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The Marine Observer

A quarterly journal of Maritime Meteorology

Volume XLI No. 231

January 1971

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THE MARINE OBSERVER

A Quarterly Journal of Maritime Meteorology
prepared by the Marine Division of the
Meteorological Office

Vol. XLI

1971

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A QUARTERLY JOURNAL OF MARITIME METEOROLOGY PREPARED BY THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE

VOL. XLI | No. 231 | JANUARY 1971

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Editorial

Keep away from the lying monster! She has neither faith nor mercy. Worship her as you will—honour her; she never moves from her own aim. Don't look at her deceiving smile promising her countless wealth. Sooner or later she will dig a grave for you or cast you on the world a useless ruin with nothing to own but your skin and bones. Sea or woman—it's all the same.

That is all the writer can remember of the advice, given by a seaman to his son, read in a story many years ago when he himself was about to go to sea. Somehow these inconsequential and unrelated pieces of prose have a habit of remaining in the mind whilst more important things get forgotten. But it is a harmless and often refreshing exercise to recall such passages and to remark how often in our literature the sea has been compared to a woman. Antrea Karkavitsas, the author of the above passage, lumped them both together as creatures to be avoided at all costs. Of a vastly different opinion, though no doubt thinking along the same lines, was Max Pemberton's pirate, Captain Black, who, from the conning-tower of his pirate submarine, said to the young captive standing beside him, "There's not a man alive who knows the truth about yonder ocean. She lives, I tell you, as surely as you and I. She's a heart and a mind to play with men. The shore's her enemy and there she fights her battles. Study her a thousand years and she's not a day older. Say that you have mastered her and she'll beat the life out of you, because she owns no master. Aye, the sea's the glory of the world and there's none like her. If you kneel before the Unseen Powers, lift your hands first to the sea. I tell you, land can show no such picture to the eyes of mankind. She is mightier than the mountains and deeper than the valleys. All the jewels dug from the bowels of earth cannot match the gems she catches from the sun. There is no emerald as green as the heart of yon wave; no diamond to match the spindrift she shakes from her crown when the winds call to her and she answers. Aye, love the sea, my lad, and make her your divinity."

But the palm for this comparison must surely go to the Master, Joseph Conrad, for his sea "whose servants were devoted slaves and went from youth to age or to a sudden grave without reading the open book of life because they could look at Eternity reflected on the element that gave the life and dealt the death. Like a beautiful and unscrupulous woman, the sea of the past was glorious in its smiles, irresistible in its anger, capricious, enticing, illogical, irresponsible, a thing to love, a thing to fear. It cast a spell, it gave joy, it lulled gently into boundless faith, then with quick and causeless anger it killed. But its cruelty was redeemed by the charm of its inscrutable mystery, by the immensity of its promise, by the supreme witchery of its possible favour. Strong men with childlike hearts were content to live by its grace and to die by its will. . . . The sea of the past was an incomparably beautiful mistress with inscrutable face and cruel and promising eyes. The sea of today is a used-up drudge, wrinkled and defaced by the churned-up wakes of brutal propellers, robbed of the enslaving charm of its vastness, stripped of its beauty, of its mystery and of its promise."

One can only guess at the reasoning behind the comparison of the sea with a woman just as one can do little but guess why a ship is always given a feminine gender. Captain Black confessed that he did not know; Karkavitsas's character could only advise his son to wash his hands of the whole business and only Conrad listed characteristics which might be attributed to both.

That these characteristics, capriciousness, illogicality and irresponsibility could be applied also to the behaviour of tropical revolving storms may have led the United States Weather Bureau to name all North Atlantic and North Pacific hurricanes, cyclones and typhoons with girls' names. The practice of naming hurricanes started in 1952 but merely according to the phonetic alphabet, Able, Baker, Charlie, etc. But, because of changes in the phonetic alphabet which had caused some confusion, girls' names in alphabetical order were used in 1953, the first storm of the season being designated with a name starting with the letter A, the second with B and so on. Provision was made for the use of all 26 letters of the alphabet though it was fortunately never necessary to use such cumbersome names as Udele, Xcel, Yasmine or Zasu. In 1960 a new system was brought into force whereby a new list would be started each year for hurricanes in the eastern North Pacific, off the Mexican west coast, and in the North Atlantic (including the Caribbean Sea and the Gulf of Mexico). Over the western North Pacific, from the International Date Line to the mainland of Asia, there are two names for every letter of the alphabet and the alphabetical list is continued from year to year, e.g. if the last typhoon of a season were Hester, the first one of the next season might be Ivy. If a major hurricane seriously affects the United States the name assigned to it is 'retired' for ten years. This makes identification in historical references, legal actions, etc. a lot easier and avoids public confusion which might result from associating a disastrous hurricane which had occurred in the recent past with another of the same name which may be threatening a coastal area in the present.

But, as Shakespeare wrote, "A rose by any other name would smell as sweet" so a tropical revolving storm by any other name would behave as badly and there is no reason to suppose that Alma, Becky and Celia of the North Atlantic in 1970 with their sisters Adele, Blanca and Connie from the eastern Pacific, together with other female relations from the western Pacific, had any better manners than the notorious Able, Baker and Charlie which, in August 1952, affected no fewer than 16 British Voluntary Observing Ships whose adventures were published in the October 1953 number of *The Marine Observer*. Though a lot of research into their origin and habits is being done, we cannot believe that we shall ever be able to tame these ladies; undoubtedly every seaman will hope to follow the advice given in the first line of the Editorial "Keep away . . .". But, when involved and whatever the degree of involution, be it great or small, we hope that no observing ship will ever neglect an opportunity of getting a radio weather message away, giving as much detail as possible, for it is only by receiving information that the weather forecaster responsible for the area can hope to give timely warning to other shipping or to coastal communities where life and property may be threatened. Perhaps the remarks of the Editor of the *Mariners Weather Log* (March 1969), quoted in the October 1969 number of *The Marine Observer* as a closing remark on hurricane Rebecca which was reported by the *Pacific Stronghold*, are a good confirmation of this: "It is gratifying to realize that even today, with the increased satellite coverage available to meteorologists, merchant-ship observations have not lost their significance. That which is observed from above a storm will assist, but can never replace, that which is encountered from within a storm."

By the time the next Editorial appears in *The Marine Observer* another northern hemisphere hurricane season will have come and gone, for considerations of space have made it necessary to reduce these Editorials to one per year. Thus the next one will appear in the January 1972 number but the body and constitution of the journal itself should remain as it is now, possibly with occasional enlarged contributions and, we hope, a slightly larger Marine Observers' Log section.

In the meantime it seems proper that the number chosen to carry the annual Editorial shall be the January number because only thus are we able to send our warmest greetings and good wishes to all members of the Corps of Voluntary Marine Observers wherever they may be. May 1971 be for all a year of health, serenity and good landfalls.

L. B. P.

January, February, March

The Marine Observers' Log is a quarterly selection of observations of interest and value. The observations are derived from the logbooks of marine observers and from individual manuscripts. Responsibility for each observation rests with the contributor.

Observing officers are reminded that preserved samples of discoloured water, luminescent water, etc. considerably enhance the value of such an observation. Port Meteorological Officers in the U.K. will supply bottles, preservative and instructions on request.

CYCLONE 'ISEULT'

Indian Ocean

m.v. *Glenfalloch*. Captain P. H. Edwards. Dakar to Singapore. Observers, the Master and Mr. J. C. Bromfield, 2nd Officer.

5th–11th February 1970. The following observations were made when the vessel was in the vicinity of cyclone Iseult. We had received the first warning of Iseult at 0800 GMT on the 5th when the vessel was off Port Elizabeth. At that time the storm was defined as a moderate tropical depression, estimated position 17° 42′S, 70°E (400 miles ENE of Rodriguez Island), moving W'ly at approx. 10 kt. Satellite photographs showed that Iseult had intensified into a cyclone by 0600 on the 6th, moving W'ly at about 8 kt. Subsequent warnings indicated a speed of 5–6 kt.

10th February

GMT

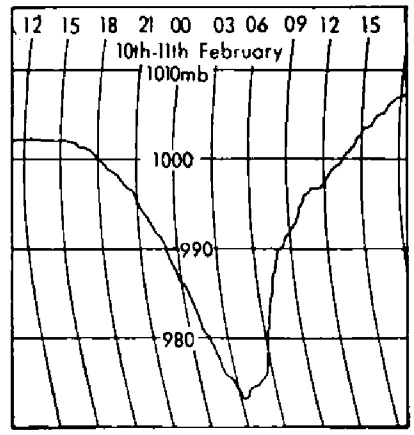
0001: Position of ship 22° 12′S, 55° 30′E. Course 061° at 20 kt. Pressure 1009 mb, steady. Wind SE, force 4. Heavy E'ly swell. Clear sky. Iseult position 17° 30′S, 61° 12′E, approx. 500 miles NE of vessel, moving west at 6 kt.

0400: Pressure 1010 mb. Wind SE, force 5. Heavy E'ly swell. Course altered to 071°; estimated that Iseult would pass about 200 miles to the north.

1130: Reduced speed due to stress of weather; altered course to 055°. Wind SE, force 6. Very heavy E'ly swell. Pressure 1002·9 mb, steady. Cloud 8/8 C_L8. Position of ship 20° 42′S, 59° 03′E. Iseult position, 200 miles away, 17° 24′S, 60° 00′E, moving west at 6 kt. It was thought that from 1130 to 1600 Iseult was almost stationary and during this period the strong SE trade wind merged with the clockwise direction of the cyclone.

1600: Pressure started falling rapidly. Wind freshening from SE. Light, continuous rain. Estimated position of ship 20° 15′S, 59° 45′E.

1800: Pressure 1000·1 mb. Wind SE, force 7, freshening rapidly. Very heavy E'ly swell. Visibility about 7 miles.



2000: Pressure 996·1 mb. Wind now force 11. Continuous moderate rain. Visibility approx. 200 yd. From 2030 until 2330, when the vessel hove to, there was continuous moderate rain and driving spray. Wind SE, force 11–12. Very heavy E'ly swell becoming confused. Pressure had fallen to 986·8 mb by 2330.

11th

0001: Iseult position from Meteo Mauritius given as 18° 00'S, 59° 42'E, almost stationary. Estimated position of ship 19° 55'S, 60° 10'E. (It was thought Iseult had, in fact, recurved some 8 hours previously.) At 0130 the wind began to veer very slowly and by 0330 was SSE, force 12+, with a very heavy, confused swell, continuous moderate rain, driving spray and visibility approx. 100 yd. Barometer steady at 972·1 mb then rapidly started rising. Wind continued to veer with increasing speed. Estimated position of ship 19° 43'S, 60° 10'E. Subsequently, when the 0600 position of Iseult was given as 20° 05'S, 60° 30'E and moving S–SSE at 10 kt, it was estimated that the vessel had been approx. 50 miles to the west of the centre at 0330.

0430: Pressure 973·9 mb. Wind S'ly, force 12. At 0500 course altered to 070° at reduced speed. From 0630 to 0930 pressure rose from 982·7 to 995·7 mb, the rain gradually eased off and the wind veered until, by 0930, it was N'ly, force 8. The rain had then ceased and a watery sun was seen. From 0930 the swell slowly moderated, becoming NW'ly.

1330: Pressure 1001 mb. Wind N'ly, force 6–7. Position of ship 18° 53'S, 61° 34'E. Full speed away.

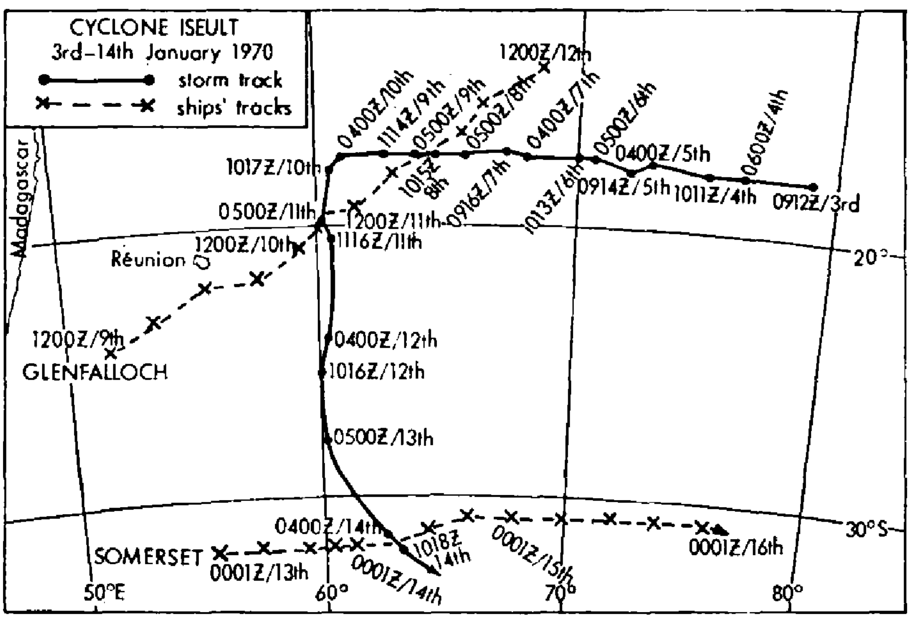
m.v. *Somerset*. Captain W. F. T. Dan. Cape Town to Fremantle. Observers, the Master and all officers.

9th–13th February 1970. At 2000 GMT on the 9th, when the vessel was in position 33° 49'S, 30° 14'E, steaming on an E'ly course for Fremantle, warning of tropical cyclone Iseult was received from Meteo Mauritius. It was centred at 17°S, 61°E, moving west at 6 kt. Hurricane winds and very high seas existed within 80 miles of the centre, and gales and rough seas within 250 miles. At 1741 on the 10th Iseult was centred at 17°S, 60°E, still moving westward at 6 kt with the same intensity and force of winds. A moderate tropical depression, Jane, was centred at 16°S, 79°E, quasi-stationary with gales and high seas extending 60 miles from the centre. At 1750 on the 11th Iseult had recurved and was travelling in a SE'ly direction at about 10 kt. Tropical cyclone Jane had also recurved and was travelling SW at 5 kt. A third cyclone, Judy, was reported at 15°S, 93°E, moving west at about 5 kt.

At 0600 on the 12th the barograph trace was approx. 5 mb below the seasonal normal, falling steadily with diurnal variations. The ESE'ly wind had freshened to force 7–8 and the E'ly swell had become longer and higher. The ship's course was altered to 090° at 0001 on the 13th. At 1500 the clouds were thinning and the sky had a strange yellow tinge. The Chief and 4th Officers said that the clouds appeared to be travelling in a W'ly direction although the wind was SE. At 2015 speed was further reduced and the vessel hove to on a course of 130° as concern was expressed over the deck cargo. At this time the wind was gusting force 10–11 with driving rain; pressure was 990 mb, still falling.

At 2145 the wind dropped quite quickly to light airs, the rain stopped and the barometer remained steady at 988 mb. The sky was clearing by 2235 and it was presumed that the vessel was in the eye of the cyclone. All the indications pointed to this, the very low pressure which had steadied, the way the wind had veered then backed to its original direction at a much greater force and, lastly, the lull experienced. A TTT message was sent reporting that the centre of the cyclone was approx. 100 miles south and nearly 50 miles east of positions given by Mauritius Radio and ESSA 8 satellite.

Position of ship at 1800 on 13th: 31° 48'S, 60° 18'E.



Note. Mr. E. G. Davy, Director, Meteorological Services, Mauritius, comments:

"Cyclone Iseult was in the area of responsibility of the Mauritius Meteorological Service from the 4th to the 13th February, and had a track for which no analogue exists in the records of Mauritius covering 100 years. From the 3rd to the 10th it moved directly and steadily west in latitude 17°S—in itself an abnormal track—and then turned very abruptly through a right angle to move almost directly south during the next four days.

"The regular movement westwards at a speed of about 6 kt during the first week resulted in forecasts which permitted accurate warnings to islands, ships and aircraft likely to be affected. Indeed all known ships were able to keep away from its centre and warnings were issued to Rodriguez Island three whole days before maximum gusts of 60 m.p.h. were reached on the 9th.

"On the 10th there was no evidence that within 24 hours the track would change suddenly and a re-analysis of all observations provided little enlightenment. Even throughout the night of the 10th/11th only a slight suspicion of change could have arisen from the hourly observations in that at St. Brandon (120 miles NW of the storm centre) the wind remained due west instead of veering a point. At Mauritius (200 miles SW of the centre) the wind showed no inclination to veer and in the hours before dawn actually backed as if the westerly course were continuing. At both St. Brandon and Mauritius slight pressure changes during that night did not conform to continued straight movement but at about 2 mb in 12 hours these changes could hardly be regarded as significant.

"Direct evidence of the turn from west to southwards was provided by a satellite photograph at 0500 GMT on the 11th. Certain confirmation of the change in direction came from the reports from the ship *Glenfalloch* which had adopted the apparently best course south of the cyclone centre and suddenly found the storm turning directly on to her.

"In the south Indian Ocean weather observations are very sparse indeed except perhaps in the most western part where islands' meteorological stations provide regular but spatially-scattered observations. Reports from ships are always valuable in fixing the positions of storms and indicating their intensity. Their value is, however, best seen in reports such as those from the *Somerset* which provided information on cyclone Iseult after the storm had moved over cooler waters and was dissipating south of latitude 30°S at a distance of about 800 miles from the nearest land station.

"Satellite photographs provide new means for detection and tracking of storms over the vast ocean expanses which, by itself over the past few years, has raised the standard of cyclone warning to levels previously unobtainable in regions not provided with air reconnaissance or a network of surveillance radar. Meteorological Services in the south-west Indian Ocean have come to regard the daily pass of the meteorological satellite as an exciting event certain to add to the understanding of the situation.

"The challenge of tropical cyclone forecasting remains for several reasons. During the last two decades the amount of observational data in the Indian Ocean has increased immensely but rarely does it provide a complete picture of the storm or fix the position of the centre with the accuracy desirable for warnings to ships and to the inhabitants of the region. At best, one can know accurately the present position and characteristics of the storm; the problems of where it will be tomorrow and what will be its size and intensity remain. Reliance must still, to a great extent, be placed on the assumption of a continuation of the changes which have been observed in the past few hours. The structure and dynamics of the atmosphere are so complex, so delicately balanced, that only a further considerable increase in data and a better understanding of the causes of change can lead to a better foresight of the behaviour of those fickle phenomena to which girls' names are so aptly given." (See also Mr. Davy's article on p. 33.)

CYCLONE 'LOUISE'

Indian Ocean

m.v. *Menestheus.* Captain D. Campbell. Cape Town to Singapore. Observers, the Master and Mr. J. R. K. Corrin, Jnr. 2nd Officer.

The following observations were made when the vessel was in the vicinity of tropical cyclone Louise.

29th March 1970

GMT

0001: Position of ship 20° 00'S, 57° 25'E. Course 090°. Wind SE, force 6. E'ly swell, 9–10 m. Barometer falling slowly.

0400: Port Louis harbour (Mauritius) closed due to weather conditions.

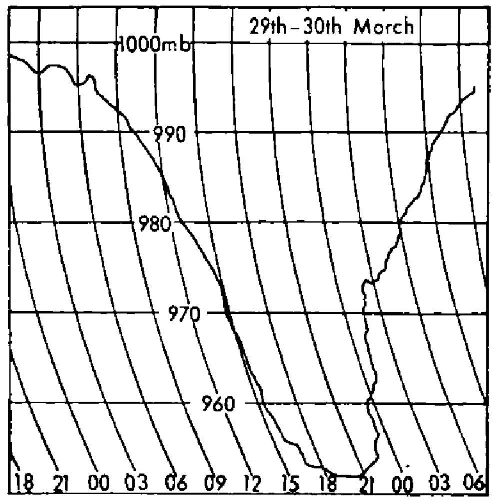
0800: Vessel hove to in position 21° 58'S, 58° 30'E. Wind ESE, force 9. E'ly swell, 11–12 m. Barometer falling quickly. Cyclone conditions prevailing on Mauritius.

1200: Wind SE–SE'S, force 12 and increasing. E'ly swell, 13 m. Barometer 985·7 mb, falling very quickly. Last observation transmitted at this time as shortly afterwards all the ship's aerials were carried away. Until 1850 hurricane conditions prevailed; wind speed estimated at well over 100 kt. Direction of wind and swell difficult to determine due to driving spray and torrential rain reducing visibility to zero. Permanent awning spars ripped off the bridge; flag halyards parted by the force of the wind. Two weather doors stove in and accommodation partly flooded by mountainous seas and swell estimated, at 1800, as 40 m. Numerous fittings ripped off deck. Barometer fell 18 mb in 3 hours.

1850: Wind decreased to force 9, E'S, and rain eased.

1900: Wind dropped suddenly and became variable, force 3–4. Rain stopped and barometer steadied at 951 mb for a short period and then continued to fall. Visibility much improved and cloud thinned to reveal an occasional star.

2100: Lowest barometer reading, 950·1 mb. Pressure started to rise shortly afterwards. Vessel still hove-to in very heavy swell.



30th March

0030: Vessel got under way at slow speed, course 130°. Wind variable, force 4–5.

0200: Wind increased to force 9 and steadied from NW. Rain began again. Vessel hove-to in 22° 00'S, 59° 25'E approx.

0230: Wind NNW, increased to force 12; continued to increase until the same conditions prevailed as during the previous night. Barometer rising very rapidly.

0600: Barometer reading 976·2 mb. More damage on deck caused by mountainous seas and swell.

0800: Wind N'ly, decreased to force 10 then backed quickly to NW'W, force 9. Rain moderated and visibility improving.

0900: Vessel under way once again.

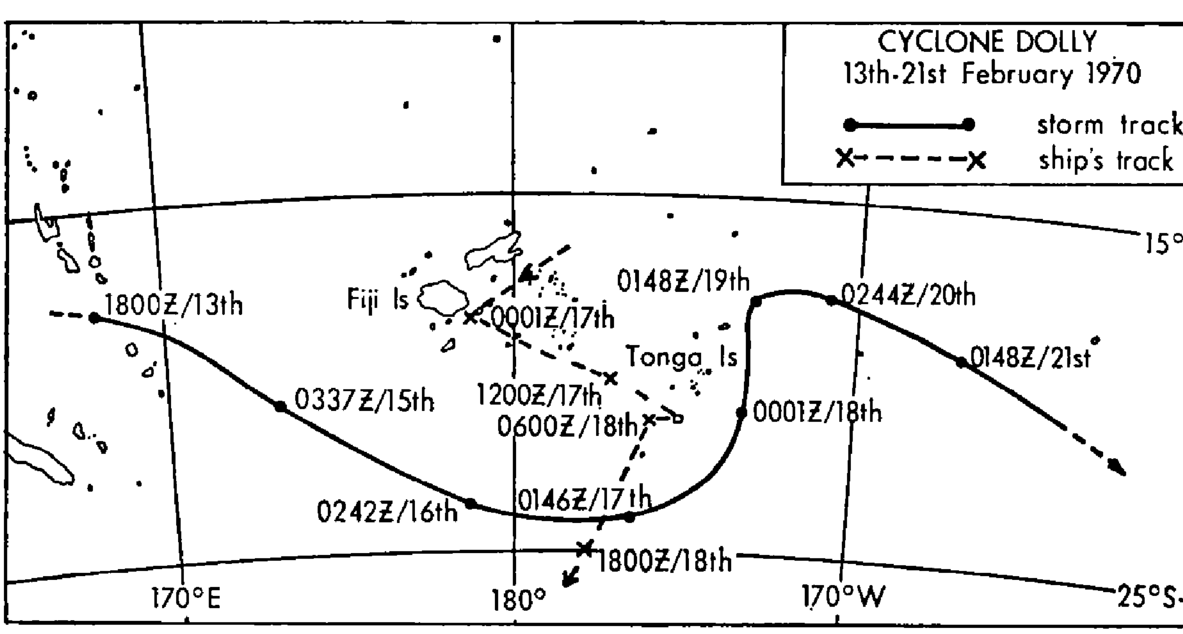
Note. The history of cyclone Louise is given in Mr. Davy's article on page 33.

CYCLONE 'DOLLY'

S.W. Pacific Ocean

s.s. *Oronsay*. Captain J. F. Wacher, R.D., R.N.R. Nuku'alofa, Tonga to Auckland. Observers, the Master, Mr. M. J. Carter, 1st Officer, Mr. M. J. F. Moulin, 2nd Officer, Mr. R. G. Young, Jnr. 2nd Officer and Mr. I. A. D. Acland, 3rd Officer.

18th February 1970. While the vessel was in the vicinity of the Tonga Islands the area was affected by cyclone Dolly. During the passage of the cyclone the wind



acceleration, force and pattern were completely consistent with a normal tropical depression. The track, however, was completely atypical. According to Admiralty Sailing Directions N.P.61, *Pacific Islands Pilot*, Vol. II, pages 23–24, it would seem that only in 1875, 1920 and 1940 have storms had unusual tracks, the track shown for 1920 being the only one similar to cyclone Dolly. At 0600 GMT: Air temp. 25·1°C, sea 28·3°. Wind SE'S, force 9. Pressure 1000·0 mb, rising.

Position of ship at 0600: 21° 24'S, 176° 24'W.

Note. The above chart is based on reports received from Tonga and Auckland, as plotted on the *Oronsay*, and from ESSA 9 satellite photographs. Dolly developed as a tropical depression in the Solomon Sea on 11th February. During the next six days it travelled over 2,000 miles towards the ESE, gradually developing into a cyclone and, by the 17th, was located by ESSA 9 satellite at 24°S, 173½°W. During the 17th it recurved towards the equator, passing within about 100 miles of the Tonga Islands. (Early on the 18th, when the *Oronsay* encountered Force 9 winds, she was about 150 miles from the storm centre.) On the 19th the storm recurved once more at about 17½°S (see chart) and, during the following six days, it gradually accelerated ESE to become extra-tropical on the 25th in longitude 140°W. From its initial development to the extra-tropical stage Dolly had travelled over 4,500 miles in 14 days, most of the time as a mature cyclone. This alone stands out as an unusually long life for a South Pacific cyclone. However, the most unusual characteristic of Dolly, as already indicated by the *Oronsay* observers, was its recurvature towards the equator. The latest edition of N.P.61 (issued three months after this report) does not show any other tracks which are in any way similar. The 1920 track must therefore remain as the only known precedent in 130 years.

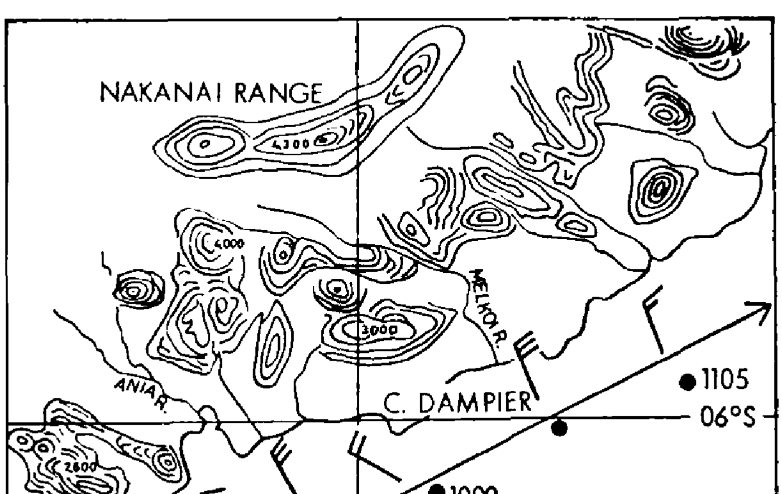
WIND FUNNELS

Solomon Sea

m.v. *Eigamoiya*. Captain D. J. Ball. Lae, New Guinea to Rabaul. Observer, Mr. R. G. Macdonald, 3rd Officer.

12th February 1970. Whilst on passage from Lae to Rabaul a 'Mistral' effect was observed off the various river valleys on the south coast of New Britain, most notably off the Ania River. This was presumed to be caused by the NW monsoon winds 'spilling' over the central mountain ranges and funnelling down the valleys.

Position of ship at 1000 LMT (0001 GMT): 06° 06'S, 151° 06'E.



Note 1. This report is very similar to the one reported by the *Woosung* on 4th February 1968, published in *The Marine Observer*, January 1969. They indicate that funnelling effects extend a considerable distance off shore. This seaward limit will depend on the stability of the lower atmosphere, being further off shore when the atmosphere is stable (layer clouds St and Sc over mountains) and closer inshore when the atmosphere is unstable (convective cloud Cu and Cb visible).

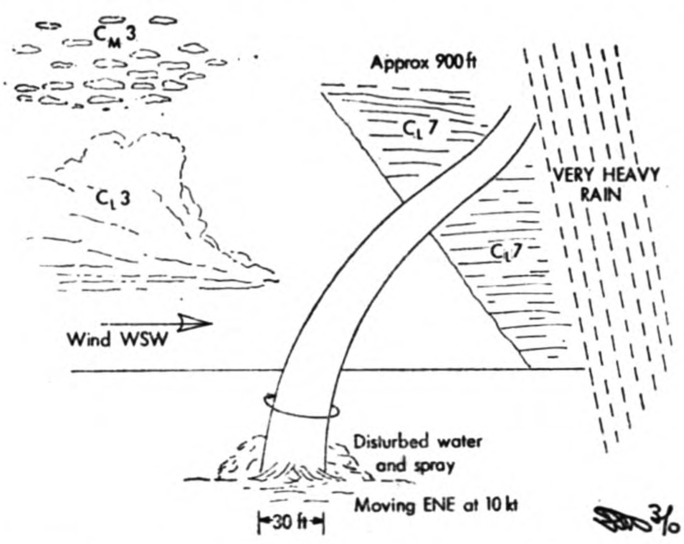
Note 2. The *Eigamoiya* is an Australian Selected Ship.

WATERSPOUT

Eastern Pacific Ocean

m.v. *Port Vindex*. Captain A. J. L. Smith. Panama to Apia. Observers, Mr. R. D. Theobald, 2nd Officer and Mr. J. L. Wright, 3rd Officer.

3rd February 1970. At 1255 GMT, after passing through a very heavy rain shower, a waterspout was seen passing down the starboard side of the vessel, approx. 60 ft away when abeam, as in the sketch. It was moving at about 10 kt in an ENE'ly direction. The base of the column was approx. 30 ft in diameter and the direction of



rotation appeared to be clockwise. The spout curved upwards to the trailing edge of Fs cloud and was visible for several minutes before fading out. Air temp. 27°C, wet bulb 27°, sea 28°. Wind WSW, force 3, Course 255° at 15·5 kt.

Position of ship: 5° 11′N, 87° 32′W.

Note. Waterspouts can rotate in either sense, especially in very low latitudes.

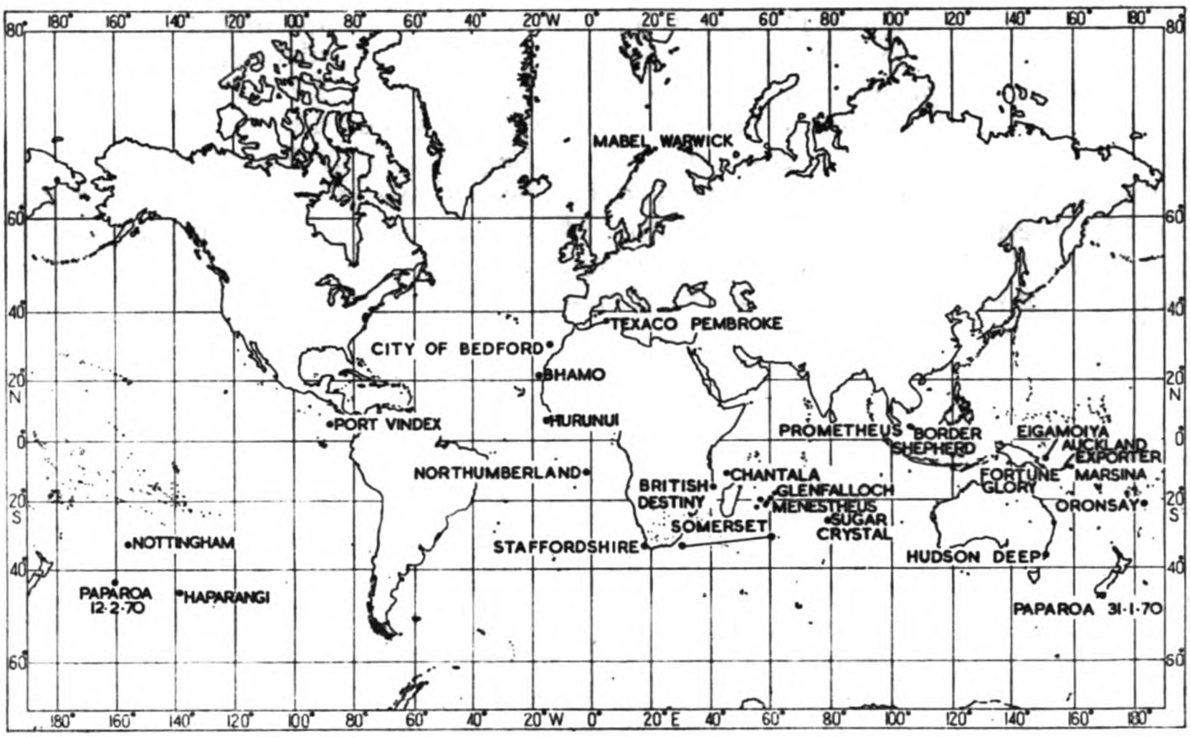
LIGHTNING

Australian waters

m.v. *Hudson Deep*. Captain P. J. Stock. Brisbane to Albany. Observer, Mr. J. A. Price, 3rd Officer.

9th March 1970. At 0900 GMT the vessel was 15 miles NE of Montagu Island. Cloud covered 6/8 of the sky, mainly Sc and a few Cb. One of the latter attracted the attention of the observer due to the continuous display of lightning within the body of the cloud. This display lit up the night for a good 5 hours and was contained within the cloud throughout this time. The effect was similar to a flickering oil flame, only of greater intensity and range. The cloud was overhead at approx. 1130 and the base was seen to be about 2 by 4 miles in extent. The lightning within consisted of short bolts and also slow-moving balls, three in all, which travelled the breadth of the cloud in just over 2 sec whereas the bolts did the same instantaneously. The maximum effect died off shortly afterwards and heavy rainfall persisted for 15 min. At the same time two of the flashes had accompanying thunder claps.

Position of ship at 1200: 36° 42′S, 150° 12′E.



Position of ships whose reports appear in "*The Marine Observers' Log*".

UNUSUAL VISIBILITY

Mediterranean Sea

s.s. *Texaco Pembroke*. Captain G. A. Chadwick. Rās Lanuf, Libya to Europoort. Observer, Mr. W. Brackenridge, 2nd Officer.

9th January 1970. At 0100 GMT Cap Sigli light, range 17 miles, became visible at 40 miles and half an hour later Cap Bengut light, range 30 miles, became visible at 65 miles. At 0140 only the loom of Cap Bengut light was visible; air temperature 16·5°C, wet bulb 13·6°. Very calm conditions with the clear reflection of stars on the sea and quite a lot of very 'green' bioluminescence present.

At 0200 the look-out reported a light 1½ points to port; the only echo visible on PPI in that direction was 34 miles off and, when plotted, it was found to correspond with the ship seen by the look-out. At 0230 Cap Bengut was again visible at a range of 51 miles.

Position of ship at 0001: 37° 18′N, 5° 36′E.

Note. At the time of this observation abnormal refraction was occurring under a temperature inversion.

SEA SMOKE

Kola Inlet and approaches

m.v. *Mabel Warwick*. Captain G. Boothby. Glasgow to Murmansk. Observers, the Master and all officers.

15th February 1970. At 0530 GMT the first slight traces of sea smoke were observed about 33 miles N'W of Kola Inlet. These reached a height of about 10 ft, with occasional wisps partially obscuring visibility, and lasted about 20 min. Air temp. −10·5°C, sea 5·0°. Wind W'ly, force 3.

About 15 miles north of Kola Inlet sea smoke was again encountered, obscuring a large trawler until about 2½ miles distant. Visibility was further reduced and after about 10 min the sea smoke became very dense with visibility varying from zero (deck 40 ft below not seen) to 400 ft. There were a few infrequent breaks when the visibility improved to ½–¾ mile. The vessel entered the actual Inlet at about 0800. At 0900: Air temp. −18·0°. Wind s'ly, force 3.

On arrival at the berth at 1200 visibility was the same. Air temp. −23·6°. We were told later that the lowest temperature in the port of Murmansk had been −27° at mid-afternoon and that the sea smoke had been similar all February. There was considerable ice on the water in Murmansk, up to about 3 inches thick, but very little down the Inlet and none at the entrance.

According to a news item in a British newspaper, the Russians are experimenting in the vicinity of Kola Inlet with chemicals for dispersing sea smoke.

Position of ship (approx.) at 0900: 69° 12'N, 33° 35'E.

Note. Sea smoke is likely to occur where the sea temperature is considerably higher than the air temperature. Convection raises excessive amounts of water vapour which at first condense into fog and later evaporate into the drier air above. Sea smoke is usually shallow and wispy but if an inversion exists at some level above the surface the fog may be dense. This is probably the explanation of the dense fog reported by the *Mabel Warwick*.

STRONG CURRENT SET

Indian Ocean

m.v. *Chantala*. Captain J. D. Stephinson. Trincomalee to Durban. Observer, Mr. L. H. Johnson, Extra 3rd Officer.

18th January 1970. In perfect visibility, Île Grande Comore being sighted at 100 miles, the ship's position was fixed by radar range and visual bearing as 12° 02'S, 45° 09'E at 1507 GMT. The south point of Île Anjovan was right ahead, the course being 237°. We then experienced a strong sideways set, so strong that the changing relative bearing of the south point was clearly observed, the ship's head remaining steady at 237½°.

Position was again fixed at 1520, giving 12° 01'S, 45° 05'E, a set and drift of 345½°, 3½ miles in 13 min. Course was then altered to counteract this current, but a general set towards the NW continued until we passed through the channel, when a small E'ly set, experienced from 1800–1900, brought the ship 'back to the line'.

There was no change in sea temperature, 28·5°C, no tide rips or upwelling water, and we could not obtain a sounding at 600 fm. The wind was calm and there was only a slight NE'ly swell—previously swell had been from the south.

Admiralty Sailing Directions N.P.39, *South Indian Ocean Pilot*, p. 116, refers to a usual SW-going current, or at times SE'ly, at a considerable rate.

Note. Extremely strong sets of this type are probably due to the complex nature of the flow of water around islands and other obstructions in otherwise deep water. Sets of this rate are likely to be short-lived; it is unlikely that a ship will ever experience this rate over, say, half an hour or an hour. This report once again underlines the necessity for extreme caution when navigating in the vicinity of islands.

BIRDS

Eastern North Atlantic

s.s. *City of Bedford*. Captain P. Mallory. Dakar to Avonmouth. Observers, Mr. R. Jenkins, Q.M. and Mr. C. K. Nelson, 2nd Officer.

4th January 1970. At 1430 GMT when the vessel was about 210 miles NNE of Las Palmas on a course of 016° at 14 kt, a pigeon was seen to land on deck. When it was captured the following marks were found on it: on the left leg, a red ring with V.G.323 stamped on it; on the right leg, a blue ring with 17123 69A-Espana stamped on it. The bird appeared to be grey but we think that the correct definition is chequer blue. It was thought to be a hen and was obviously exhausted and had no food in its crop. It was given some water but was very reluctant to leave Mr. Jenkins's hand and had to be placed near the water which it very rapidly drank. The bird was kept warm and allowed to rest. It was felt that it would be safer to keep the bird for the few remaining days to England owing to the contrary winds and storms in the vicinity and to be given into the custody of a pigeon organization in Avonmouth. (On the 6th, in position 40°N, 10° 30'W, the bird was released as it was becoming restive and the weather had improved appreciably.) At 1430: Air temp. 19·6°C, sea 18·8°. Wind WNW, force 6. Rough sea and swell.

Position of ship at 1200: 31° 00'N, 14° 18'W.

Note. Major L. Lewis, M.B.E., Secretary of The Royal National Homing Union Council, comments:

"This report was read with great interest. The pigeon concerned would be a Spanish pigeon and engaged in a race because the red ring on its left leg would be a race rubber.

"It would be very much appreciated if you would kindly let us have any further reports which may reach you [in meteorological logbooks] from time to time, where racing pigeons are concerned."

South Pacific Ocean

m.v. *Haparangi*. Captain J. M. Burn. Bluff, N.Z. to Las Palmas via Cape Horn. Observers, the Master and all deck officers.

5th–8th January 1970. At 0600 GMT on the 5th a bird was found on deck in an exhausted state. It was identified as a White-faced Storm Petrel (*Pelagodroma marina*) by a study of *Birds of the Ocean*, by W. B. Alexander. It was put in a cardboard box to recover, as recommended in *The Marine Observer*, October 1969.

On the morning of the 6th the bird seemed sufficiently perked up and attempts were made to feed it with small pieces of fish which did not prove successful. In the evening the bird was kept in the chart room and spent most of its time exercising its wings on the chart-room table. The bird drank a small amount of water but still would not take any food. Next day it spent the day hidden in a quiet, dark corner of the wheel-house and, in the evening, small amounts of fish and water were forced upon it. The bird became very restless next morning and was flying about all over the wheel-house so, to avoid any damage to its wings, it was decided to release it. It was released in approx. position 45° 50'S, 110° 00'W and it flew strongly away from the ship.

Position of ship at 0600 on 5th: 46° 00'S, 138° 48'W.

Note. Several months ago we received the following useful advice in a letter from Lt. N. R. Messenger, R.N.R., then 2nd Officer on the *Oronsay*, a member of the R.N.B.W.S.:

"A bird landing on board finds itself in a completely alien world of noise and people. It becomes frightened and, being already exhausted, is very difficult to feed. By experience I have found a glucose and water solution to be the general answer. To administer this I use a plastic disposable syringe and a large blunted hypodermic needle. The bird is wrapped in towelling and, while being firmly held by an assistant, it is comparatively easy to squirt the solution well back into the throat. After an initial dose the bird is placed in darkness, a suitably-furnished tea-chest being ideal for this purpose, and left quiet and undisturbed for about 12 hours. After this rest period the bird is well on the way to recovery and from then on regular doses of the glucose and water solution are administered until the bird is ready for release. To date, this method has been 100 per cent successful."

Mozambique Channel

s.s. *British Destiny*. Captain J. Beattie. Das Island to Cape Town. Observer, Mr. P. A. Edwards, 2nd Officer.

15th January 1970. At 1300 SMT a bright yellow bird was seen to alight on the ship, staying on board for only about half an hour which was just time enough to make a quick sketch of him before he flew away in an easterly direction. It was 10 inches

long, 6 inches in height and had a wing span of about 14 inches. The back and head were yellow ochre while the throat and chest had dark-brown speckles on bright yellow. The beak and eyes were black and the tail was dark brown. The shoulder feathers were dark brown becoming light brown along the wing, all edged with yellow. It struck me as curious that its beak did not look like a sea-bird's, being short and rounded rather than long and pointed and that, plus its very colourful and conspicuous plumage, made it almost certain that the bird had come from the mainland. Therefore I would like to enquire what sort of bird this was, where it had probably come from and where it was going.

During the previous 24 hours the ship had covered a distance of 381 miles, passing the Comoro Islands to the westward, her closest approach to land being a little over 30 miles during the whole period. Wind NNW, force 4 throughout.

Position of ship at 1300: 14° 45′S, 41° 20′E.

Note. Captain G. S. Tuck, Chairman of the Royal Naval Birdwatching Society, identified this bird as an African Golden Oriole.

CRICKETS

off West Africa

m.v. *Hurunui.* Captain S. W. Lambrick. Durban to Flushing. Observers, the Master and all crew.

5th–6th January 1970. At 2100 GMT on the 5th two crickets were captured on the boat deck and several others were found the next morning (*see* photograph opposite page 32). They were seen to make their distinctive 'chirp' by rubbing their wing cases together, being able to produce a variety of noises ranging from a clicking, like a loud clock tick, to a penetrating high-pitched squeak. The vessel was steering 324° at 9 kt, 130 miles from Cape Sierra Leone, bearing NE'ly, the nearest point of the African mainland. Although the surface wind was NW, force 2 at the time the crickets were captured it had been S or SW, force 3–4 for the previous 3–4 days. At 2100 on 5th: Air temp. 27·4°C.

Position of ship at 2100 on 5th: 07° 12′N, 15° 05′W.

Note. The specimens were forwarded to the Natural History Museum. They were the common African Cricket, *Gryllus bimaculatus*, which had swarmed throughout October to December 1969 and were reported by many observers. A selection of the reports were published in *The Marine Observer* last October.

FISH PARASITE

South Atlantic Ocean

m.v. *Northumberland.* Captain R. G. Hollingdale. Durban to Tenerife. Observers, the Master and all officers.

12th February 1970. During the morning watch a 9-inch flying fish was found on the foredeck. On examination, several types of live parasite were observed in the fish's mouth. One which was grey in colour was approx. 1½ inches wide with feeler-like legs. (The others appeared to be the normal sea lice.) No attempt was made to withdraw the creature from the fish as it was feared that this might destroy some interesting biological data. The head of the fish was therefore cut off, complete with live parasites, and preserved in a jar of formalin. It was thought that the creature might be some kind of sea scorpion.

Position of ship: 10° 48′S, 2° 07′W.

Note. Dr. R. J. Lincoln of the Department of Zoology, Natural History Museum, comments:

"Thank you for the very fine specimen of a fish parasite which has been forwarded to me for identification. The parasite is an isopod crustacean belonging to the family Cymothoidae, the full Latin name being *Ceratothoa impressa* (Say).

"This species is found occupying the mouth cavity of several kinds of flying fish and the female holds itself in this unusual position by embracing the fish's tongue with long curved claws on its legs. The male is much smaller and can be found beneath the posterior appendages of the female.

"I will arrange for the specimen to be placed in the Museum Collection."

MARINE LIFE

Indian Ocean

m.v. *Sugar Crystal.* Captain J. E. Leaver. Mourilyan, Queensland to Cape Town. Observers, the Master and Mr. J. McNeill, 2nd Officer.

2nd January 1970. At 0330 GMT (0900 SMT) the vessel stopped for engine repairs. The sea all around us was seen to be full of small masses of a dirty-brown substance, mainly measuring about 1–3 inches long and between ½ and 1 inch wide. They ranged from the surface to as deep as we could see from the deck of the ship. A bucket and heaving line were used to obtain samples which have been preserved and retained for study. The samples were obtained from a number of bucketfuls and transferred to the sample bottle but it was estimated that where they were densest there were between 50 and 70 of the masses to 1 cu. ft. Also collected from the buckets were several small amoeboid creatures and a larger jellyfish which have been included in the sample bottle. (Not included were several young flying fish we caught, not more than ¾ inch long, which were used for food for some terrapins we have on board.) It was not possible to make an estimate of the area covered by this growth because at normal sea speed the stuff was invisible in the wash but it was certainly quite a large area. There was no indication of larger marine life feeding in the area though a good look-out was kept while stopped and for the rest of the day. Air temp. 27·1°C, sea 25·0°. Wind E'ly, force 2–3. Slight sea and low S'ly swell.

Position of ship: 26° 47′S, 78° 49′E.

Note 1. Dr. P. F. S. Cornelius, Head of the Coelenterate Section, Department of Zoology, Natural History Museum, comments:

"The 'jellyfish' was a young specimen of the medusa *Aequorea*. There are about 13 species of *Aequorea* and between them they are found in most oceans. It would be difficult to identify the species to which your specimen belongs because it is in an immature stage but we will keep it and perhaps one day it will be useful to someone with a particular interest in *Aequorea*. Thank you for sending it in. Its B.M. reference number is 1970-2-10-1. I think the brown masses mentioned must have broken up as I could find nothing in the jar but there was a lot of microscopic plant plankton which I have sent to the Botany department for identification."

Note 2. Miss Patricia Sims of the Department of Botany, Natural History Museum, comments:

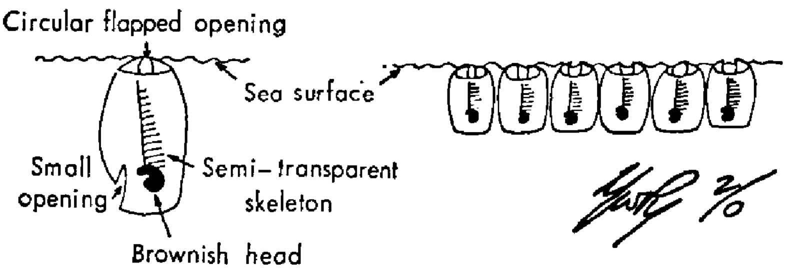
"The sample contained large quantities of the planktonic diatom *Rhizosolenia*. The cells of the diatom are cylindrical and often form long chains. There are at least two species present but these are very weakly silicified forms which makes it difficult to place them into species. These diatoms, which are unicellular plants, could well cause a brownish coloration to the sea."

Solomon Sea

m.v. *Marsina*. Captain C. G. Cocksedge. At anchor. Observers, Mr. T. W. Robertson, 2nd Officer and Mr. J. W. Salke, 3rd Officer.

17th January 1970. While the vessel was at anchor off Honiara (Guadalcanal Island) bands of egg-like creatures were seen floating on or near the surface. The length of the bands varied from a few inches to about 2 ft. Each band consisted of one or two layers of 'eggs', each about ¾ inch in circumference and just over 1 inch long. The creatures were transparent and had a semi-transparent skeleton with a brown spiral head at one end. They sucked water in through a small opening on the under-side and pushed it through a much larger flapped opening at the back. In the bands all the creatures were the same way up, with the larger opening at the top, and showed no movement when touched.

Position of ship: 9° 25′S, 159° 58′E.



Note 1. When forwarding the above report, the Director of Meteorology, Commonwealth Bureau of Meteorology, Australia, enclosed the following comments from Mr. P. H. Coleman, Department of Molluscs, Australian Museum, Sydney:

"The phylum [animal sub-kingdom] Protochordata includes animals possessing chordate characteristics such as a notochord, gill slits, etc., but which do not have a true vertebral column and so may be considered as intermediate between the vertebrates and the invertebrate animals. Within this phylum are three subphyla, of which the Tunicata or Urochordata concern us here. The animals collected from the *Marsina* are salps—pelagic, largely transparent, gelatinous animals belonging to the Tunicata (a name derived from the external coating of Tunicin, a normally hard test [covering] that is related to cellulose).

"There are many different kinds of salps and they inhabit all seas; most of the species appear to be world-wide in distribution. The one reported above, *Pegea confoederata* Forskal, is believed to be the most abundant species in the Philippine region. Like all salps it shows two body forms during its life history—a solitary or asexual form and an aggregate or sexual form. *Pegea confoederata* is rarely found as the solitary form and is generally taken in strings comprising several or many individuals, attached to each other by four lateral and four ventral protuberances. Normally the species lives in surface waters but has been recorded down to 100 m. The five specimens in the *Marsina* sample were interesting in that each carried an embryo, apparently not a common occurrence.

"Salps feed by filtering particles from the sea, drawing water in through the enormous anterior syphon, passing it through the hollow body, while extracting food particles by trapping them on strings of mucus which are ingested, then expelling the water through the atrial syphon. By contracting the prominent curving muscles of the body wall the water is thus used for locomotion as well.

"Readers are referred to a previous report on salps which appeared on page 179 of the October 1968 number of *The Marine Observer*. It carried an illustration of a similar species."

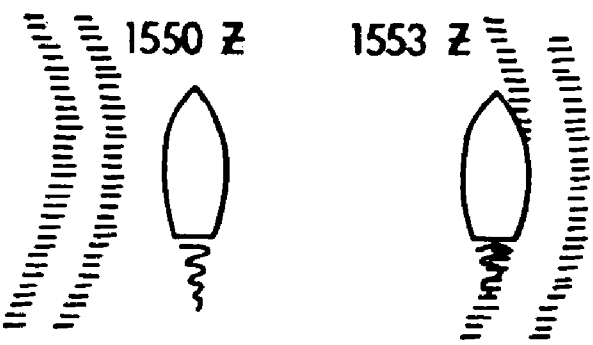
Note 2. The *Marsina* is an Australian Selected Ship.

LUMINESCENCE

South China Sea

m.v. *Prometheus*. Captain F. N. Curphey. Singapore to Hong Kong. Observers, Mr. B. J. Kay, 3rd Officer and Mr. J. Meekin, A.B.

12th March 1970. At 1550 GMT bands of luminescence, as shown in the diagrams,



were observed moving very fast towards the ship. They appeared to be the outer edge of a vast circle whose centre was beyond the horizon to our west (as if a large stone had been dropped and these were ripples spreading out from the centre). The radar and Aldis had no effect and, apart from the bands, there were no further examples of bioluminescence. The phenomenon was over by 1557. The moon had set at about 1525. Sea temp. 27·8°C. Wind ENE, force 3. Course 035° at 21 kt.

Position of ship: 4° 55'N, 106° 38'E.

Note. A similar report was received for 9th November 1953 from the s.s. *Peleus* when she was in the same area at 4° 35'N, 106° 18'E, although in her case the bands were straight. It is believed that these rapidly moving bands are sometimes the forerunner or the aftermath of a phosphorescent wheel and we have had only a few observations of them without association with the wheel.

LUMINESCENCE IN THE AIR

South China Sea

m.v. *Border Shepherd.* Captain C. Salt. Mina' al Ahmadi to Kawasaki, Japan. Observer, Mr. A. Y. Purvis, 3rd Officer.

28th March 1970. At 1430 GMT a series of rapidly moving bands of light were observed in the air, a few feet above the water. At first the bands were parallel to each other but after a few minutes they appeared to start revolving in a clockwise direction, about a point on the starboard bow (NE from the ship) at a distance of about 1,000 ft with no discernible limit to their length. After a further few minutes the bands reverted to their original parallel form and were joined by a second series, originating on the port bow, at right angles to the first set. Both sets moved rapidly towards the ship, being visible at times over the deck as well as over the water. After about 20 min they subsided into a general luminescence all round the ship, flashing on and off about twice per second, then disappeared quickly. The whole display was confined to the air, no light being seen in the water. The colour was generally white but it became greenish after the bands disappeared. At 1200: Air temp. 28·0°C. Wind N'ly, force 2. Good visibility.

Position of ship: 4° 11'N, 107° 08'E.

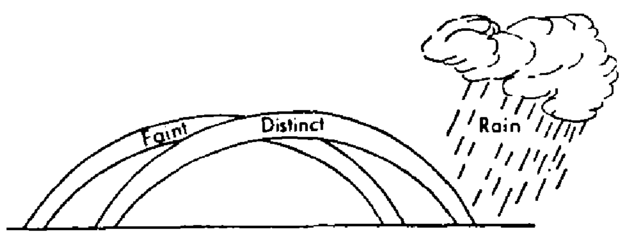
Note. The reality of this phenomenon, as seen in the air alone and not merely as a reflection from a phosphorescent wheel in the water, seems to be clearly established as we have already heard of six similar reports. One was in the Gulf of Oman, three were in the Gulf of Siam and two were in the southern part of the South China Sea, as in the *Border Shepherd*'s case. The months of occurrence were March, May, November, December and therefore, as far as we know, the phenomenon of the air is confined to the transition period before the onset of the SW monsoon and to the earlier part of the NE monsoon period. Outwardly this phenomenon is similar to forms of phosphorescent wheel and it has been suggested that the luminescence of the air was an effect produced by the projection of a deep-lying phosphorescent wheel on to a reflecting layer above the surface, with the sea waves acting as cylindrical lenses. However, this takes no account of the fact that similar luminescence in the sea is definitely stated in all reports to be absent. Also, in addition to the above report, there have been other instances of luminescent bands passing over the ship so the light was not a reflection from the water. Aerial luminescence has been reported from exactly the same limited areas as the surface wheels but, to date, no satisfactory explanation has been given for either phenomenon.

DOUBLE RAINBOW

South Pacific Ocean

m.v. *Nottingham.* Captain A. Britain. Wellington to Panama.

23rd February 1970. At 0430 GMT the vessel was stopped with the ship's head 049°, lying quietly in a moderate to heavy SSE'ly swell. As a rain squall approached the vessel with ESE'ly winds, force 5, two complete rainbows formed ahead of the



ship, one rather faint and the other quite distinct. They lasted approx. 5–6 min before the rain squall actually arrived, the further end of them being at the edge of the squall. As the squall approached the rainbows moved across. The sky was extremely overcast with numerous rain squalls reaching sea level within 3 miles of the vessel. There was no apparent sunlight.

Position of ship: 33° 06'S, 156° 18'W.

Note. Professor M. G. J. Minnaert of the Sterrekundig Instituut te Utrecht, Netherlands, comments:

"I have never seen a description of such a phenomenon in the literature. Assuming that the description is right, I can only see one possibility: it looks actually as if there were two rainbows, shifted over perhaps a degree or two with respect to one another. One is compelled to assume there were two suns! It might perhaps be possible that there was a kind of 'double sun'—two holes in the sheet of clouds, both quite near to the sun, one transmitting more light than the other. Since the sky was 'extremely overcast' it might be possible that the light piercing the clouds was sufficiently bright enough to form a rainbow. I am conscious that this explanation might seem somewhat artificial but I am unable to find something better."

FOG BOWS

off Cape Town

m.v. *Staffordshire.* Captain L. H. Sheldrake. At anchor. Observers, Mr. S. H. Gibson, 3rd Officer and Mr. J. Duncalf, Q.M.

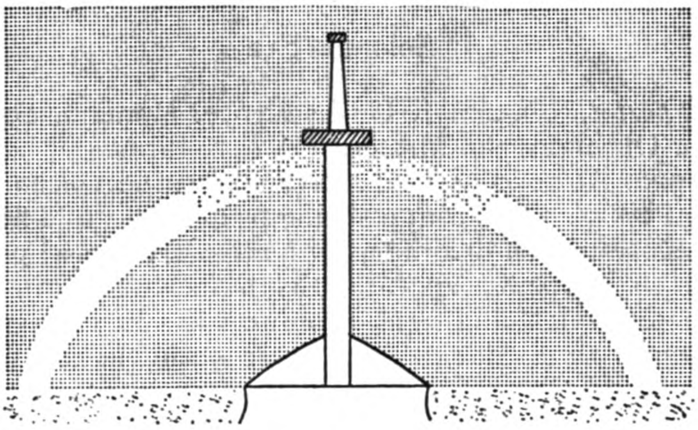
8th February 1970. When the vessel was at anchor off Cape Town between 0800 and 1100 GMT a completely circular fog bow was observed at the ship's side away from the sun. The bow was about 1½ ft wide and about 100 ft in diameter. The predominant colour was a bright grey with faint bands of red and green visible. There was dense fog with visibility approx. 50 yd. The vertical depth of the fog was about 300–400 ft with the sky visible (few clouds, sunny and fine). Air temp. 14·7°C, wet bulb 14·7°, sea 11·7°.

Position of ship: 33° 55'S, 18° 22'E.

South Pacific Ocean

s.s. *Paparoa.* Captain A. Dorkins. Timaru to Balboa. Observers, the Master, Mr. P. Grimes, Chief Officer and Mr. R. A. Nixon, 3rd Officer.

12th February 1970. At 1940 GMT, while steaming in thick fog with visibility



less than 100 yd, a white fog bow was observed ahead. It appeared to span the vessel from port to starboard. Its concentration of whiteness was greatest at the extreme ends of the bow near the surface of the sea, thinning out until it was only just visible at the top of the arch. The bow's altitude at the highest point was approx. 30–35°. It appeared to be about 50–80 yd ahead of the vessel and persisted for about 10–15 min. Air temp. 15·5°C, wet bulb 15·2°, sea 15·6°. Wind NNE, force 3.

Position of ship: 43° 28′S, 160° 06′W.

Note. The requirement for this phenomenon is that the luminary should not be obscured by the fog. The general lack of colour in fog bows is due to the small size of the water droplets. The radius of the bow is 42°, as in the rainbow. With fog enveloping the ship and with fairly high elevation of the sun it is possible to see a complete ring from an elevated position such as the bridge as in the *Staffordshire* report.

BLUE FLASH

North Atlantic Ocean

m.v. *Bhamo.* Captain J. S. Grassick. Las Palmas to Takoradi. Observers, the Master, Mr. D. Fox, Chief Officer and Mr. T. Seel, 3rd Officer.

7th March 1970. At sunset a very brilliant blue flash was observed as the sun passed below the horizon. It was visible with the naked eye and lasted long enough to allow us to pick up binoculars and observe it through them. Towards the end the blue became deeper and changed to a blue-green before fading away. Visibility was very good. Air temp. 21·4°C, sea 20·5°.

Position of ship: 21° 46′N, 17° 25′W.

Note. This phenomenon is produced by the unequal refraction of light of different colours when the sun is observed at low altitudes through a clear atmosphere. Normally the red end of the spectrum is absorbed and the violet end is scattered, leaving green as the only remaining colour to be seen at the time of the 'flash'. With less scattering the colour will be blue-green or even blue, deepening as the sun sets.

UNUSUAL RADIO RECEPTION

New Zealand waters

s.s. *Paparoa.* Captain A. Dorkins. Bluff to Timaru. Observer, Mr. B. J. F. Adkin, Radio Officer.

31st January 1970. At 0800 GMT, after working Portishead Radio on 12 MHz, the operator there indicated that my signal was so strong that he thought the vessel was in U.K. waters. The signal from Portishead was also exceptionally strong. The vessel was on a New Zealand coastal passage at the time.

Position of ship at 1200: 46° 42′S, 169° 30′E.

SUBMARINE VOLCANO

Solomon Sea

m.v. *Auckland Exporter*. Captain J. G. Lawrence. Honiara, Solomon Islands to Lae, New Guinea. Observer, the Master.

23rd January 1970. At 2030 GMT an active submarine volcano was observed in position 8° 58·5′S, 157° 56·7′E. Steam emitting from it rose to a height of 500 ft and the lava outflow was restricted to a radius of ½ mile. The vessel passed at a distance of 1 mile to the north of it and it appeared that at its western tip a small island had formed. Unfortunately this could not be confirmed as it was not thought prudent to go any closer than we were due to shoal water in the vicinity and possible falling debris.

This volcano was uncharted although one was reported in 1965 at a distance of 9 miles to the west. A photograph was taken when we were abeam and this showed a considerable extent of discoloured water spreading from the area. The sea temperature remained constant at 30°C throughout and no soundings were obtained.

The New Guinea Marine Department were advised by cable and the New Zealand Hydrographic Office have been informed by letter.

Note 1. Mr. R. C. Lilwall of the Global Seismology Unit, Institute of Geological Sciences, Edinburgh, comments:

"The region mentioned by Captain Lawrence appears to be one which has regular volcanic activity, at least over the last 20 years. The following eruptions have been noted previously:

19.4.52	9·0°S, 157·9°E	Island formed
20.11.58	8·9°S, 157·9°E	Underwater eruption
7.3.61	8·9°S, 158·5°E	Island formed
2.1.64	9·0°S, 157·9°E	Underwater eruption
21.3.65	9·0°S, 157·9°E	Island formed
19.3.66	9·0°S, 157·9°E	Underwater eruption

"It is noticeable that the exact location of the eruption varies somewhat, indicating that there may be more than one volcano, or one volcano with several outlets.

"The eruption seen from the *Auckland Exporter* has been noted by others and I think is the same as the eruption of Kovachi submarine volcano described in the Smithsonian Institution reports [summarized below]. The activity observed is apparently a continuation of activity which started in 1969. The possibility of an island being formed is interesting as it is not noted in the earlier phase of the eruption. However, such islands usually decay to just below sea level very quickly after activity ceases."

The reports received by the Smithsonian Institution include the following from airline pilots and the Geological Survey Department on Honiara:

"Submarine volcano Kovachi 9°S, 158°E was sighted erupting 0400 GMT 28th October 1969. Brown pumice spread on sea for 70 miles. Half-second eruption cycle. No lava build-up above sea-level. Able to observe more closely on 29th when shock waves followed by water eruption were observed at roughly 30-sec intervals. Further observations 31st showed activity continuing but by 0100 GMT explosions and massive bubbles had ceased but boiling action of sea-water still very persistent."

"At 0045 GMT on 3rd November Kovachi erupting grey mud from under sea to maximum height of 20 ft at 2-min intervals. Sea light green for a radius of 200 yd."

"On 4th November core of activity 50 yd across active every every 4 min. Discharging water 10 ft rock and gas and a little mud. One geyser 200 ft sighted. Area approx. 3 miles diameter coloured light brown."

"Volcano observed welling up very gently on 5th December and from then until the week before Christmas it was generally quiet. On 22nd–24th activity had renewed and waterspouts were rising to 100 ft every 5–10 min. It appears that this type of activity can be expected for some time."

Note added by Smithsonian Institution: "Kovachi is an 1800-metre-high submarine strata volcano that last erupted in 1952 and produced a 30-metre-high small island that remained above the surface for several months. The island disappeared on 19th January 1953."

Note 2. The *Auckland Exporter* is a New Zealand Selected Ship.

m.v. *Fortune Glory*. Captain W. F. Allan. Lae, New Guinea to Honiara, Solomon Islands. Observers, the Master, Mr. R. E. Herman, 1st Officer, and other officers.

30th January 1970. At approx. 0700 GMT, whilst steaming eastward along the south coast of Vangunu Island, a large column of smoke was sighted on the horizon. It was first assumed to be the smoke from a steamer but it soon became evident that it was being emitted too quickly and in too large a quantity to have come from a ship. Course was altered towards the smoke which was soon seen to be associated with a small, red, glowing object on the horizon which, as the vessel approached, took the shape of a dark-coloured cone with a glowing tip which was emitting large quantities of smoke and clouds of what appeared to be steam and, at intervals, throwing up showers of sparks. As it did not appear prudent to approach the object too closely, as soon as we had identified it as a volcano we resumed our course, passing about 7 miles to the north. At this distance the glowing tip of the cone and the showers of flaming fragments were plainly visible through binoculars and the height of the cone was estimated to be approximately 50 ft above the level of the sea. The approx. position of the volcano was observed to be 9° 00′S, 157° 59′E. On the British Admiralty charts of this area a shoal area is marked in this position whilst volcanic activity has previously been reported close by. The volcano was seen for some time after the vessel had passed it and even after the glowing tip of the cone (which was in the form of a crater from whence the smoke and sparks were emitted) had dipped below the horizon, by which time it was already dark, the showers of sparks could still occasionally be seen. The weather throughout was overcast with rain showers, light variable winds and smooth sea.

At the time that the volcanic eruption was sighted the Master sent the usual radio message so that a navigational warning could be sent out. During our stay in Honiara the vessel was visited by a member of the local Geological Survey Department to whom we repeated all the details. From him we learned that the volcano was situated in an area which had a long record of volcanic activity. There had been several reports of smoke issuing from the sea surface in the few weeks prior to our report but ours was the first report which mentioned any part of the volcano having emerged from the sea though this had occurred occasionally during previous periods of activity several years ago.

(On 2nd May the vessel again passed through the same area but there were no signs of activity and nothing was visible on the sea surface.)

Note 1. Mr. Lilwall comments:

"Thank you for this report. I do not think I have much to add to my previous remarks. On further thought, I doubt whether there is more than one volcano in the region but only a single one with possibly several vents. Confirmation that an island formed is interesting; in many cases the activity never reaches sea level.

"The rapid disintegration of the island after activity ceased was to be expected as doubtless the cone was made up of unconsolidated ash and cinders, all susceptible to rapid wave erosion. This erosion continues until the height of the cone is reduced to just below sea level where the wave action stops.

Note 2. The *Fortune Glory* is a Hong Kong Selected Ship.

AURORA

The following notes have been received from Mrs. Mary Hallissey of the Aurora Survey:

"We summarize briefly below the auroral reports received at the Balfour Stewart Auroral Laboratory of the University of Edinburgh from British ships during the period January–March 1970.

"The most extensive display of recent months occurred on 8th/9th March when a peak was reached in a three-day period of sustained moderately high magnetic activity. The maximum occurred around 2100 GMT on 8th March when red aurora was observed in the zenith from the *Atlantic Causeway* off south-west Ireland. Reports from southern England indicated that aurora might have been visible from much lower latitudes and this was later confirmed by the report from R.R.S. *Discovery* in a position just west of northern Portugal. Observers reported an orange glow and strong rays, while around midnight GMT in the western Atlantic observers in the *Constance Bowater*, at 38½°N geographic, reported a white glow and rays. At the same geographic latitude as R.R.S. *Discovery*, observers in the *Saxonia* reported aurora in the morning hours of 8th March. The magnetic activity figure was actually several points lower than at 2100 GMT but the difference in geographic longitudinal position of the two ships and consequent difference in geomagnetic coordinates and inclination give rise to a greater expectation of auroral frequency at the more westerly point.

"At this quiet period a steady flow of reports from the Weather Ships and other ships at the higher latitudes gives working material to those of us who are land-bound and frustratingly far south. The absence from the list of Weather Ships' names during the second half of February does not indicate any lack of auroral sightings; merely that British ships were not on duty there at the time. Many reports were received from Dutch ships.

"We are very indebted to you for your help. We can only pass on our thanks through these notes, but hope you will continue to watch for aurora and let us have your reports."

Date (1969–70)	Ship	Geographic Position		Λ	Φ	I	Time (GMT)	Forms
17th Oct.	*Ripon*	59°05′N	18°25′W	070	65	+73	2000–2330	HB, RA, RB, RR
2nd Jan.	*Orsino*	66°36′N	23°40′W	070	73	+77	0400–0510	RB, RR
	Weather Surveyor	64°00′N	23°12′W	070	70	+76	0545–0850	RA, N
4th	*Weather Surveyor*	62°08′N	33°15′W	060	70	+76	2315–2353	HA
5th	*Weather Surveyor*	62°08′N	33°15′W	060	70	+76	0045	SB
		62°10′N	33°36′W	060	70	+76	0340	P
7th	*Orsino*	64°12′N	22°06′W	070	70	+76	1750–1909	HB, RB
	Weather Monitor	58°53′N	18°20′W	070	65	+72	2150	RA
8th	*Weather Surveyor*	61°57′N	32°49′W	060	70	+76	2235–2259	N
9th	*Weather Surveyor*	61°49′N	32°45′W	060	70	+76	0430–0455	N
		61°55′N	32°51′W	060	70	+76	2305–0012	HA, RR
10th	*Weather Surveyor*	61°55′N	32°54′W	060	70	+76	0029–0212	N
							0739–0815	P
11th	*Weather Surveyor*	62°06′N	33°00′W	060	70	+76	0245–0600	N
		62°08′N	33°02′W	060	70	+76	2240–0400	HA, RA, SA, P, N
13th	*Orsino*	66°00′N	24°12′W	070	73	+77	2120	HB
							2200–2220	RB
14th	*Weather Surveyor*	61°41′N	28°21′W	060	69	+75	0255–0800	HA, RR, V, N
	Orsino	66°54′N	23°18′W	070	70	+77	2315–2320	RR
18th	*Orsino*	65°54′N	24°06′W	070	72	+77	2120, 2200	HA
23rd	*Orsino*	65°54′N	23°48′W	070	72	+77	2150–2202	RR
30th	*Weather Reporter*	59°02′N	18°36′W	070	65	+72	2130	HA
							2310	N
	Orsino	66°04′N	23°08′W	070	72	+77	2130–0010	All forms
4th Feb.	*Orsino*	67°00′N	22°30′W	070	73	+77	2045–2115	All forms
7th	*Orsino*	65°48′N	23°06′W	070	72	+77	0001	RR
12th	*Weather Reporter*	59°02′N	19°08′W	070	65	+72	0300	N
17th	*Orsino*	66°30′N	23°37′W	070	72	+77	2045–2145	RB
2nd Mar.	*Weather Adviser*	57°55′N	15°18′W	070	64	+72	0010	N
3rd	*Weather Surveyor*	58°50′N	18°25′W	070	65	+72	2250	N
4th	*Weather Surveyor*	58°54′N	18°36′W	070	65	+72	0150	N
	Weather Adviser	60°35′N	26°16′W	060	68	+74	0350–0500	N
		60°44′N	27°00′W	060	68	+74	0545	N
		61°33′N	30°56′W	060	69	+76	2150	HB
		61°48′N	31°14′W	060	69	+76	2245	RB
5th	*Redgate*	57°18′N	13°30′W	070	62	+71	2100–2400	HA, RR
6th	*Weather Adviser*	61°57′N	32°54′W	060	70	+76	0200–0700	HB, N
	Redgate	62°00′N	16°22′W	070	67	+74	2100–0300	RB, RR
	Weather Surveyor	58°40′N	18°44′W	070	65	+72	2220–0245	RR, P, N
7th	*Weather Reporter*	56°34′N	11°44′W	080	61	+71	2050	HA
	Weather Surveyor	58°48′N	18°55′W	070	65	+72	2310–0300	P
8th	*Weather Reporter*	57°08′N	13°00′W	070	62	+71	0550–0600	RR
	Saxonia	41°20′N	41°00′W	030	51	+64	0700–0720	P
	Discovery	41°26′N	09°34′W	070	46	+59	2030–2130	HA, RR, N
	Atlantic Causeway	50°17′N	12°30′W	070	56	+66	2030–2245	HA, RR, P
9th	*Constance Bowater*	38°30′N	57°42′W	020	50	+68	0001	RR, N
	Weather Adviser	62°07′N	32°53′W	060	70	+76	0150, 0250	HB, N
12th	*Weather Reporter*	59°01′N	19°12′W	070	65	+72	0350	N
17th	*Weather Adviser*	62°00′N	32°45′W	060	70	+76	2250	HB
25th	*Weather Adviser*	61°44′N	32°21′W	060	70	+76	0350–0600	N
28th	*Northern Reward*	63°56′N	06°05′E	100	64	+75	2338–2358	RA, RB
	Weather Reporter	58°57′N	19°16′W	070	65	+72	2340–0001	HA, HB, N
	Weather Monitor	62°04′N	32°26′W	060	70	+76	2350–0600	HB, SB, N
29th	*Northern Reward*	67°55′N	10°17′E	110	67	+76	2145–0016	All forms
	Weather Reporter	58°54′N	19°06′W	070	65	+72	2340–2355	RR
	Weather Monitor	61°50′N	33°04′W	060	70	+76	2315–2350	HB, RB, RR, V
31st	*Weather Reporter*	59°03′N	19°06′W	070	65	+72	0450–0515	N
							2310	RR

KEY: Λ = geomagnetic longitude; Φ = geomagnetic latitude; I = inclination; HA = homogeneous arc; HB = homogeneous band; RA = rayed arc; RB = rayed band; R(R) = ray(s); P = Patch; V = Veil; S = striated; N = unidentified auroral form.

Photo by courtesy of Bullock & Turner Ltd.

Act 1 (shown above) and *Act 2* (shown overleaf) are two of the most recent recruits to the Voluntary Observing Fleet. Of 24,821 tons gross and 715 ft length they can commence loading early one day and be at sea with a full cargo by midnight on the second day. Ships of this class are designed to make at least 5 Australian voyages every year.

(Opposite page 25)

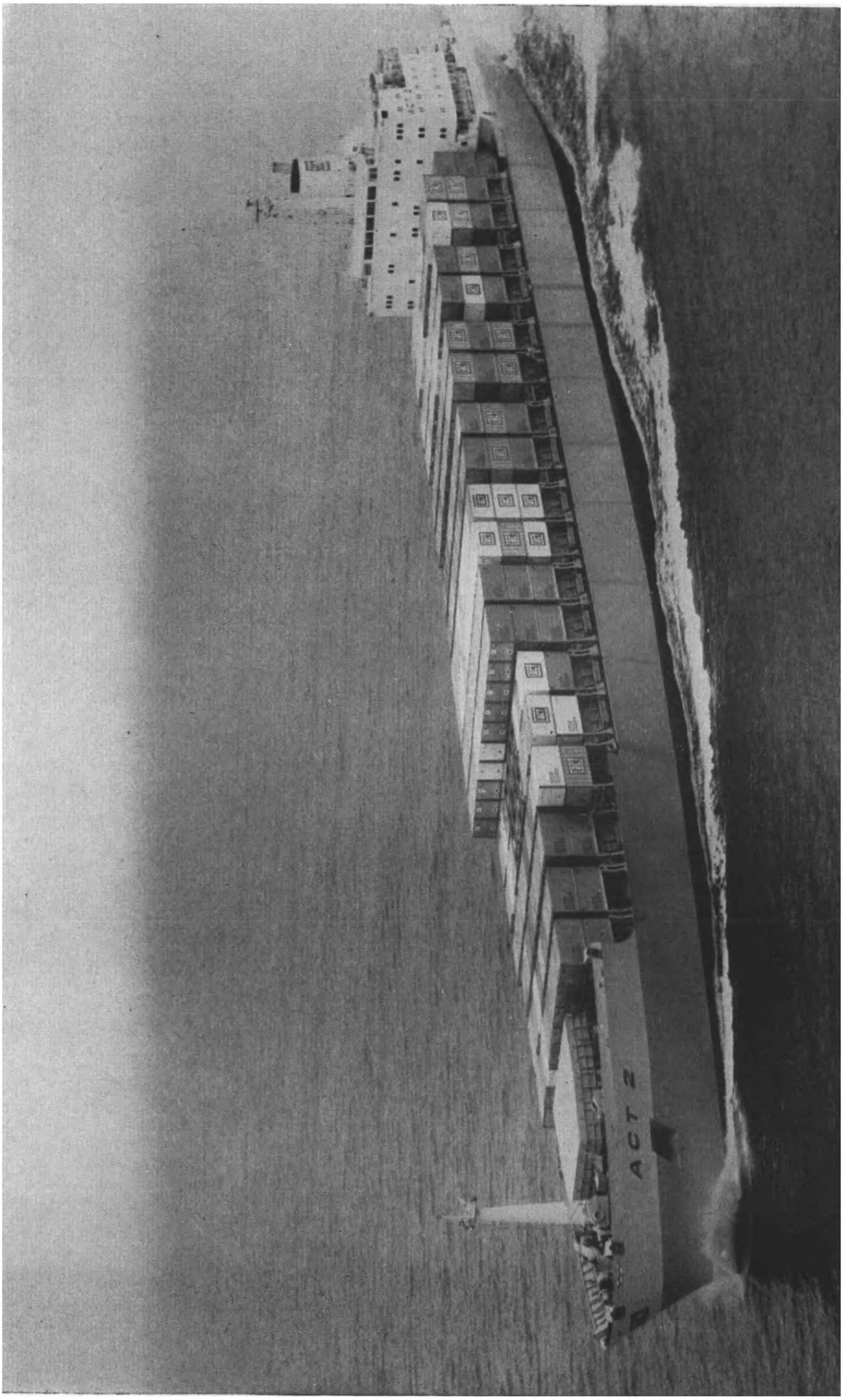


Photo by courtesy of Bullock & Turner Ltd

SYMPOSIUM ON WEATHER ROUTEING OF SHIPS

On 16th July 1970 a symposium on Weather Routeing of Ships, arranged by the United Kingdom Meteorological Office and co-sponsored by the World Meteorological Organization, was held at the Ships' Gear International '70 Exhibition in Olympia, London, by the kind permission of the organizers of the Exhibition, Brintex Exhibitions Ltd. The principal object of the meeting was to demonstrate to world shipping the value of Ship Weather Routeing from the viewpoint of economy and to acquaint shipowners and shipmasters with the techniques employed by various nations in the art of routeing ships by advice from meteorological centres ashore.

Previous meetings on this subject had been held at the Institute of Navigation and on board the *Wellington*, the Headquarters ship of the Honourable Company of Master Mariners, the last meeting being in March 1966.

This Symposium was under the Chairmanship of Mr. P. J. Meade, Director of Services, Meteorological Office and was addressed by Mr. G. Verploegh of the World Meteorological Organization. The Marine Superintendent of the Meteorological Office spoke on some practical and economical aspects of ship routeing and was followed by the four principal speakers from the German Federal Republic, the Netherlands, United States of America and United Kingdom who, due to the limited amount of time available, were restricted to only twenty minutes each in which to present their papers.

As the number of ships being weather routed is steadily increasing and mariners are becoming more aware of the benefits to be gained, these papers are now being published in *The Marine Observer* to stimulate further interest in the subject, the first three in this number and the remainder in the April 1971 edition.

551.5:629.12

Practical and Economic Aspects of Ship Routeing

BY CAPTAIN G. A. WHITE
(Marine Superintendent, British Meteorological Office)

There will be very few shipmasters who, at some period of their career, have not navigated in the China Sea and used a chart of that area on which is printed a recommended course to Hong Kong in the north-east monsoon for low-powered steamers, also the usual route to and from Hong Kong with the fair-weather monsoon. These well-worn tracks on the chart have been followed by vessels for half a century or more as prudent navigators have made good use of the knowledge available, but on occasions when weather conditions indicated that a tropical revolving storm was liable to be encountered the necessary adjustment of course was made so as to avoid the worst of a storm area. It is not, therefore, correct to suggest weather routeing of ships is something entirely new. In fact I can remember, as a young 2nd Officer, reading an old edition of *Ocean Passages of the World* which contained only recommended sailing-ship routes, obviously drawn up in the light of experience of early navigators and what they had learned of the weather and sea conditions throughout the world. It may be agreed, however, that prior to World War II the term 'climatological routeing' may have been a little more appropriate.

Since the early days of sailing ships it has been the practice and duty of mariners to exert their efforts in taking a ship from the port of departure to the destination in the least possible time, obviously avoiding hazards and keeping damage of all kinds to a minimum. As more knowledge of the seas and weather becomes available so the efficient navigator will be able to put such knowledge to use, thereby navigating his vessel as economically as possible.

Much attention has been drawn in previous years to time spent by ships in port and it has often been said that when ships are in port they are not earning their keep. Now that we are viewing a more complete picture there can be a great deal of time wasted at sea by navigation which, today, might be described as being other than good. A vessel that is hove-to in heavy weather is unlikely to be earning maximum profit. There will be occasions when even the most careful and experienced navigator must heave to but such cases can be appreciably reduced if careful consideration is given to weather and sea conditions likely to be encountered in the area and avoiding the worst of both.

The reliability of weather forecasting must obviously be considered as it is principally upon this that the efficiency of weather routeing depends. Expert meteorologists and weather forecasters will be the first to admit that all forecasts cannot be correct but it is fair to say the majority are sufficiently accurate for weather-routeing purposes. It must also be appreciated that on some few occasions storm areas and areas of heavy seas are so great that to circumnavigate them would not be practicable. In other cases, which cover the vast majority of voyages of weather-routed ships, there are several economic advantages to be gained.

A well-established tanker company, operating British-flag vessels across the Pacific Ocean, estimated that the weather-routeing service only has to assist the master of a 95,000-ton d.w. tanker in reducing his time on passage by half an hour in order to pay the weather-routeing fee for the trans-Pacific voyage. Obviously it is most difficult to make any estimate of the time saved on passage but in some of the more extreme cases there can be no doubt that considerable time has been saved. Time-saving, although important, is not the main economic benefit to be gained from weather-routeing. Every year insurance underwriters pay out vast sums of money in claims for heavy-weather damage to ships and cargo. To estimate the saving in repair bills as a result of routeing ships would be nearly as difficult as estimating time saved on passage, but an indication can be given by making a comparison of the repair costs prior to and after commencement of weather routeing a particular ship over a reasonable period of time and employed on the same trade. Last January the *Journal of Commerce* published a short article in which it was stated a shipowner reported a reduction in heavy-weather repair costs by approximately £30,000 in under two years by weather-routeing his ships. I do not know if this figure takes into consideration the loss of earnings of ships whilst in port undergoing repairs as not all repairs can be completed whilst ships are loading and discharging cargo. Tanker owners are obviously not concerned with cargo damage but suitable weather conditions are desirable for tank cleaning and transferring of ballast. There may be occasions when owners of container ships are faced with claims for damage to containers. A case was reported a little while ago of a container of whisky being lost overboard. No doubt an entry appeared in the deck log to the effect that the container was lost overboard due to heavy weather. To substantiate such a logbook entry may have been difficult if the ship had been weather routed.

Weather routeing as it is known today was pioneered after World War II and now many shipping companies which operate vessels across the Pacific and North Atlantic avail themselves of the services of weather-routeing organizations and we have, I think, reached the stage where a good weather-routeing service can be considered as an aid to navigation. On the introduction of any new aid the conscientious and progressive navigator will endeavour to learn what he can about the aid and its limitations before putting it to use. The purpose of this Symposium is for shipowners and navigators to learn first-hand from the expert weather-routeing officers present something of their methods of routeing and perhaps the limitations; then I believe more use will be made of this service.

Ship-Routeing Activities in the Seewetteramt, Hamburg

By H. Kruhl
(Seewetteramt, Deutscher Wetterdienst, Hamburg)

Ship routeing means to select the least-time track or, strictly speaking, the optimum track for oceanic crossings. The calculation of the course involves not only meteorological conditions but also nautical and economic features. Therefore the problem is very complex and the solution cannot be found in an analytical form. Even if we simplify the task and first take into consideration the sea conditions, wind force and fog areas, etc. as the main factors which subtract from ship speed, it is impossible to compute the route entirely by numerical methods, for practical purposes, because of the lack of surface-wind forecast charts and consequently sea-wave prognostic charts of sufficient accuracy for 7 or 12 days ahead. We feel that this problem cannot be overcome for another 10 years or more.

In spite of these basic difficulties, ship routeing works with great efficiency. The reason is that the choice of optimum track does not depend to any great extent on detailed features of wind and wave fields but rather on the general circulation and its variation; it is necessary and in many cases sufficient to know if the ship's course will run north or south of the main tracks of cyclones or anticyclones. A ship leaving German Bight, not bound for another European port, is able to choose two very different routes. She can either run north around Scotland or south through the English Channel. Such a decision requires a forecast of Atlantic circulation for at least 6–7 days because it will be 1 or 1½ days after leaving German coasts and 2 or 2½ days after the latest weather information, and after receiving numerical charts, before the ship will reach the Pentland Firth or Scilly Isles. Then wind and wave fields over the Atlantic have to be predicted for the next 4 or 5 days in order to provide the optimum route for the vessel. This prediction cannot be made by any shipmaster. We feel that this is a real meteorological task. So our main problem in ship routeing is to select the least-time track from the alternative routes around Great Britain.

For all ships bound for eastern Canadian ports the routes north around Scotland or through the English Channel lead to four great-circle courses in the season when Belle Isle Strait is free of ice. The northern route can be used with great success because the passage north of Scotland to Belle Isle is about 200 n. miles shorter than the one through the English Channel, and the route to Cape Race through the Pentland Firth is 100 n. miles shorter than the southern route. That means a 13–14 hours' gain in steaming time to Belle Isle or 6–7 hours to Cape Race for a 14-knot ship. The distance to eastern Canadian ports via the north of Scotland and Belle Isle is 350 n. miles shorter than the way through the Channel and Cabot Strait. That is a saving in steaming time of about one day. The saving on the northern route may be considerably greater in autumn or early winter when shipmasters of non-routed ships tend to sail on southern shipping lanes while, for example, a large anticyclone covers northern North Atlantic, Greenland and Iceland areas, causing easterly winds in the north while westerly gales predominate south of 50°N.

Even for all voyages to American ports on the eastern seaboard to as far south as the Florida Strait the distance north of Scotland via Cape Race is about 90–100 n. miles shorter than through the Channel. These are important facts and must be taken into consideration when deciding whether the ship should use the northern or southern route around Great Britain. However, the Channel route is shorter for all ships bound for Panama and Pacific ports, using the Mona Passage, although sometimes the alternative route may be chosen. An impressive example was the route recommended to a ship bound for the Mona Passage to sail north of Scotland in January 1967. No shipmaster would take this route, especially in winter-time, without particular advice. However, the ship followed the recommendation and saved 40 hours' steaming time compared with a voyage on the shorter great-circle normal course through the Channel. Later analysis showed that a route off south-east Newfoundland would have saved even more time. These routes were hindcast by using actual sea-condition charts and a relation between wave heights and propagation and ship's speed and course. The severe weather conditions, which would have considerably increased steaming time on the southern route, included waves of about 14 metres in height. The ship would have met these phenomenal seas 5 days after leaving the port. However, she was able to pass north of the dangerous area.

Subsequent evaluation of recommended routes is very important in gaining experience in ship routeing and in achieving better results. Our office has carried out many series of comparisons. During 32 successive ship-routeings to Canada in winter-time an average of 19 hours was saved on each crossing. Another investigation on 200 routeings for Atlantic crossings bound for Canada in the cold season yielded an average gain of 10½ hours. As regards the general selection of route (north or south around Britain) 77 per cent of recommendations were correct. All these voyages, i.e. the determination of real course of least-time track, were checked by means of actual sea-condition maps and ship-speed reduction tables. However, all these gains and saved hours should not be given great importance because the results are greatly dependent on the definition of the route with which the comparison was made. We do not usually know which route the shipmaster would have taken without any routeing advice. Apart from this, not all recommendations are prepared as least-time tracks because shipmasters demand safety first or wish to sail around fog areas or to meet no waves above a certain height rather than make a fast crossing. Although in all these cases the routeing advice may be correct, the time saved is less than the maximum possible on an optimum route. As a consequence the evaluated total of hours saved is somewhat reduced.

Therefore it is useful to analyse routed voyages by using different criteria. The latest evaluation was made in Hamburg for 31 successive crossings to North and Central America last January. Firstly, steaming time on the recommended route was compared with that on the great-circle alternative route. It was shown that 7 hours were saved, on average, for each crossing but in some cases 20 or 60 hours were saved. However, a loss of 55 hours must be taken into account as well. But in the latter case a smooth voyage was required, not a fast one. Secondly, the recommended route was compared with the optimum alternative route, with a resultant saving of 5 hours which is less than in the first evaluation. Thirdly, the recommended route was compared with the normal alternative route; the gain was 10 hours. In January a shipmaster without any routeing advice will probably choose the normal Channel route. The recommended routes, compared with those via the Channel, resulted in an average gain of 17 hours for each crossing. If the recommended route is also the optimum one the difference in steaming time is 0.

The methods used

The adviser tries to obtain an idea of the predominating circulation over the northern North Atlantic and its changes. He uses upper-air forecasts for the North Atlantic issued by Offenbach and those for the North Pacific transmitted by Washington. He estimates the development of the circulation for a further 3 days ahead. Thus he obtains a weather picture for about 6 days ahead. He uses climatological data and the latest reports on ice conditions near Newfoundland, on fog areas near the coasts of North America and the English Channel. He takes into account ocean currents and the Gulf Stream, and ice accretion on ships near American coasts in winter-time. He also has to consider the requirements of shipping authorities such as security, loading conditions, cargo and freeboard limits.

Some preparatory aids for selecting routes are being developed. For example, for a special type of weather circulation the distribution of optimum routes was constructed. In one case a large anticyclone had remained almost stationary south-west of Great Britain whilst depressions were running from the south-east of Newfoundland to Iceland and thence to southern Scandinavia. For all these typical situations in winter-time over the past 10 years optimum routes have been drawn. For example, the belt of routes between the Scilly Isles and Cape Race is very narrow. So the probability is great that in a special case of this type the optimum route will run near the great circle. On the other hand, on a voyage between Pentland Firth and Cape Race a great many routes run south of a great-circle course. So with this circulation it is advisable that ships should take a course south of the great circle.

A statistical evaluation of all these routes shows that on southern routes to Belle Isle 5 hours are saved, to Cape Race 8 hours, and to the position 42°N, 50′W (to which the distance south and north around Britain is equal) 13 hours are saved, compared with routes north around Scotland. Thus we can decide which route should be selected in this type of circulation.

When we know the general route and the direction of deviation from a great-circle course, we must determine how much further to go north or south. To solve this problem a series of detour maps has been plotted by means of electronic computer. The distance between every grid point of latitude and longitude degree across the Atlantic Ocean and the Scilly Isles, Pentland Firth and many American ports respectively has been calculated as well as difference from great-circle distances between the Scillies, Pentland and American destination points. Using this basic material, lines of equal detour from great circles were drawn. They are spherical ellipses, and the foci lie on the end points of a great circle. The maps also show the relation between mean wind speed and mean wave heights on routes between Britain and Newfoundland. One hundred crossings were evaluated. Estimated wind-speed differences on various courses resulted in wave-height differences which were then converted into ship-speed reduction for a particular vessel. This term can be expressed as approximate distance and gives an estimation of the economy of the detour.

Determining optimum tracks for west-bound ships is easier than for east-going vessels. For vessels sailing from Europe to North America the decisive days for the ship-router are on the first part of the voyage. However, it is quite the contrary for east-bound ships. Therefore we mainly give routeing recommendations for west-bound ships. Change of course and sailing advice to the shipmaster during the crossing are not regularly transmitted. This short-range weather navigation is mainly left to the Captain who has facsimile weather charts and ocean-wave analyses to refer to and can generally estimate the behaviour of his ship in sea and swell, considering the loading and other factors, much better than an adviser ashore. Apart from this it has been proved by investigation that in many cases essential deviations from the proposed strategic course do not lead to an approximation to the optimum route. Improvement may be realized only by sailing round relatively small storm belts or fog areas.

Routeing recommendations for Atlantic shipping have been issued by the Seewetteramt, Hamburg since 1959. At first the advice was only given on a trial basis and confined to voyages to Canadian ports. There was a remarkable increase in recommendations in 1966. In 1969 the total number of recommendations amounted to 350. Most of these were for ships bound for the American east coast. A considerable number were for vessels bound for Canada and the fewest were for the Gulf of Mexico or ports on the Pacific coast.

551.5:629.12

Optimal Routeing of Ships

By W. D. Moens
(Chief, Routeing Service, Royal Netherlands Meteorological Institute)

In general, one can say that there are two methods of weather routeing of ships. The first method I would call 'climatological routeing'. It uses climatological information about wind, currents, wave height and direction. The data have been compiled for many years for ocean areas and are made available to users via atlases, books, etc.

One may say that climatological routeing will be definitely very successful in ocean areas where the weather and wave conditions are in a settled state for a long time, mainly within the tropics when there are no tropical revolving storms in the region. The routes recommended in the well-known handbook *Ocean Passages of the World* are also based on climatological data.

From experience, however, we know that outside the tropics the difference between the present weather and the climatological conditions can be quite considerable in certain periods. Better weather will not necessarily be encountered on a climatologically-favourable southerly route in the northern hemisphere. For instance, the weather in the Atlantic near the Azores can be much worse over there than at higher latitudes at the same time.

Using actual wave and weather charts together with prognostic computed 500-mb surface and wave charts for up to 72 and 96 hours ahead for recommending a specific route is nowadays called 'weather routeing' or 'optimal routeing', or 'minimal-time routeing', or 'least-time routeing'. In my country we use the term 'tactical routeing'. Later I will explain why we call it tactical routeing.

Weather routeing is generally most effective on westerly or easterly ocean crossings outside the tropics. Accordingly there are five areas: (*a*) the North Atlantic, (*b*) the North Pacific, (*c*) the South Indian Ocean, (*d*) the South Atlantic Ocean and (*e*) the South Pacific Ocean.

In practice, meteorological bureaux specializing in weather routeing only issue recommendations for three of them, namely the North Atlantic, the North Pacific and South Indian Ocean.

Our weather-routeing bureau, specializing in weather routeing on the North Atlantic, was set up on an experimental basis in 1960 in close collaboration with the Holland-America Line. This has gradually become a regular service and route recommendations and meteorological guidance is given to ships of all nationalities wishing to cross the North Atlantic in either direction. Ships under Swedish, Norwegian, Danish, British, German, French, Italian and Dutch flags are regularly routed by our service.

There are seven maritime meteorologists working in the bureau, each of whom holds a Master's certificate. For when the routeing service was first set up everybody agreed that whoever issues a route recommendation or gives a ship guidance should be fully acquainted with procedures on board, understand all the jargon, speak it and be capable of interpreting it.

The cost for the routeing service amounts to 300 Dutch florins (about £40) per crossing by subscription and 325 Dutch florins (about £43) per odd crossing. Telegram costs are excluded; they vary between £6 in summer and about £12 in winter. For these charges we render the following service:

(*a*) Advice on the tactical route to be followed, information on the meteorological conditions which led to the advised tactical route and a wave forecast for the first 48 hours along the route. When the ship carries a specially heavy deck cargo and when she is leaving from Rotterdam or Amsterdam the routeing officer usually goes on board and does the briefing with the captain.

(*b*) At intervals of at least two days a new forecast of the wave conditions (heights and directions) along the route for the next 48 hours.
(*c*) Deviation of the advised tactical route if the meteorological conditions along the first advised route become unfavourable.
(*d*) Information about icebergs and, if the master wishes, advice regarding the best route to avoid coming too close to tropical cyclones.
(*e*) A hindcast of the wave conditions which occurred at sea during the crossing and a comparison in crossing time of the hindcast computed optimal route, tactical route and a standard route with the great circle. From the hindcast the master and shipowner can see how successful the routeing has been.

When I spoke about recommended routes I used the word 'tactical' not 'optimal'. I did this deliberately because I do not think it is yet possible for any of us to select a real optimal route for the whole crossing prior to departure. What you really need to route a ship over the North Atlantic optimally is an accurate forecast of the wind speed and direction, sea wave and swell conditions for a week to ten days ahead, which is the normal crossing time over the Atlantic, plus an accurate speed-performance curve of the ship at sea. At the present time we can only hope to be able to do real optimal routeing some time in the future. We have to manage with a good deal less at the moment.

The same thing applies to the speed performance of a ship. Today, in my country, we use curves which resemble ellipses with the ship situated in one of the foci. The ellipses can easily be used when you compute the tactical route numerically. We are not yet doing this on a fully operational basis. The final advice is still checked by the routeing officer manually.

Shipowners and masters always ask us, "Are your recommendations of any benefit to the ships to which they are given?" I am glad to say they are, although they are not spectacular from a meteorological point of view. It is not possible for us to tell a shipowner what his real profits are when he has his ships regularly routed because we do not know anything about damage to ships due to bad weather, the yearly amount of claims which had to be paid before the ship was routed, the penalty which has to be paid to shippers because the ship is not on schedule, etc.

Our results are calculated as follows. After completion of the crossing the route is always evaluated. An evaluation involves:

(*a*) Preparing a graph showing the optimal route (minimal time route) made up from the actual wave analysis charts of 0001 and 1200 GMT during the crossing. The wave analysis charts are made up daily by the routeing service.
(*b*) Calculating the differences between the duration of the actual voyage, the great circle and of one or more standard routes, and the optimal route.
(*c*) Calculating the time the ship remained among waves of a certain height and the angle of approach to the waves on each of the alternative routes.
(*d*) Calculating the detours made by the alternative routes compared with the geographically shortest route, taking the average anticipated displacement of the vessel by surface currents into consideration; (detours are expressed in nautical miles).

Calculation of a large number of crossings from Europe to the Panama Canal shows that the average profit in time of the tactical route compared with the great circle was 4·3 hours; the average optimal gain could have been 6·2 hours.

For the route from Europe to the Gulf of Mexico the average profit in time of the tactical route compared with the great circle was 3·4 hours; the average optimal gain could have been 7·0 hours.

For the route Europe–Charleston, the crossing time of the tactical route was equal to the great circle; the average optimal gain could have been 3·2 hours.

For the route Europe–Bermuda, the average profit in time of the tactical route was 1·5 hours; it could have been 5·8 hours.

For the route Europe–New York the tactical route also equals the great circle; the average optimal gain could have been 3 hours.

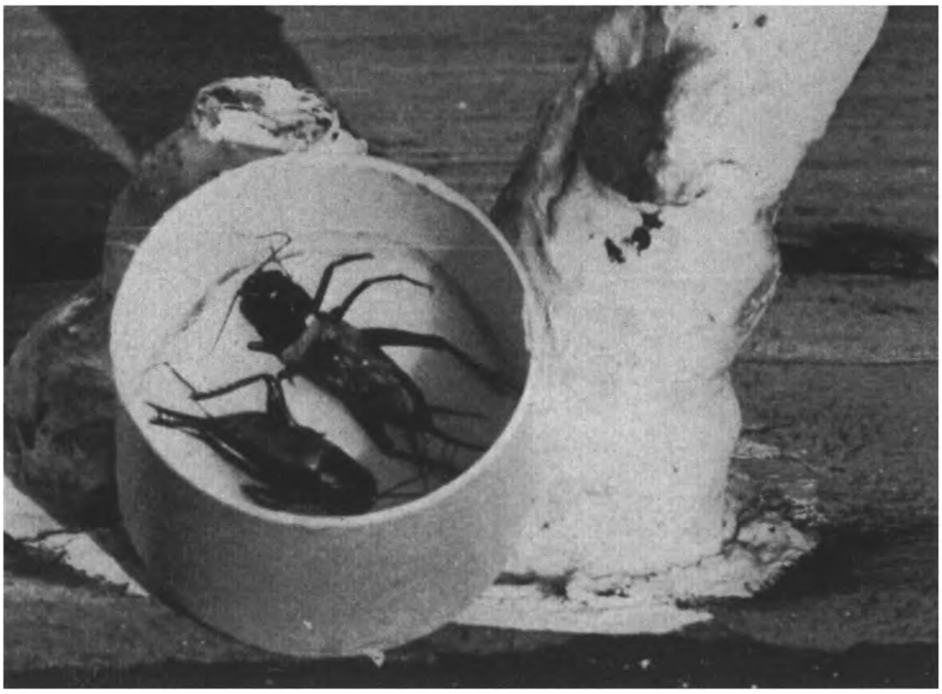
You will note that our average profits are not spectacular. It is my view that this is not the most important item of weather routeing. To my knowledge it is more important for shipowners, especially nowadays with the very specialized ships which are used, to know that the ships leave and arrive on schedule.

I can give you a very striking example about schedules. Last January we were approached by a chartering agent who runs a shipping line with four ships, tonnage about 2,500 tons, between Europe and Boston, Massachusetts. The agent told us that in the previous month it had sometimes taken the ships 15 and even 20 days to cover the voyage from Antwerp to Boston instead of the normal 11 days. We were asked to route the ships to the U.S.A. and back. Since that time no voyage has lasted longer than 12 days, the ships are always on schedule, but we never calculate a profit of more than 10 hours. I am telling you this to show how relative a calculation of a profit in time is. There is, however, something which you cannot calculate: how the master would have chosen his route and what his route would actually have been if he were not routed.

During our 10 years' experience with routeing of ships across the North Atlantic we did something else beside weather routeing. We have changed the attitudes of mind of the masters towards crossing the North Atlantic Ocean. They had been taught by their masters when they were mates (and this went on for generations) that it was a horrible thing to sail over the North Atlantic north of the rhumb line from Bishop Rock to 42°N, 50°W. North of this line the weather was so bad that it was out of the question to deviate to the north. When bad weather occurred during the trip in winter you could do only one thing: deviate to the south. There were not many masters who had actually sailed the great circle from Bishop Rock to Cape Race.

This attitude has changed completely. When a ship is bound even for the Gulf of Mexico in winter-time with a heavy deck cargo and the routeing officer advises the master to deviate to the north after Fastnet, sight Cape Race, thence to Florida, the master is convinced that this is the best route in the circumstances and he will follow the advice. But I can assure you that it takes you many years of operational experience even for the routeing officers to issue this advice.

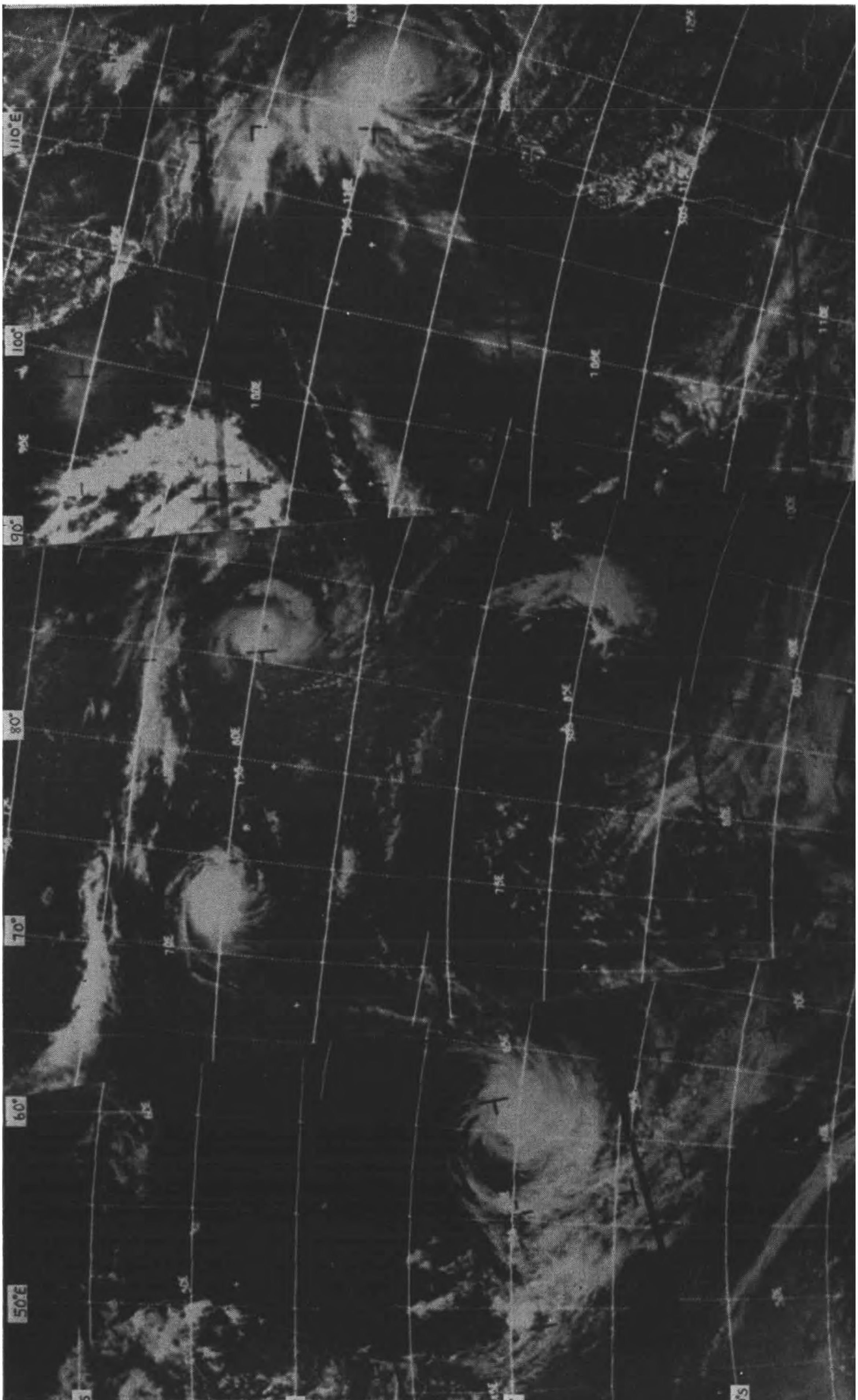
Gentlemen, those are some of the practical aspects of routeing; there is more in it than meets the eye.



African crickets (*Gryllus bimaculatus*) caught on board the *Hurunui* on 5th January 1970 (*see* page 16).

Orographic cloud over Table Mountain at 0800 GMT on 31st March 1970, photographed by Mr. P. R. Dyson, 2nd Officer on the *Cape York*, as the vessel approached Cape Town. (The very first photograph published in Vol. 1, No. 1 of *The Marine Observer* in 1924 was also of the 'table cloth' on Table Mountain).

(*Opposite page* 33)



ESSA 9 captures four cyclones raging in the South Indian Ocean on 13th February 1970 (*see* details on page 35 at the end of Mr. Davy's article).

551.515.

The Cyclones of January, February and March 1970 in the S.W. Indian Ocean*

By E. G. Davy

(Director, Meteorological Services, Mauritius)

The 1969–70 cyclone season has been an active one with several cyclones, at some time in their life, following a westerly track between latitudes 15° and 20°s just to the north of the Mascarene Islands [Mauritius, Rodrigues and Réunion]. By mid-February the tenth depression of the season had been named in the south-west Indian Ocean and in the early part of that month there were as many as four co-existing active centres scattered across the Indian Ocean at distances of about 1,000 miles apart—Iseult and Jane in the Mauritian region of responsibility and Judy and Ingrid in the Australian one (*see* photograph opposite this page). While the first and third of these were of consequence only to ships at sea, Jane wreaked havoc in southern Madagascar whilst Ingrid caused much loss in north-western Australia. During January, February and March there were seven tropical depressions in the south-west Indian Ocean; four of these were of immediate interest to Mauritius (see Fig. 1).

Tropical depression Hermine formed only about 600 miles north-east of Mauritius on 22nd January and moved rapidly south-west, then approximately west, before becoming almost stationary 250 miles north-west of the island. In the early morning on the 25th it started moving south-south-east to pass not far west of Île de la Réunion and about 150 miles west of Mauritius. As was shown by satellite photographs, Hermine had not developed into a mature cyclone. Réunion recorded the highest gust of 78 m.p.h. which was of the same order as the 77 m.p.h. at Mon Désert-Alma and 75 m.p.h. at Plaisance in Mauritius 100 miles further away from the centre. As is usual in the mountains of Réunion the depression gave very heavy rainfall which caused considerable damage.

Although 150 miles from the centre, Mauritius was covered by the 'tail' cloud band from the typical comma-shaped cloud mass of an immature cyclone. In most coastal areas rainfall in the four days 22nd to 25th January was about 5 inches and falls were twice as much on higher ground. The northerly winds caused some damage to plantations, mainly on the leeward side of mountains. There is increasing evidence from data accumulating in Mauritius to show that the highest gusts are associated with the turbulence caused on the sides and in the lee of mountains. Moreover, it is the gusts combined with continuous changes in wind direction in turbulent conditions which put stresses and strains on plant structures and cause the damage. Such turbulent conditions are very localized over small areas which differ from cyclone to cyclone with the various wind directions.

Cyclone Iseult was shown on satellite photographs to have the concentric mass of cloud bands typical of a mature intense cyclone with the clear eye of the central calm clearly visible. This cyclone had a trajectory for which no analogue is found in the records of the Mauritius Meteorological Service. It formed rather far south, between latitudes 17° and 18°s, and then for seven days, from 3rd to 10th February, moved directly westwards at moderate speed. On the night of the 10th/11th, when 200 miles north-east of Mauritius, it turned abruptly through a right angle to take up a rapid southerly movement during the next three days. Whilst passing about 125 miles east of Mauritius, Iseult was an intense cyclone in which ships were suffering hurricane winds but Mauritius was sufficiently far away in the 'navigable'

* Adapted from an article in *la Revue Agricole et Sucrière de l'Île Maurice*, Vol. 49, 1970, pp. 11–14, by kind permission of the author.

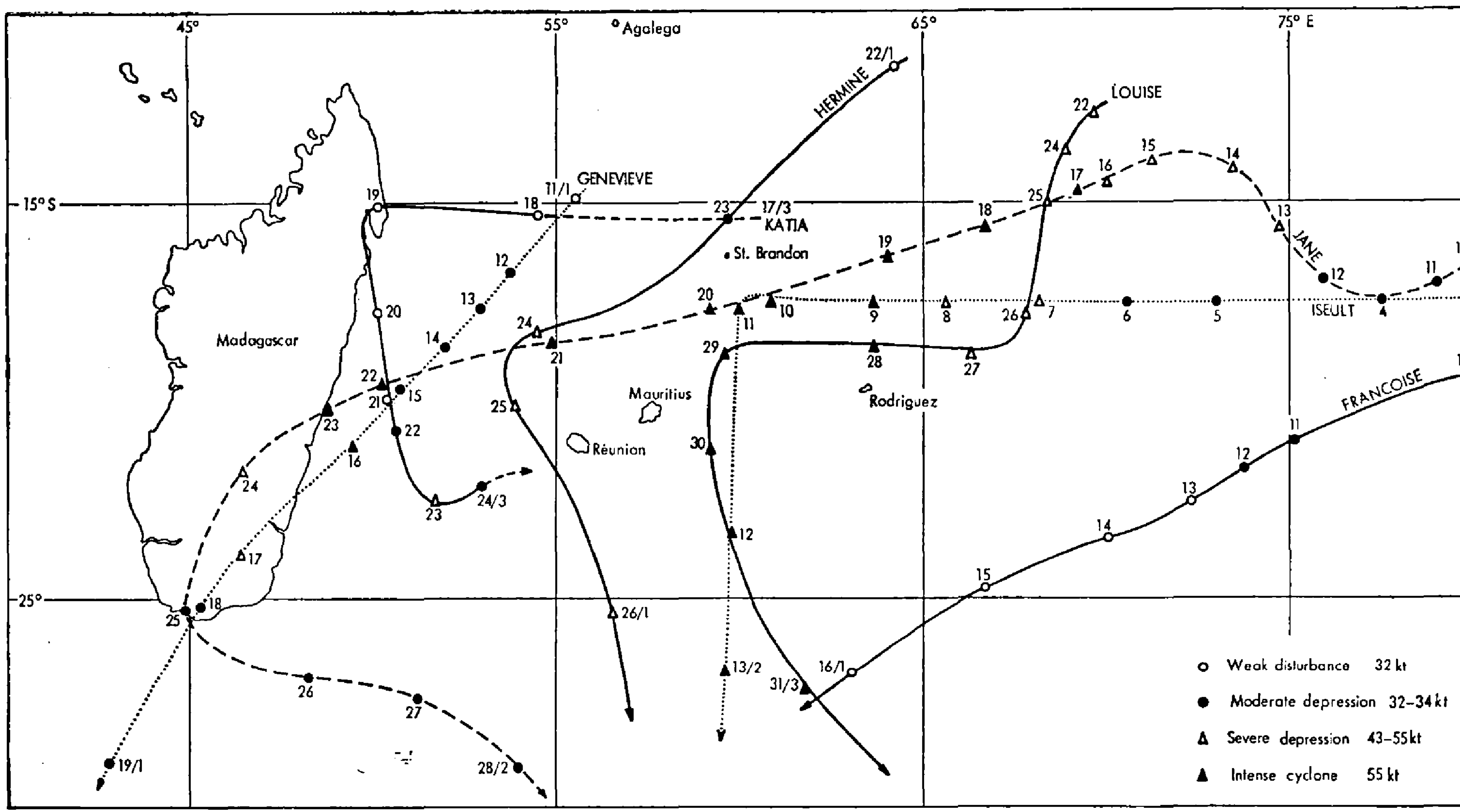


Fig. 1. The cyclones of January–March 1970.

quadrant to escape its violence; the highest gusts were between 35 and 40 m.p.h. generally and rainfall did not exceed 1 inch.

Cyclone Jane, moving west-south-west, also came into that dangerous position which lies 100–200 miles north-north-east of Mauritius. On the morning of 20th February it was too late for a recurve to the south. The best that could be hoped for was a continued westward movement which would take the centre about 75 miles to the north of the island, giving very strong but not violent winds. Fortunately for Mauritius and Réunion the earlier track continued more or less unchanged; in fact there was a very slight tendency nearer to the west which kept the centre some 20 miles or so further to the north at a distance of nearly 100 miles from Mauritius. Our installations suffered only slightly and, although sugar cane was considerably damaged in some localities in turbulent winds near hills, the loss over the islands as a whole was slight. The highest gusts were 94 m.p.h. at Medine, 82 m.p.h. at Fort William and 65–75 m.p.h. at the five stations St. Antoine, Pamplemousses, Mon Désert-Alma, Bigara and Vacoas. To the east and south the gusts were considerably less, with 50–60 m.p.h. at Union Flacq and Plaisance. Near the coast rainfall hardly reached 1 inch while on higher ground about 3 inches was recorded. Going on westwards beyond the point at which it could recurve on to the Mascarenes, Jane hit the east coast of Madagascar about 140 miles south of Tamatave with full force on 23rd February before turning southwards down the centre of southern Madagascar. Reports have been received of winds reaching 100 m.p.h. with torrential rain which caused 20 deaths, made thousands homeless and left broken communications and heavy damage. Leaving the southern tip of Madagascar on the 25th, Jane turned sharply east-south-east and on the 27th and 28th, when 600 miles south of the Mascarenes, gave us unsettled weather with north-westerly winds. On 2nd March Jane was still distinguishable as a temperate-latitude extra-tropical depression. In the 23 days of its existence, from 9th February to 2nd March, depression Jane travelled over 4,000 miles.

Depression Katia never developed fully into a mature cyclone and approached the Mascarenes only after it had degenerated almost completely into a weak, rainy depression whilst drifting slowly north-eastwards.

Both Rodriguez and Mauritius were unfortunate in being appreciably affected by Louise which, from 22nd to 26th March, moved as a severe cyclone in a southerly direction and, on an average trajectory, should have passed well east of Rodriguez. However, on the 26th and 27th Louise intensified and turned abruptly on to a direct westerly track which brought it within 80 miles to the north of Rodriguez on the 28th. Gusts of 90 m.p.h. near Port Mathurin and of 102 m.p.h. at Marechal were registered and, although there was little damage to buildings and installations, an estimated 75 per cent of the almost-mature maize crop was destroyed. On the 29th cyclone Louise, when about 100 miles north-east of Mauritius, made an abrupt turn south and passed to the east of Mauritius at a distance of 90 miles. Almost all parts of the island suffered gusts of 80–90 m.p.h. during that period on Easter Sunday when the wind changed direction from south-east to west-south-west. The sugar cane was in an advanced and luxuriant state of growth and the change of direction of strong winds caused appreciable damage which is currently estimated at 15–25 per cent of the crop. The telephone and electricity distribution networks also suffered appreciable disruption.

Communities on both Mauritius and Rodriguez have lost a considerable part of the almost matured crops on which their economy so largely depends and Mauritius has had more than its share of cyclone activity. On the other hand, Mauritius could have suffered much more violent cyclonic conditions if either Iseult or Louise had curved southwards only 12 hours later than they did.

Editor's note. The photograph opposite page 33 is a composite from three consecutive orbits on 13th February 1970 of ESSA 9 weather satellite (original pictures supplied by N.E.S.C., Washington D.C., U.S.A.). Cyclone Iseult is located about 700 miles south-east of Madagascar while Jane is in 15°S, 73°E. Cyclone Judy, in about 15°S, 87°E, soon recurved southwards and dissipated in about 35°S. The fourth cyclone in the picture is Ingrid which recurved in about 112°E and caused considerable damage over Western Australia.

The clockwise circulation of these southern hemisphere storms is well marked and the eye of cyclone Judy in 87°E is clearly visible.

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM JULY TO SEPTEMBER 1970

JULY

The low pressure area over the Arctic Basin was replaced by the normal anticyclone. Low pressure became established over the Norwegian Sea, resulting in southerly winds over the Barents Sea where a large ice deficit persisted, and over eastern Canada where there were generally excessive ice conditions over areas north of 55°N. The ice limits at the end of the month are shown on the map on page 38.

Canadian Arctic Archipelago and Baffin Bay. Winds from a northerly point maintained an excess in the north, particularly Lancaster Sound, whereas in the south-west a deficit existed due to winds from a southerly point.

Foxe Basin, Hudson Bay and Strait. Air temperature fell to around 3 degC below normal and generally excessive ice conditions prevailed, though there was a slight deficit in Foxe Basin.

Davis Strait, Labrador Sea and Grand Banks. Ice conditions over the Davis Strait were near normal. An initial excess over the Labrador Sea was reduced by south-westerly winds and this area was almost free of pack-ice by the end of the month. July is normally the last month of the iceberg season over the Grand Banks. At the end of the month 25–30 icebergs were counted between 46° and 50°N, westward of 45°W.

Greenland Sea and South-east Greenland. Light to moderate north-easterly winds prevailed over the region and air temperatures were near normal in the north but up to 2 degC below in the south. An ice deficit persisted in the north, where the ice edge was about 40 miles back from normal, and in the Denmark Strait although there was an excess southward of the Strait where the normal concentration is very open pack-ice at this time.

Barents Sea. A large deficit persisted, due largely to moderate southerly winds, and by the end of the month this region was almost clear of ice.

AUGUST

High pressure areas over the Beaufort and Barents Seas and central Greenland resulted in light and variable winds over most regions. Once more the main ice excesses were located to the west of Greenland while the main deficits occurred to the east.

Canadian Arctic Archipelago. Excessive ice conditions persisted in the east, mainly due to cold northerly winds. Fast-ice in Lancaster Sound broke to very close pack early in the month (the Sound is usually ice-free at this time), later becoming mostly open water as the northerlies were replaced by winds from a southerly point. The remainder of the Parry Channel, westward of about 92°W, was covered by close pack-ice except for a 20-mile-wide lead off the north coast of Banks Island. At the end of the month open pack-ice covered the northern half of Prince of Wales Strait while open water prevailed to the south, linking with a large open-water area extending from the south-east corner of the Beaufort Sea, through Amundsen, Coronation and Queen Maud Gulfs into the Victoria Strait. Close pack-ice covered the McClintock Channel. In the south-western part of the area there was a little less ice than normal.

Foxe Basin, Hudson Bay and Strait. At the end of the month the southern half of Foxe Basin was almost ice-free; a slight deficit persisted in this area. At this time Hudson Bay and Strait were ice-free, the clearance occurring two to three weeks later than normal.

Baffin Bay and Davis Strait. An area of open and close pack-ice covered the region southward of 74½°N, roughly between 60° and 67°W, enclosing the coast of Baffin Island between Cape Henry Kater and near Brevoort Island. Though there was much more ice than normal, the excess was not as large as in the extremely bad summer of 1965. The southernmost limit of icebergs off the Labrador coast was reported as the northern end of the Belle Isle Strait.

Table 1. Icebergs sighted by aircraft and merchant ships within latitudes 40°N–65°N and longitudes 40°W–65°W

(This does not include growlers or radar echoes)

Limits of Latitude and Longitude		Degrees North and West												
		66	64	62	60	58	56	54	52	50	48	46	44	42
Number of bergs reported south of limit	July	> 318	> 318	> 275	> 226	> 223	> 216	> 196	> 59	> 49	> 3	0	0	0
	Aug.	> 48	> 47	> 47	> 47	> 47	> 47	> 45	> 13	5	0	0	0	0
	Sept.	40	40	40	22	22	22	21	2	0	0	0	0	0
	Total	> 406	> 405	> 362	> 295	> 292	> 285	> 262	> 74	> 54	> 3	0	0	0
Number of bergs reported east of limit	July	> 318	> 318	> 318	> 318	> 312	> 312	> 167	> 130	> 78	> 55	> 45	> 45	8
	Aug.	> 48	> 48	> 48	> 48	> 48	> 48	> 15	> 6	> 3	0	0	0	0
	Sept.	40	40	40	40	40	40	32	27	19	19	0	0	0
	Total	> 406	> 406	> 406	> 406	> 400	> 400	> 214	> 163	> 100	> 74	> 45	> 45	8
Extreme southern limit	July	46° 30′N, 47° 30′W on 1.7.70												
	Aug.	48° 44′N, 53° 54′W on 1.8.70												
	Sept.	50° 55′N, 47° 21′W on 5.9.70												
Extreme eastern limit	July	61° 31′N, 41° 06′W on 4.7.70												
	Aug.	49° 33′N, 48° 12′W on 11.8.70												
	Sept.	60° 12′N, 47° 00′W on 20.9.70												

> ('greater than') has been inserted where there is some doubt as to the actual number of icebergs at some of the sightings, but the true value is probably greater than the value given.
Extreme limits during the 3-month period are underlined.

At this latitude the eastern limit was 50°W. A little close pack-ice remained at the head of Melville Bight where, exceptionally, there were reports of new ice at the end of the month. On the western side of the Davis Strait, off south-west Greenland, excessive conditions existed early, but by the end of the month this area was ice-free.

Greenland Sea and South-east Greenland. After almost four months with ice deficits, sometimes extreme, an excess became established during the month over the Greenland Sea northward of about Scoresby Sund. This increase was not due to the effect of wind as the northerlies were much lighter than normal and were sometimes replaced by southerlies. The most probable explanation is that the pack-ice within the Arctic had become more broken during the summer, allowing the ice floes greater mobility, resulting in an increased volume of ice in the East Greenland Current. At the end of the month the edge of close pack-ice lay from 80½°N at 10°E, south-west to Kap Hodgson. Though this edge was only a little further east than normal, it extended much further south; normally there is only very open or open pack-ice south of 76°N at this time. Southward of Kap Hodgson a narrow belt of very open pack-ice persisted along the coast as far as Tingmiarmiut Fjord.

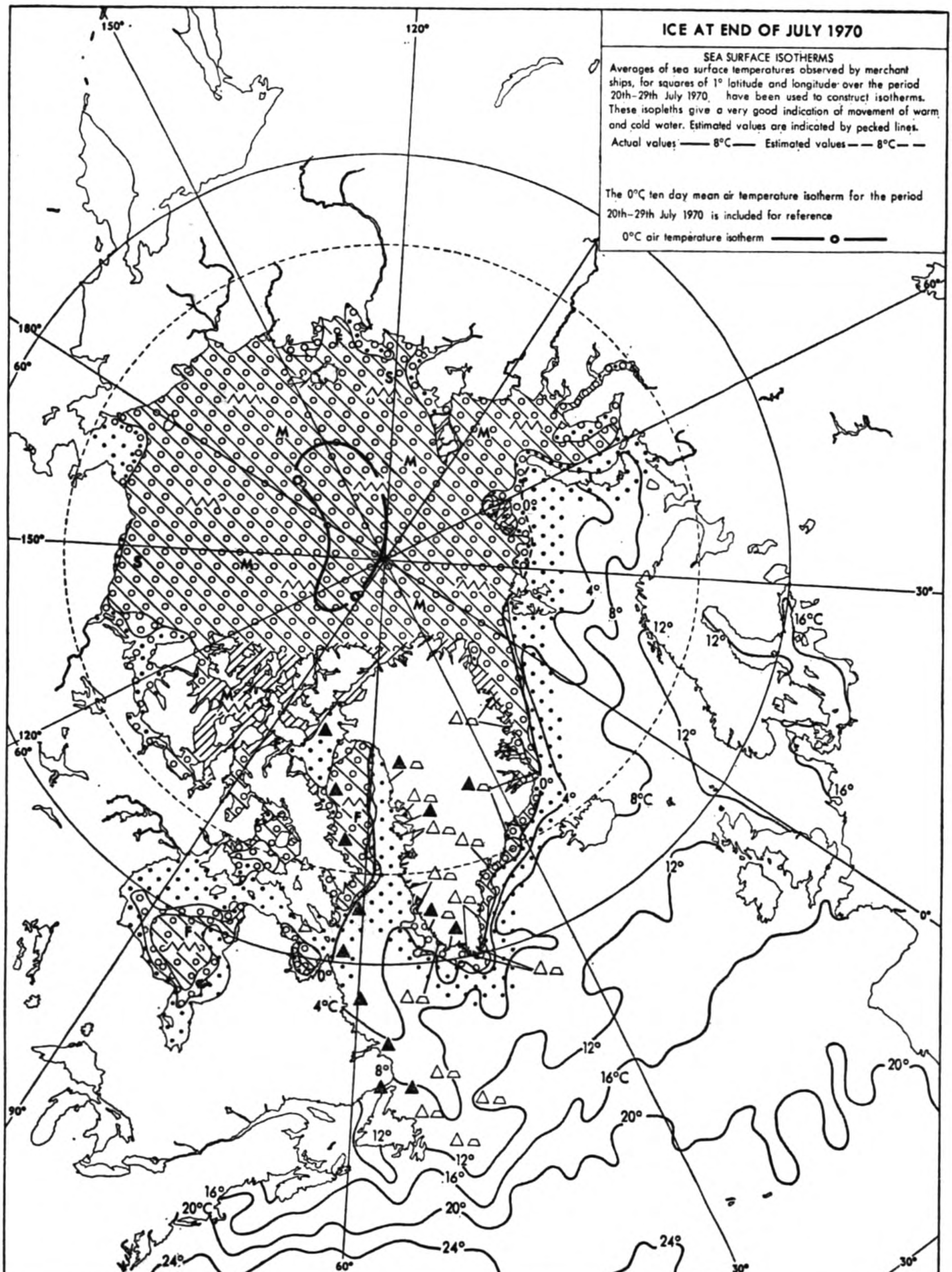
Barents Sea. Apart from a small tongue of close pack-ice extending southward to about 79½°N at 40°E and some very open pack along 80°N on either side of this tongue, this sea was completely clear of ice for the whole month. The ice deficit in this area persisted into its sixth month as southerly winds continued. However, towards the end of the month, these winds were replaced by north-westerlies and there were signs of a return to near-normal ice conditions in this area.

September

Pressure was unusually low over the greater part of the area, the main depressions occurring in a belt from Foxe Basin to the North-Western Approaches. As a result, in most ice areas the winds were light and variable and temperatures were generally close to, or a little above normal. This month sees the advent of winter in the far north and new freezing occurred in parts of the Canadian Arctic and Baffin Bay, off north-east Greenland and in the far north of the Barents Sea.

Canadian Arctic Archipelago. Winds were light and variable and, as a result, temperatures were about 2 degC above normal. Though new ice was forming over many northern districts there was an overall slight ice deficit over the area. Close pack-ice covered the greater part of the Parry and McClintock Channels, westward of 100°W, and most of the Gulf of Boothia. Very open pack and new ice occurred over the remainder of the Parry Channel westward of 90°W and between 80° and 85°W.

Foxe Basin. The ice situation here was near normal. At the end of the month a few patches of very open pack-ice remained against west-facing coasts.



- Open water
- Lead
- Polynya
- New or degenerate ice
- Very open pack-ice (1/10–3/10 inc.)
- Open pack-ice (4/10–6/10 inc.)
- Close, very close or consolidated pack-ice (7/10–10/10)
- Land-fast (10/10) (no open water)
- Ridged ice
- Rafted ice
- Puddled ice
- Hummocked ice

(The symbols for hummocked and ridged ice etc., are superimposed on those giving concentration)

- N New ice or Nilas
- P Pancake
- Y Young ice
- F First-year ice
- S Second-year ice
- M Multi-year ice
- △ Few bergs (<20)
- ▲ Many bergs (>20)
- Few growlers (<100)
- Many growlers (>100)
- Cracks
- Radar target (probable ice)
- Radar boundary
- Known boundary
- Assumed boundary

Note:- The plotted symbols indicate predominating conditions within the given boundary. Data represented by shading with no boundary are estimated

Baffin Bay and Davis Strait. Air and sea temperatures persisted at about 1 degc below normal in the west and a belt of very open pack-ice on the western side of the Bay survived the summer melt, new freezing occurring around the older ice towards the end of the month. This belt, about 60–100 miles wide, lay roughly along 65°W, from 74°N to 69°N, then bulged eastwards to 59½°W in rounding Cape Dyer before continuing southward along 63°W to 64°N. A narrow coastal belt of close pack-ice from Kangeeak Point around Cape Dyer to 66°N was enclosed by the area of very open pack-ice.

In the far north a belt of very open pack and new ice extended northwards along the east coasts of Devon and Ellesmere Islands to meet the western end of the edge of close pack-ice bridging Smith Sound from Cape Combermere to Kap Alexander. New ice occurred in bays and inlets southward of the latter cape and in a coastal belt about 30 miles wide, containing some open pack-ice, extending from Kap Parry, round Kap York and across Melville Bight to just north of Nugssuaq.

Southward of the west Baffin Bay icefield all sea areas were ice-free apart from a few icebergs drifting southward in the Labrador Current to about the latitude of the Belle Isle Strait.

Greenland Sea. The excess in this region continued through the month. The edge of close pack-ice lying from the northern extremity of Svalbard to 80°N at 10°E, gently undulated south-westward to meet the coast of Greenland near Kap Brewster. New ice and open pack-ice filled and enclosed the indented coastline northward of this cape to Skoerfjorden. The main ice edge was 50 miles south-east of normal in the north; an excess also prevailed around Scoresby Sund; elsewhere the ice situation was near normal.

Barents Sea. After a period of below-average temperatures in the north-west when the edge of close pack-ice advanced to 78½°N on the eastern side of Spitsbergen, light southerly winds became established, resulting in a recovery of air temperature to near normal (sea temperatures persisted around 2 degc above normal) and the edge of close pack-ice retreated northward of 80°N. The edge of very open pack-ice lay along 79°N, while open pack-ice and new ice enclosed Zemlya Frantsa Iosifa. The long-lasting ice deficit persisted though at the end of the month the ice situation was only a little below normal.

R. M. S.

Note. The notes in this article are based on information plotted on ice charts similar to the map shown opposite but on a much larger scale (39 in × 27 in). These charts are published at ten-day intervals and are available at the price of reproduction on application to the Director-General, Meteorological Office (Met.O.10a, D.W.R.), London Road, Bracknell, Berks. Alternatively, they may be seen at any Port Meteorological Office or Merchant Navy Agency. Up-to-date ice charts are broadcast daily by facsimile.

With effect from the July map shown in this number, the isopleths of degree days will be omitted in order that the ice information presented shall be more easily understood.

AUSTRALIAN EXCELLENCE AWARDS

(From the Director of Meteorology, Commonwealth Bureau of Meteorology, Australia)

The following ships and ships' officers were selected to receive Excellence Awards for 1968:

SHIP AWARDS

m.v. *Island Chief*, China Navigation Co. Ltd.
m.v. *Barpeta*, British India S.N. Co. Ltd.
m.v. *Iron Flinders*, Broken Hill Pty. Co. Ltd.

PERSONAL AWARDS

Captain J. Wilby	m.v. *Island Chief*, China Navigation Co. Ltd.
Mr. J. Mitchell	2nd Officer, m.v. *Montoro*, Burns, Philp & Co. Ltd.
Captain P. H. King	m.v. *Moana Raoi*, The Wholesale Society of Betio, Tarawa, Gilbert and Ellice Islands
Captain L. Myer	m.v. *Wongala*, Tucker Shipping Pty. Co.
Captain J. L. Sutherland	m.v. *Stentor*, Ocean Fleets Ltd.
Mr. G. Hemmings	Radio Operator, m.v. *Rhexenor*, Ocean Fleets Ltd.

Captain R. Marsh	m.v. *Koolama*, Western Australian State Shipping Service
Mr. R. A. Hesser	2nd Officer, m.v. *Woomera*, Associated S.S. Pty. Ltd.
Mr. L. Robinson	Radio Operator, m.v. *Iron Flinders*, Broken Hill Pty. Co. Ltd.

Book Reviews

Handling Small Boats in Heavy Weather, by Frank Robb. 5½ × 8¾ in, pp. 133, *illus.* Adlard Coles Ltd., 3 Upper James Street, Golden Square, London W1R 4BP, 1970. Price 30*s.* (£1·50)

This is a book mainly about survival in small deep-water vessels, sail or power-driven, in storm conditions or worse—wind speeds of 48 knots and above. It is written for owners and/or skippers of small ocean-going boats who are already able to handle their boats competently in weather conditions associated with winds up to gale force. The author is well qualified to give advice on the subject after forty-five years of skippering sailing and motor vessels, mostly in the turbulent waters off the seaboard of southern Africa, interspersed with periods in U.K. waters and the Mediterranean.

This handy-sized and well-produced book contains some clear diagrams and information of real value to the small-boat sailor who has a fair amount of off-shore sailing experience behind him but has yet to encounter anything worse than gale conditions. It would, of course, be foolish to claim that the skill and judgement required to survive an encounter with a hurricane can be learnt from a book, but much of what to avoid certainly can.

The first seven chapters deal with the mechanism of the weather, the instruments necessary to make a simple weather forecast, Buys Ballot's law, the characteristics of 'highs' and 'lows' and useful information about tropical revolving storms, including their seasons. Then follows some good advice on the all-important matter of choosing a cruising hull, rig and fittings. Much has been written on this fascinating subject since Joshua Slocum sailed *Spray* single-handed round the world in 1895–8, a vessel which could hold a course, on or off the wind, without a helmsman or a steering vane. However, few cruising sailors will disagree with Frank Robb's view that the safest (if not the fastest) cruising hull is round-bilge, with generous beam and sweet lines, and that a flush deck is the best form of superstructure in really bad weather.

Some sound advice is given on the subject of human fatigue in a small boat; the danger of this, particularly when sailing single-handed in areas where storms can develop with very little warning, will be readily understood. Fatigue is aptly described by the author as a spell cast over the human mind and body by three wicked witches of the Lack Family working together, namely Lack of Food, Lack of Comfort and Lack of Sleep.

Roller-reefing comes in for some harsh criticism. The author claims that it is inferior on all important counts in the cruising boat to conventional reefing. With roller-reefing now almost standard equipment in modern cruising boats this advice is unlikely to claim many converts although the case made in favour of conventional reefing is most persuasive.

Storm gear and equipment, preparations for weathering a storm, sea anchors, survival after disaster all have a place in this book.

The book has style and although much of the contents will be found in some of the many books written in recent years on the subject of off-shore cruising in small boats it is certainly a useful addition to the library of the cruising sailor and will be enjoyed by all interested in sailing.

A. D. W.

Clouds and Weather, by R. K. Pilsbury. 8 in × 8½ in, pp. 90, *illus.* B. T. Batsford Ltd., 4 Fitzhardinge Street, London, W.1. Price: 25*s*. (£1·25).

The author has assembled together a comprehensive collection of black and white cloud photographs and produced an instructive book on clouds and their associated weather.

The first part of this book lists the main types of clouds, using the latest World Meteorological Organization definitions. This is followed by an easily understood explanation of how the various clouds are formed and the phenomena, such as rain, snow, etc., which accompany them. References to everyday occurrences, such as the steam rising from a kettle, help to give an insight into some of the physical processes involved in the formation of cloud.

The 107 plates of cloud photographs with descriptive notes will greatly assist observers to identify more clearly the various cloud formations. In addition to the more commonly observed clouds there are photographs of jet-stream clouds, condensation trails and the less common distrail, noctilucent clouds and, for good measure, there are delightful photographs of hoar-frost patterns and of rime. Inevitably with black and white photographs, cloud shadows and blue sky are not always easily distinguished. Unhappily some references to the plates are wrongly numbered, e.g. on page 11 the reference to lenticular-shaped clouds (52, 53) should read "(53, 54)".

This book is a welcome addition to the cloud atlas already available to observers on land and aboard ships.

R. G. H.

Personalities

OBITUARY.—We regret to record the death of DR. T. J. HART of the National Institute of Oceanography, well known in ships of the Voluntary Observing Fleet for his comments on their observations of discoloured water.

Thomas John Hart was born in Cambridgeshire in 1907; he was educated at Lady Manners School, Bakewell and in 1929 graduated with first-class honours in Zoology at Leeds University. In the same year he joined Discovery Investigations, a body which was later to grow into the National Institute of Oceanography, and served in R.R.S. *Discovery II* in the Southern Ocean on her first, third and fifth commission (1929–31, 1933–35 and 1937–39). He served also in R.R.S. *William Scoresby* in 1936–37 and in 1950. He obtained the degrees of M.Sc. in 1934 and D.Sc. in 1935.

Although trained as a zoologist he was principally known for his work on phyto-plankton (vegetable plankton) and produced several reports on its occurrence in southern waters.

In 1950 he sailed in R.R.S. *William Scoresby* as Principal Scientist to conduct a survey of the Benguela Current but ill-health forced him to leave the ship at Cape Town at the end of the first part of this project. In 1953, however, he published preliminary accounts of the Benguela Current plankton investigations and the full report was published in 1960 with Mr. R. I. Currie, also of the National Institute of Oceanography, who had remained in the ship. In later years Dr. Hart worked on the skin film diatoms of whales and on discoloured water phenomena, the latter work being based on narratives from ships' meteorological logbooks and samples which had been collected by ships of the Voluntary Observing Fleet. From these sources he contributed papers to *The Marine Observer* in 1959 and 1964, and in 1966 he published a paper "Observations on the relative abundance of marine phytoplankton populations in nature" which brought together much information on the enormous variation in numbers which can occur in natural populations in the sea. The end product of all this work would, of course, be the proper farming of the sea instead of merely hunting in it which had, regrettably, been the practice for so many years.

In the 20 years that we had been sending extracts from ships' meteorological logbooks to Dr. Hart there can have been few, if any, such observations which did not elicit an informed comment from him even though many of the narratives were sketchy and not backed up by the sample which was so necessary for his work. He always picked out one or two of the most interesting observations for *The Marine Observer* and his exhaustive comments on the others are a measure of the way in which he valued them all.

We knew him as a most meticulous scientist, a faithful correspondent and an agreeable companion on the few occasions when we would see him at meetings of the Challenger Society or elsewhere. His colleagues at the National Institute of Oceanography speak of him as a quiet man, with a dry and often penetrating sense of humour, who was always ready to help from his immense store both of knowledge of marine biological literature and of practical experience of the plants and animals in the sea. He was awarded the Polar Medal in 1940 and always took a keen interest in Antarctic affairs.

We shall miss him.

L. B. P.

RETIREMENT.—CAPTAIN A. J. HORT, Commodore of the Union-Castle Line, has retired after 45 years at sea, including command of fourteen cargo and mail ships of the Union-Castle fleet.

Alec James Hort served his apprenticeship with the Glasgow firm H. Hogarth & Sons, joining his first ship *Baron Loudaun* in 1925. After obtaining his 2nd Mate's certificate in 1930 he joined Sir William Reardon Smith & Sons Ltd. the same year and was appointed 3rd Officer of their *Bradesk.*

On obtaining his Master's certificate in 1936 he joined the Union-Castle Line as 4th Officer and served in all ranks to Master in the Mail Service. His first command was the *Rustenburg Castle* in 1954 and he was appointed Commodore of the Company's fleet in 1969.

During 1939–41 Captain Hort served in the Royal Navy as a temporary Lieutenant-Commander R.N.R. and from 1941 to 1943 was First and then Chief Officer of the *Stirling Castle,* at that time employed in carrying troops. Then followed a spell as Master Stevedore at Southampton from 1943 to 1945 which included responsibility for handling much of the equipment and stores for the D-Day landings on the Normandy beaches.

Captain Hort's association with the Meteorological Office goes back to 1937 when he sent us his first meteorological logbook from the *Edinburgh Castle.* In 14 years of weather observing he has sent in 36 meteorological logbooks.

We wish him health and happiness in his retirement to enjoy his hobbies of golf and gardening.

A. D. W.

RETIREMENT.—CAPTAIN W. E. G. OLIVER has recently retired from the sea after 49 years' service.

Walter Ernest Gerald Oliver first went to sea in August 1921 as an apprentice with Manchester Liners, his first ship being the *Manchester Division* on the River Plate trade. After successfully obtaining his 2nd Mate's certificate in 1926 he joined the *Manchester Spinner* in Cardiff—bound for the River Plate again.

In 1927, with a view to gaining more experience and to see new horizons, Captain Oliver left Manchester Liners and joined Kaye, Son & Co. Ltd. of London and later the Silver Line. In 1937 he returned to Manchester Liners after a profitable 10 years' absence. For during the 10 years away from the Liners he passed his 1st Mate's and Master's certificates. His first appointment was 2nd Officer of the *Manchester Spinner*, the ship he had left 10 years previously.

In 1943 Captain Oliver was 2nd Officer of the *Manchester Citizen* when she was torpedoed off the west coast of Africa with the loss of 15 lives. As a result he spent six weeks in Lagos before repatriation. Later the same year he was promoted to Chief Officer and appointed to the then new *Manchester Shipper*.

Promotion to Master came in 1951 when he took command of the ship he had joined 30 years earlier as a first-trip apprentice, the *Manchester Division*. Since then Captain Oliver has commanded a number of the Company's ships, his last command being the *Manchester Renown*.

Our association with Captain Oliver goes back to 1939 when he sent in a logbook from the *Manchester Brigade*. Since then he has sent in 27 logbooks, 6 of which were classed Excellent, and he received an Excellent Award in 1961.

We wish him health and happiness in his retirement.

E. R. P.

RETIREMENT.—CAPTAIN J. P. SMYTHE, D.S.C., R.D. retired on 30th September after 44 years at sea with the Union-Castle Line, except for the war years spent on active service in the Royal Navy.

John Patrick Smythe was born and educated in Johannesburg. After training in H.M.S. *Conway*, followed by six months' training in the Royal Navy as a midshipman R.N.R., he joined the Union-Castle Line as a cadet in 1926. On passing for 2nd Mate in 1928 he was appointed 4th Officer of the *Grantully Castle;* then followed service as 3rd, 2nd and Chief Officer in the Company's cargo ships. He passed for Master in 1935.

On the outbreak of war in 1939 he was serving as Chief Officer of *Rothesay Castle* and as an R.N.R. Officer was immediately called up for service in the Royal Navy and appointed to H.M.S. *King Gruffydd*, a 'Q' ship. Subsequently he commanded H.M.S. *Stonecrop* and *Cam* employed on convoy escort duty in the Western Approaches Command. For his services during this period he was awarded the D.S.C.

After the war Captain Smythe returned to the Union-Castle Line and was appointed Master of the cargo ship *Samsteel* in January 1947. After serving for five years in command of cargo ships he was promoted Master of passenger ships; his first passenger ship command was the *Dunnottar Castle* in 1952. He subsequently commanded the *Kenya Castle* and *Warwick Castle* and, on promotion to Master in the Cape Mail Service, commanded first the *Caernarvon Castle* and later the *Pretoria Castle, Edinburgh Castle* and finally *Pendennis Castle*. A total of 18 years in command of passenger ships is probably a record unequalled by any of his contemporaries in the British Merchant Navy.

Captain Smythe's association with the Meteorological Office goes back to 1937 when he was an observing officer in the *Athlone Castle*. In 11 years of observing he has sent us 27 meteorological logbooks. He received Excellent Awards in 1965 and 1968.

We wish Captain Smythe a long and happy retirement in Jersey, C.I. where he has now made his home.

A. D. W.

THE LIGHTER SIDE

Footnote to a trawler's meteorological logsheet recently received:

Thirty-three obs. done with care and pride
Then I found I'd started
On the wrong bloody side.

We hasten to reassure Skipper Bowman and Radio Officer Hailstones that we easily got these sorted out and

Even an upside-down ob. is much preferred
To no ob. at all, and the worst that is heard,
When one is received, is a four-letter word.

Fleet Lists

Corrections to the list published in the July 1970 number of *The Marine Observer*

Information regarding these corrections is required by 20th October each year. Information for the July lists is required by 20th April each year.

GREAT BRITAIN (Information dated 1.10.70)

The following coasting vessels ('Marid' ships) have been recruited:

NAME OF VESSEL	CAPTAIN	OWNER/MANAGER
Duke of Rothesay	D. O. Griffiths	British Railways Board
Isle of Ely	R. J. Howells	British Railways Board

The following vessels have been delected:
Killingholme, Lancashire Coast, Oliver Bury, Thelma P.

The following skippers and radio operators have been added to the Trawler Fleet List:

SKIPPER	RADIO OPERATOR	TRAWLER OWNER/MANAGER
A. Blenkin	H. G. Pask	T. Hamling & Co. Ltd.
W. Brettell	P. M. Denehy	Newington Trawlers Ltd.
J. Curtis	J. E. Billany	Boston Deep Sea Fisheries Ltd.
R. Ellis	K. Ward	T. Hamling & Co. Ltd.
R. Hutcheon	R. Green	Heward Trawlers Ltd.
A. R. Pedder	J. Brickwood	Hellyer Bros. Ltd.
D. C. Pulfrey	D. Jardine	Gowerοak Ltd.
J. W. Russell	W. Brown	Hellyer Bros. Ltd.
J. Walsham	A. Wilkinson	Firth Steam Trawling Co. Ltd.
E. Wooldridge, Jnr.	D. Walker	Newington Trawlers Ltd.

GREAT BRITAIN—(*contd.*)

The following ships have been recruited as Selected Ships:

Name of Vessel	Date of Recruitment	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Act 1	6.7.70	W. A. Davidson	B. Luke, —. Coutts	P. Phelan	Associated Container Transportation
Act 2	24.9.70	D. McPhail	J. S. Pottinger, S. Frost, T. Paton		Associated Container Transportation
Amarna	8.9.70	R. D. Leckie	S. Venner, R. D. Hodgkinson, I. McAllister	J. Lamb	Moss Hutchison Line Ltd.
Antilochus	16.7.70	F. J. Squires	W. Fleming		Ocean Fleets Ltd.
Beechbank	26.6.70	J. A. Appleby	T. D. Faithful, F. Hunter, C. J. W. Armstrong		Bank Line Ltd.
Bellnes	19.8.70	J. G. Stewart	S. Larcombe, R. McCleery, R. Harper	V. Ring	Tenax S.S. Co. Ltd.
Benlawers	11.6.70	D. Cowie	R. Roberts, G. Mutch, D. Nesbit, G. McLean		Ben Line Ltd.
Benvalla	2.4.70	R. Griffiths	M. Harris, S. MacDonald, A. H. Macklin	F. Patterson	Ben Line Ltd.
British Fulmar	10.7.70	W. Hare	W. Hopkins, B. A. Moir, R. Tiltman		B.P. Tanker Co. Ltd.
British Hero	29.7.70	M. J. Cleary	S. Rodgers, E. Ritchie, P. D. Mas	R. Skinner	B.P. Tanker Co. Ltd.
British Kiwi	7.4.70	G. R. Campbell	R. Simpson, I. D. Walker, M. Wright	W. Jefferies	B.P. Tanker Co. Ltd.
Cirolana	23.6.70	E. A. Binnington	A. Everitt	N. Volland	Ministry of Agriculture, Fisheries & Food
City of Exeter	1.4.70	R. S. Steel	T. D. Parkhouse, M. G. Sewell, R. A. Shopland	J. S. Agnew	Ellerman Lines Ltd.
City of St. Albans	8.5.70	A. G. Hine	J. Fraser, S. Mortimer, M. Fagan	M. Woodhouse	Ellerman Lines Ltd.
Collin	27.8.70	D. Smith	P. Cawthorne, R. James, P. Piriou	D. Brooks	Matheson & Co. Ltd.
Discovery Bay	10.8.70	K. E. Howard	F. T. A. Dupuy, J. Thorpe, B. Wight	B. T. Davies	Overseas Containers Ltd.
Encounter Bay	1.6.70	R. A. Wilson	J. Hutson, D. Embery	J. Bilton	Overseas Containers Ltd.
Hudson Trader	6.6.70	—. Taylor	A. Gordon, D. Sutherland, —. Collier	D. Griffith	Hudson S.S. Co. Ltd.
Jervis Bay	5.5.70	M. R. Ryan	C. J. Armstrong, C. T. Damping, J. Thompson	E. Lamb	Overseas Containers Ltd.
Lossiebank	16.9.70	R. W. Gunn	R. J. B. Collinson, W. B. Geddes, R. J. Jenks	P. E. Bowler	Bank Line Ltd.
Malancha	29.1.70	D. C. Drummond	J. B. McGrath, C. G. Webster, M. Gardner	A. R. Taylor	Cunard-Brocklebank Ltd.
Mitra	2.4.70	—. Goddard	J. Frewer, K. Morris, I. Walker	A. McPhail	Shell Tankers (U.K.) Ltd.
Norse Viking	27.8.70	A. Dekonski	G. Hindmarsh, T. F. Jones, S. C. Floate	G. Smith	Sir R. Ropner & Co. Ltd.
Orotava Bridge	9.9.70	W. Backhouse	D. M. C. Allan, D. Ley, W. Forbes		Ore Carriers Ltd.
Pacific Exporter	27.4.70	J. Ferres	S. McCollin, M. J. Hindmarch, J. S. McKechnie	E. J. D. Banner	Furness Withy & Co. Ltd.
Starworth	29.7.70	A. P. Hurst	G. Winters, T. Kent, A. H. Downs	D. Spicer	R. S. Dalgliesh Ltd.
Sugar Transporter	25.8.70	A. F. Lunn	R. Tait, D. Thomson, J. Gravatt	G. Graham	Sugar Line Ltd.
Telamon	24.8.70	D. M. Ketcham	J. M. Hughes		Ocean Fleets Ltd.
Yewbank	4.6.70	S. Peterson	R. W. Boatwright, D. C. Boyter, A. D. S. Dodds	K. H. Sellar	Bank Line Ltd.

The following Selected and Supplementary Ships have been deleted:

Angelo, Ariosto, Beaverbank, Beaveroak, Border Shepherd, Boston Viscount, Boston Widgeon, Bristol City, British Resource, Chicanoa, Cicero, Clan Macdonald, Empress of England, Ernest Holt, Essex, Glenearn, Glengarry, Huntsland, Iron Barque, Iron Crown, Iron Horse, Machaon, Manchester Faith, Manchester Fame, Melampus, Oulton Queen, Paparoa, Port Hobart, St. Margaret, Tower Bridge.

BRITISH COMMONWEALTH

AUSTRALIA (Information dated 14.9.70)

The following have been recruited as Selected Ships:

Iron Cavalier (Broken Hill Pty. Co. Ltd.)
Manoora (Associated S.S. Pty. Ltd.)
Matthew Flinders (Flinders Shipping Co. Pty. Ltd.)
Rosie D. (Nauru Pacific Shipping Lines)
Waipara (British India S.N. Co. Ltd.)

The following ships have been deleted:

Balaar, Braeside, Moresby, Tenos.

HONG KONG (Information dated 7.9.70)

The following ships have been recruited:

Taiwan (China Navigation Co. Ltd.)
Six Stars (China Navigation Co. Ltd.)

The following ships have been deleted:

Anking, Bragernes, Chefoo, Eastern Argosy, Eastern Maid, Eastern Queen, Ningpo, Star Betelgeuse, Tong Jit.

INDIA (Information dated 1.9.70)

The following has been upgraded to a Selected Ship:

Maha Vikram (South East Asia Shipping Co. Ltd.)

The following have been recruited as Supplementary Ships:

Damodar Zuari (Damodar Bulk Carriers Ltd.)
Jalamani (Scindia S.N. Co. Ltd.)
Jawaharlal Nehru (Shipping Corporation of India Ltd.)
Lok Sevak (Mogol Line Ltd.)
Varuna Kanchan (Thakur Shipping Co. Ltd.)
Vishva Bindu (Shipping Corporation of India Ltd.)
Vishva Kusum (Shipping Corporation of India Ltd.)
Vishva Tej (Shipping Corporation of India Ltd.)
Vishva Tirth (Shipping Corporation of India Ltd.)

The following ships have been deleted:

Ashok Jayanti, Jalamaya, Laxmi Jayanti.

NEW ZEALAND (Information dated 14.9.70)

The following have been upgraded to Selected Ships:

Carnatic (Crusader Shipping Co. Ltd.)
James Cook (New Zealand Government)

The following has been recruited as a Supplementary Ship:

Dido (Northern S.S. Co. Ltd.)

The following ships have been deleted:

Auckland Exporter, Maurea, Wainui, Waitake.

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