the S. E. Trade was blowing in strong breezes and moderate gales, as indicated by three vessels.

The N. W. monsoon was blowing in moderate and strong breezes, from $15^{\circ} 38' S.$ and $45^{\circ} 00' E.$, to $1^{\circ} 42' S.$ and $80^{\circ} 49' E.$; it was experienced, also, at $14^{\circ} 33' S.$ and $75^{\circ} 13' E.$.

7th March.—The third diagram in Plate II represents the direction and force of the winds on the 7th., to the West of $62^{\circ} E.$ The S. W. and N. E. winds were observed at the following stations :

No. 49, $35^{\circ} 12' S.$ & $18^{\circ} 35' E.$, W.S.W., 5	No. 71, $36^{\circ} 02' S.$ & $55^{\circ} 15' E.$, E.N.E., 9
No. 22, $30^{\circ} 11' S.$ & $38^{\circ} 40' E.$, S.W.bS., 6	No. 88, $32^{\circ} 35' S.$ & $52^{\circ} 36' E.$, East, 9
No. 8, $27^{\circ} 05' S.$ & $44^{\circ} 02' E.$, W.bS., 9	No. 38, $30^{\circ} 39' S.$ & $53^{\circ} 55' E.$, N.N.E., 9
	No. 36, $30^{\circ} 14' S.$ & $53^{\circ} 40' E.$, N. E., 9
	No. 9, $25^{\circ} 26' S.$ & $50^{\circ} 17' E.$, E.N.E., 7
	No. 73, $20^{\circ} 58' S.$ & $56^{\circ} 48' E.$, E.N.E., 6

The S. E. Trade was blowing in strong breezes at $25^{\circ} 22' S.$ and $80^{\circ} 57' E.$, and also at $21^{\circ} 55' S.$ and $68^{\circ} 48' E.$ The N. W. monsoon was blowing in moderate and fresh breezes to the North of $15^{\circ} S.$, and West of $80^{\circ} E.$

8th March.—The force and direction of the winds on this day are represented in the fourth diagram of Plate II. The S. W. and N. E. winds still continue. They were experienced by the following vessels :—

No. 49, $35^{\circ} 03' S.$ & $20^{\circ} 04' E.$, S. b. W., 4	No. 71, $34^{\circ} 45' S.$ & $55^{\circ} 14' E.$, East, 9
No. 55, $34^{\circ} 09' S.$ & $14^{\circ} 00' E.$, S. S. W., 4	No. 88, $33^{\circ} 21' S.$ & $52^{\circ} 46' E.$, E.N.E., 10
No. 22, $30^{\circ} 12' S.$ & $41^{\circ} 00' E.$, S. W., 6	No. 38, $30^{\circ} 50' S.$ & $55^{\circ} 10' E.$, N.N.E., 6
No. 8, $26^{\circ} 54' S.$ & $45^{\circ} 29' E.$, S. W., 5	No. 36, $29^{\circ} 46' S.$ & $54^{\circ} 54' E.$, N. E., 6
No. 9, $26^{\circ} 10' S.$ & $50^{\circ} 21' E.$, W.N.W. & W. S. W., 2	No. 26, $21^{\circ} 10' S.$ & $65^{\circ} 55' E.$, E.N.E., 9
No. 1, Mauritius, S.W.&N.W., 2	
No. 25, $19^{\circ} 43' S.$ & $58^{\circ} 09' E.$, S. S. W., 2	

The S. E. Trade, on this day, was got by only one vessel, No. 37, at $24^{\circ} 52' S.$ and $77^{\circ} 17' E.$, where it was blowing in strong breezes.

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The N. W. monsoon was experienced by four vessels, from $5^{\circ} 50'$ S. and $65^{\circ} 45'$ E. to $5^{\circ} 20'$ S. and $71^{\circ} 40'$ E., and also by another vessel at $12^{\circ} 14'$ S. and $82^{\circ} 59'$ E.

9th March.—The same currents of S. W. and N. E. winds still continue. They were found at the following stations :

No. 22, $30^{\circ} 31'$ S. & $43^{\circ} 31'$ E., S. W., 6	No. 71, $35^{\circ} 38'$ S. & $56^{\circ} 10'$ E., N. E., 9
No. 8, $26^{\circ} 59'$ S. & $44^{\circ} 36'$ E., W. S. W., 6	No. 38, $30^{\circ} 33'$ S. & $50^{\circ} 34'$ E., N.N.E., 6
No. 9, $25^{\circ} 51'$ S. & $49^{\circ} 43'$ E., W. S. W., 2	No. 36, $29^{\circ} 57'$ S. & $56^{\circ} 49'$ E., N. E., 6
	No. 88, $33^{\circ} 47'$ S. & $55^{\circ} 09'$ E., N. E., 9

During the greater part of the day the S. E. Trade was blowing in strong breezes, in $24^{\circ} 59'$ S. and $76^{\circ} 59'$ E., but about 4 p. m. the wind became variable, and continued so till 8 p. m., when it set in from N. E. The Trade prevailed also at Mauritius and at $20^{\circ} 28'$ S. and $61^{\circ} 38'$ E.

The N. W. monsoon extended to $16^{\circ} 43'$ S. and $72^{\circ} 53'$ E.

10th March.—On the 10th the S. W. and N. E. winds are not so frequent ; but they are still observed, as will appear from the following statement :

No. 22, $30^{\circ} 37'$ S. & $45^{\circ} 55'$ E., S.W., 4	No. 88, $33^{\circ} 55'$ S. & $56^{\circ} 55'$ E., N.E.bN., 8
No. 66, at Natal, W.S.W., 6	No. 36, $30^{\circ} 01'$ S. & $58^{\circ} 21'$ E., N. E., 4
No. 9, $25^{\circ} 07'$ S. & $49^{\circ} 16'$ E., S.W., 4	No. 37, $24^{\circ} 24'$ S. & $74^{\circ} 09'$ E., N. E., 5

On the South-East coast of Africa, South of the 30th parallel, a gale is blowing from the N. W., as indicated by four vessels, Nos. 55, 51, and 52.

The S. E. Trade is observed only at $20^{\circ} 12'$ S. and $59^{\circ} 54'$ E., where it is blowing in light breezes.

The N. W. monsoon is traceable from $5^{\circ} 14'$ S. and $71^{\circ} 46'$ E. to $17^{\circ} 08'$ S. and $72^{\circ} 18'$ E.

11th March.—The S. W. and N. E. currents still continue, but the latter is now less regular and less extensive, while the former prevails from the Southward of the Cape of Good Hope to Mauritius, as will appear from the winds experienced at the following localities :

No. 52, $37^{\circ} 30'$ S. & $33^{\circ} 21'$ E., S.W., 6	No. 71, $33^{\circ} 27'$ S. & $58^{\circ} 00'$ E., East, 4
No. 55, $36^{\circ} 15'$ S. & $22^{\circ} 26'$ E., S.W., 6	No. 88, $32^{\circ} 31'$ S. & $57^{\circ} 45'$ E., East, 4
No. 66, at Natal, West, 6	No. 38, $29^{\circ} 48'$ S. & $57^{\circ} 45'$ E., E.N.E., 4
No. 8, $27^{\circ} 32'$ S. & $42^{\circ} 40'$ E., S.S.W., 4	No. 36, $28^{\circ} 57'$ S. & $58^{\circ} 39'$ E., E. b N., 4
No. 9, $25^{\circ} 12'$ S. & $48^{\circ} 31'$ E., S.W., 4	No. 37, $24^{\circ} 22'$ S. & $73^{\circ} 54'$ E., North, 5
No. 26, $19^{\circ} 59'$ S. & $58^{\circ} 53'$ E., S.S.W., 4	

The N. W. monsoon extends from $8^{\circ} 28'$ S. and $65^{\circ} 58'$ E. to $17^{\circ} 32'$ S. and $72^{\circ} 09'$ E. Nearly due South of the latter station, viz., at $24^{\circ} 22'$ S. and $73^{\circ} 54'$ E., the wind is Northerly in fresh breezes ; and from $28^{\circ} 57'$ S. and $58^{\circ} 39'$ E. to $33^{\circ} 27'$ S. and $58^{\circ} 00'$ E., it is Easterly in moderate breezes ; while to the Southward and Westward of Madagascar, it is S. W.

The S. E. Trade is barely perceptible, except at $12^{\circ} 58'$ S. and $80^{\circ} 30'$ E.

The direction and force of the winds on this day, from 35° to 75° E., are shown in the first diagram of Plate III.

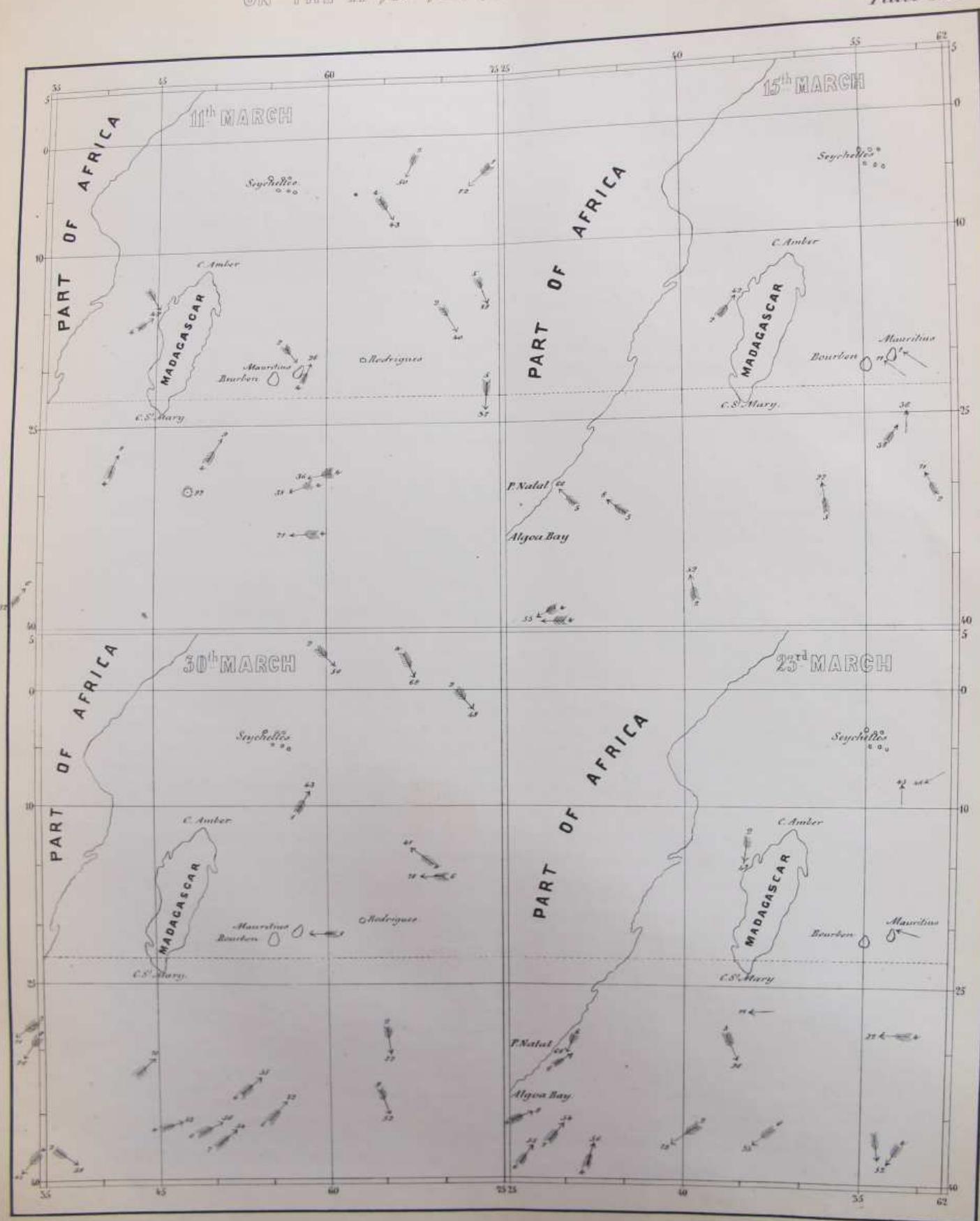
12th March.—On the 12th, the S. W. wind is found at three places, and the N. E. wind, also at three places, viz. :

No. 22, $30^{\circ} 01'$ S. & $48^{\circ} 05'$ E., S. W.bS., 5	No. 89, $17^{\circ} 05'$ S. & $73^{\circ} 26'$ E., N.bE., 2
No. 8, $28^{\circ} 15'$ S. & $40^{\circ} 12'$ E., S. S. W., 5	No. 40, $17^{\circ} 41'$ S. & $70^{\circ} 16'$ E., North, 2
No. 11, $20^{\circ} 31'$ S. & $56^{\circ} 39'$ E., S. S. W., 1	No. 37, $23^{\circ} 50'$ S. & $70^{\circ} 13'$ E., N. b E., 5

DIAGRAMS SHOWING THE DIRECTION & FORCE OF THE WIND,

ON THE 11th, 15th, 23rd, & 30th MARCH, 1853.

Plate III.



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At $31^{\circ} 35'$ S. and $57^{\circ} 58'$ E., the wind is E. b. S. in moderate breezes; at $25^{\circ} 58'$ S. and $47^{\circ} 58'$ E., it is S. S. E. in moderate breezes; and at $15^{\circ} 42'$ S. and $45^{\circ} 47'$ E., it is S. W.

The S. E. Trade makes its appearance about 14° S. and 80° E., and it seems also to be setting in towards the South-East coast of Africa.

The N. W. monsoon is seen from $10^{\circ} 38'$ N. and $85^{\circ} 56'$ E. to $2^{\circ} 13'$ N. and $89^{\circ} 24'$ E. It also appears at $2^{\circ} 37'$ S. and $66^{\circ} 05'$ E. in light airs from North.

13th March.—Both the S. W. and N. E. winds now seem to be dying away, and the S. E. Trade to be replacing them. They are observed, however, as follows:

No. 49, $33^{\circ} 57'$ S. & $25^{\circ} 39'$ E., S. W. to	No. 38, $26^{\circ} 05'$ S. & $58^{\circ} 02'$ E., East,	2
S.E., 2	No. 36, $25^{\circ} 48'$ S. & $59^{\circ} 30'$ E., N. E.,	2
No. 22, $30^{\circ} 00'$ S. & $49^{\circ} 22'$ E., S.W.bS., 1	No. 37, $23^{\circ} 48'$ S. & $68^{\circ} 37'$ E., North,	2
No. 8, $28^{\circ} 35'$ S. & $38^{\circ} 06'$ E., S.bW., 5	No. 40, $17^{\circ} 21'$ S. & $69^{\circ} 13'$ E. East,,	2

The S. E. Trade seems to be setting in over a great part of the Ocean, and calms and light winds predominate.

14th March.—On this day, no trace of the N. E. wind is found, and a similar remark almost applies to the S. W. wind, which is observed at only one station ($30^{\circ} 08'$ S. and $49^{\circ} 44'$ E.) in light breezes from West, with calms.

Extensive calms prevail to the Southward of Mauritius where the heavy North-Easterly gales were recently encountered; and the general direction of the wind, South of the 8th parallel, is S. E.

Its prevailing direction, from 8° S. and 65° E. to 6° N. and 85° or 90° E., is S. W., and, from Ceylon to the North end of Sumatra, N. W.

15th March.—Hardly any sign either of the N. E. or S. W. wind is observed on the 15th, the S. E. Trade occupying their place. (*See Plate III.*)

Before proceeding further, I shall make a few remarks.

The two systems of winds which we have been considering are, apparently, caused by the action of heat on the atmosphere of Southern Africa, Madagascar, and the islands of Bourbon and Mauritius. If, for example, we suppose the zone of maximum temperature to lie in or near the Southern parts of Madagascar, we should infer that currents of air would flow thither from all sides, viz.: a S. W. current from the Southward of the Cape of Good Hope; a S. E. current from the Indian Ocean, East of 45° E.; a N. E. current from Mauritius; and a N. W. current from the Mozambique Channel. Now, such currents are actually often found in those parts. But the zone of maximum heat is constantly varying; it may on one day be several degrees farther to the East or the North, and on another as many degrees farther to the West or South; and hence the confines of the aerial currents flowing towards it are subject to fluctuation.*

At the commencement of the month we find a S. E. wind (the Trade) flowing towards the South end of Madagascar; but a little to the Southward of this S. E. wind is found a N. E. wind; and in the same parallels with this N. E. wind, but considerably far to the Westward, a S. W. wind prevails. The S. E. wind, however, gradually disappears, being replaced by the N. E. wind, which ultimately extends as far North as Mauritius, and as far East as 70° or even 75° , the S. W. wind still appearing in the same parallels to the Westward. On the 8th, for example, the N. E. wind is observed extending from $21^{\circ} 10'$ S. and $65^{\circ} 55'$ E. to $33^{\circ} 21'$ S. and $52^{\circ} 46'$ E., a distance of 700 miles, over which it is blowing in strong breezes and gales; and it is probable that it extended still farther South. The S. W. wind, at the same time, extends from $35^{\circ} 03'$ S. and $20^{\circ} 04'$ E. to $19^{\circ} 43'$ S. and $58^{\circ} 09'$ E., a distance of nearly 900 miles.

These two winds (the N. E. and S. W.) seem to have attained their maximum force on the 7th, when a heavy gale was blowing from $19^{\circ} 44'$ S. to $36^{\circ} 02'$ S., and from $44^{\circ} 03'$ E. to $68^{\circ} 48'$ E. (*See Plate. II.*); and it is remarkable that on that day there was

* The N. E. wind, however, appears, upon the whole, to proceed from warmer to colder latitudes, which may be owing to a disturbance of the atmospheric equilibrium caused on the South-East Coasts of Africa, by the air being removed thence by the S. W. wind.

scarcely a breath of air in motion at Mauritius, though a strong gale was raging in its immediate vicinity. Yet, calm though the weather was, there were unmistakable signs of what was occurring in the neighbourhood. The barometer, at $3\frac{1}{2}$ P. M. of the 6th, stood at 29.615 (the minimum pressure for the year), to which it gradually fell from 29.848 on the 3rd, on which day the gale was felt most at $34^{\circ} 51' S.$ and $48^{\circ} 45' E.$ (See Plate IV.) On the 8th, the barometer at the same hour stood at 29.621; the sky during the day was overcast and lowering, the sea sending in breakers on the reefs, and at 2 P. M. there was thunder at North. About 120 miles to the East of the Island a gale was blowing from E. S. E. (No. 25), the ship's barometer standing at 29.66; and about 56 miles to the S. W. of it, the same gale was blowing from E. N. E. (No. 73); while in the Island itself the atmosphere was perfectly tranquil. On the 6th, however, the wind was E. S. E., in moderate breezes, with a falling barometer.

We here find, that though the wind was E. S. E. at Mauritius (on the 6th), and the barometer low and falling, yet there was no hurricane, or any sign of one, to the Northward of the Island. The bad weather was in the very opposite direction, to the Southward, as clearly shown by the Journal. Yet, how often has it not been announced, with confidence, that because the barometer was falling at Port Louis, with a S. E. or E. S. E. wind, a hurricane was bearing down upon the Island from E. N. E.?

As the Northern limits of the N. E. wind go on extending, the S. E. Trade seems to run into it. This is exemplified on the 8th, when, in the case above cited, the wind was E. S. E. at $19^{\circ} 44' S.$ and $59^{\circ} 14' E.$, and E. N. E. at $20^{\circ} 58' S.$ and $56^{\circ} 48' E.$, and various other instances might be adduced; I shall, however, give only one other.

On the 7th, No. 37 (the *Funny Fisher*, Capt. Harold, from Swan River to Mauritius) had fresh breezes from E. S. E. "with squally appearance; the sky overcast with clouds at a high altitude, and the sun obscured all day. The barometer", continues the master's private log, from which I make these extracts, "has been gradually falling since noon of yesterday, but with no increase of wind or sea, although the weather looks unsettled. At 4 P. M. (Bar. 29. 82), shortened sail to single-reefed topsails. Midnight, squally at intervals, with much rain and little sea."

On the 8th, her position at noon, was $24^{\circ} 40' S.$ and $77^{\circ} 17' E.$, the wind being E. S. E. and S. E. The log proceeds as follows: "At 1 A. M. the wind squally at intervals. Daylight, sent down royal yards and all small gear. At 8, made preparations for bad weather, although the wind and sea have not much increased up to this time. At 11, the sun shone out for a few minutes, and the weather appeared to be getting finer, but by 11.30 a squall came on, and by noon it was blowing a fresh gale between East and E. S. E. Shortened sail to close-reefed topsails, and sent down top-gallant yards and masts, and brought ship to on Port Tack, and secured hatches, and put on preventive stay-tackle on foremast. At 4 P. M. the barometer had fallen to 29.60, and the wind had veered to S. E. b S. since we hove to, and increased to a strong gale. At 6 and 8 P. M., barometer 29.55; a few stars were seen, but it soon commenced to blow a hard gale with torrents of rain, the wind veering to E. S. E.—Bar. 29.40,

"A. M. (of the 9th) blowing a heavy gale, with constant rain; expecting to see the main-top-sail go every minute. At 4, moderating a little, and a star or two shone out. Daylight, still squally—wind having veered gradually to E. N. E., with two or three small blue spots in the sky. Barometer rising rapidly. Noon, ($24^{\circ} 59' S.$ and $76^{\circ} 39' E.$), less wind with dark heavy appearance to the N. W. At 7 P. M., fine night, stars shining, and moderate E. b. N. breeze; bore away to W. N. W. Midnight, cloudy with passing showers.

"Daylight (of the 10th), moderate breeze from East, with cloudy weather. Bar. 29.80. Upper clouds moving from North and West. Noon, ($24^{\circ} 24' S.$ and $74^{\circ} 25' E.$) ditto; sent up main-top-gallant mast, and set fore-topmast studding-sail, but did not make any more sail from the low state of the barometer, as I think we must be going to the Westward as fast as the storm, which must be moving slowly, as the first indication of bad weather commenced on Sunday the 6th. At 4 P.M., barometer falling slightly,

with a moderate breeze and cloudy weather; took in studding sails; wind varying between East and E. N. E. At 8 P.M., barometer 29.75; fresh breezes from East with drizzling rain; shortened sail to close-reefed topsails, and stowed courses. At 10, barometer 29.70; hove to under two close-reefed topsails on Port Tack. Shortly after heaving to, the wind backed to E. S. E., in strong breezes with rain.

"At 2 A.M. (of the 11th), blowing strong from E. S. E., with rain; barometer 29.60. At 4, blowing strong, ship hove to under a close-reefed main-topsail, very little rain, a few stars visible in general for a few seconds. At 5.30, still blowing strong, but weather clearer. At 6, wind S.W., blowing hard, with sea in pyramids from the wind; wore ship; the weather clearing, and the sun, when 8° above the horizon, shining brightly, with no angry appearance. At 8, barometer 29.70; fresh gale, and clearing off fine. At noon ($24^{\circ} 22'$ S. and $73^{\circ} 22'$ E.), still hove to, with brisk gale from N. N. W. and heavy lumbering sea from all quarters. At 1 P.M., less wind and sea; made sail to W. N. W. At 8, fine clear starlight night. Midnight, light passing showers."

"A.M. (of the 12th), fresh breezes and fine. Towards daylight, wind freshened from Northward and Eastward, with a heavy swell from N. W. and S. W. and sometimes S. E. Noon ($23^{\circ} 51'$ S. and $70^{\circ} 26'$ E.), wind and cross sea increasing, with cloudy weather, and looking dark to the Westward. At 1 P.M., strong breeze and much sea; double reefed the topsails. At 4, moderate. At 6, out all reefs. At 8, fine clear starlight night, and much lightning to South, low on the horizon; wind N. N. W.

"13th Fine clear weather; sent up top-gallant yards; light wind from N. N. W.; barometer 30.00."—Position at noon, $23^{\circ} 47'$ S. and $68^{\circ} 46'$ E.

The direction of the wind, as given in these valuable extracts from the master's log, are somewhat different, on one or two days, from that given in the ship's log, of which an abstract will be found in the Journal. The ship's log, also, does not contain barometric observations. But either of the logs is sufficient for our present purpose.

When, on the 7th, the wind was E. S. E., with a falling barometer, and other indications of bad weather, captain Harold, trusting to what is called the Law of Storms, evidently thought that he was in "the dangerous quadrant" of a hurricane or gale, the centre of which bore N. N. E. of the vessel's position.

Now, there is no evidence of there having been bad weather in that direction; but we have, on the other hand, positive proof that a strong gale was prevailing to the *Westward*.

It is recommended by Cyclonologists that when a vessel has the wind at any point between East and S. S. E., with a low barometer and other "premonitory signs," her commander should, if possible, pass in front of the storm, which is considered to be bearing down upon him from the North-Eastward; that is, that he should steer to the West or W. N. W. But, in the present case, it seems certain, that, by steering West, the vessel would have run into the very heart of the gale.

On the 9th, the wind, after having been at E. S. E. and S. E. for four days, "gradually veered to E. N. E.," the barometer rising from 29.35, at 2 A.M., to 29.60, at 8 A.M.

Here, according to the Law of Storms, we should infer that the centre of a gale or hurricane had passed to the Northward of the vessel's position, and that it now bore N. N. W. of her. But of this, also, we have no evidence; while it is certain that a strong gale still prevailed to the Westward; and, moreover, the veering of the wind from S. E. and E. S. E. to E. N. E. is precisely what had occurred, on the preceding days, to vessels situated to the *West* of the vessel in question.

To make these remarks clearer, I shall, at the risk of repetition, give the positions of some of the vessels from the 1st to the 11th, with the winds experienced by them,

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<i>1st March.</i> —No. 50, 16° 49' S. & 56° 21' E., S. E. b. E.,	6
No. 1, 20° 16' S. & 57° 29' E., S. E.,	4
No. 8, 20° 27' S. & 54° 39' E., E. S. E.,	6
No. 9, 26° 03' S. & 49° 06' E., E. S. E.,	7
No. 73, 31° 38' S. & 57° 48' E., E. N. E.,	5
No. 38, 34° 13' S. & 50° 55' E., N. E.,	4
No. 36, 34° 20' S. & 48° 25' E., E. N. E.,	5
No. 71, 34° 46' S. & 44° 50' E., N. E.	4

<i>2nd March.</i> —No. 1, 20° 10' S. & 57° 29' E., S. E. & N. E., 4,	6
No. 8, 23° 35' S. & 52° 30' E., E. S. E.,	5
No. 9, 24° 35' S. & 49° 27' E., Easterly,	6
No. 73, 28° 15' S. & 57° 30' E., E. N. E.,	5
No. 38, 34° 20' S. & 52° 53' E., N. E. b. N.,	5
No. 36, 35° 20' S. & 51° 57' E., N. E.,	5

On these two days, we find a S. E. wind blowing in one part of the Ocean, and a N. E. wind somewhat to the Southward of it, the former appearing to run into the latter.

<i>3rd March.</i> —No. 1, 20° 10' S. & 57° 29' E., E. S. E. to North, 1,	6
No. 73, 25° 25' S. & 57° 05' E., E. N. E.,	6
No. 9, 25° 26' S. & 49° 08' E., East & E. S. E.,	6
No. 8, 25° 30' S. & 50° 32' E., S. E.,	5
No. 38, 34° 14' S. & 54° 07' E., N. b. E.	6

<i>4th March.</i> —No. 25, 16° 05' S. & 68° 35' E., E. S. E.,	6
No. 26, 19° 43' S. & 80° 18' E., S. E.,	7
No. 1, 20° 10' S. & 57° 29' E., E. S. E.,	4
No. 73, 23° 58' S. & 57° 22' E., East,	8
No. 38, 32° 47' S. & 55° 10' E., Easterly,	2
No. 71, 32° 59' S. & 50° 25' E., N. E.,	4

The same relation of the S. E. and N. E. winds is observable on these two days also.

<i>5th March.</i> —No. 25, 17° 39' S. & 65° 27' E., E. S. E.,	5
No. 1, 20° 10' S. & 57° 29' E., S. E. to North,	1, 4
No. 73, 22° 37' S. & 57° 09' E., E. N. E.,	9
No. 26, 23° 23' S. & 76° 06' E., S. S. E.,	7
No. 9, 25° 35' S. & 49° 30' E., E. N. E.,	6
No. 38, 31° 49' S. & 55° 07' E., E. N. E.,	4

<i>6th March.</i> —No. 25, 18° 31' S. & 62° 26' E., East,	7
No. 1, 20° 10' S. & 57° 29' E., E. S. E. to East.	4
No. 73, 21° 28' S. & 56° 58' E., E. N. E.,	9
No. 26, 22° 42' S. & 72° 12' E., S. S. E.,	6, 7
No. 37, 25° 42' S. & 84° 43' E., E. S. E.,	5
No. 9, 25° 48' S. & 49° 50' E., E. N. E.,	8
No. 36, 29° 40' S. & 53° 40' E., E. b. N.,	9
No. 71, 34° 43' S. & 53° 45' E., N. E. b. E.,	4

The S. E. and N. E. winds have still the same relative positions, but it appears that the latter has advanced to the Eastward and Northward, for No. 25 has the wind, on the 6th, from East, whereas she had it, on the previous days, from E. S. E. Farther to the East, however, Nos. 26 and 37 have the wind S. S. E. and E. S. E.

<i>7th March.</i> —No. 25, 19° 44' S. & 59° 44' E., East to E. S. E.,	9, 7
No. 73, 20° 58' S. & 56° 48' E., E. N. E.,	8, 6
No. 26, 21° 55' S. & 68° 48' E., E. b. S.,	6
No. 37, 25° 22' S. & 80° 57' E., E. S. E.,	5
No. 9, 25° 26' S. & 50° 17' E., E. N. E.,	7
No. 36, 30° 14' S. & 53° 40' E., N. E.,	9

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8th March.—No. 25, 19° 43' S. & 58° 09' E., S. S. W.,		9
No. 26, 21° 10' S. & 65° 55' E., E. N. E.,		8
No. 37, 24° 52' S. & 77° 17' E., East to E. S. E.,		6
No. 36, 29° 46' S. & 54° 54' E., N. E.,		6
No. 38, 30° 50' S. & 55° 10' E., N. N. E.,		9
No. 71, 34° 45' S. & 55° 14' E., East,		9

We have, on these two days, additional proof of a further advancement of the N. E. wind to the Eastward. No. 25, it is true, had the wind from East to E. S. E. on the 7th, but, on the 8th, she had it from S. S. W., which was the S. W. monsoon blowing up from the Cape of Good Hope; and No. 25, instead of having the wind from S. S. E., as on the 6th, has it from E. b. S. on the 7th, and this E. b. S. wind becomes, on the 8th, a strong gale from E. N. E. Meanwhile, No. 37 (the *Fanny Fisher*), to the Eastward of No. 26, has the wind still from E. S. E.

9th March.—No. 26, 20° 28' S. & 61° 38' E., E. S. E.,	5
No. 37, 24° 59' S. & 76° 59' E., S. S. E.,	5*
No. 36, 29° 57' S. & 56° 49' E., N. E.,	6
No. 71, 35° 38' S. & 56° 10' E., N. E.,	9
10th March.—No. 26, 20° 12' S. & 59° 54' E., E. S. E.,	2
No. 37, 24° 24' S. & 74° 09' E., N. E.,	5
No. 8, 27° 08' S. & 43° 16' E., Var. & S. S. E.,	2
No. 36, 30° 01' S. & 58° 21' E., N. E.,	4

It would appear that on these two days the S. E. Trade was blowing in the vicinity of Mauritius, as shown by No. 26. But, that the N. E. wind experienced by No. 37, on the 9th or 10th, was the same N. E. current of air as that experienced by No. 36, may be inferred from the changes which were observed on the preceding days. If observations had been made between these two vessels, this point would be settled; but, in the absence of direct observations, we must be guided by analogy. Now, the observations, taken as a whole, indicate that the Northern limits of the N. E. wind advanced to the Eastward and Northward, the S. E. Trade appearing to veer to East and N. E., and that the change of wind with the *Fanny Fisher*, on the 9th or 10th, was owing to the same cause—whatever that may have been—as the similar changes which had been experienced on the previous days by other vessels situated to the Westward.

That the gale had been to the West of the *Fanny Fisher*, before she met with it, and that it was progressing to the Eastward, is indicated, also, by the localities where the wind blew in greatest force on each day, and by the barometrical observations given in the Journal.

On the 6th, for example, when the *Fanny Fisher* was in 25° 42' S. and 84° 43' E., with the wind at E. S. F., her barometer stood at 30.08; at Mauritius, on the same day, with the wind also at E. S. E., the barometer ranged from 29.738 to 29.615; and at 18° 31' S. and 62° 26' E., it stood at 29.76. Now, it will hardly be said that such would have been the indications of the barometer, if the storm or gale had been to the North-Eastward of the *Fanny Fisher*.

Again, on the 8th, No. 26, in 21° 10' S. and 65° 55' E., had a strong gale from E. N. E., and the *Fanny Fisher*, in 24° 52' S., and 77° 17' E., had a gale from E. S. E. Now, according to the Law of Storms, the centre of the gale bore N. N. W. of the former vessel, and N. N. E. of the latter; which is impossible.

We have, then, no proof whatever, but the very contrary, that the gale was bearing down upon the *Fanny Fisher* from the North-Eastward, and yet her intelligent commander was perfectly justified in supposing that it was; for, with the wind and weather which he had, and a falling barometer, a Cyclonologist would have assured him that he was in the "dangerous quadrant" of a revolving storm.

* According to Captain Harold's private log, No. 37 had the wind from E. N. E., 5, 6.

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These remarks are not made with the view of casting doubt upon the general theory of storms, which, I think, is, in the main, unassailable; but of pointing out the danger of laying down dogmatic rules for the guidance of vessels in the circumstances in which the *Fanny Fisher* was placed. Commanders who have acted according to such rules, have, in some cases, proclaimed the Law of Storms to be without any foundation, because the very reverse of what was expected has turned out.

Leaving this subject for the present, however, it is further to be remarked, that when the N. E. wind, as on the 11th, had attained its highest Northern limit, the N. W. monsoon appeared to run into it, the two winds forming an arc of a circle, and that, an East and E. S. E. wind appearing at the same time to the South of Mauritius, and the S. W. wind still blowing to the West of it, a circular wind of great extent was formed. The following, for example, were the positions of several of the vessels on that day, and the winds which, they had at noon. (*See Plate III.*):

No. 43, 08° 28' S. & 65° 58' E., N. W., 4		No. 71, 33° 27' S. & 58° 00' E., East, 4
No. 40, 17° 32' S. & 72° 09' E., N. W., 2		No. 8, 27° 32' S. & 42° 40' E., S. b W., 4
No. 37, 24° 22' S. & 73° 54' E., North, 5		No. 42, 15° 42' S. & 47° 57' E., S. W., 4

It is this apparent continuation of the N. W. monsoon on the surface, as a North and N. E. wind, that partly suggests the supposition of the N. E. wind of the earlier part of the month being also the N. W. monsoon, which, after overleaping the intervening S. E. current of air, makes its appearance as a surface wind. But, however this may be, it would seem that from the 1st to the 11th of the month, the Southern limits of the N. W. monsoon were advancing to the Southward, and the Northern limits of the N. E. wind to the Northward, till, on the 11th, the two winds appeared to flow in one continuous curve.

The same thing is observed, also, on the 12th, as will be seen from the direction of the wind at the following stations:

No. 40, 17° 41' S. & 70° 16' E., North, 2		No. 71, 31° 35' S. & 57° 58' E., E. b S., 4
No. 37, 23° 50' S. 70° 13' E., Northerly, 5		No. 9, 25° 58' S. & 47° 58' E., S. S. E., 4

No. 42, 15° 42' S. & 45° 57' E., S. W.

On the 13th, 14th, and 15th, as already remarked, the S. E. Trade prevailed over the greater part of the Ocean in light winds, with extensive calms around Mauritius.

On the 15th the S. E. Trade, as may be seen in *Plate III.*, extended as far South and West as 36° 43' S. and 40° 20' E.; but at 39° 13' S. and 27° 07' E., the wind was N. E. Now, this is the first indication of the setting in, for the second time, of the N. E. current of air of which mention has so frequently been made; and, proceeding with our résumé, it will be seen that the Eastern limits of this N. E. wind increased as before, and that, after it had made some progress to the Eastward, the S. W. wind or monsoon reappeared to the Westward of it.

16th March.—The following vessels had the N. E. wind on this day:

No. 55, 39° 43' S. & 30° 35' E., N. E., 6
No. 52, 37° 45' S. & 41° 23' E., East., 5
No. 8, 32° 20' S. & 31° 30' E., E. N. E., 5

No S. W. wind is now observed in this part of the Ocean, and all the vessels to the Northward and Eastward of No. 52, as far as 17° 36' S. and 70° 28' E. have the S. E. Trade.

17th & 18th March.—The same thing occurs on the 17th and 18th; only, on the 18th, the wind in the neighbourhood of the Southern coasts of Africa is somewhat irregular, with thunder and lightning at midnight, in about 34° 38' S. and 27° 13' E., where it was blowing a heavy gale from E. b N.

19th & 20th March.—The same N. E. winds still prevail in strong breezes, with lightning at 10 p. m. of the 19th, in about 36° S. and 28° E.,

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On the 20th, three vessels, Nos. 8, 49, and 54, near the land, have the wind from N. W. But four vessels to the Eastward of them, as far as $39^{\circ} 13'$ S. and $48^{\circ} 43'$ E. have the wind from N. E. and E. N. E., and the vessels to the Northward and Eastward of that station have the Trade wind.

There was a heavy thunder storm on this day in the vicinity of the land, where the N. W. wind was blowing.

21st March.—On this day, we have the same winds as on the preceding, viz., a N. W. wind near the land (Nos. 8, 49, and 54); a N. E. wind to the Eastward, as experienced by Nos. 56, 72, 55, and 52; and the S. E. Trade to the Southward of No. 52. But we find also a S. W. gale at $38^{\circ} 47'$ S. and $21^{\circ} 12'$ E., which may be regarded as the first indication of the second appearance of the same S. W. monsoon, in the course of the month. Its progress towards the East, on the following days, may easily be traced.

It may be worthy of remark that the direction of the wind on this day, at the four following stations, seems to indicate a circular gale between the S. W. and N. E. winds :

No. 53, $38^{\circ} 47'$ S. & $21^{\circ} 12'$ E., S. W., 8		No. 56, $37^{\circ} 42'$ S. & $29^{\circ} 00'$ E., North, 6
No. 54, $36^{\circ} 03'$ S. & $25^{\circ} 36'$ E., N. W., 7		No. 72, $38^{\circ} 37'$ S. & $36^{\circ} 06'$ E., N. E., 6

22nd March.—The same winds still continue, with indications of a circular gale:

No. 53, $38^{\circ} 24'$ S. & $23^{\circ} 18'$ E., S.W., 7		No. 72, $38^{\circ} 33'$ S. & $38^{\circ} 00'$ E., N. E., 6
No. 54, $35^{\circ} 21'$ S. & $28^{\circ} 39'$ E., W. & W.		No. 55, $38^{\circ} 15'$ S. & $43^{\circ} 22'$ E., North., 6
S.W., 6		No. 52, $39^{\circ} 38'$ S. & $52^{\circ} 49'$ E., North., 4

The N. E. wind now extends as far North as $29^{\circ} 51'$ S. and $47^{\circ} 05'$ E., and somewhat to the Northward, at $26^{\circ} 57'$ S. and $46^{\circ} 18'$ E., the wind is East, with heavy thunder and lightning at 10 p. m., while, to the Eastward and Northward of this last station, the S. E. Trade is found extending to $07^{\circ} 13'$ S. and $72^{\circ} 23'$ E.

23rd March.—The S. W. wind is now seen in full sway (*See Plate III.*) with the N. E. wind to the Eastward of it, and every appearance of a circular gale between them :

No. 53, $38^{\circ} 11'$ S. & $27^{\circ} 54'$ E., S. W., 6		No. 49, $33^{\circ} 57'$ S. & $25^{\circ} 39'$ E., N. W., 2
No. 56, $37^{\circ} 54'$ S. & $33^{\circ} 18'$ E., South, 4		No. 26, $30^{\circ} 27'$ S. & $44^{\circ} 49'$ E., N. W., 3
No. 54, $35^{\circ} 32'$ S. & $32^{\circ} 02'$ E., S.S.W., 7		No. 72, $38^{\circ} 16'$ S. & $39^{\circ} 00'$ E., E.N.E., 2
No. 8, $34^{\circ} 09'$ S. & $25^{\circ} 00'$ E., W.S.W., 4		No. 55, $38^{\circ} 20'$ S. & $46^{\circ} 15'$ E., E.N.E., 5

At $26^{\circ} 50'$ S. and $45^{\circ} 30'$ E., and $28^{\circ} 45'$ S. and $57^{\circ} 45'$ E., the wind is East in light and moderate breezes, and the S. E. Trade prevails to the Northward.

24th, 25th, & 26th March.—An inspection of the Journal will show that on these days the S. W. and N. E. winds still continue, with a tendency to run into vortical gales. On the 24th, for instance, we have the following winds, with thunder and lightning at $30^{\circ} 54'$ S. and $43^{\circ} 04'$ E. :

No. 53, $37^{\circ} 25'$ S. & $30^{\circ} 34'$ E., S.&S.W., 4		No. 26, $30^{\circ} 34'$ S. & $43^{\circ} 04'$ E., North, 5
No. 54, $35^{\circ} 40'$ S. & $34^{\circ} 35'$ E., S. S. W.		No. 55, $37^{\circ} 08'$ S. & $46^{\circ} 22'$ E., E.N.E., 4
& S., 4		No. 52, $37^{\circ} 48'$ S. & $57^{\circ} 29'$ E., N.E., 2
No. 66, $29^{\circ} 58'$ S. & $32^{\circ} 00'$ E., S.W., 4		No. 72, $37^{\circ} 11'$ S. & $41^{\circ} 16'$ E., S. E., 2
No. 11, $26^{\circ} 58'$ S. & $44^{\circ} 32'$ E., W.N.W., 6		No. 56, $37^{\circ} 03'$ S. & $35^{\circ} 33'$ E., S.S.E., 4

On the 25th, they are as follows :

No. 72, $37^{\circ} 12'$ S. & $41^{\circ} 30'$ E., S.S.W., 2		No. 11, $28^{\circ} 28'$ S. & $43^{\circ} 17'$ E., W.N.W., 6
No. 56, $36^{\circ} 18'$ S. & $37^{\circ} 51'$ E., S. b W., 6		No. 22, $30^{\circ} 24'$ S. & $59^{\circ} 51'$ E., N.E., 5
No. 26, $31^{\circ} 13'$ S. & $41^{\circ} 46'$ E., S. W., 5		No. 52, $37^{\circ} 46'$ S. & $58^{\circ} 53'$ E., N.E., 6

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And on the 26th :	
No. 72, 36° 59' S. & 43° 00' E., S. W., 2	No. 22, 31° 40' S. & 61° 52' E., N.E., 6
No. 56, 36° 11' S. & 41° 00' E., S. W. & W. 4	No. 52, 38° 28' S. & 62° 28' E., N.E., 4
No. 26, 29° 46' S. & 40° 09' E., W.SW. 2	

The N. E. wind has, it will be observed, advanced considerably to the Eastward.

On the 25th and 26th, signs of a circular gale appear in the neighbourhood of Ceylon.

27th March.—On this day, the S. W. wind does not appear so far to the Eastward as on the 26th; but indications of a rotatory gale are still discernible:

No. 59, 38° 57' S. & 24° 42' E., S.W., 6	No. 53, 37° 00' S. & 37° 19' E., North., 2
No. 45, 38° 09' S. & 22° 29' E., S.S.W., 2	No. 54, 35° 31' S. & 42° 24' E., N.E., 6
No. 46, 37° 50' S. & 19° 08' E., S.W., 4	No. 72, 36° 26' S. & 44° 13' E., N.E., 2
No. 70, 34° 03' S. & 32° 24' E., West., 6	No. 22, 31° 12' S. & 61° 32' E., NE., 4
No. 26, 30° 00' S. & 38° 12' E., N.N.W., 6	No. 52, 38° 20' S. & 60° 50' E., N.E., 5

Three vessels, Nos. 79, 12, and 63, from 6° 43' N. and 84° 05' E. to 13° 13' N. and 86° 27' E., have a strong S. E. wind, giving indications of a storm which, I believe, was raging in the neighbourhood of Madras.

28th March.—There are, on this day, signs of two circular gales, the one to the West of the 30th meridian, and the other about 45° E. The winds, and the positions of the vessels, in the first, were as follows:

No. 46, 37° 58' N. & 19° 42' E., S. W., 9	No. 8, 33° 57' S. & 25° 39' E., N. W., 6
No. 67, 37° 22' N. & 23° 57' E., N.N.W., 7	No. 45, 38° 09' S. & 26° 12' E., N. E., 6

This would lead us to infer the existence of a revolving gale, having its centre in about 38° S. and 20° E. The barometer of No. 45 was at 29·75.

To the Eastward of the above stations we find the following winds:

No. 26, 30° 37' S. & 36° 01' E., S.W.bS., 7	No. 55, 34° 17' S. & 50° 04' E., N. E., 8
No. 11, 29° 16' S. & 40° 18' E., S. W. 6	No. 54, 36° 06' S. & 46° 08' E., N. E., 6
	No. 72, 36° 26' S. & 48° 00' E., N. E., 6

From these directions of the wind we should infer the existence of another circular gale, having its centre in about 36° S. and 39° E.

29th March.—There are indications of a revolving gale on this day also:

No. 56, 37° 07' S. & 48° 12' E., W.&W. S.W., 6	No. 53, 35° 44' S. & 42° 12'E, N&NNW 5, 8
No. 47, 36° 44' S. & 26° 06' E., S.S.W., 6	No. 54, 36° 02' S. & 49° 28' E., N. W., 4
No. 26, 30° 09' S. & 34° 51' E., W.S.W., 5	No. 72, 35° 00' S. & 51° 00' E., N&NNW, 6
No. 11, 28° 23' S. & 38° 14' E., S. W., 6	No. 55, 33° 54' S. & 53° 54' E., North, 9
No. 70, 31° 06' S. & 40° 53' E., West, 4	No. 52, 36° 17' S. & 67° 07' E., North, 4

The barometer of No. 56 is at 29·60.

The S. E. Trade is observed only to the Northward of Mauritius.

30th March.—The force and direction of the winds as found on this day, between the parallels of 35° and 75°, are represented in Plate III.

Indications of a circular gale are observed to the South of the 30th parallel, in about 60° E., where the strength and direction of the wind were as follows:

CHART SHOWING THE DIRECTION & FORCE OF THE WIND
ON THE 3rd MARCH, 1853.

Plate IV

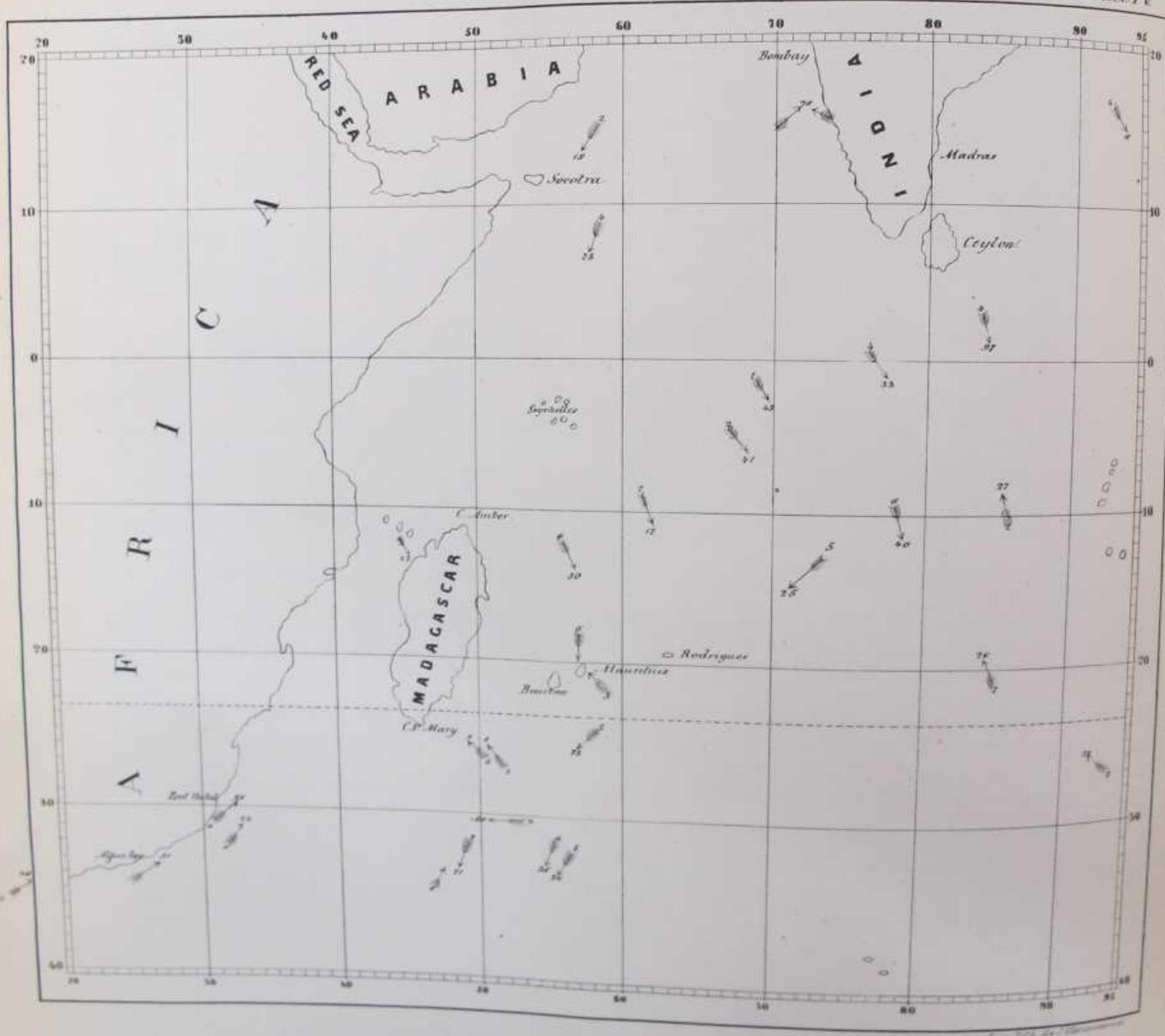


CHART SHOWING THE DIRECTION & FORCE OF THE WIND
ON THE 31st MARCH, 1855.

Plate V



PRESSURE AND TEMPERATURE OF THE AIR.

xli

No. 54, $35^{\circ} 35'$ S. & $52^{\circ} 47'$ E., South., 7	No. 22, $29^{\circ} 27'$ S. & $65^{\circ} 12'$ E., N.N.W., 2
No. 72, $34^{\circ} 38'$ S. & $55^{\circ} 40'$ E., S.W., 6	No. 52, $35^{\circ} 16'$ S. & $65^{\circ} 10'$ E., N.N.W., 9
No. 55, $32^{\circ} 26'$ S. & $54^{\circ} 13'$ E., W.S.W. 6	

To the West of the 35th meridian, a strong N. E. wind is blowing from $28^{\circ} 04'$ S. to $38^{\circ} 50'$ S. This seems to be the setting in, for the third time, of the N. E. current of air which has been shown to travel to the Eastward, and it makes its appearance when the former N. E. current has reached its Eastern limits, and when the circular gale at 60° E. is apparently about to break up. The following were the positions of the vessels which experienced it :

No. 11, $28^{\circ} 04'$ S. & $33^{\circ} 41'$ E., N.E., 2	No. 45, $38^{\circ} 09'$ S. & $32^{\circ} 50'$ E., N. E., 4
No. 26, $30^{\circ} 26'$ S. & $32^{\circ} 57'$ E., N.N.E., 7	No. 46, $38^{\circ} 50'$ S. & $21^{\circ} 50'$ E., N. E., 6
No. 67, $36^{\circ} 47'$ S. & $30^{\circ} 32'$ E., N.E., 6	
No. 47, $37^{\circ} 00'$ S. & $28^{\circ} 05'$ E., N.E., 9	

In the vicinity of the Southern extremity of Africa, the wind is strong from N. W.

31st March.—Plate V. shows the direction and force of the wind on this day.

The revolving gale of the preceding day no longer appears ; but the S. E. Trade is found extending from No. 54, at $34^{\circ} 32'$ S. and $55^{\circ} 38'$ E., to No. 70, at $27^{\circ} 32'$ S. and $48^{\circ} 54'$ E., and also to the North-Eastward of Mauritius ; while the N. E. wind is still prevailing to the West of 47° E., its Eastern limits being more to the East than they were yesterday, as will be seen from the localities in which it was observed :—

No. 53, $34^{\circ} 49'$ S. & $47^{\circ} 06'$ E., N.F., 4	No. 11, $28^{\circ} 55'$ S. & $33^{\circ} 37'$ E., N.F., 6
No. 59, $38^{\circ} 54'$ S. & $40^{\circ} 20'$ E., N.E., 7	No. 26, $33^{\circ} 14'$ S. & $29^{\circ} 32'$ E., North, 7
No. 45, $38^{\circ} 09'$ S. & $37^{\circ} 13'$ E., N.bE., 6	No. 46, $38^{\circ} 30'$ S. & $25^{\circ} 45'$ E., N.E., 6
No. 67, $36^{\circ} 20'$ S. & $33^{\circ} 34'$ E., N.E., 5	

To the Westward and Northward of No. 46, a gale is blowing from N. W.

The great practical importance of a knowledge of these N. E. and S. W. winds which have now been briefly passed in review, and of the revolving gales which seem to be formed on their borders, is so palpable as to require no notice here. The advantages which the former wind offers to vessels sailing from India, Ceylon, Mauritius, and the East generally, towards the Cape of Good Hope, and the similar advantages afforded by the S. W. wind to vessels steering on an opposite course, are manifest to every one.

I could have wished to have given a chart for each day ; but finding this to be impossible, and yet anxious to convey a more vivid impression than could be done by description alone, I have selected for graphical representation the N. E. and S. W. winds of the 2nd, 5th, 7th, 8th, 11th, 23rd and 30th, as examples of what was observed on other days, and those of the 15th to show the extension of the S. E. Trade when the first of the N. E. winds had disappeared.

The winds of the 3rd and 31st have also been selected to convey an idea of the change which took place, towards the middle of the month, in the Northern limits of the N. W. monsoon, as well as to give examples of the direction of the wind over the Ocean generally, as found by actual observation. The Charts for these days (*Plates IV & V*) are placed opposite to each other for more convenient comparison.

11. Pressure and Temperature of the Air.

The number of observations made with the barometer, in the course of the month, is 343, and with the thermometer 267, which gives a daily average of 11 of the former and of 8 to 9 of the latter.

The greatest altitude of the barometer was observed on the days and at the localities subjoined :

- 30. 20, on the 14th, in $38^{\circ} 46'$ S. & $26^{\circ} 00'$ E.
- 30. 24, on the 19th, in $23^{\circ} 27'$ S. & $54^{\circ} 25'$ E.
- 30. 24, on the 20th, in $25^{\circ} 56'$ S. & $52^{\circ} 40'$ E.
- 30. 25, on the 30th, in $37^{\circ} 00'$ S. & $28^{\circ} 05'$ E.
- 30. 25, on the 31st, in $33^{\circ} 04'$ S. & $53^{\circ} 31'$ E.

It stood lowest at the following localities :

- 29. 615, at $3\frac{1}{2}$ P.M. of the 6th, at Port Louis.
- 29. 66, on the 7th, in $19^{\circ} 44'$ S. and $59^{\circ} 14'$ E.
- 29. 66, at $9\frac{1}{2}$ A.M. of 7th, at Port Louis.
- 29. 65, at $3\frac{1}{2}$ P.M. of 8th, at Port Louis.
- 29. 60, at 4 P.M. of 8th, in $24^{\circ} 52'$ S. & $77^{\circ} 17'$ E.
- 29. 35, at 2 A.M. of 9th, in $24^{\circ} 59'$ S. & $76^{\circ} 59'$ E.
- 29. 55, on the 9th, in $35^{\circ} 10'$ S. & $21^{\circ} 04'$ E.
- 29. 60, on the 21st, in $33^{\circ} 57'$ S. & $25^{\circ} 39'$ E.
- 29. 64, on the 25th, in $36^{\circ} 30'$ S. & $46^{\circ} 06'$ E.
- 29. 60, on the 29th, in $37^{\circ} 07'$ S. & $48^{\circ} 12'$ E.
- 29. 55, on the 29th, in $39^{\circ} 03'$ S. & $32^{\circ} 55'$ E.
- 29. 60, on the 30th, in $38^{\circ} 50'$ S. & $21^{\circ} 50'$ E.
- 29. 50, on the 31st, in $38^{\circ} 30'$ S. & $25^{\circ} 45'$ E.

The highest temperature was observed on the 1st, in $12^{\circ} 20'$ S. and $75^{\circ} 05'$ E., and on the 15th, in $15^{\circ} 09'$ S. and $88^{\circ} 56'$ E., the thermometer on both occasions standing at 91°

The lowest temperature was observed on the 26th, in $36^{\circ} 37'$ S. and $10^{\circ} 52'$ E., where the thermometer was at 59°

In consequence of the fewness of the observations, and of the instruments not having been verified by common standards of comparison, no definite results, with regard to the pressure and temperature of the atmosphere in different parts of the Ocean, can be obtained. I have, however, after rejecting the observations made with instruments which were evidently too high or too low set, taken the means of the remaining observations for each square of 10 degrees, and exhibited the results in Plate VI.

It will be seen that, upon the whole, the zone of maximum temperature extends from the Equator in about 90° E. to the North end of Madagascar, and that the barometer stands highest in the vicinity of the Tropic and in the region of the N. E. Trade, and lowest from Mauritius to the North of Madagascar.

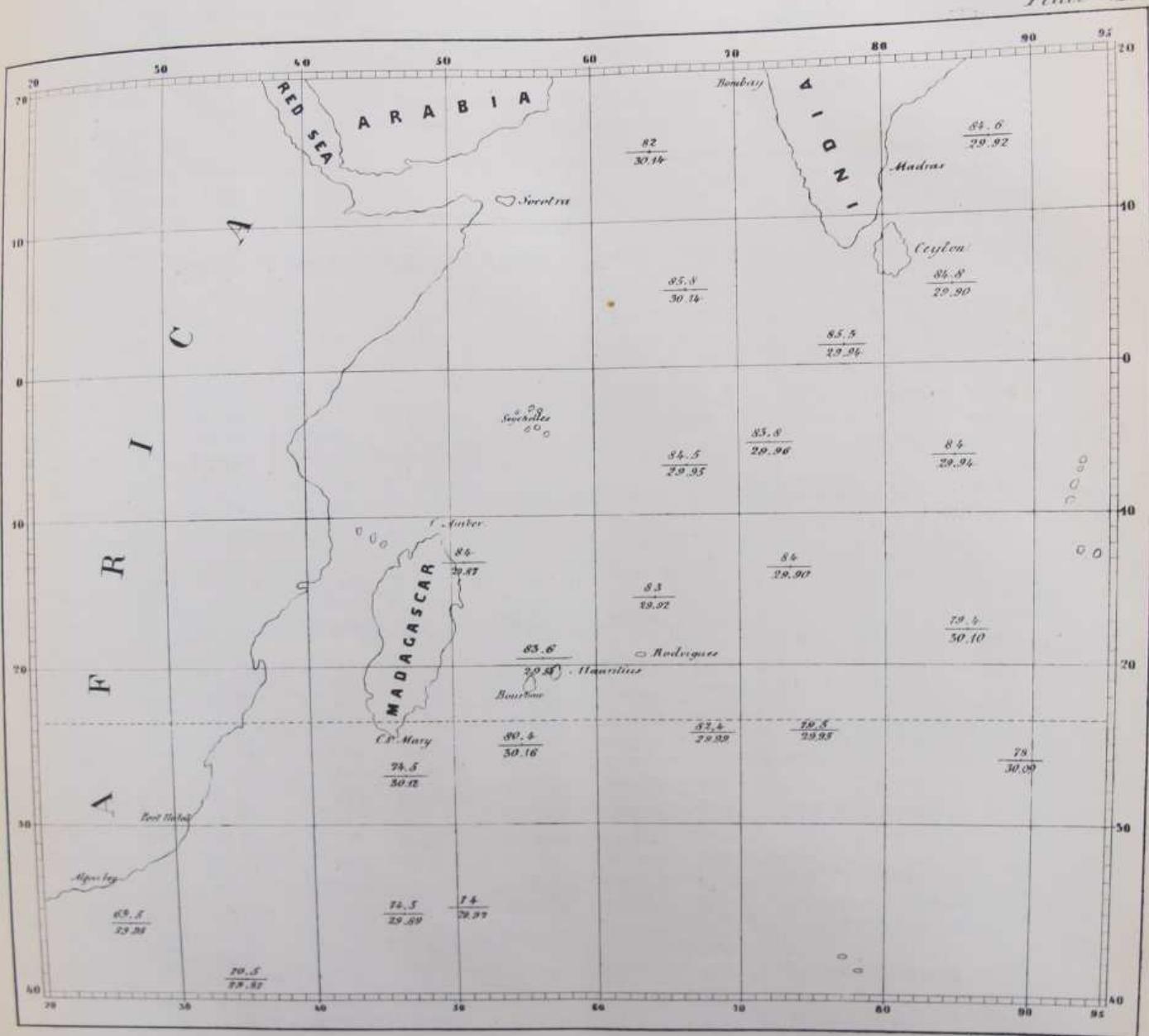
That the pressure was so great in the district of the N. E. Trade, as is represented, may, however, be doubted; for the observations were made by only one vessel, and her barometer, though a subtractive correction of 4.5 was made, may have still been too high. The general results, also, are doubtless somewhat different from what they would have been even with the same instruments, if the observations had been made in the different squares on the same days, instead of at different periods of the month.

The difference between the temperature of the air, South of Cape Colony, and in the neighbourhood of Mauritius, accounts for the S. W. monsoon which blows from the former to the latter locality; but the counter N. E. current of air does not admit of a similar explanation, for it flows from warmer to colder latitudes. The probability is, therefore, that it moves Southward to preserve the equilibrium which would otherwise be disturbed by the constant withdrawal of air from those parts by the S. W. wind. On this supposition, the two currents are owing to the influence of heat, the S. W. directly, and the N. E. indirectly.

Most of the observations made South of the 30th parallel show that the barometer

CHART SHOWING THE MEAN PRESSURE & TEMPERATURE OF THE AIR,
IN EACH SQUARE OF 10 DEGREES.

Plate VI.



is subject there to great fluctuation. But, with regard to this and many other subjects of inquiry, a far greater number of barometric and thermometric observations made with instruments compared with common standards and with another, are required.

At the same time, it is to be regretted that the observations with the instruments with which vessels are already provided, should be so few.

12. Swell and Heavy S. a.

Though frequent mention of swell and heavy sea is made in the logs, yet the direction is seldom recorded. The instances in which it is given are presented in the following Table, in which h denotes heavy swell, and A heavy sea.

*TABLE shewing the Directions and Localities of the Swell and Heavy Sea,
on each day of the month.*

Date.	Lat.	Long.	From	Lat.	Long.	From	Lat.	Long.	From
March.									
1	09°13s	80°41E	S. E.	12°20s	75°05E	S.E.&N.			
2									
3									
4	39°08s	142°16E	S. W.						
5	38°54s	141°17E	S. W.						
6	33°57s	25°39E	S. E. h.						
7	06°00s	67°10E	Srd.	21°55s	68°48E	Wrd.	20°10s	57°29E	Wrd.
8	38°53s	139°06E	S. W. h.						
9	16°43s	72°53E	S.E.&W.						
10	08°12s	66°25E	S.S.W.h.						
11	08°28s	65°58E	S. S. W.	12°58s	80°30E	S. W. h.	36°15s	22°26E	A S.W.
12	27°48s	57°45E	West						
13									
14	08°05N	87°07E	S. W.						
15	67°06N	86°50E	S. W.						
16	01°04N	77°39E	S. E. h.	18°26s	63°37E	South			
17									
18	05°16N	85°50E	S. E.	34°38s	27°13E	N. E. h.			
19	36°06N	27°40E	N. E. h.	36°06s	21°00E	Wrd.			
20	17°49N	39°24E	S. W.	36°32s	22°58E	A Wrd.			
21	02°37N	85°56E	South h.	26°36s	48°40E	Srd. h.	36°03s	25°36E	A Wrd.
22	26°57s	46°18E	S. E. h.						
23	05°09N	84°37E	S. E. h.	38°11s	27°54E	North A.			
24	16°05N	88°00E	Srd.	10°21N	81°00E	S. E.	03°09s	85°43E	S. W. h.
25	05°48N	82°17E	Nrd. h.	08°20s	79°41E	S. E. h.			
26	06°21N	83°05E	Nrd. h.	05°52s	86°39E	Srd. h.			
27	07°31s	86°05E	A S.	10°34s	75°17E	S. E.	34°38s	15°50E	S. h.
28	08°52s	85°46E	A S.S.W.	36°06s	46°08E	N. W.	36°14s	39°26E	S. h.
29	{ 03°29N	67°03E	South h.	02°35s	60°09E	S. E.	13°22s	70°39E	S. E. h.
	{ 35°26s	18°25E	A S. E.						
30	{ 01°33N	67°38E	South h.	01°43s	72°31E	S. S. E.	08°00s	85°25E	S. W. h.
	{ 28°14s	35°41E	A Srd.	35°12s	45°53E	N.W.h			
	{ 35°35s	52°47E	Wrd.	36°08s	19°53E	A S. E.	38°45s	36°55E	S. W. h.
31	60°09s	68°27E	South h.	34°32s	55°38E	S. W.	34°49s	47°06E	West.

The observations show that the swell and heavy sea depend upon the strength and direction of the winds. The sea appears to have been agitated most on the 7th, 11th, 29th and 30th, and also on the 5th, 6th, 8th, 9th, 21st, 24th, 25th, 26th, 27th, and 28th, when the wind blew in strong gales; and to have been least agitated from the 13th to the 20th, when the African S. W. monsoon did not appear, and no rotatory gales occurred in that part of the Ocean.

RAIN.

The direction of the swell and heavy sea seem to be determined by the direction of the wind, though the directions of the wind and swell are frequently different at the same locality, the swell in that case being caused by a stronger wind in another quarter. This is exemplified in the case of vessels approaching the equatorial limits of the S. E. Trade, where a swell from S. E. is generally experienced, though the wind may be coming from a different direction. Most of the instances of a S. E. swell were owing to this cause, and the other directions of the swell were owing to similar causes. On the 11th, for example, a vessel in $8^{\circ} 28' S.$ and $65^{\circ} 58' E.$ had a swell from S. S. W., the wind being from N. W.; but on that and previous days a S. W. wind extended from the Southern coasts of Africa to at least Mauritius; and it is probable that it was the swell caused by this wind which the vessel in question experienced. In circular gales, also, the directions of the wind and swell are often different. On the 23rd, for instance, a vessel in $38^{\circ} 11' S.$ and $27^{\circ} 54' E.$ had a heavy sea from North, while the wind was strong from S. S. W.; but a N. E. gale had recently passed over or near that locality. On the 28th, in $36^{\circ} 06' S.$ and $46^{\circ} 08' E.$, a heavy swell set in from N. W. at midnight, the wind being strong from N. E.

13. *Rain.*

The rainiest days were from the 1st to the 9th inclusive, especially the 1st, 2nd, and 3rd, and also from the 23rd to the end of the month; and these were the days on which gales were prevalent. Very little rain fell from the 10th to the 18th, when the wind was generally light, and calms frequent.

There were, generally speaking, two regions of aqueous precipitation., viz., the equatorial borders of the S. E. Trade, and the region of the N. E. wind to the Southward of Mauritius.

The district of the N. W. monsoon was almost rainless, condensation taking place only on its limits.

The S. W. monsoon which blows towards Madagascar and Mauritius also appears to be a dry wind. In the circular gales which took place between it and the N. E. wind described above, rain fell abundantly on the East side of the gale, where the wind was N. W., North, and N. E., but on the West side, where the S. W. wind prevailed, the weather was generally fine. This will appear from the observations of the last twelve days of the month.

It is apparently to the vibration of the Northern limits of the S. E. Trade, and of the belt of calms, that the Indian Ocean owes its rainy season, which, at Mauritius, usually commences in the latter end of December, when the Trade arrives there loaded with moisture. The rainy season of Sumatra, it may be presumed, sets in when its S. W. monsoon, which is but a continuation of the S. E. Trade, reaches it, depositing moisture on meeting the high lands, as the S. W. monsoon of India does on arriving at the Western Ghauts.

The localities and hours of precipitation, for each day of the month, are stated in the Table on the opposite page, in which p denotes passing showers, h—heavy showers, r—heavy continuous rain, d—drizzle, and const.—constant rain or drizzle.

14. *Thunder and Lightning.*

In the course of the month, thunder was heard, or lightning seen, on 41 different occasions.

The distribution of these 41 observations, as regards the regions of the different systems of winds, was as follows:

Region of the N. W. Monsoon	No. of Observations	11
— — N. E. wind to the Southward of Mauritius	— —	12
— — S. W. Monsoon towards Sumatra	— —	3
— — S. E. Trade	— —	3
Calms and Variables	— —	5

TABLE SHOWING WHERE AND AT WHAT TIME RAIN FELL ON EACH DAY OF THE MONTH.

Date	Lat.	Long.	Time.	Lat.	Long.	Time.	Lat.	Long.	Time.	Lat.	Long.	Time.	Lat.	Long.	Time.	Lat.	Long.	Time.	
March 1	11°20S	48°05E	All day	16°49S	56°21E	Noon & p.m.	20°10S	57°29E	p. all day	29°53S	31°02E	p.m.	39°20S	143°00E	Midt.				
2	{ 13°04S	73°43E	All day	13°18S	46°43E	All day	16°07S	56°17E	All day	20°10S	57°29E	p.m., h.	28°18S	57°30E	Midt.				
3	{ 33°57S	25°39E	P.M., const.	35°01S	49°00E	P.M.	10°23S	142°39E	Night	13°37S	57°18E	6A.M. & midt	14°18S	29°53S	31°02E	Midt.			
4	{ 07°13N	58°10E	2 to 8 A.M.	08°37S	84°43E	8 A.M.	11°36S	78°40E	All morning	13°37S	34°52S	54°17E	Midt.	20°18S	57°29E	All day			
5	{ 25°25S	57°05E	A.M.	29°53S	31°02E	All day	31°14S	54°07E	6 P.M.	20°10S	57°29E	10A.M. & 6P.M.	46°11E	A.M.					
6	{ 01°28S	79°17E	P.M.	09°15S	81°00E	4 P.M.	12°44S	76°56E	5 to 10 A.M.	20°10S	57°27E	Daylight	35°10E	Constellations					
7	{ 01°32S	80°27E	5 P.M.	08°26S	64°27E	A.M., p. at 6 h.	17°39S	64°43E	2 AM. [cons]	30°58S	54°13E	2 AM. [P.M.]							
8	{ 10°14S	83°33E	A.M.	14°33S	75°13E	Midt.	18°31S	62°26E	3 P.M.	22°42S	72°12E	p.m.	25°48S	49°50E	7 P.M.	29°40S	53°40E	A.M. const. &	
9	{ 33°57S	25°39E	Daylight	25°53S	21°55S	68°48E	18°31S	58°57E	5 & 10 P.M.	25°22S	80°57E	5A.M.P.M. const	27°05S	44°03E	Midt.				
10	{ 19°44S	59°14E	Daylight & P.M.	26°54S	45°29E	5 & 10 P.M.	29°46S	54°54E	Midt.	30°50S	55°10E	2 P.M.	30°14S	53°40E	Noon & till 4 P.M.				
11	{ 24°22S	77°17E	All day	16°43S	72°53E	9 P.M.	21°59S	76°59E	A.M.	29°57S	56°49E	All day	25°38S	56°10E	8 P.M.				
12	{ 00°51N	88°11E	A.M.	27°32S	42°10E	10 P.M.	28°57S	58°39E	Midt.										
13	{ 27°07S	59°21E	A.M., p. P.M., r.	28°15S	40°12E	5 P.M.	37°50S	37°00E	Midt.										
14	{ 36°02S	39°18E	P.M.	29°00S	59°30E	A.M.	30°35S	8 A.M., qr.											
15	{ 29°34S	58°00E	P.M.	20°10S	57°29E	3½ P.M.													
16	{ 18°26S	63°37E	A.M., qr.	20°10S	57°29E	2 & 3 P.M., const.	39°42S	30°35E	8 A.M., qr.										
17				18°31S	27°21E	Midt, h.	35°22S	17°58E	p. all day										
18	{ 13°48N	100°30E	A.M. & P.M., h.	34°02S	48°18E	A.M.	25°56S	52°40E	A.M. & till 5 P.M.	33°37S	26°00E	AM. P.	36°33S	22°58E	A.M., r.	37°02S	28°50E	Midt r.	
19	{ 01°30N	85°29E	4 A.M., h.	13°12S	48°18E	A.M.	03°06N	80°51E	Daylight										
20	{ 14°04N	85°48E	3 A.M., h.	01°47S	82°02E	P.M.	07°07S	80°02E	8 A.M.	30°27S	44°49E	8&9P.M., h.	38°16S	39°00E	A.M.&P.M., h.	38°13S	37°29E	All day	
21	{ 11°00S	126°47E	11 P.M. h.	20°58S	44°32E	P. all day	30°54S	43°04E	p. & r. all day	37°48S	57°29E	P.M.	37°59S	14°19E	P.				
22	{ 17°13S	72°23E	P.M.	06°22S	62°14E	All day	36°30S	46°06E	All day	37°46S	58°55E	All day	38°09S	22°39E	A.M., p.				
23	{ 01°17S	103°59E	Noon, h.	36°03S	25°36E	A.M., h.	38°47S	21°12E	A.M., h.	40°26S	124°45E	All day	36°33S	39°06E	A.M.&P.M., h.	36°33S	28°50E	All day	
24	{ 00°49S	85°19E	4 A.M.	01°47S	82°02E	P.M.	07°07S	80°02E	8 A.M.	30°27S	44°49E	8&9P.M., h.	38°16S	39°06E	A.M.&P.M., h.	38°13S	37°29E	All day	
25	{ 06°45S	61°49E	All day	20°10S	57°29E	d. & r. all day	37°48S	21°11E	P. & r.	37°46S	58°55E	All day	37°59S	14°19E	P.				
26	{ 09°00S	51°20E	d. & r. all day	38°28S	62°28E	A.M., h.	39°27S	21°11E	P. & r.	37°46S	58°55E	All day	38°09S	22°39E	A.M., p.				
27	{ 07°31S	18°50E	P. all day	20°10S	57°29E	9 A.M. & P.M.	30°00S	38°12E	All day	37°00S	37°19E	All day	38°09S	22°39E	A.M., p.				
28	{ 38°37S	120°00E	4 P.M.	11°40S	72°58E	A.M.	20°10S	57°29E	6½ A.M.	29°16S	40°18E	6A.M. P.	30°37S	36°01E	All day				
29	{ 03°27S	67°24E	A.M.	36°46S	22°50E	P.M., h.	37°34S	115°35E	A.M., h.	37°11S	46°04E	All day	37°30S	65°28E	S.A.M., r.	37°55S	19°42E	3 A.M.	
30	{ 36°26S	48°00E	Midt.	09°20S	85°30E	A.M., h.	13°22S	70°30E	A.M., r.	20°10S	57°29E	8½ A.M., r.	35°34S	42°12E	P. M.	35°16S	65°10E	P. M.	
31	{ 09°05S	83°16E	A.M.-p. M. h. & r.	37°07S	48°12E	10 P.M., h.	38°09S	30°12E	All day	39°13S	118°00E	All day	34°38S	65°40E	p. all day	37°05S	30°45E	P. M.	
32	{ 36°17S	67°07E	P.M.	08°40S	81°20E	P.M.	09°00S	85°00E	All day	10°19S	80°38E	All day	33°21S	65°00E	All day	33°21S	28°58E	Night	
33	{ 08°27S	85°11E	10 A.M.	10°00S	85°00E	Noon, h	20°10S	57°29E	5 P.M., r.	33°14S	29°32E								
34	{ 38°30S	115°36E	Noon, h.	11°00S	117°00E														

THUNDER AND LIGHTNING.

XLVII

The remaining 4 observations were made South of 30° S., the wind being from the N. W. quadrant.

No lightning was observed in the region of the S. W. wind to the Southward of Mauritius, or in that of the N. E. Trade.

Frequent electrical discharges occurred in the vicinity of the Equator, about 80° E., from the 3rd to the 8th inclusive, when, as has been seen above, heavy gales prevailed to the Southward; and much lightning was observed also on the 20th, 21st, and 22nd, when a second series of gales was commencing near the Southern promontory of Africa.

The observations for each day are given in the subjoined Table, in which l denotes lightning and t thunder.

TABLE showing When and Where Thunder or Lightning was observed in the course of the month.

Date.	Lat.	Long.	Time.	Wind.	Lat.	Long.	Time.	Wind.	No. of Obsr.
March									
1									0
2									0
3	01°37'S	77°26'E	5 P.M., l	N.W.					1
4	01°28'S	79°17'E	A.M., l; P.M., tl	North.	14°40'S	46°26'E	Till 8 A.M.	Var. & W. N.W.	2
5	{ 01°32'S	80°27'E	2 to 5 A.M., t	NW & calm					1
	{ 5 P.M., l								1
6	01°42'S	80°49'E	9 P.M., l	N.W.					2
7	10°42'S	83°22'E	8 P.M., l	W.N.W.	20°10'S	57°29'E	2 P.M., t	Calm	2
8	01°09'S	82°14'E	9 to 12 P.M., l	N.E. & S.E.	34°45'S	55°14'E	Midt., t	N. E.	0
9	-								1
10	00°22'N	86°39'E	A.M., l	N.N.W.					0
11									0
12									1
13	29°53'S	31°02'E	P.M., l	E.N.E.					2
14	09°26'N	97°10'E	Midt., l	N.N.W.	05°56'N	91°02'E	9 to 12 P.M.	N. W.	1
15	03°43'N	77°00'E	Midt., l	W.S.W.					0
16	01°40'N	77°39'E	Midt., l	W.S.W.					1
17									2
18	34°38'S	27°13'E	Midt., t	E.b.N.					5
19	02°47'N	80°17'E	11 P.M., l	N.W.	36°06'S	27°40'E	10 P.M., l	E. N. E.	
20	{ 25°55'S	52°40'E	A.M., l	E.S.E.	{ 29°53'S	31°02'E	A.M., tl, P.M., l	N.E. & var.	
	{ 33°37'S	26°00'E	4 P.M., t	W.N.W.	{ 36°32'S	22°58'E	A.M. & P.M., tl	W. N. W.	
	{ 37°02'S	28°50'E	Midt., t	E.N.E.					3
21	{ 28°38'S	50°08'E	A.M., l	E.S.E.	{ 29°53'S	31°02'E	A.M., l	Var.	
	{ 38°37'S	36°06'E	4 A.M., l	N.E.					4
22	{ 04°42'N	82°57'E	Midt., l	N.N.W.	15°06'S	51°00'E	8 A.M., t	Calm.	
	{ 26°57'S	46°18'E	10 P.M., tl	East.	38°33'S	38°00'E	Midt., tl	N. E.	2
23	30°27'S	44°49'E	8&9 P.M., tl	Var.	38°16'S	39°00'E	2 A.M., tl	N. E.	2
24	20°10'S	57°29'E	1½ P.M., t	N.W.	30°54'S	43°04'E	A.M. & P.M., tl	N. E. & N.	0
25									0
26									0
27	07°47'S	59°20'E	P.M., l	S.W.	20°10'S	57°29'E	{ 9 A.M., tl	S. E.	2
28	08°52'S	85°46'E	Midt., l	N.W.	39°00'S	18°00'E	{ 6 P.M., t	W. N. W.	0
29							{ 8 P.M., l		1
30	08°00'S	85°25'E	7 A.M., tl	W.N.W.	38°30'S	25°45'E	Midt., l	N. E.	2
31	37°05'S	30°45'E	P.M., tl	N.W.					

CURRENTS.

XLVIII

15. Currents.

The following Table contains the observations made on the surface currents, which are given without remark or comment, save that in some instances it is difficult to know from the log-books whether it is the set, or the point from which the current was flowing, that is given.

TABLE showing the Localities and Directions of the Currents.

Date.	Lat.	Long.	Set.	Rate per hour.	Lat.	Long.	Set.	Rate per hour.
March.	S.	E.			S.	E.		
1	04°23'	70°50'	N. E.	Strong	13°21'	90°16'	Northward	1'
2	07°53'	85°11'	Westerly		17°24'	87°04'	N. b. W.	1'
3	19°43'	83°04'	North	1'				
4	19°43'	80°18'	North	1'				
6	07°19'	66°16'	S. W.					
7	{ 01°34'	81°39'	W. S. W.					
	{ 06°00'	67°10'	Eastward	Strong	05°59'	67°32'	S. W.	
	{ 21°55'	68°48'	Eastward	1'	06°31'	64°18'	Eastward	3'
8	{ 05°08'	68°47'	S. W.					
	{ 06°31'	67°30'	East	Strong	05°40'	65°45'	Eastward	1½'
9	07°30'	66°55'	East	Strong	21°10'	65°55'	East	1½'
17	07°51N	89°27'	Strong	Current				
18	21°19'	56°16'	West	3'	19°52N	87°30'	N. E.	
19	23°27'	54°25'	N. b. E.	1'	39°52'	36°10'	S. 66° E.	2'
20	25°56'	52°40'	N. N. E.	1½'	39°49'	38°13'	East	½'
21	28°38'	50°08'	N. E.	3'	37°33'	37°48'	N. W.	1½'
22	29°51'	47°05'	N. E. b. E.	1½'				
23	38°20'	46°15'	S. 64° E.	2¾'	38°15'	43°22'	S. 67° E.	3¼'
24	26°58'	44°22'	Southward	Strong				
25	31°13'	41°46'	N. E. b. E.	1½'	30°54'	43°04'	East	1/6'
26	29°46'	40°09'	S. E. b. S.	1½'				
27	30°00'	38°12'	W. N. W.	1'				
28	{ 30°37'	36°01'	East	1'				
	{ 34°35'	17°33'	N. E.					
29	30°09'	34°51'	E. N. E.	Strong	34°17'	50°04'	S. 82° E.	1'
30	08°40N	81°30'	Northward	Strong				
31	33°14'	29°32'	E. N. E.	1½'	30°26'	32°57'	North.	1½'

LIST OF THE VESSELS.

III. TABLE comprising the names of the Vessels corresponding to the numbers in the first column of the Journal, the names of the Commanders, the Ports of Departure and Arrival, and the duration of the Passage.

XLIX

Ship's No.	Ship's Name.	Commander.	Bound		Days' Passage.
			From	To	
2	Fazel Currim	W. McGregor	Calcutta	Mauritius	
3	Briton	A. Vaulking	Tranquebar	Mauritius	35
5	Despatch	Dérivière	Mauritius	Nossi Bé	18
6	Futtah Rachman		Singapore	Calcutta	49
8	John King		Mauritius	Algoa Bay	27
9	Ospray	T. Macomber	Whaling		
11	Jessie Smith	W. M. Baxter	Mauritius	Algoa Bay	24
12	Futtah Sultan	J. Norman	Mauritius	Madras	37
19	Mazeppa	H. Clements	Mauritius	Muscat	56
22	Roscoe	J. Day	Natal	Mauritius	49
23	Sir G. Anderson		Mauritius	Socotra	42
25	Shah Allum	J. S. Wadge	Calcutta	Mauritius	35
26	Eugenia		Batavia	Mauritius & the	42
27	Ahmoody	J. W. Fingate	Bombay	Mauritius [Cape	60
33	Ceres (fr.)		Mauritius	Akyab	
36	Amy	J. D. Dixon	Table Bay	Mauritius	34
37	Fanny Fisher	C. Harold	Swan River	Mauritius	57
38	Herald		Turnbull	Mauritius	36
40	Paquebot Mexicain		Monmaur	Bourbon	
41	Dart	[fr.) A. Labury	Mauritius	Perros Banhos	17
42	Richmond	R. Arnulphy	Mauritius	Bally (Mada-	15
43	Chieftain		Whaling	[gascar)	
45	Araby Maid	W. Riddock	Table Bay	Mauritius	20
46	Japan	J. Green	London	Mauritius	
47	Thomas Blyth	J. E. Gammon	Viale	Mauritius	
48	Alfred (fr.)		M. McAlpine	Table Bay	31
49	Clydeside		J. P. Ellis	Mauritius	11
50	Nautilus		Le Conte'	At Algoa Bay	48
51	G. Dean		A. Fraser	Algoa Bay	27
52	Magnolia		R. Boyd	Clyde	
53	Collingwood		T. Cook	Table Bay	32
54	John		W. Bergh	Table Bay	27
55	Natal		J. Maughan	Algoa Bay	25
56	Chamois		W. Hoskins	Calcutta	37
57	Bland		M. J. Rowe	Calcutta	35
58	Julia		T. D. King	London	
59	Pauline Houghton			At Table Bay	
60	Express	C. Lucas		Muscat	40
61	Nimble				18
62	Æneas	J. W. Wright			39
63	Hydroosee		J. Browne	Calcutta	48
64	Marmion		J. Douglas	Celcutta	61
65	Blue Bell		Pelletier	Port Philip	
66	Margaret Gibson			Mauritius	
67	Le Fernand (fr.)			Mauritius	37
68	Romp			Mauritius	
69	Surpass	[South		Algoa Bay	
70	S. V. Queen of the			Mauritius	
71	W. & M. Brown	G. Roberts	Table Bay	Mauritius	11
72	Corsair's Bride		Table Bay	Mauritius	40
73	S. V. Mauritius	W. Crawlay	Algoa Bay	Mauritius	18
			Table Bay	Mauritius	

LIST OF THE VESSELS.

TABLE comprising the names of the Vessels, &c. (continued).

Ship's No.	Ship's Name.	Commander.	Bound		Days' Passage.
			From	To	
78	City of Palaces	J. M. Symons	Bombay	Mauritius	
79	Enfant Nantais (fr.)	Bernier	Carical	Bourbon	41
88	Ide	T. Perry	Table Bay	Mauritius	42
89	Atieth Rohoman	J. J. Toughim	Calcutta	Mauritius	39

I regret that the names of a few of the gentlemen who commanded these vessels are unknown to me; but I beg, in conclusion, to tender to all of them my best thanks for the assistance which they have afforded, and to request that they will continue to favor me with their powerful co-operation; for without their aid and advice I should in vain expect to be able to prosecute with success the work which lies before me.

METEOROLOGICAL JOURNAL of the INDIAN OCEAN. [1st & 2nd March, 1853.]

METEOROLOGICAL JOURNAL of the INDIAN OCEAN. [3rd, 4th & 5th March, 1853.]

METEOROLOGICAL JOURNAL of the INDIAN OCEAN. [5th & 6th March, 1853.]

4

Time A.M. P.M.	Position at noon.	Wind's Direction and Force.			Bar.	Ther.	State of sea.	Remarks.		
		First Part, Midt. to 8 A.M.	Middle Part, 8 A.M. to 4 P.M.	Last Part, 4 P.M. to Midt.				A.	M.	P.
1800 A.M.	N.	E.	South 2 SWW & Calm	SW.2 West & WSW 2 NNE 1.2	Bar.	Noon.	Swell &c. from.			
1816	18 16	88°06'	74°18'	Calm & West 2	Bf.	f.				
1402	14 02	74°18'	58°04'	Calm & NNE 1	f.					
1357	13 57	58°13'	NNE 4	NNE 24	f.					
[5th March.]	10 11	58°13'			c.					
1032	10 32	80°27'	Calm & NTH	NW2 & Calm	o. From 2 to 3½ t l. At 5, t l at North.					
0132	01 32	80°27'	W NW.2	NNW.2	f.					
0411	04 11	67°50'	NW.4	NW.4	f.					
0514	05 14	71°46'	NW.4	NW&NNW	Daylight, p. q. Noon, f.					
0826	08 26	64°27'	East & NE	NW.6	Bf.					
0927	09 27	60°26'	NW.6	NW.6	Noon q.					
0932	09 32	83°55'	NW & SW.2	SSW & SSE.2	q. At 5, oq. At 9, q and calms.					
1352	13 52	75°58'	NE.6	NNW & WSW	f.					
1513	15 13	45°46'	Var.	WLY	At 10, A.					
1739	17 39	65°37'	ESE 6	ESE 5	Sunset, do & heavy following sea.					
2010	20 10	57°29'	SE & ESE 3.4	SE & NW 1.4	At 2½ q from Nth.					
2237	22 37	57°19'	EDN & ENE 6	ENE 9	c. B.R.T.S. S.					
2333	23 33	76°06'	SE 6	SEASSE 6.7	bef.					
2535	25 35	49°30'	E.E.8	E&ENE 6						
2545	25 45	88°13'	Sly.5	SE.5						
2726	27 26	45°20'	E.NE.5	ESE 6						
2953	29 53	31°02'	Vau. & NE.4	Var.	Close w.r. At 11, wind veered to WSW					
3043	30 43	34°29'	SSW 6.4	SSW.5.4	f.					
3058	30 58	54°43'	EBN.5.6	Ebn.5	Heavy head sea. V. Lab.					
3149	31 49	55°07'	E.NE.4	ENE.4	At 2, r. At 8, 1 R.T.S. Noon, B.					
3340	33 40	52°10'	NE.4	NE 4	B. At 6, q. Noon, B.					
3357	33 57	25°39'	SW.5	NW	Strong head sea.					
3520	35 20	17°30'	SSE.4.2	SE 2.6	At Algoa Bay.					
3854	38 54	141°17'	SW	Var & SW 4	f.					
N.	E.				m.					
1800	18 00	91°23'	WSW & WNW 4	NNW 4	Noon, Bf.					
1727	17 27	88°14'	SW 2	SSW & West 2	At 4, m.					
1453	14 53	92°12'	NNW 4	NNW.5	f.					
1408	14 08	58°30'	NNE 1	Calm	f.					
1317	13 17	74°00'	WSW 2	SSW & SSW.2	f.					
1125	11 25	55°19'	NNE 4.2	NE 2	f.					
S.	E.									
0142	01 42	80°40'	Calm	WSW & WNW 2	At 5, q, & 1 at NW. At 9, q,					
0520	05 20	71°40'	NW	NW & N	f.					
				29°94	f.					

[6th March.]

METEOROLOGICAL JOURNAL of the INDIAN OCEAN. [6th & 7th March, 1853.]

WEATHEROLOGICAL JOURNAL of the INDIAN OCEAN: AN & OUTLINE.

Wind's Direction and Force,							Remarks.		
Position at noon,			Wind's Direction and Force,		Bar.				
Pass A	Lat.	Long.	First Part, Mid. to 8 A.M.	Middle Part, 8 A.M. to 4 P.M.	Last Part, 4 P.M. to Midt.	Noon,	A.	B.	C.
S. [7th March]	E. 20°50'	57°29'	Calm. ENE.8	Ene&Calm. ENE.6	Ely.1 EHN EBS ESE.5 ENE.7	19 667-621 750-7	831-80 26.0	Nearly o. Clouds moving from E&N's At 4, set e. R. 1 S &c on NW reefs bc. Current ENE. 1' per hr. At 5, e g p. At 8, more mod. Noon, g. + gale. V. Lab. At Natal, f.	At 2, or & t at N-s on reefs. At 4, set e. R. 1 S &c on NW reefs pqr. Thick bank of e. in N&NW g. & const. r. R. T. S.
8. [7th March]	E. 20°58'	56°48'	SE-SE	EBS	ESE.5 ENE.7	750-7	— Wnd	q. V. Lab. Midt. qr. f.	At 4, set e. R. 1 S &c on NW reefs pqr. Thick bank of e. in N&NW g. & const. r. R. T. S.
26. [7th March]	21°35'	68-48	SE-SE	ESE.5	ENE.7	— Wnd	—	Heavy head sea. V. Lab. cr. At 8, B. Midt. c. r. At 4, B. Midt. B & heavy head sea. f.	At 4, set e. R. 1 S &c on NW reefs pqr. Thick bank of e. in N&NW g. & const. r. R. T. S.
37. [7th March]	26°22'	60-57	ENE.5	WBS.9	WBS.9	— Wnd	—	Heavy head sea. V. Lab. cr. At 8, B. Midt. c. r. At 4, B. Midt. B & heavy head sea. f.	At 4, set e. R. 1 S &c on NW reefs pqr. Thick bank of e. in N&NW g. & const. r. R. T. S.
9. [7th March]	25°26'	50-17	ENE.8	WBS.9	Var.2	— Wnd	—	Heavy head sea. V. Lab. cr. At 8, B. Midt. c. r. At 4, B. Midt. B & heavy head sea. f.	At 4, set e. R. 1 S &c on NW reefs pqr. Thick bank of e. in N&NW g. & const. r. R. T. S.
8. [7th March]	27°05'	44-03	WBS.6.8	ENE.2	SWBS.6	— Wnd	—	Heavy head sea. V. Lab. cr. At 8, B. Midt. c. r. At 4, B. Midt. B & heavy head sea. f.	At 4, set e. R. 1 S &c on NW reefs pqr. Thick bank of e. in N&NW g. & const. r. R. T. S.
66. [7th March]	29°33'	31-02	ENE&Var	EBS	NE.9.6	— Wnd	—	Heavy head sea. V. Lab. cr. At 8, B. Midt. c. r. At 4, B. Midt. B & heavy head sea. f.	At 4, set e. R. 1 S &c on NW reefs pqr. Thick bank of e. in N&NW g. & const. r. R. T. S.
22. [7th March]	30°11'	53-40	SWBS.6	EBS&NE.9	NN.E.9.7	— Wnd	—	Heavy head sea. V. Lab. cr. At 8, B. Midt. c. r. At 4, B. Midt. B & heavy head sea. f.	At 4, set e. R. 1 S &c on NW reefs pqr. Thick bank of e. in N&NW g. & const. r. R. T. S.
36. [7th March]	30°14'	53-40	East.9	NN.E.9	NN.E.9.7	— Wnd	—	Heavy head sea. V. Lab. cr. At 8, B. Midt. c. r. At 4, B. Midt. B & heavy head sea. f.	At 4, set e. R. 1 S &c on NW reefs pqr. Thick bank of e. in N&NW g. & const. r. R. T. S.
58. [7th March]	30°29'	53-53	East.8	NN.E.9	NN.E.9.7	— Wnd	—	Heavy head sea. V. Lab. cr. At 8, B. Midt. c. r. At 4, B. Midt. B & heavy head sea. f.	At 4, set e. R. 1 S &c on NW reefs pqr. Thick bank of e. in N&NW g. & const. r. R. T. S.
51. [7th March]	33°37'	25-39	NE.4	NE&SE	NE&SE	— Wnd	—	Heavy head sea. V. Lab. cr. At 8, B. Midt. c. r. At 4, B. Midt. B & heavy head sea. f.	At 4, set e. R. 1 S &c on NW reefs pqr. Thick bank of e. in N&NW g. & const. r. R. T. S.
49. [7th March]	35°12'	18-35	Calm.	SW&WSW.4.5	WSW.5.1	29-85	70	At 4, 2 R. T. S. &c. At 8, Calm. At 8, 1 from Srd. Noon, 1 R. T. S.	At 4, 2 R. T. S. &c. At 8, Calm. At 8, 1 from Srd. Noon, 1 R. T. S.
71. [7th March]	36°02'	53-15	ENE.4	ENE.9	ENE.9	29-70	—	At 4, 2 R. T. S. &c. At 8, Calm. At 8, 1 from Srd. Noon, 1 R. T. S.	At 4, 2 R. T. S. &c. At 8, Calm. At 8, 1 from Srd. Noon, 1 R. T. S.
65. [7th March]	38-48	140-32	WSW&SW.4	SSW.8	SSE.8.6	29-70	—	At 4, 2 R. T. S. &c. At 8, Calm. At 8, 1 from Srd. Noon, 1 R. T. S.	At 4, 2 R. T. S. &c. At 8, Calm. At 8, 1 from Srd. Noon, 1 R. T. S.
N. [7th March]	E. 58	16-26	89-30	WNW&WNW.4	WNW.3	29-67	82	f.	f.
[7th March]	E. 57	15-33	87-05	Var.2	Var.2	—	—	m.	f.
[7th March]	E. 62	18-30	93-42	NNE&Nth.4	NW.2	—	—	BE.	f.
[7th March]	E. 10	15-20	58-45	NE	East.4	—	—	BE.	f.
[7th March]	E. 6	14-41	90-10	North.2	NNE.1	—	—	BE.	f.
[7th March]	E. 78	11-36	75-30	NE.2	NE&SW.2	—	—	BE.	f.
[7th March]	E. 23	12-39	54-01	NE.4	NE.4	—	—	BE.	f.
S. [7th March]	E. 33	01-09	82-14	ESE&ENE.3	NE&NE.2	NE&NE.2	—	q. At 5, f	f.
[7th March]	E. 41	05-20	71-40	WNW.4	WNW.4	WNW.4	29-98	—	f.
[7th March]	E. 12	05-08	68-47	NNW.2	NNW.2	NNW.2.1	29-94	—	f.
[7th March]	E. 50	05-50	65-45	NNW.4	NNW.2	NNW.4	—	—	BF.
[7th March]	E. 43	06-31	67-30	NW.4	NW.4	NW.4	—	—	f.
[7th March]	E. 27	12-14	82-59	WNW.4	WNW&NE.2	WN&WSW.2	—	At 10, q. Noon, calm. Heavy dew.	f.
[7th March]	E. 40	15-43	75-36	SW	West.1	West.1	—	—	f.
[7th March]	E. 42	15-43	45-57	WNW&SW.3	SSW&NTL.	NNW	—	—	f.
[7th March]	E. 25	19-43	58-09	Calms.SSW.2	SSW.2.1	SSW.2.1	29-73	86	f.
[7th March]	E. 1	20-10	57-29	Calm.	NN.W.1.2	NN.W.1.2	29-704-653	83-86½	At 9, B.
[7th March]	E. 26	21-10	65-55	ENE.7,8	ENE.8,9	ENE&E.9.8	757-0	27	At 9, B.
[7th March]	E. 37	24-52	77-17	SE.6	SEAVar.6	Var.8	—	—	At 9, B.
[7th March]	E. 9	26-10	60-21	WNW.6	WNW&WSW.2	WNW.2	—	—	At 9, B.
[7th March]	E. 8	26-54	45-20	WBS.5	SW.4.5	SW.4.5	—	—	At 5, PQ. At 10, QR.
[7th March]	E. 36	29-46	54-54	NE.6	NE.6	NE.6	—	—	At 5, PQ. At 10, QR.
[7th March]	E. 65	29-53	31-02	East.4	ENE.5	ENE.5	—	—	At 5, PQ. At 10, QR.

METEOROLOGICAL JOURNAL of the INDIAN OCEAN. [8th & 9th March, 1853.]

No. of Vessel	Position at noon.	Wind's Direction and Force.		Bar.	Theor.	State of sea.	Remarks.
		First Part. Midt. to 8 A.M.	Middle Part, 8 A.M. to 4 P.M.				
22	S. 30°12'	E. 41°00'	SW.4	SW.6	Δ	f.	At 2, r. Midt. B.
38	30°50'	55°10'	NNE.6	NNE.6	Δ	B. At 6, q. Noon, head sea.	
51	33°57'	25°39'	Var.4	SW.4	Δ	At Algoa Bay. f.	
55	34°09'	14°00'	Srh&SSW.4	SSW.4	Δ	ed. At 8, B. Noon, Bf.	
71	34°45'	55°14'	East.9	E&NE	Δ	Severe gale, q.	
49	35°03'	20°04'	SbW.2.4	SbW&Var	Δ	f.	
65	38°53'	SE&E.6.4	East.4	ESE.4	Δ	Thick wr. & p.	
					SW		
19	N. 16°45'	E. 59°11'	East.5	E&EbS.5	BF.	BF.	
58	16°09'	89°06'	NW&SW.2	SW&Nth.2	Δ	f. At 2, very heavy dew. f.	
6	14°57'	89°30'	Calm&Wrd.	NW.4	Δ	f. Daylight, head sea.	
57	14°42'	86°30'	Var&Calms	Var.2	Δ	f.	
62	14°15'	94°23'	NW&W.2	Calm&Var.2	Δ	f.	
78	10°17'	76°00'	SW&NE.2.3	WSW&W.4	Δ	f.	
				E&SW.2	Δ	f.	
33	S. 10°26'	E. 83°04'	SE&NW.2	NW.2	Δ	At 3½, qr. At 5, r. At 9, f. At 11½, r.	
12	04°14'	71°02'	NNW.1	NNW&Calm	87	f. At 5, q. At 9, do.	
50	04°55'	66°36'	NNW.2	NNW.2	87	f.	
41	05°14'	71°46'	NN&West.5	NN.3	87	f.	
43	07°30'	66°55'	NW.4	NN.4	87	f.	
27	12°25'	82°55'	WSW.2	SSW.1	87	f.	
42	15°42'	45°57'	Northo.NNW	North	87	f.	
40	16°43'	72°53'	WNW	NNW	87	f.	
1	20°10'	57°29'	South.1	SSE&SE.1.2	87	At 5, e & fine sea. At 9, f. s. SSE.	
26	20°28'	61°38'	ESE.8.7	ESE.5.4	87	At 9, f. s. SSE.	
37	24°59'	76°59'	SE.7	SSE&Var.5	87	At 9, qr. At 5, r. SSE.	
9	25°51'	49°43'	WSW	WSW.2	87	At 9, f. s. SSE.	
8	26°59'	44°36'	SWbW.6	WSW.6	87	At 9, f. s. SSE.	
66	29°53'	31°02'	ENE.4	ENE.2	87	At 9, f. s. SSE.	
36	29°57'	56°49'	NE.6	NE.6	87	At 9, f. s. SSE.	
22	30°31'	43°31'	SW.6	SW.6	87	At 9, f. s. SSE.	
38	30°33'	56°34'	Nrh&NN.E.6	NNE.6	87	At 9, f. s. SSE.	
51	33°57'	26°39'	NW.1	SE.8	87	At 9, f. s. SSE.	
55	34°42'	15°26'	SSW.2.0	NW.2.6	87	At 9, f. s. SSE.	
49	35°10'	21°94'	Var.4.2	WNW.4	87	At 9, f. s. SSE.	
71	35°38'	56°10'	NE.9	NE.6	87	At 9, f. s. SSE.	
65	37°35'	135°57'	ESE.4	ESE.4	87	At 9, f. s. SSE.	

METEOROLOGICAL JOURNAL of the INDIAN OCEAN.

[10th & 11th March, 1853.]

METEOROLOGICAL JOURNAL of the INDIAN OCEAN. [11th & 12th March, 1853.]

Position at noon. Lat. & deg. of Vessel N.	Long.	Wind's Direction and Force.			Bar.	Ther.	State of sea.	Remarks.		
		First Part, Midt. to 8 A.M.	Middle Part, 8 A.M. to 4 P.M.	Latter Part, 4 P.M. to Midt.				A.	M.	P.
50° 0' 39"	E.	NNE.2	NE.1	ENE.1	29.93	87	f.	f.	f.	f.
50° 1' 11"	66.47	NE.1	Var. & East	East.	29.98	-	f.	f.	f.	f.
50° 1' 11"	72.34	Var.	NW.4	SSE.4	-	-	SSW	SSW	SSW	SSW
50° 1' 11"	71.46	Var.	SW&SSE.3.4	SW.4	-	-	More mod.	f.	f.	f.
41° 43'	65.58	NW.4	SW&NNW	NW.2	-	-	f.	B. At 9, c & δ	B. At 9, c & δ	B. At 9, c & δ
43° 27'	80.30	SW&SSE.3.4	NW.2	NW&N 2	-	-	bc.	c. At 9, B.	c. At 9, B.	c. At 9, B.
42° 42'	45.57	SW.4	NW.2	S&SSE.5.4	-	-	bc.	c. Clouds moving from SSE.	c. Clouds moving from SSE.	c. Clouds moving from SSE.
40° 40'	72.09	WNW	SSW.2.4	NW&ESE.1	29.828-769	83½-84½	r. Noon, more mod. & B.			
26° 21'	58.53	SW&SW.1.2	WNW.1.2	NLY.4	-	-	f.	f.	f.	f.
26° 21'	57.29	Calm&Sxy.1	NLY.5	SSE.4	-	-	c. At 10, o & q r. Midt., B.	c. At 10, o & q r. Midt., B.	c. At 10, o & q r. Midt., B.	c. At 10, o & q r. Midt., B.
37° 37'	73.54	NLY.9	SW&SE.4	SBW&SSW.4	-	-	p. q.	p. q.	p. q.	p. q.
9° 25° 12'	48.31	SW.4	SSE.4	E&ESE.4	-	-	f.	f.	f.	f.
8° 27° 32'	42.40	N&EEN.2.4	E&ESE.4	Ebs.4	-	-	c.	c.	c.	c.
36° 36° 57'	58.39	N&EEN.2.4	E&ESE.4	West&NNW.6	-	-	B. At Natal.—m.	B. At Natal.—m.	B. At Natal.—m.	B. At Natal.—m.
38° 29° 48'	57.45	NNE.4	East.4	Var.1.5	-	-	f.	f.	f.	f.
66° 29° 53'	31.02	WSW&West.6	West.6	Var.1	-	-	q. At 4, furled M.T.G.S. At 8, 1 R.T.S.	q. At 4, furled M.T.G.S. At 8, 1 R.T.S.	q. At 4, furled M.T.G.S. At 8, 1 R.T.S.	q. At 4, furled M.T.G.S. At 8, 1 R.T.S.
22° 22° 30'	46.55	Var.2	Var.1	East.4	-	-	At Agao Bay.—f.	At Agao Bay.—f.	At Agao Bay.—f.	At Agao Bay.—f.
71° 71° 33'	58.00	SSE.8	SE.3	SE.3	30.02	69	Midt., steady breeze & f.			
51° 51° 33'	25.39	NW.4	NW.4	SE.5	-	-	Blowing hard.	Blowing hard.	Blowing hard.	Blowing hard.
49° 49° 34'	25.30	WNW.8	WNW.7	SW.6	-	-	c. Daylight, A SW. Noon, f.			
55° 55° 36'	22.26	West&SW.6	SW.6	WSW.6.7	30.10	72	More mod. & f.			
65° 65° 36'	13.26	WNW&WSW.3	WSW.8	SSW&South.6	-	-	At 6, more mod.			
52° 52° 37'	33.21	WSW.5	WSW.5	-	-	-	f.	f.	f.	f.
68° 68° 22'	N.	E.	NW.4	NW.3	30.55	79	V. Lab.	V. Lab.	V. Lab.	V. Lab.
19° 19° 22'	60.16	SW&SSW.6	West.2	NNW.2.1	30.04	86	At 3½, wind shifting.			
2° 2° 18'	60.58	West.2	NNW.4.2	NLY.2	-	-	f. Midt., B & calm.			
6° 6° 15'	88.12	NLY.1	NLY.2	NLY&Calm	-	-	m.	m.	m.	m.
62° 62° 11'	88.20	NLY.1	SW&Sbe.1	SbE&SbW.1	-	-	f.	f.	f.	f.
58° 58° 10'	96.23	SW.2	NNE&NNW.4	NNW&Nbe	29.65	85	f.	f.	f.	f.
57° 57° 10'	87.46	Nbe.4	ENN.2	NW.2	-	-	f.	f.	f.	f.
33° 33° 02'	85.56	Ebn.2	WNW.2	WNW.2.5	-	-	f.	f.	f.	f.
50° 50° 02'	89.24	NW.5	North.1	North.1	-	-	f.	f.	f.	f.
12° 12° 02'	66.05	NebN.2	SE.1.2	SEA&SW.4	29.97	88	f.	f.	f.	f.
41° 41° 05'	72.53	ENE.1	Var.2	Var.2	-	-	f.	f.	f.	f.
43° 43° 07'	71.46	Var.2	South.2	SW.1	-	-	f.	f.	f.	f.
27° 27° 14'	66.10	WSW.1	WSW.1	SSE.4	-	-	f.	f.	f.	f.
42° 42° 15'	80.04	SSE.4	South.	SSE.4	-	-	f.	f.	f.	f.
40° 40° 17'	45.57	North to NNW	North.1	NNE.1	-	-	f.	f.	f.	f.
	70.16	North.1	North.1	North.1	-	-	f.	f.	f.	f.

[12th March.]

METEOROLOGICAL JOURNAL of the INDIAN OCEAN. [12th & 13th March, 1853.]

Position at noon.		Wind's Direction and Force.		Bar.		Ther.		State of sea.		Remarks.	
Lat.	Long.	First Part. Midt. to 8 A.M.	Middle Part. 8 A.M. to 4 P.M.	Latter Part. 4 P.M. to Midt.	Noon.	Noon.	Noon.	Swell &c. from.	A.	M.	R. M.
12° 40' N	8° E.	57° 29' Calm	NNW.1 SSW.6 N.W.5 SSE.4	Calms&East.1 SSW&C.linn N.W.4 SSE.4	29-883-841	82-84			At 6, heavy dew. B.		
11	20° 31'	59° 39' SSW.6	N.E.5					f.	f.		[9½], B.
37	23° 50'	70° 13' SSE.4	EBS.2					c.	2 R. T. S. Lat. part, B.		
9	25° 58'	47° 58' ESE.4	EBS.2	East&NE.2,4				f.			f.
36	27° 07'	59° 21' S. E. 4,2	SSW.5	SE&East.2,4,2				cr. Midd., c.			
38	27° 48'	S. E. 4,2	Vari.2	SbW.4,5				B. At 5, r. At 8, q. Midd., B.			
8	28° 15'	40° 12' N.N.W. & Var.4	Var.5	ENE.2,6				qr. At 4, c. Midd., do.			
66	29° 53'	31° 02' Var.5	SWbS.5	SWbS.5				m.			
22	30° 01'	48° 05' Ebs.4	Ebs.4	Ebs.4				f.			
71	31° 35'	57° 58' SE.4	SE.4	SE.4				f.			
51	33° 57'	25° 39' SE.2	SE.4	SE.5				f. Midd., B. & Calm.			
49	34° 02'	25° 41' SE.4	ESE.6	ESE.6,7				Bf. At 8, + g.			
65	36° 49'	23° 59' SE.4	SE.4	SE.4,5				c. Lat. part, + g. Midd., qr.			
62	37° 50'	37° 00' South&SSE.4	WSW.6,7	WSW.6,7				B.			
65	37° 52'	132° 09' WSW.6,7									
19	22° 36' N.	60° 33' E.	NNW.2,1 N.W.2	NNW&East.2 Vars&Calms	Calms	30-55	79				
68	22° 01'	60° 38' Var&WNW.4	Var&SW.2,1	Var&SSW.4	East&ESE.2,1	30-07	84				
2	17° 22'	88° 01' NW.1	NbW	Calm, SE, Sth				f.			
6	16° 05'	87° 55' SSW.1	SW&WLY.2	WNW.2,1				f.			
62	10° 34'	96° 46' NbE.2	NW.2	N.W.2	N.W.&NbE.2	29-65	83				
58	09° 16'	87° 29' NW.2	NNW.2	NNW.5	WSW.5			f.			
57	09° 14'	85° 21' W. W. 5,2	NW.2	NW.2	NW.2			f.			
78	08° 12'	74° 00' W. W. 5,2						f.			
33	04° 21'	90° 12' S.	E.	ENE.1	NE&E.1			f.			
50	02° 06'	65° 10' SW&SE.4	NBw&SE.4	STH&NNNE.4,1	30-00	82		pq. At 5, c. At 11, q.			
12	03° 00'	72° 23' SW.2	South&SW	W. W. V. Jr				f.			
41	05° 15'	71° 42' S. E. 2,1	SRD.2,1	SH.2,1				f.			
43	07° 39'	66° 04' SSE.4	ESE.4	ESE.4				f.			
27	15° 03'	77° 31' Var.1	Var.1	Var.1				c. & s.			
42	15° 42'	45° 57' NE&East.2	NE&East.2	SE.2				At 3½, nearly overcast. At 9½, B.			
40	17° 21'	69° 13' Calm	Calm	SE.1&Calms				f.			
1	20° 10'	57° 29' SSE&Calm	Calm	Calm				B & heavy dew.			
11	20° 40'	56° 12' N.W.2	N.W.2	N.W.2				B & heavy dew.			
37	23° 48'	68° 37' SSE.4	East&NE.2	NE&East.1				f.			
9	24° 45'	48° 16' E. 1, 2	E. 1, 2	NE&West.2				f.			
36	25° 48'	59° 30' NE&East.4						At 4, c. Noon, B.			
38	26° 05'	58° 02' E. 1, 2						B. At 8, p. Noon, B.			

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Position at noon.		Wind's Direction and Force.		Bar.		Theat.		State of sea.		Remarks.	
Lat.	Long.	First Part. Midt. to 8 A.M.	Middle Part. 8 A.M. to 4 P.M.	Latter Part. 4 P.M. to Midt.	Noon.	Noon.	Noon.	Swell &c. from	A.	M.	P. M.
S. 8	E. 28°35'	S. 38°06'	SbW.5 ENE.6 SWbS.5	SbW.5 ENE.6 SWbS&Nth.1					c.		c. ml.
66	29°53'	31°02'	ENE.2					f.	f.		f.
22	30°00'	49°22'	SE.2	SE.2				f.	f.		f.
71	30°41'	57°58'	SE.2	SE.2				f.	f.		f.
49	53°57'	26°39'	SW.5	SE.4				c m q r	Midt., c m.		Bf.
52	36°02'	39°18'	SE.2	East.2				B. At 6, + g, c. R.T.S, &c.—Violent q.	B. At 6, + g, c. R.T.S, &c.—Violent q.		Bf.
55	38°13'	25°41'	East.6	Ebs.2							
65	38°33'	131°43'	NW&Var.6.5	NW&NNW.7	30-10	72	(—)	—	—	—	
N. 19		E. 23°18'	59°33'	Calm&SW.6	South.6 SSW.4	30-58	78		f.		f.
63	21°31'	60°35'	ESE.4	Wbs.1	SWbW.5			f.			m.
6	16°40'	88°30'	SW.2	Var&SW.1	NW&NNW.1	30-07	86		f.		f. Midt., 1 over the land.
2	16°21'	88°20'	SSW&Var.4.6	WnW.2	NW&NNW.2			f.			
62	09°26'	97°10'	West&Var.2	NbE&NW.4	NW.4.2			f.			f. At 10, s. SW.
57	08°08'	85°21'	NbE.4	NNW&NbN.2	Wbn.2	29-64	83	—SW	f.		f. Midt., B.
58	08°05'	87°07'	NW.2	WSW.5.2	WSW.5			f.			f. From 9 to Midt., 1 in several parts.
33	05°46'	76°30'	WSW.2	NW.2	NW.2			f.			
8.	E.	SW.4	SSE&Wbs	NW.4	NW&NNW.4	29-97	85	q. Noon, f.			f. Midt., calm
12	01°39'	73°57'	61°54'	West.1	West.1			f.			During night, q., var & calms.
59	01°37'	61°54'	WSW.1	West&Var.1	Calms			f.			f.
41	03°13'	71°42'	Snd.2	Snd.2	Snd.2			f.			At 4, q. Midt., q.
43	07°32'	65°25'	Snd.2	ESE.4	ESE.4.5			f.			f. Great heat.
27	16°11'	75°07'	E-S&SE.5	N.Ly.	N.Ly.			f.			f.
42	15°42'	45°57'	NEtoNth.	ESE&SE.4	ESE&SE.2			f.			Nearly overcast. At 10, B.
40	17°30'	67°52'	ESE&SE.4	NNW.1&Calms	Calm	30-008&	82 $\frac{1}{4}$ -81 $\frac{1}{2}$	—	Bf.		Bf.
1	20°10'	57°29'	Calm	Calm	Calm	[29]962			Bf.		Bf.
11	26°38'	56°06'	N.Ly.2	N.Ly.2	N.Ly&Calm			f.			Bf.
37	23°32'	68°21'	East.2	Calms&East.1	East.2			Bf.			Bf.
36	25°24'	59°30'	East&Calm	Calm&West.2	Calm&NbW.1			Bf.			Bf.
38	26°07'	58°20'	West&WNW.2	SE.2	ESE.2			q.			q.
71	29°34'	58°00'	SE.2	SE&TESE.2	Var&SE.2.4			f.			
8	29°40'	36°58'	Sbd.5	Sth.5	ESE.5			c.			
66	29°53'	31°02'	ESE.5	ESE.5	ESE.4			Bf.			Bf.
22	30°08'	49°44'	Calm	Calm&West.2	West&SSW.2			f.			Bf.
49	33°57'	25°39'	NW.6	NW.6.7	NW.8			At Algoa Bay.			
52	36°36'	39°32'	SE&SSE.4	SSE.4	SSE&South.4.1			Bf.			
55	38°45'	26°00'	East&Var.1	Var&SE.4	SSE.4	30-20	71	f.			
65	39°28'	131°26'	NNW.7.9	NNW&WSW.6	NNW.6			Galo.			

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Time 15th 16th March	Position at noon.	Wind's Direction and Force.			Bar.	Ther.	State of sea, from.	Remarks.		
		Lat.	Long.	First Part, Midt. to 8 A.M.	Middle Part, 8 A.M. to 4 P.M.	Latter Part, 4 P.M. to Midt.	Noon.	84	86	85
19	N. R.	23° 32'	68° 23'	NW 2	NW 1	NW&Nth 1	30-59	78	f.	m.
68	20° 41'	61° 30'	SSW.2	SSW.2,1	SSW.2	f.	f.	f.	cf.	f.
6	18° 07'	87-23	SW.5	Vark&West.2,1	NW&Calm	30-05	91	f.	Sunset, calm. Midt., do.	
2	15° 09'	88-56	Vark&SW.5	Var&West.2,1	West, Var&Calm	f.	f.	f.	Sultry & hot.	
2	07-53	97-51	WN.W.4	NW.4	NW.4	f.	f.	f.	c.	
62	07-29	85-06	NW.2,1	NW&West.4,2	West&WNW.2	At 4, calm	f.	f.	f.	
57	07-06	86-50	WN&N.E.2	North&West.2	WesttoNorth.2	29-64	84	~SW	f.	
58	06-47	91-30	NW.2	NW&Nth.2	NNE&WNW.2	Bf.	f.	f.	f. At 8, B. Midt., c. l.	
33	06-47	77-00	WSW.5	SW&WSW.6	WSW.6,5	f.	f.	f.	f. At 9, eq. Midt., q.	
78	03-43	75-52	WNW.4	NW.4	NW&WNW.5,6	29-93	86	f.	f.	
12	00-11	E.		Wbn.1	Wbn.1,2	f.	f.	f.	f.	
50	01-19	64-48	West&Calm	WSW&West.2	WSW&West.2	29-96	f.	f.	f.	
41	05-14	71-42	West*2	Sd.	Sd.	f.	f.	f.	f.	
43	07-53	64-20	Snd.3&Calm	Sd.2	SSW.2	f.	f.	f.	f.	
42	15-42	45-47	NetoNorth.2	NetoSouth.2	ESEtoSE.4,5	f.	f.	f.	f.	
27	17-12	72-47	ESE&SE 5	SE&ESE 4,5	SE 2	At 6, heavy dew. B.	At 6, d.	At 6, V. Lab.	At 9, c.	
40	17-45	65-42	SE&ESE 2	SE 2	SEtoSouth.1,2	30-05&29	82½-78½	-----	At 6, B. & overcast. At 9, B.	
1	20-10	57-29	Calm.	ESE 1,2	ESE&SSE 4,5	29-96 [981]	-----	-----	At 6, Bt.	
11	20-31	56-02	Calms&NE.1	East 1	ESE 1	Bf.	Bf.	Bf.	Bf.	
37	25-10	67-52	NorthtoEast.1	East.1	SSE. 1,2	Bf.	Bf.	Bf.	Bf.	
36	24-36	58-57	East&Calm	Calm&Sth	Calms&East	Bf.	Bf.	Bf.	Bf.	
38	25-57	58-49	NbW.1	NW&NbW.1	SE 2	Qr.	-----	At Natal.—Bf.	Bf.	
71	29-00	59-30	ESE&E 4,2	SE.5	SE&SSE.2,4	Bf.	Bf.	Bf.	Bf.	
66	29-53	31-02	ESE.5	ESE.5	SEBs.5	f.	f.	f.	Bf. At 8, c.	
22	30-22	51-49	SSW&SE.4,5	SEBs.5	Ely 5	At Algoa Bay.	Gale.	At 8, c. At 10, q;	At 8, Noon, em.	
8	30-55	33-15	SE&East.4	Ely 4,5	SF.5	Hot sultry wr.	B.	B. at times & q.	f.	
49	33-47	25-39	NW.6,7	NW.7,8	SSE&East 1,2	30-13	72	-----	f.	
52	36-43	40-20	South&SSE 1	SSE.	ENE.6	WNN&West.4,5	-----	-----	f.	
55	35-13	27-07	East.4	East&NE.4	WNN.5	-----	-----	-----	f.	
65	40-30	131-35	WNW.6	WNW.5	-----	-----	-----	-----	cf.	
	N.	E.							c.	
19	23-25	58-35	Nth.2	SE.2	NW&SE.2,1	30-60	79	f.	Overcast.	
68	20-04	62-10	SSW.2	SSW&West.2,1	NNE.1	30-05	84	f.	m. Noon, em.	
6	18-53	87-21	West & WNW.1	WNW&Nth.1	WNW&N.W.4	f.	f.	f.	f.	
2	14-23	88-44	Var.1	Var&WNW.4	ENE.2	f.	f.	f.	f.	
57	07-00	84-25	WNW.2	WNW&ENE.2	North.2	29-67,	85	f.	f.	
33	06-58	88-37	NNW&NNE.2	NbE&NbN.2	NbE&NbN.2	WNW.2	-----	-----	Daylight, d g At 10, q SW.	
58	06-33	86-31	NLY&Calm	-----	-----	-----	-----	-----	-----	
62	06-30	99-22	WNW.2	-----	-----	-----	-----	-----	-----	

[16th March.]

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Position at noon.		Wind's Direction and Force.		Bar.		Ther.		State of sea.		Remarks.
Lat.	Long.	First Part, Midt. to 8 A.M.	Middle Part, 8 A.M. to 4 P.M.	Latter Part, 4 P.M. to Midt.	Bar.	Noon.	Ther.	Swell &c. from.	A. M.	P. M.
12° 01' 42' N. [16th March.]	E. 77° 34'	WNW&NNW. 6.2	NW.4	NW&Nth.4	29.94	85	SE	At 8. dq. At 9. B. Noon, do.	At 8. c.	cf. e & s. Midt., c & l at SE, B. Midt., c.
78 01' 40' S.	E. 77° 39'	WSW.5	WSW.5	WSW.5.2	f.	f.	f.	f.	f.	At 10. q.
50 00' 08' S.	E. 64° 44'	WBN 2	Wbn&NW.2	SW.2	f.	f.	f.	f.	f.	f. Midt., q.
43 07' 01' S.	E. 63° 25'	Sq.2	South&SW.2	SW.2	f.	f.	f.	f.	f.	f.
41 07' 05' S.	E. 72° 00'	West&SW.2	SW.2	NN&SW.2	f.	f.	f.	f.	f.	f.
42 15' 42' S.	E. 45° 57'	North&NNE.2	SE.5	SE.5	f.	f.	f.	f.	f.	f.
27 17' 36' S.	E. 70° 28'	SE.5	SE&SE.5	SE.5	f.	f.	f.	f.	f.	f.
40 18' 26' S.	E. 63° 37'	SE.4	SE.2	SE.2	f.	f.	f.	f.	f.	f.
48 19' 13' S.	E. 55° 50'	ESE.4	ESE&Var.4	Ely.4	f.	f.	f.	f.	f.	f.
1 20' 10' S.	E. 57° 29'	Nil.1.2	NW.1&Calm	Ely.1&Calm	30.020&	81 1/2-83 1/2	f.	f.	f.	f.
11 21' 36' S.	E. 54° 08'	SSE.5	SSE&SE.4	ESE.4	f.	f.	f.	f.	f.	f.
37 23' 31' S.	E. 66° 23'	Ely.1	Ely.1	Ely.1	f.	f.	f.	f.	f.	f.
36 23' 37' S.	E. 58° 47'	SSE.2.1	SSE&SE.2	SE&East.2	f.	f.	f.	f.	f.	f.
38 24' 48' S.	E. 58° 50'	Ely&ESE.2	ESE.2	ESE.2	f.	f.	f.	f.	f.	f.
71 28' 10' S.	E. 59° 16'	ESE.4.7	ESE.7	East.7	f.	f.	f.	f.	f.	f.
22 29' 24' S.	E. 54° 04'	SEBS.5	SE&Var.6	Var.6	f.	f.	f.	f.	f.	f.
66 29' 53' S.	E. 31° 02'	ESE.4	ESE.4	ESE&ENE.4.2	f.	f.	f.	f.	f.	f.
8 32' 20' S.	E. 31° 30'	East&ENE.6	ESE.5	ENE.4	f.	f.	f.	f.	f.	f.
49 33' 57' S.	E. 25° 39'	SE.6.7	SE.7	SEly.6	f.	f.	f.	f.	f.	f.
52 37' 45' S.	E. 41° 23'	East.2.5	East.5.4	ENE&NE.4	f.	f.	f.	f.	f.	f.
55 39' 43' S.	E. 30° 35'	NEbN.6	NE.6.4	NE&NE.4	f.	f.	f.	f.	f.	f.
65 41' 41' S.	E. 131° 36'	West&WSW.4.5	WSW&SW.4	SW&SSW.4	f.	f.	f.	f.	f.	f.
19 23' 37' S. [17th March.]	E. 58° 35'	SE.2	SE&East.2	ENE.2	f.	f.	f.	f.	f.	f.
6 19' 52' S.	E. 87° 30'	SW.1	NN&East.1	SW.4	f.	f.	f.	f.	f.	Bt.
68 19' 43' S.	E. 62° 10'	NW&Nth.2	North.2	North&NNE.2	30.60	79	f.	f.	f.	f.
2 13' 03' S.	E. 87° 57'	NW.4	NW&NNW.4.2	Var&NNW.2	30.07	84	f.	f.	f.	f.
33 07' 51' S.	E. 89° 27'	North.2	North.2	North.2	f.	f.	f.	f.	f.	f.
57 06' 03' S.	E. 84° 14'	NE.2	NE&NNE.2	NE.4	f.	f.	f.	f.	f.	f.
58 05' 38' S.	E. 85° 14'	Ely.2	North&Var.2.3	Ely.3	29.67	87	f.	f.	f.	f.
62 05' 22' S.	E. 100° 07'	West&NW.2	West&West.2	SW West&NNW.2	f.	f.	f.	f.	f.	f.
12 02' 17' S.	E. 78.85	North.2	North.2	North&NNE.2	29.94	85	f.	f.	f.	f.
50 01' 12' S.	E. 66° 27'	NWBN.4	NW.4	NW.4	f.	f.	f.	f.	f.	f.
78 00' 11' S.	E. 78.00	WSW.2	WSW&SW.2	WSW&SW.2	f.	f.	f.	f.	f.	f.
43 06' 43' S.	E. 62° 35'	SSW.2	SSW&South.2	SSW.2	f.	f.	f.	f.	f.	f.
41 07' 13' S.	E. 72° 23'	Wly.2	Wly.2	Wly.2	f.	f.	f.	f.	f.	f.
12 16' 42' S.	E. 45° 57'	NE.3	ENE.3	ENE&North.2.1	f.	f.	f.	f.	f.	f.

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Position at noon.		Wind's Direction and Force.			Bar.			Ther.		State of sea.	
Lat.	Long.	First Part. Midt. to 8 A.M.	Middle Part. 8 A.M. to 4 P.M.	Latter Part. 4 P.M. to Midt.	Noon.	Noon.	A.	M.	S.	Remarks.	
19° 33' N	8° E	ESE.4 SE.5	ESE.4 SE.5	ESE.4 SE&ESE.4 NW&ESE.1	ESE.4 ESE.5 ESE.3	ESE to East.1	30-046&29, East.2 NE.2	30-046&29, [996 30-00	(—)	cf. f. Bf. f. Clouds from East. Bf. Bf. Bf. Bf. Bf. Bf. Bf.	
48° 17' 45"	17° 48' 37"	ESE.4 SE.5	ESE.4 SE.3	ESE.4 SE&ESE.4 NW&ESE.1	ESE.4 ESE.5 ESE.3	ESE to East.1	30-046&29, East.2 NE.2	82-83	(—)	cf. f. Bf. f. Clouds from East. Bf. Bf. Bf. Bf. Bf. Bf. Bf.	
27° 40' 40"	18° 43' 40"	61-13	61-13	ESE.1.2 ESE.2	NNE&East.	NE.2	30-046&29, [996 30-00	(—)	(—)	cf. f. Bf. f. Clouds from East. Bf. Bf. Bf. Bf. Bf. Bf.	
March 1	20° 10' 36"	57-39	57-39	East&NNE.2	NNE.2	ESE.4	P.	(—)	(—)	cf. f. Bf. f. Midt., q.	
36° 11' 22"	22° 16' 53"	53-03	53-03	ESE.2	NNE.2	ESE.4	At Natl. B.	(—)	(—)	f. Bf. f. Midt., q.	
37° 22' 22"	22° 22' 64-50	East&ESE.5	ESE.4	ESE.4	NE&ESE.2.4	ESE.4	Var.4	(—)	(—)	c. Bf.	
38° 23' 12"	23° 12' 58-27	ESE.2	ESE.2	ESE.2	EBS.2	EBS.2	Var.5	(—)	(—)	f. Bf.	
71° 71° 66°	25° 29' 59-10	East&ESE.7.4	EBS.4.2	EBS.4.2	ESE&NE.5	ESE&NE.5	Var.4	(—)	(—)	f. Bf.	
29° 33' 31-92	31° 02' 29-53	ESE.2	ESE.2	ESE.2	ESE.2	ESE.2	Var.5	(—)	(—)	f. Bf.	
22° 30' 38"	30° 12' 54-12	Var.5	Var.5	Var.5	Var.5	Var.5	Var.4	(—)	(—)	f. Bf.	
8° 33' 05"	33° 05' 28-55	ENE.4	ENE.4	ENE.4	ENE.4	ENE.4	ENE.4	(—)	(—)	f. Bf.	
52° 58' 57"	58' 57" 44-32	NE&ENE.4	NE&ENE.4	NE&ENE.4	NE&ENE.4	NE&ENE.4	NE&ENE.4	(—)	(—)	f. Bf.	
55° 39' 54"	39' 54" 39-93	NNE.6.7	NNE.6.7	NNE.2	NNE.2	NNE.2	NNE.2	(—)	(—)	f. Bf.	
65° 41' 13"	41' 13" 131-07	NW.2	NW.2	NW.2,3	West&SW.2 to 4	West&SW.2 to 4	West&SW.2 to 4	(—)	(—)	f. Bf.	
19° 23' 37"	23° 37' 58-36	E.	E.	SE.4	SE.4	SE.4	SE.4	(—)	(—)	f. Bf.	
6° 6° 6°	20° 15' 89-00	East.2	ENE.2	SW.2	SW.2	SW.2	SW.2	(—)	(—)	f. Bf.	
64° 64° 68°	19° 37' 88-39	SW.4	WSW.2	SW.2	SW.2	SW.2	SW.2	(—)	(—)	f. Bf.	
17° 52' 62-45	37' 39' 88-39	NNE.4	NE.3	NE.3	NE.3	NE.3	NE.3	(—)	(—)	f. Bf.	
2° 12' 03"	12' 03' 87-19	Var.1	NW&Var.1	NW&Var.1	Var.1.2	Var.1.2	Var.1.2	(—)	(—)	f. Bf.	
33° 08' 14"	08' 14' 88-00	North&NNE.2	NNE.2	NNE.2	NNE.2	NNE.2	NNE.2	(—)	(—)	f. Bf.	
58° 05' 16"	05' 16' 85-50	Ely.2	Ely.2	Ely.2	Ely.2	Ely.2	Ely.2	(—)	(—)	f. Bf.	
57° 05' 12"	05' 12' 83-39	NNE.2	NNE.2	NNE.2	NNE&NW.4	NNE&NW.4	NNE&NW.4	(—)	(—)	f. Bf.	
62° 03' 48"	03' 48' 100-30	NW&Var.	Vark&NNW	Vark&NNW	NW&SW.4	NW&SW.4	NW&SW.4	(—)	(—)	f. Bf.	
50° 02' 24"	02' 24' 75-47	NWb.3	NWb.3	NWb.3	NW.2.1	NW.2.1	NW.2.1	(—)	(—)	f. Bf.	
12° 02' 28"	02' 28' 79-19	NNE.1	NNE.1	NNE.1	NNE&North.1	NNE&North.1	NNE&North.1	(—)	(—)	f. Bf.	
8° E.	01' 20' SW.2.5	Vark&NNW.5	Vark&NNW.4.2	Vark&NNW.4.2	West&WSW.5	West&WSW.5	West&WSW.5	(—)	(—)	f. Bf.	
78° 43° 41°	06' 45' 60-55	SSW.2	SSW.2	SSW.2	SLy.4	SLy.4	SLy.4	(—)	(—)	f. Bf.	
43° 41° 48°	07' 13' 72-23	NW.2	NW.2	NW.2	WNW.5	WNW.5	WNW.5	(—)	(—)	f. Bf.	
48° 42° 27°	14-45' 55-05	ESE.4	ESE.4	ESE.4	ESE.4	ESE.4	ESE.4	(—)	(—)	f. Bf.	
42° 18° 40°	15-42' 45-57	South.2	SE&NE.2	SE&NE.2	Neto&NNW.2	Neto&NNW.2	Neto&NNW.2	(—)	(—)	f. Bf.	
27° 19° 40°	18-06' 64-11	ESE.5	ESE.5	ESE.5	SE&ESE.5	SE&ESE.5	SE&ESE.5	(—)	(—)	f. Bf.	
40° 1° 36°	19-38' 58-27	ESE.4	ESE.4	ESE.4	SE.2.4	SE.2.4	SE.2.4	(—)	(—)	f. Bf.	
1° 36° 37°	20-10' 57-39	ESE&SE.1	ESE&SE.1	ESE&SE.1	East&SE.1	East&SE.1	East&SE.1	824-844	824-844	f. Bf.	
36° 37° 36°	20-31' 58-04	East.2	East.2	East.2	SE.5	SE.5	SE.5	(—)	(—)	f. Bf.	
66° 66° 66°	20-76' 62-50	ESE.4	ESE.4	ESE.4	ESE.5	ESE.5	ESE.5	27-7	27-7	f. Bf.	
56° 56° 56°	21-19' SE.2.3	SE.2.3	SE.2.3	SE.2.3	SE.2.3	SE.2.3	SE.2.3	—	—	At 5, e. bc.	

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No. of Vessel	Position at noon.	Wind's Direction and Force.		Bar.	Ther.	State of sea.	Swell &c. from	Remarks.	
		First Part t. Midt. to 8 A.M.	Middle Part, 8 A.M. to 4 P.M.					A.	M.
49	S.	E.	NW.6	NW.2.6	29.65	Δ WED	At Algoa Bay, f. tl.	f.	
54	33°57'	25.39	NWLY.4	NW&NNW.4. ⁷			At 10, fair.	c.	
54	36.32	22.58	NE.4	Ebn&ENE.6			c. At 8, stowed F. T. S., qc.	c.	
72	36.37	34.05	ENE.6	NE&Ebn.6	30.00		c. Midt., q. t 1 r. B. At 8, c d m.	c.	
56	37.02	28.50	ENE&NE.4.6	ENE.6	30.15	~SE1 $\frac{1}{2}$	Daylight, more mod. Noon, c.	Bf.	
56	37.33	37.48	East&ENE.6	ENE.6	70		f. During night, thick r. wr.	f.	
55	39.13	48.43	Var.2.1	Var.&NE.1					
52	39.13	48.43	SW.4	South&SSE.2					
65	41.00	126.47							
19	N.	E.	NW.5	North&NW.5. ²	29.84	81	At Muscat f.	f.	
63	23.37	58.35	S&SW.2	SW&WNW.2	30.64	83	m. Noon, f.	f.	
68	17.15	88.56	North&Var.2	North.2	30.04		f. Noon, calm.	f.	
[20th March.]	13.43	64.17	Ely&Calm	Var.&Calm	30.00		q.	of.	
3	10.14	80.20	Ely.2	N&NE.1.4	30.05	85	Bf.	f.	
2	07.55	86.11	NY.4	N.W.2.4	29.93	85	At 6, qr. Noon, steady.	f.	
12	03.36	82.08	North.2	N.W&NNW.2	Var.2		c. At 5, m. Noon, g.	f.	
50	03.23	64.47	NW	N.W.4	29.64	83	q. Noon, B.	B.	
58	02.37	85.56	Wbn&N.2	NW&WbN.4.6	29.64				
62	01.46	82.20	NE&NW.2	NE&N.2.1	ENE.1				
57	S.	E.	West.4.6	West.6					
78	05.36	80.00	SW.6	SSW.6					
41	07.13	72.23	SE.4	SE.4					
43	08.22	57.45	SE.2	SSE.2					
48	09.47	59.47	SSE.2	Var&SE.1					
42	15.42	45.57	NE&ENE	NNE&ENE					
27	20.00	58.20	ESE.2	ESE.2					
1	20.10	57.29	East&ESE.1	ESE.1.4	30.063.29	80 $\frac{1}{2}$.83	ef. Numerous cirri.	ef.	
11	26.36	48.40	SSE.6	SSE&East.6	30.10.1976		f.	f.	
26	28.38	50.08	ESE.6	Ebb.5	67.7	~SW3 ^b	b c l.	bc.	
66	29.53	31.02	WSW&Var.6	Var.2	25.9		q. l.	f.	
22	29.57	56.18	Var.4	Var&SEbS.5			f.	eq.	
8	33.41	25.07	WNW.4	WNW.6				At 4, + g gale. V. Lat.	
49	33.57	25.39	NW.2.6	NW.6.2				f.	
54	36.03	25.36	NNW.7	N&NNW.7				p.	
56	37.42	29.00	Var&N.4.6	Nrth.6				c. At 4, B. Midt., qr.	
55	37.54	39.58	ENE.6	ENE.6				B. At 8, c.	
72	38.37	36.06	ENE&NE.6	NE.6				c. Midt., q.	
53	38.47	21.12	West&WSW.8	SW.8				g. q. Midt., p & A.	
64	39.00	130.00	SSE&ESE.5	ESE.2	29.68 Sym			g.	
52	39.35	49.45	NE&SE.2	ENE&NE.1.4.5				Bf. Midt., c.	

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Time A.M.	Position at noon.	Wind's Direction and Force.			Bar.	Ther.	State of sea, swell &c, from.	P. M.	Remarks,
		First Part, Midt. to 8 A.M.	Middle Part, 8 A.M. to 4 P.M.	Latter Part, 4 P.M. to Midt.					
[21st]	N. 8. 65°	E. 124°45'	ENE.4	ENE&NE.4	NE.4				Thick r. wr.
19	23°37'	58°15'	N&NW.5.2	NW.2	NW&S.2	29.85	85		f.
[22nd]	16°50'	38°30'	SEA&SW.2	SW.1	NW.2	30.58	84		BC.
68	12°02'	E4.30	N.W.2	N&NE.3	North.2				f.
2	06.34	85.31	NE.4	NE.4	NE.4	29.99			c.
March.	12	04.42	82.57	NW.4.2	NW.2	29.92	85		At Daylight, q. Noon, f.
50	03.55	65.02	Vari.	NW.2	NW.2				dg. Daylight, do.
62	01.17	103.50	NW&Var.2	NW.2	NW&E&N.2				Bf.
58	01.05	85°26'	WN&Wbs.6	Wbs&WNW.6	WNW.6	29.63	85		At Singapore, f. Noon.
		E.							f.
57	00.02	81°54'	West.6	West.6					Short head sea.
78	06.17	80.45	West&NW.2.4	WLY.2	Vnts. VSW.2				f.
41	07.3	72°23'	SE.4	SE.2.4	SE.3.2				Midt., qr.
43	08.12	57.55	SSE.2	Sly.1	Sly.1				c.
48	08.46	62.40	SE&East.1	Var&SE.1	SE&East.1				f.
5	15.06	51.00	SE&V.W&SW.2.1	North&NNW.2	North&NE.1	29.85	84		At 2, wind shifted to SE. At 5, qr. f.
42	15.42	45.57	ENE.1	ENE&SE.1.2	SE&SE.1.4	30.007&29.	82-83		var. At 8, calm & i.
1	20.10	57.29	East.1	East.2.4	East.4	29.90[923			f. At 8. B. At 10. c.
11	20.57	46.18	East.2	SE&Var.4	Var&East.4				f. At 10, t. 1 at SW.
22	27.53	57.07	SE&S.6	NE.5	NE&Wt.N.4	64.00	24.8		f.
26	29.51	47.05	NE.5	WS&V. NE 6.2	NE.2.6				Fig. 4 to Midt., qr.
66	29.53	31.02	WSW.4.6	WNW.9.6	WNW&NW.4				f.
8	33.90	27.30	WNW.8.9	NW.6	NW.6	29.65			& V. Lab.
49	33.57	25.39	NW.2	W&WSW.5.6	WSW.6				c. At 10, pq.
54	35.21	28.39	WNW&West.7	WNW&S.2	South.2	29.80			c. Midt., cpr.
56	37.34	31.26	N.W.4	North.4	North.4				f.
55	38.15	43.22	North.5.7	SW.7	SW.7.6				gm. Midt., pq.
53	38.24	23.18	SW.6.7	NE.6.2	NE.2				c. Midt., d.
72	38.33	38.00	NE.6	ENE.2	ENE.2				f. At 8, g.
61	39.00	129.00	ES&E.NE.2	NE.4	NE.4.5				Bf. At 10, dfr.
65	39.05	121.25	NE.4	North&N.6	NNW&NNE.4.2				c. Midt., emr.
52	39.38	32.49							
19	N.	E.							
[23rd]	23.37	58°35'	South.2	SE.2	SE&NW.4				f.
63	16.28	88.00	SE.2	SbW&NF.2	NESSE.2.1	29.80	88		B. At 4, m. Noon, Bf.
68	11.35	64.48	North.3	North.4	NE.3	30.59	84		f.
2	05.09	84.37	NW.4	NW&NNW.4	NNW&Var.1	29.96	86		c. Sunset, q. Midt., cr.

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Date A.D. M.	Position at noon.		Wind's Direction and Force.		Bar.	Ther.	State of sea.	Remarks.		
	Lat.	Long.	First Part, Mid. to 8 A.M.	Middle Part, 8 A.M. to 4 P.M.						
23rd March.]	N. 50° 05' 05".	E. 83° 19'	NW&NNW.2 NW.1	NW&NNW.4 NW.1,2	NE&NNE.6,5 NW&WNW.1 Calm	29-87	84	Bf. f.	c. f. N on, calm & B. m.	
	50° 04' 31".	63° 13'	NE&N.E.2	W.N.W.6	WNW&WbS.4 West 6	29-64	84	At 4, q.r. Noon, e.	c.	
	50° 01' 17".	103° 50'	E.	W.b.6	SW.4 SW.2	At 8, q.	At 8, q.r.	q.r.	c.	
	52° 08' 02".	S.	W.b.6	W.b.6	SW.5	At 8, q.r.	At 8, q.r.	e.	f.	
	58° 00' 49".	83° 19'	W.b.6	W.b.6	SW.5	f.	f.	At 5, q. From 9 to midt., r.	f.	
	57° 01' 47".	82° 02'	W.b.6	W.b.6	SW.5	f.	f.	f.	f.	
	57° 07' 07".	80° 02'	SW.4	SW.4	SW.5	f.	f.	f.	f.	
	41° 07' 43".	72° 23'	ENE.1	ENE.1	WSW&SSE.1	f.	f.	f.	f.	
	48° 07' 43".	60° 44'	SW.4	SW.4	SSE.1	f.	f.	f.	f.	
	43° 08' 13".	57° 21'	SW.4	SW.4	North & WSW	f.	f.	f.	f.	
	42° 15' 42".	45° 57'	NE.1	NE.1	NE&North 2	29-973-927	80&84	Clouds coming from East, At 9, z.	f.	
	1° 20' 10"	37° 29'	East.4	East.4	East&SE.1	29-90	c.	At 10, B.	p.	
	11° 26' 50"	45° 30'	East.3	East.3	East&Calm	c.	c.	f.	f.	
	22° 28' 45"	47° 45'	East.4	East.4	East&Var.4	c.	c.	Br.	At 8 & 9, t l r.	
	06° 29' 53"	31° 02'	NE.6	NE.6	WSW&West.4	c.	c.	f.	f.	
	26° 30' 27"	44° 49'	North&NW.5,3	North&NW.5,3	Var.1,5	61.00	26.0	WSW	p. At 8, calm. Midt., B.	
	49° 33' 57"	25° 29'	N.W.2	N.W.2	North&Calm	29.70	c.	b c f s from East.	At 4, 2 R. T. S. At 3, set jib, &c.	
	8° 34' 09"	25.0°	SW.4	SW.4	WSW.4,1	c.	c.	At 8, q.r. Noon, g.	Fair. Midt., q.	
	54° 36' 32"	32° 02'	WSW&SSW.6	SSW.6,7	SSW.7	c.	c.	At 8, q.r. Noon, g.	g p.	
	56° 37' 54"	33° 16'	South&SW.2	South.4	South.4,6	c.	c.	At 2, t l q.r.	At 2, q. 2 R. T. S. Midt., q.	
	53° 38' 11"	27° 54'	WSW&SW.6	Var. ENE 2	ESE&E.2	c.	c.	er.	At 6, q.r. & q.r. Midt., more n. o.d.	
	72° 38' 16"	39° 00'	NE.2	NE.2	WSW.2,4	c.	c.	q. At 8, c.	c. Midt., emr.	
	65° 38' 6"	118° 47'	NE.4	NE.4	ESE 9,6	70	70	$\frac{1}{4}$	1 to WNW.	
	53° 38' 20"	46° 45'	NE&ENE.6	NE&ENE.5	NN&NNW.4	c.	c.	c.	c.	
	52° 38' 43"	57° 20'	NNE.2,5	NNE.2,5	NN&NNNE.4	c.	c.	c.	c.	
	64° 38' 57"	127° 15'	ENE.2	ENE.2	ENE&NE.2,5	30.00	63	c.	c.	
	N.	E.								
	19° 23' 37"	58° 35'	NW&South.4	South&NW.2	NW&South.2,5	c.	c.	f.	f.	
	63° 16' 05"	88° 90'	Calm&SE.2	SE.2	SE&ESE.2,1	29-83	88	At 6, m. Noon, Bf.	f.	
	79° 10' 21"	81° 00'	NNE.2,1	NE.4	NE.4	c.	c.	f. q. at NW.	f.	
	68° 10' 06"	65° 37'	NE.4	North.4	North.4	85	85	At 7, d _g . Midt., c.	At 7, d _g . Midt., c.	
[24th March.]	12° 05' 17"	82° 25'	NbE.5	NE&NW.2	NE&NW.2	29-88	82	f. Noon, calm & B.	Midt., c.	
	50° 04' 48"	64° 46'	WNW&West.1,2	West.1	WNW.2,4	c.	c.	At 4, q. & s. Daylight, f.	q. At 10, q. Midt., c.	
	2° 03' 22"	84° 00'	Vnw&NNW.2	NNW.2	NNW.4	84	84	At Singapore, m.	d m.	
	62° 01' 17"	103° 50'	NEx.1,2	NEx.1,2	NEx.1,2	c.	c.	c.	c.	
	58° 03' 9"	85° 43'	WSW&WNW.4	WNW.4,5	WNW&WbN.6	29-60	82	At 8, SW	q.	
	57° 02' 44"	28° 02'	West.6	West.6	West.6,5	c.	c.	Head sea, Noon, B.	Bf.	
	48° 06' 45"	16° 49'	SSEx&ESE.2	Var&ENE.2	NNW&Var.2	r.	r.	r. At 9, q. Wind SE to SW & calms.	r.	

Date A.M. Lat. N.	Position at noon.	Wind's Direction and Force.			Bar.	Ther.	State of sea.	Remarks.		
		First Part. Midt. to 8 A.M.	Middle Part. 8 A.M. to 4 P.M.	Latter Part. 4 P.M. to Midt.			Noon.	Noon.	A.	M.
24th March.	S. 8.	E. 72°23'	SSW 2 SW&Calm	SW.2 SSE.2	SW&WN.2.5 SSE.2	Bf. At 5, calms.	f.	c.		
78	07°29'	80°19'	Sly.1	SW&North	North&NNE	f.	At 1, t. at Snd. c.	At 9, calm. Clouds		
43	08°01'	57°46'	WSW	SE&NW.1	Calm&End	p. q. V. Lab. A.	[from End.]			
42	15°42'	45°37'	Sly.1	EBN&WNW2.6	WNW.6.9	f.	f.			
1	20°10'	57.29	East.2	Var.4	Var.4	f.	f.			
11	26°58'	44°32'	Var.4	SW.4	SW.4	f.	c. r. l. Confused. s. Wind constantly [shifting.]			
22	29°52'	59°01'	West&WSW.4	ESE&North.2.5	North.5.3	Bf.	f.			
66	29°58'	32°00'	NE.5	Var.4	Var&NW	29.95	—N.R.D.			
26	30°54'	43°04'	Calm&SE	NE.4.5	NE.5.4	29.95	20.5			
31	33°57'	25°39'	Calm&NE.4	SS&East.2	East.5	71	—WI6' o p.t.			
8	34°19'	25°30'	S&East.5	SSY.2.5	SSY.2.5	Bf.	f.			
70	34°50'	19°06'	SSW.4	SSE&South.4.2	SEB.4	29.90	20.5			
54	35°40'	34°35'	S&SSE.6.4	S&SSE.4	Var	29.85	20.5			
56	37°03'	35°33'	Var.6	ENE.4	SW.4	29.79	72			
56	37°08'	46°22'	South.6.4	South&SW.4	Calm&SbW.3					
53	37°25'	30°34'	SE.2	SE&Calm	East&NNE.4.5					
72	37°11'	41°16'	NE	NE&East.2	West&Var.6					
52	37°48'	57°29'	WSW.4	WSW.7.6.	WBn.4	29.80	20.5			
65	38°07'	118°34'	NE.5	NE.5.6						
64	38°19'	122°44'								
N.	E.									
19	23°37'	58°35'	South.5	South&SE.5	NW.2	29.77	86			
[25th March.]	63	15°18'	88°02'	ESE.2	SE&ESE.2.5	30.58	85			
68	09°08'	66°13'	V&NNW.4	NNW&Var.4	Var&NNW.4					
79	09°00'	81°20'	ENE&NE.4	NE&Nth.2	North&NW2.4					
12	05°48'	82°17'	NW.2.4	NW.4	NW&North.6.9	29.81	S84			
50	04°15'	64°16'	WNW&West.4	WNW&West.4	West.4					
2	01°27'	84°09'	NNW.7.4	WSW&W.4.5	Var&West.6	29.95	86			
62	01°17'	103°50'	Etx.1.2	East&NE.2	Etx.2					
	S.	E.								
58	04°17'	86°30'	WBn.6	WSW&SW.6	SW.6	29.55	83			
57	05°11'	81.54	West.5	West&W.6	SW.6	Bf.	f.			
48	06°22'	62°14'	Var&SE.1	Calm&West.2	WSW&SE.2	At 7, q. r.	At 4, q. At 8, q	Midt., B.		
43	07°34'	58°00'	SSE.2	Sly.1	SLY.2.1	f.	f. At 5, q. At 9, q. r.			
78	08°20'	79°41'	WBn&SSW.5.2	SE.6	SE.6	f.	f.			
42	15°42'	45°57'	WSW.3	SW&North.3	NNE.4					
1	20°10'	57°29'	East&ENE.1	EBN.1	Ecv.1	29.997-927	82-84	b c f.		
11	28°28'	43°17'	WNW.9.6	WWN.6	WWN&WW.6.2	29.85	82-84	b c f.		
22	30°24'	53°51'	Var.4	Var&NE.5	NE.6			p.		

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Position at noon.		Wind's Direction and Force.			Bar.		Ther.		State of sea.		Remarks.	
Lat.	Long.	First Part. Midt. to 8 A.M.	Middle Part. 8 A.M. to 4 P.M.	Latter Part. 4 P.M. to Midt.	Noon.	Noon.	Swell &c. from.	A.	M.	P.	M.	
8.	E.	WSW.4	SW.5	N.W.4	56.8	23.0	SWb [W16]	bc.				
26	31°13'	41°46'	25.39	N.W.4	29.95	71	f.					
51	33°57'	23.10	South.2	N&West.4	30.01	75	f.					
70	34°17'	36.54	Six.5.4	South&SSW.4	29.85		c.					
54	35°55'	37.51	SEbS.6	SEbS&SbW.6	29.64	72	At 6, r. Noon, do.					
56	36.18	46.06	ESERN.2	Var.2	29.64		At 10, q. r.					
55	36.30	41.30	SWb&SW.4	SSW&SbE.2	29.70	Sym	Bf.					
72	37.12	33.00	SW&West.4	N.W.4	30.05		c. At 3, q.					
53	37.20	58.55	NE&North.4.5	NE.6.7	30.05		Laying to. r.					
52	37.46	14.19	WSW.4	WSW&SW.6	30.00		q.					
45	37.59	119.16	SS.W.7.	SW.9.5	30.00		At 8, calm.					
65	38.42	17.06	WNW.9	WNW&West.6	64							
59	39.30	121.30	Wb&W4.1x.4	SW&SbE.2								
64	39.32											
N.	E.	58.35	NW.2	N.W.2	29.75	85	A					
19	23.37	ESE.5	ESE.5	ESE.6			f. At 8, c.					
63	14°36'	67.24	SE.2	SLy.2	30.61	86	Near Socotra, f.					
23	12.92	53.24	NW.4	NW&West.5			f. At 8, B.					
68	08.01	66.13	NNW.4	SSW&South.4	29.72	84	f. At 5, u.					
79	07.32	83.00	NNW&SW.3	WSW&WbN.6			Strong gale.					
12	06.21	63.05	NW.9	WbN&West.6			f. At 5, u.					
50	02.27	63.19	West.4	West.4			m. Noon, d.					
62	01.17	103.50	ELy.2	NE.2								
2	00.25	85.06	West.6.2	West.2	29.94	86						
48	05.17	63.22	Var&ENE.2	WNW&NNW	29.55							
58	05.52	86.39	SW.6	SW.6								
57	06.20	82.50	SW.6	SW.6								
41	07.13	72.23	Var.	SSE.5								
43	07.22	58.35	SLy.1	South&SSW.2								
78	09.36	77.43	SEbS&SbE.8	ShE.6								
42	15.42	45.57	SW.	WSW&North								
1	20.10	57.23	SSEtoEast.1	NNW&NTH.1	29.996-29.	81 ¹ -84 ¹	A End.					
11	28.22	42.58	Calm.	ESB.2	29.86[952		f. At 8, c.					
26	29.46	40.09	SW.4	Calm.	61.08		bc.					
22	31.49	61.52	NEbE.6	NE.6.5	24.7		f. At 8, Mod.					
70	34.32	27.49	WNW.5	West.4			f. At 8, c.					
34	35.22	32.40	WNW.5	WNW&WSW.4	30.02	72	f. At 8, veering to SW.					
55	35.56	47.01	NW.2	WNW&WSW.4	29.80	75	f. At 8, p.					
36	36.11	41.00	SSW&SW.6	West.4	29.87		c.					

[26th March.]

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[27th & 28th March, 1823.]

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Wind's Direction and Force.						Bar.	Ther.	Remarks.		
Position at noon.		First Part. Midd. to 8 A.M.		Middle Part. 8 A.M. to 4 P.M.	Latter Part. 4 P.M. to Midt.	Noon.	Noon.	A.	M.	N.
Lat.	Long.							Swell & c. from sea.		
70° 45' N	8. E.	22.30	SSW.4	SSW.4	SSW.4	29.80	60	c.	f.	c. q.
67° 46' 27th March.]	37.50 38.09	19.08 22.29	SW.4 SSW.2 SSW.2	NWbW.5 Var.2	North&NbW.6 A	30.07		p. q.	B. At 10, wind veered to N.	B. At 10, wind shifted to SE.
52° 52° 64°	38.20 38.37	60.50 120.00	NE.6 SSE.6 SW.6	SE&NW.6 NW&WSW.6,9	NW&WSW.6,9	30.00	64	q.	Thick hazy wt. & q. r.	At 4, c R. T. S. r.
59°	38.57	24.42		SW&West 6,4	West&NW.4			f.	f.	f.
19°	N. E.	58.35	SE.2 SW.3	East&NW.2 WSW&South.3	NW.2 SW&WSW.2	29.78	83	At Muscat. f.	f.	f.
61°	19.25	63.10	ESE.6 SSE.4	SE.4 SSE.4	SE.4 SSE.2,4	29.89	86	Bf.	Bf. At 4, c. Midt. 9.	f.
63°	12.01	85.50	SSE.4	SSE.4	South.1	30.56	86	c.	f.	f.
12°	08.37	81.28	SSE.1	SE&South.1	NW.4			f.	f. Midt., Bf.	f.
79°	06° 19'	84° 21'	NW&Var.2	NW&Var.2	Var&WBn.4	30.56	86	Bf.	f.	f.
68°	05.11	66.51	WW&Var.4	WW&Var.4	West.4			f.	f.	f.
50°	03.11	62.06	NE.2	NE.2	NE&North.2			Bf.	Bf.	Bf.
62°	01.17	103.50								
48°	03.27	67.24	Var&SE.2	ENE.1		29.97	84	qr. Calms. Noon, Var.		
2°	04.42	85.11	W.L.Y.4	WNW.4,5				c.		
43°	07.52	59.08	SW.1	SW.1				c.		
57°	08.34	83.35	WSW.5	WSW.5				f. Heavy head sea.		
38°	08.52	85.46	WSW.5	West&NW.5				q. on q. Heavy mass of c to SW. Midt.		
41°	09.51	70.01	SE.5	SE.5				[Bank of c from SE to SW with faint L. c g.u.		
78°	11.40	72.58	SBE.6	SE&EBS.6				c. At 10, nearly B.		
42°	15.42	45.57	NE&SW	SW				c. At 6 $\frac{1}{2}$, r. Clouds from E.		
1°	20.10	57.29	Calm&East.1	Calm&East.1				At 8, p.		
11°	29.16	40.18	NNW.4	NNW.4				f.		
26°	30.37	36.01	South&West.8	SWbs.7				f.		
22°	31.00	62.57	NE.4	NE&NNW.4,2				c.		
70°	32.07	36.55	West.2	West.2				At 6 $\frac{1}{2}$, r. Clouds from E.		
60°	33.53	18.24	SE.6,9	SE.6,9				At 8, p.		
8°	33.57	25.39	NE&NW.4,6	NE&NW.4,6				f.		
45°	84.17	40.04	NE.4	NE.6,8				f.		
69°	34.35	17.33	SW&WNW.4	SW&WNW.4				c.		
54°	36.06	46.08	NE.6	NE.6				At 8, q. Midt., A.		
53°	36.14	39.26	NNW&Var.4	Var.4,2				At 5, wind shifted to SE.		
72°	36.26	48.00	NE.6	NE.6				cp. Midt., heavy s from NW		
47°	36.46	52.50	NE&WSW.2,7	NE&WSW.2,7				At 2, q. r. Midt., s. from South.		
65°	37.04	11.53	WSW.7	WSW.7				q. r.		
56°	37.11	46.04	NW.4	NW.4				Tremendous s. Hove to.		
								c g. r.		

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Position at noon.	Lat.	Long.	Wind's Direction and Force.			Bar.	Thor.	State of sea.	Remarks.
			First Park. Midd. to 8 A.M.	Middle Part. 8 A.M. to 4 P.M.	Latter Part. 4 P.M. to Midd.				
S. [28th March.]	37°22'	E. 23°57'	NES&Var.5	North&NNW.7 NW.4 SW.9 N.W.6 NE.6 NW&West.9 NNW.9	NNW&WNW. NW.4 SW.9 N.W.6 West&WNW.9 NNW&WNW.9	65	8	c. Thick wr. r. q. At 3, qr. At 6, gale. c. qr. Puffy. Noon, q.	Violent q. Thick wr.-mr. c. & X. m. At 5, veered to NW. r & h. Hove to under o R.M.T.S. At 8, q & A. Midd., q. r. h. [furious q & much l.
S. [29th March.]	37°30'	63°23'	NW&NNW4.5	SW.4 SW.9 N.W.5 NW.6	SW.9 N.W.6 West&WNW.9 NNW&WNW.9	29.75	64		
S. [29th March.]	37°58'	19°42'	NW.4.6	NE.6	NE.6	29.80			
S. [29th March.]	38°09'	26°12'	NNE.5	NW&West.9	NW&West.9				
S. [29th March.]	38°00'	118°00'	WSW&West.9	NW.6.9					
S. [29th March.]	39°20'	28°14'	NW.6.9						
S. [29th March.]	59°	-	-	-	-				
S. [29th March.]	58.35	E.	NW.2	NW&East.2	ELX.2	f.	Bf.		
S. [29th March.]	63.38	63.38	WSW&NE.2	NW&West.1,2	West.1,2	29.75	84		
S. [29th March.]	84.42	SEB.4	SEB.4	SEB.2	SEB.2	29.87	87		
S. [29th March.]	80.55	SSE.2,4	SSE.2	SE.2					
S. [29th March.]	84.23	SSW&Calm.	SW&South.1	SSW.1					
S. [29th March.]	67.03	NW	NW	NW&Var.1					
S. [29th March.]	61.28	W6S	NW&WBn.2	WBn&Var.2					
S. [29th March.]	03.07	E.	ENE&West.2	West.2					
S. [29th March.]	69.09	ENE	WNW.5,6	WNW.5	WNW.5	29.93	87		
S. [29th March.]	85.25	SW.1	SX.1	SX.1					
S. [29th March.]	58.40	SSW&South.2	South.2	South.2					
S. [29th March.]	83.16	NW&West.1	West&SW.2	SWtoSE.2					
S. [29th March.]	85.30	SE.5	SE.5	East&ESE.5					
S. [29th March.]	69.10	Ebs.6	Ebs.6	Ebs&East.6					
S. [29th March.]	70.39	SE.1	East&North.1	SE&East.1					
S. [29th March.]	57.29	WSS.5	WSS&SW.6	SW&SSW.6					
S. [29th March.]	38.14	WSS.5	WSS.5	SW&South.6,5					
S. [29th March.]	34.51	WSS.2,5	Var.2	Var.2					
S. [29th March.]	64.01	NNW.2	West.4	SW.4					
S. [29th March.]	40.53	West.3	SE.4	SE&SW.2					
S. [29th March.]	18.24	SE.4	NbW&North.9	North&NW.7					
S. [29th March.]	52.44	NN.5,9	ESE&NE.4	ESE&NE.4					
S. [29th March.]	25.39	SSE.4	SE.4	NW&WSW.6					
S. [29th March.]	51.00	NE&WBn.9	North&NNW.6	ESE&East.6					
S. [29th March.]	18.25	SSE.5	SE&ESE.6	SE&ESE.6					
S. [29th March.]	42.12	NW.5	North&NNW.5,8	NW.8					
S. [29th March.]	49.28	NNE&North.6	NNW&WNW4.5	NNW&WNW5,6					
S. [29th March.]	67.07	NNW&North.4	North.4	NNW4,8					
S. [29th March.]	26.06	SW&SSW.7,6	ENE&ENE.6	ENE&ENE.4,2					
S. [29th March.]	28.30	WNW&West.8,	West.6,5	West&WSW.5					
S. [29th March.]	48.12	Var.5,6	West.6,5	WSW.6					
S. [29th March.]	57.07	Var.5,6	West&WSW.5	WW.9					
S. [29th March.]	116.05	WLY.3	WLY.3	WLY.3					
S. [29th March.]	37.23	-	-	-					

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Position at noon.	Lat.	Long.	Wind's Direction and Force.		Bar.	Ther.	State of sea.	Remarks.	
			First Part. Mid. to 8 A.M.	Middle Part. 8 A.M. to 4 P.M.					
10° N	S.	E.	30°12'	WNW.6	SW.4.	29.85	Δ	f.	q.r.
38°09'	38°20'	20°50'	SW.6	SW&Calm	Calm&ENE.6	30.10	X	f.	Ends. with strong + g breezes.
45°	39°03'	32°55'	WNW.9	WNW.9	WNW.8.6	28.55-8.0	Δ	f.	c. At 10, steady.
46°	39°13'	118°00'	WNW.9	West & WNW.7.6	WNW.6	6.4	X	f.	q. r.
N.	N.	E.	58.35	Ely.2	SE&East.2	29.78	86	— SRD	q.r. At 8, more mod.
19°	23°37'	63°48'	West & WNW.2	SE&SSE.2	West.2	29.78	86	Bf.	c. At 8, more mod.
61°	17°32'	84.00	SE.5	SE&SSE.2	SE&SSE.2	29.78	86	At 5½, sighted land.—e f.	At 9, set R. M. S.
63°	10°15'	81.20	SSE.4	WSW.2	WSW.1	29.78	86	Bf.	At 6, more mod.
12°	08°40'	84.50	SW.1	WN&WNW.2	WN&WNW.2	29.78	86	Bf.	At 8, less wind.
79°	05°36'	60°58'	Var&WbN.2	NW.4	NW	30.55	86	f.	R. & hail. Hove to.
50°	02°35'	67.38	Var&NW.2	NE.2	NE&East.2	30.55	86	f.	f.
68°	01°33'	103.50	Calm					f. Noon, d.	f.
62°	S.	E.	72°31'	West&WNW.2	WNW.2	29.96	86	— SSE	Hard gusts. At 7, q l t. Noon, const. r.
48°	01°43'	85.25	WNW.5	WNW&SbW.2	Var&West.2	29.96	86	— SW	d g o. At 4, finer. At 8, e. Midt. f.
2°	08°00'	58.45	S.1x.1	SSW.1	SSW.1	29.62	80	X	f.
43°	08°20'	85.00	SE.2	East&SE.1	East&SE.1	29.62	80	At 4, q.r. Noon, thick r & X.	c. q. During night, r.
58°	09°00'	80.38	South.2	South.2.6	NW&SE.4.2	29.62	80	gr.	At 4, wind flew to NW with r. At 8 [var]
57°	10°13'	67.13	ESE	ESE&Var.4	30.00	80	f.	f. Midt., c.	
41°	13°28'	67.13	ESE	Eb.2.5	Eb.2.5	29.988-9.88	81.1-82.1	At 3½, g at SE. At 10, B.	c. At 3½, g at SE. At 10, B.
78°	15°10'	67.54	East.6	Calm&SE.1	30.00	80	— V. Lab.	Heavy sea.	
1°	20°10'	57.29	Ely.1	NE.1.5	NE.1.5	30.00	80	f.	Bf.
11°	28°04'	33.41	NE&South	NW&North.2.5	NW&North.2.5	30.09	72°	At 9, I.R.F.T.S.	At 9, I.R.F.T.S.
22°	29°27'	65.12	Var.2	Var&NNW.2	Var&NNW.2	30.09	72°	b c.	b c.
70°	29°51'	45.02	WSW	Strn&West	SSW&South	67.3	23.6	— S.1'	At 8, + g.
26°	30°26'	32.57	ESE.1	ENE&NNE.1.7	ENE&NNE.1.7	29.80	77	Steady.	Strong gale.
55°	32°20'	54.13	West.6	WSW&Sth.6	SSE.6				
60°	33°53'	18.24	SW.4	SW&NW.9	NW.9				
8°	33°57'	25.39	NE&East.6	WW.6	WW.6				
72°	34°38'	55.49	WSW.6	WW&SSW.6	WW&SSW.6				
53°	35°12'	46.53	WNW&West.6	Wbs&WBS.4	Wbs&WBS.4	29.98 Sym			
52°	35°16'	65.10	NNW.8.4	NNW.9	NNW.9				
66°	35°20'	51.21	WSW.5	WSW&SE.6	SE.6	30.00			
54°	35°35'	53.47	West&WSW.6	SW&South.7	SW&South.7				
69°	36°08'	19.53	ENE&NE.6	NE&NNE.6	NE.6				
67°	36°47'	30.92	SW.5	NNW&Var.9.6	NNW&Var.9.6				
47°	37°00'	28.05	NE&NN.7	NE&NE.9	NBE.9				
65°	37°52'	116.17	NW.9.6	NW&NNW.8	NW.8.7				
45°	38°09'	32.50	Var&NE.4	NBE.4	30.05				

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