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The Marine Observer

A quarterly journal of Maritime Meteorology

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THE MARINE OBSERVER

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

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Editorial

One does not normally expect a meteorological subject to be dealt with in the pages of a journal with the professional circulation of *The Economist* and it is not therefore surprising that, though an article in the issue of 23rd May 1964 was headed *Hoist the Cones*, that article concerned a subject far removed from the science of meteorology; none other, in fact, than the likelihood of competition in the hire-purchase industry tending to produce first-class rows amongst the finance companies rather than cheaper facilities for the customer.

But it is significant that *The Economist*, whose writers must of necessity be men accustomed to choosing their words with care, should, in announcing their premonition of an impending business struggle, use the same words which Admiral FitzRoy used in his telegram to ports around the home coasts on 1st February 1861—the first Gale Warning. FitzRoy was warning his 'customers' of a genuine gale; *The Economist* is warning theirs of an economic one.

Many a half hour on anchor watch in a sheltered roadstead could be spent less profitably than in recalling the many ways in which terms derived from natural phenomena have been adapted for use in the common language of everyday life. Many an officer will be able to recall a day when the master arrived on the bridge with a brow like thunder, or when a storm of protest arose over the introduction of a new item into the syllabus for the Ministry of Transport examinations or when a hail of abuse descended about his ears when he had overstowed or overcarried a parcel of cargo. The Cabinet Minister who returned from a Commonwealth tour a few years ago to announce that "the Wind of Change is blowing over Africa" added yet another meteorological phrase to the many which have, over the years, crept unnoticed and unrecognised into common usage. To us who came ashore and now, happily or unhappily, feel obliged to read a daily newspaper, the term has taken its place alongside many other ornate and somewhat pompous ways of describing simple things: we have read of a wind of change blowing through the board-room of a company and through the machine shop of a factory. All alterations, additions and deletions, in fact, seem now to be collectively described as the Wind of Change.

This tendency to describe day-to-day events in meteorological terms is perhaps man's subconscious acknowledgement that his life at some point or other is affected by weather; in some cases, despite the protection afforded by buildings, clothes and new methods of transport and communication, he is still very much dependent on it. He must have, from the earliest times, recognised this dependence but, until the sixteenth century, his thoughts on the subject were governed by the practice of Aristotle of formulating theories without testing them against reality. He was thus content to accept the weather at its face value.

Among the many anniversaries being celebrated this year is the 4th centenary of the birth of William Shakespeare. His contemporaries in the scientific world were the pioneers of inductive reasoning, bent on overthrowing the Aristotelian theories and devoted to the accumulation of evidence from accurate observation and experiment and to the basing of scientific conclusions on actual facts. It could, in fact, be said that the Wind of Change was blowing through the scientific England of Shakespeare's day.

In his works, Shakespeare revealed that in general he subscribed to the Aristotelian concept of the universe; the earth as centre surrounded by a sphere of air, the atmosphere, then a sphere of fire, the seven planetary spheres, the sphere of fixed stars and finally by the *primum mobile*, the powerhouse of the universe driving the fixed stars in their daily rotation. After the layman's fashion of the day he did not question accepted ideas but he was nevertheless a disciple of the new school, keenly attentive to the wonders of the world around him and with a great respect for the marvels of nature. Few of the natural sciences escaped his attention, even though his recognition of them might be by only a phrase or a line in a sonnet.

Meteorology was perhaps his favourite and many of his plays, particularly *A Midsummer Night's Dream* and *The Tempest*, bear witness to his interest. And, since a playwright must, of necessity, if he is not to starve, write around subjects which are acceptable to his public, it is reasonable to suppose that the man in the street of Shakespeare's day was himself weather conscious.

Today, four hundred years later, there are few who do not hear, read or see and discuss the weather forecast. The Wind of Change which sprang up in the sixteenth century is still blowing. As the years pass and man's interests become wider it is inevitable that new problems will occur and to meet them new theories will have to be propounded. But any theory must be based on facts and the basic need remains the same, the facts which can alone be obtained from good observations.

L. B. P.

October, November, December

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.

It sometimes happens that we are unable to offer an explanation for phenomena reported. In such cases we shall be very glad to hear from any reader who can put forward an authoritative or a possible explanation, which could be published in this journal. We should also be glad to hear from any reader who has witnessed a similar phenomenon in the past, but which has not previously been communicated to us.

SEA SMOKE

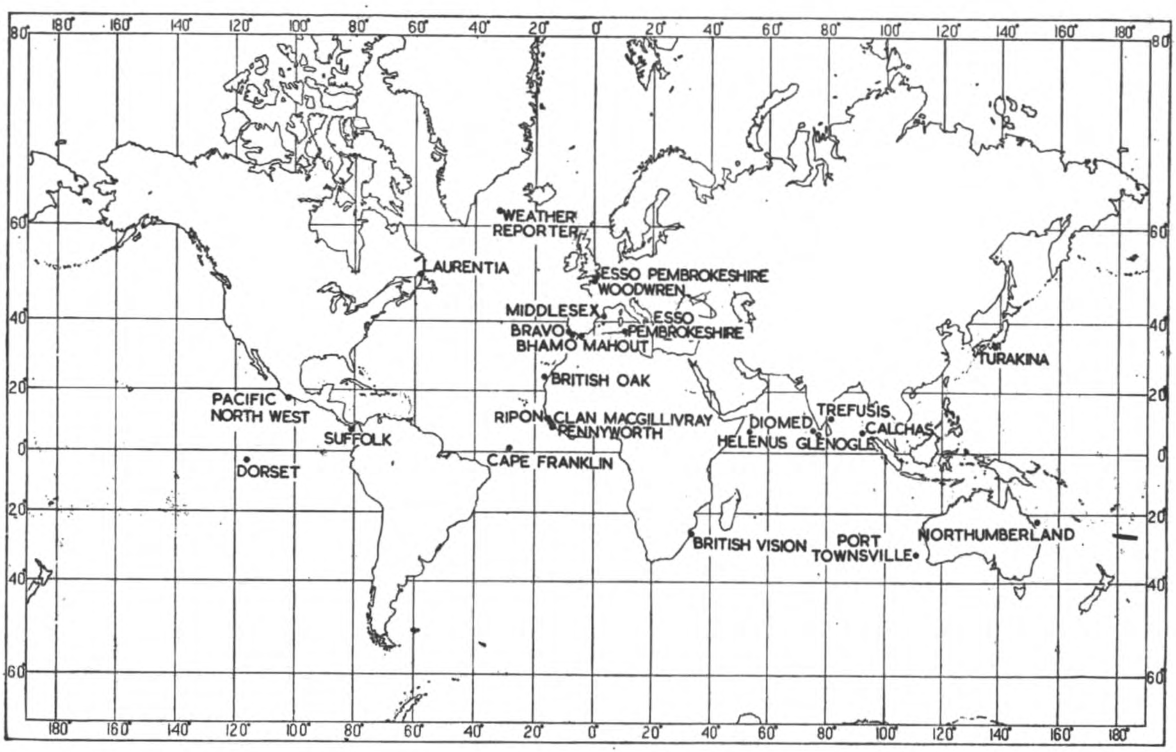
Straits of Dover

s.s. *Esso Pembrokeshire*. Captain G. R. Dance. Sidon to Rotterdam.

5th December 1963. At 1000 GMT while approaching the Straits of Dover, sea smoke was seen, which at first glance was thought to be oil slick on the water, due to its being so close to the sea surface. After about 15 min. the smoke began to rise and increase in volume. The visibility in the fog at this time was just about a mile; at 1055 it was $\frac{3}{4}$ of a mile. The sea smoke continued to be seen until 1300. Air temp. 37°F, wet bulb 37°, sea 51·0°. Wind ENE, force 4.

Position of ship: 50° 41'N, 0° 53'E.

Note. The interest in this observation is that the phenomenon occurred in British waters. It was produced by a cold easterly air stream from the continent, where temperatures were − 2°C (28°F), flowing over warm water originating in the English Channel.



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

off Barcelona

m.v. *Middlesex.* Captain R. E. Baker. At anchor. Observers, the Master and all officers.

15th December 1963. While the vessel was at anchor off Barcelona harbour, patches of dense sea smoke were seen drifting with the wind. Visibility was reduced to 20 yd. and to less at times when showers of rain and snow occurred. Air temp. 38°F., sea 57°. Wind NNE, force 4.

Position of ship: 41° 22′N, 2° 16′E.

Note. At noon on the 15th an elongated trough of low pressure lay from SE Spain to the Tyrrhenian Sea, giving rise to a N–NE airstream on its northern side. The air temperature was at, or near, freezing point on the coast of NE Spain and falls of snow were occurring in the area. The sea smoke was due to the evaporation of the warm sea surface water into the very cold overlying air. Cold air is able to accept only a small amount of water vapour before becoming saturated and the excess condenses to form fog. Sea smoke does not as a rule form unless the air is at least 15°F colder than the sea over which it passes.

ST. ELMO'S FIRE

Gulf of Tunis

s.s. *Esso Pembrokeshire.* Captain J. A. Macleod. Milford Haven to Marsa-el-Brega (Libya). Observers, the Master, Mr. M. Birchmore, 3rd Officer, Mr. R. Dewick, 4th Officer, and two look-outs.

14th September 1963. While crossing the Gulf of Tunis and in the vicinity of Cape Bon, an intense thunderstorm was encountered between 1900 and 2100 GMT. Throughout the storm there was an excellent display of St. Elmo's Fire, the places most affected being the fo'c'sle head bulwark rails, foremast truck and table, tops of gas uprisers, VHF and Decca Navigator aerials, bridge rails, ensign gaff and the tops of the life-boat davits. The most interesting display was that given by the radar scanner—a continuous glow (perhaps 3–4 in. long) was seen at the extremities of the scanner as it revolved. On each revolution when the scanner lay in the fore and aft line of the ship, the glow intensified and was accompanied by a sharp crackling sound which could be heard quite easily above the noise of the wind although the scanner is some 52 ft. above the bridge wings.

It was also noted that on holding up one's hand to approx. eye-level and at least 1 ft. away from steelwork, a glow was produced from each finger and thumb nail individually. In this respect the forefinger gave the best result producing a violet glow some 2–3 in. long in the shape of a fan. It was accompanied by a sizzling noise. As the arm was raised the glow intensified and the sizzling became louder and higher-pitched. Air temp. 75·9°F, wet bulb 73·8°, sea 74·2°. Wind ENE, force 4–5. Height of eye 70 ft.

Position of ship at 1800: 37° 18′N, 10° 24′E.

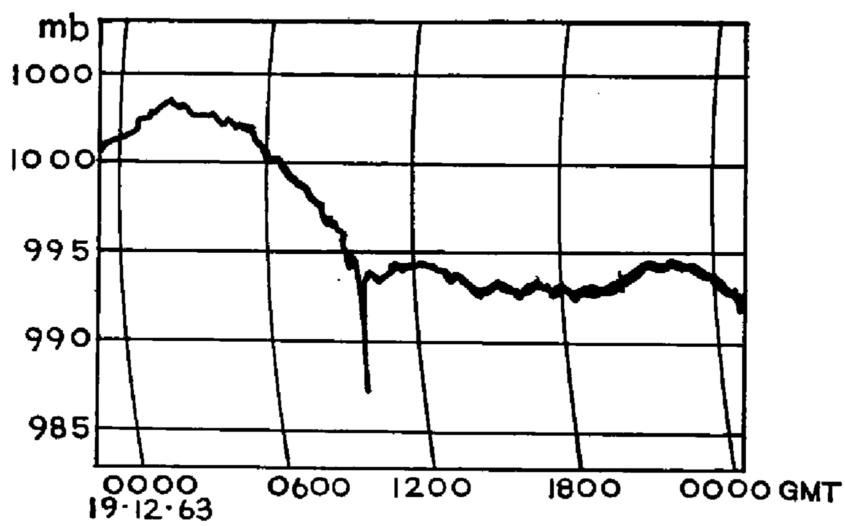
Note. The synoptic chart for 2100 GMT shows that a thundery trough of low pressure lay over Tunisia and extended in a NE'ly direction towards Sicily. In the trough the air was very humid and warm, resulting in the outbreak of thunderstorms over a rather wide area.

St. Elmo's Fire occurs when there is a very strong static electric field in the area, such as may be produced by a highly charged Cb. cloud passing overhead at a comparatively low height above the surface. The extent to which it was seen on this occasion seems to be most unusual, particularly that affecting the observers themselves.

VIOLENT SQUALL
off S.W. Spain

m.v. *Bhamo*. Captain J. C. Gibson. Rangoon to Liverpool.

19th December 1963. The brief but very violent squall shown on the barograph trace was experienced at about 0945 GMT. The wind reached force 12 and there was



precipitation in the form of pieces of ice measuring up to ½ in. in size.

Position of ship: 100 miles SE'E of Cape St. Vincent.

Note. Examination of our synoptic charts shows that a small, intense, fast moving secondary depression travelling in an ENE direction crossed the track of the vessel at about 1000 GMT. The centre appears to have passed very close to the ship, probably to the south of it, and this would have caused the wind to have changed rapidly in an anti-clockwise direction. The downward 'kick' of the barograph trace, 5½ mb., at the passage of the squall is unusually large, and probably represents a very intense local disturbance within the circulation of the secondary.

PASSAGE THROUGH WATERSPOUT
Bay of Bengal

m.v. *Calchas*. Captain R. C. Riseley. Aden to Singapore. Observer, Mr. M. G. Collins, 3rd Officer.

3rd October 1963. At 0840 GMT during heavy rain, a patch of what seemed to be smoke was observed on the surface, upwind at extreme visibility, which at the time was about ¾ mile. The patch moved with the wind and when it neared the ship it was seen to be an incipient waterspout, about 30 ft. in diameter. The wind was circulating very rapidly in a clockwise direction and lifting spray to a height of approx. 3 ft. As the disturbance passed over the ship, there was a sudden increase of wind which seemed to be drawn from all directions; the rain falling at the time was whipped horizontally and there was a brief, but very obvious drop in temperature. The time taken to pass from one side of the ship to the other was not longer than about 12 sec. The disturbance continued to move away towards the NE, remaining the same size until it passed beyond the limit of visibility which was still about $\frac{3}{4}$ mile, due to heavy rain. At 0600: Air temp. 75·6°F, wet bulb 74·8°, sea 81·6°. Wind SW'W, force 4.

Position of ship: 6° 11′ N, 92° 54′E.

m.v. *Trefusis*. Captain R. B. Oliver. Durham to Madras. Observer, Mr. D. R. Mitchell, 2nd Officer.

19th October 1963. At 0855 GMT, the vessel passed through the disturbed water of a developing waterspout which had attained a height of 20 ft. and was rotating in an anticlockwise direction. On entering the spout, the wind was found to be force 9–10 and it sounded like a shot from a gun. No heavy water was shipped but considerable spray landed on the fo'c'sle head. Outside the spout the wind was NW'W, force 4, and rain squalls were seen in the area. Air temp. 84°F, sea 86°. Cloud 6/8 C_L3.

Position of ship: 10° 11′ N, 81° 07′ E.

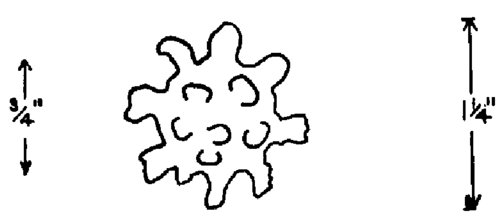
Note. These are useful accounts of physical conditions in undeveloped waterspouts, which occurred during the period of a retreating south-west Monsoon. Waterspouts occur frequently throughout the year in the eastern Indian ocean between about 10°N and the equator but we have had few reports of waterspouts occurring so far to the east as that reported by m.v. *Calchas*, nor do we get many reports, such as these from *Calchas* and *Trefusis*, of waterspouts passing right over the ship.

HAILSTONES

Indian Ocean

m.v. *Port Townsville*. Captain C. J. H. Gorley. Aden to Auckland. Observers, Mr. M. Twomey, Chief Officer, Mr. B. Eaton, 2nd Officer, and Mr. R. Grey, 3rd Officer.

21st August 1963. At 0810 GMT exceptionally large hailstones fell for a period of 10 minutes. A typical example, which measured $1\frac{1}{4}$ in. across, is shown in the



accompanying sketch; the inner sphere had horn-shaped protuberances. Cloud 8/8 C_L7. Air temp. 60° F, wet bulb 57°, sea 64°. Wind NW'N, force 9. Squally.

Position of ship at 0600: 32° 12′S, 110° 42′E.

Note. These strange shaped hailstones are a record of the complex history of water particles within the system of storm clouds producing the hailstones. When rising within the clouds hailstones tend to solidify and grow, when falling they tend to melt and when they are numerous they tend to collide. If they are melting and colliding they tend to stick together in groups which become permanent if they are carried aloft at the correct velocity. Hailstones of this size are rare and are the result of very intense storms.

PATCH OF CALM WATER

Western Mediterranean Sea

m.v. *Mahout*. Captain J. B. Newman. Port Said to Wilmington. Observers, Mr. A. P. Spriggings, Chief Officer, and Mr. D. D. Pease, 4th Officer.

2nd October 1963. At 0700 GMT the vessel passed through a patch of calm water approx. 2,000 yd. wide and several miles long, extending in a line lying 350°–170°. The wind at the time was force 5 and all the surrounding sea was covered with breaking wave crests. There was no sign of oil on the surface of the water. Sea temp. 68°F.

Position of ship: 36° 21′N, 4° 42′W.

Note. Dr. L. H. N. Cooper of the Marine Biological Association of the United Kingdom has given an extensive note on a calm patch in the North Atlantic in *The Marine Observer* of July 1961, page 118. Dr. Cooper has kindly passed the above report to M. Cousteau, the famous underwater explorer, because these phenomena are probably associated with the structure of the sea bottom. This calm patch was probably associated with descending cold Atlantic water at the easterly approaches to the Straits of Gibraltar.

CURRENT RIPS

West African waters

m.v. *Clan MacGillivray*. Captain F. H. S. Petherbridge. Cape Town to Dakar. Observer, Mr. R. Harden, 3rd Officer.

3rd November 1963. At 1000 GMT the sea surface was seen to be very confused and choppy, with what appeared to be 'lanes' running in a NW′W–SE′E direction. These lanes were alternately rough and smooth and stretched for about 3 miles to the north and 2 miles to the south of the ship; they were approx. 50 yd. in width. The ship, steering by auto-pilot, was thrown off course by up to 10° on either side of the course line, and at the same time the speed, from the 'SAL' log, was seen to fluctuate between 14·5 and 17·5 kt. as each lane was crossed. By 1110 the fluctuations in direction and speed had disappeared altogether. The sea temperature remained constant throughout at 82·5°F. Wind NE, force 1–2. Speed of vessel 16·25 kt. Course 326°.

Position of ship: 7° 56′N, 15° 16′W.

Note. This very interesting report concerns phenomena associated with the Equatorial Counter Current and the Guinea Current; it is almost certainly the result of strong currents below the surface.

North Pacific Ocean

m.v. *Suffolk*. Captain H. J. D. Sladen. Auckland to Balboa. Observer, Mr. P. Hornby, 2nd Officer.

5th December 1963. At 1000 GMT the vessel crossed a strip of discoloured water about 60 ft. wide extending as far as the eye could see in an E–W direction. In the half-light its appearance was similar to an oil slick. As the vessel passed through the band she veered sharply to starboard and about 20° port helm was required to regain course. Wind, force 2. Sea slight. Long low swell from S′W. Sounding gave no bottom at 600 fm. Course 049°. Speed 14·0 kt.

Position of ship: 6° 16′N, 81° 05′W.

Note. This rip occurred in the general area where the cold Peru current converges with the Pacific equatorial counter current. Many ships have reported rips in this area (i.e. east of 120°W to the coast, and within 15° of latitude of the equator). Dr. L. H. N. Cooper of the Marine Biological Association of the United Kingdom has suggested that calm water and violent ship motion reported by m.v. *Shropshire* at 2° 18′N, 94° 38′W in February 1962 (see *Marine Observer*, January 1963, page 13) were associated with the Cromwell current. It is possible that this observation is also associated with an oceanic 'jet' stream because in April 1959 m.v. *Port Pirie* at 6° 16′N, 81° 05′W experienced a sharp movement to port, exactly opposite to that reported above. (See *Marine Observer*, April 1960, page 56.)

LINE OF DRIFTWOOD

off River Scatula, Mexico

s.s. *Pacific Northwest*. Captain J. L. Sims. Cristobal to Los Angeles. Observers, Mr. R. Driver, 3rd Officer, and Mr. C. R. Giles, 4th Officer.

5th October 1963. At 1330 SMT a distinct line of driftwood was seen stretching across the bow in a NNW–SSE direction about 3 miles ahead. It was observed, as the vessel approached, to be stretching in an unbroken line for 2–3 miles in both directions. Before the line of driftwood was seen the water had changed to a light green colour, only some small patches of driftwood being then present. The previous evening lightning had been seen, and heavy rain squalls were showing-up on the radar screen. As these were observed off the mouth of the Scatula River it seems probable that a heavy rainstorm inland had swollen the river and carried the driftwood out to sea. Sea temp. 83°F. Wind calm.

Position of vessel: 17° 33′N, 102° 15′ W.

Note. Mr. Boyd E. Olson, Director of the Marine Sciences Department of the U.S. Naval Oceanographic Office, comments:

"A check of our 6-hour synoptic weather charts for October 1963 showed that no tropical storm was present at or near the time of the observation. The observer undoubtedly has hit upon the reason for both the colour change and the presence of driftwood. October is one of the rainy months in this region and squalls such as those mentioned are frequent. The Scatula River, one of the longest and largest in Mexico, discharges immense volumes of water into the sea during this season and the accompanying suspended material discolours the water for some distance offshore. Close to shore, the waters often are brownish in colour, but at the ship's position (about 22 miles offshore) the discolouring is sufficient only to shift the colour from blue to green. Areas of dense mangroves as well as reports of dead trees and shrubs in many places, such as on Punta Mangrove, would seem to indicate a ready source for the reported driftwood.

Mention of driftwood occurring in a distinct line is typical of observations by our field oceanographers on lines of drifting seaweed, such as Sargassum. Alignment of such floating material is believed to be due either to the influence of the wind or the presence of a zone of convergence sinking, which tends to concentrate floating debris along the axis of the zone. The strong outflow from the Scatula River undoubtedly led to the development of a convergence zone along the boundary between the fresh water of low density and the denser sea water. Wind may have been influential in intensifying or maintaining this effect."

DISCOLOURED WATER

Coral Sea

m.v. *Northumberland.* Captain M. J. Heron. Townsville to Sydney. Observers, the Master, Mr. D. Butcher, 2nd Officer, and Mr. E. M. Smith, 3rd Officer.

27th October 1963. While making for Pine Peak Island at 0000 GMT the sea ahead of the vessel was seen to be covered with light brown streaks, lying along the direction of the wind, which were at first thought to be sand churned up from the sea bed. However on entering the area it was seen that the substance causing the discoloration was floating in the form of scum on the surface. Samples taken in the sea bucket showed small flaky pieces of matter floating on the top.

The vessel steamed southwards through variable quantities of the substance and at 0330 passed an area about 7 miles long by half a mile wide almost completely covered with scum. The sea in the vicinity of the larger patches was lighter in colour than elsewhere. Sea temp. 74·2°F. Wind ESE, force 4. Sea moderate.

Position of ship: 21° 32′S, 150° 35′E.

Note. Dr. T. J. Hart of the National Institute of Oceanography comments:

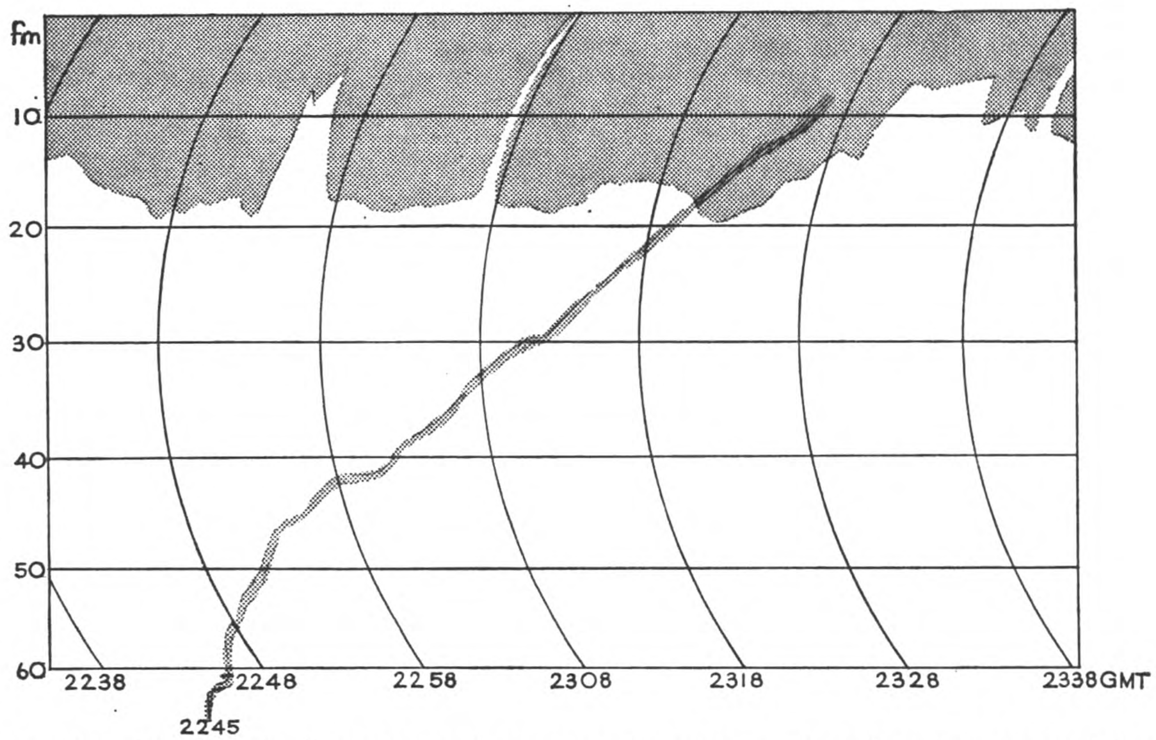
"This sounds rather like a pure phytoplankton bloom. Dinoflagellate swarms are known further south down the East Australian coast, mostly close inshore, but from the 'small flaky pieces floating on the top' of the sample, rafts of the microscopic plankton alga *Trichodesmium* seem more likely here. Without the opportunity to examine the sample microscopically it is not possible to give a firm answer."

ECHO SOUNDING

off Portuguese East Africa

m.v. *British Vision.* Captain N. D. C. Michaels. U.K. to Lourenço Marques. Observer, Mr. R. McVeigh, 2nd Officer.

14th November 1963. The portion of an echo sounding trace, here reproduced, began at 2245 GMT in a position with Point do Ouro bearing 323° at a distance of



$11\frac{3}{4}$ miles. The gap in the trace at about 2307 was due to changing the range of the instrument to 60–120 fm. in order to check echo, and then changing back to the 0–60 fm. range. The return could not have been from off the sea bed as the depth of water at the time was far greater than the range of the echo-sounder. Perhaps it was caused by a current of water of different density from that of the surface layer, possibly the effect of the Mozambique current which flows down this coast. The charted depth of water was 250–350 fm. At approx. 2320 the trace was lost when Point do Ouro bore 287°, distance $8\frac{1}{2}$ miles. The ship's course was 017°, speed $11\frac{1}{4}$ kt. Mean draught 29 ft.

Position of ship: 26° 52′S, 32° 53′E.

Note. Dr. A. S. Laughton of the National Institute of Oceanography comments:

"It does not seem possible that Mr. McVeigh's interpretation is correct and the most plausible explanation of this trace is that it is indeed an echo from the bottom but that it has been observed on the second rotation of the recorder stylus. Although the scale of the echo sounder goes only to 120 fm., if the bottom reflectivity is unusually high or the gain of the echo sounder is turned right up, echoes can be obtained from greater depths. The depth equivalent to one complete rotation of the stylus is 300 fm. and the depth therefore at 2308 GMT is 333 fm., consistent with that expected.

While echoes have sometimes been obtained from discontinuities in the water mass, these are frequently caused by plankton and fish which live on the boundary and the echoes are long and diffuse. The slope of such a boundary can only be maintained by relative movement of the water masses and if the echoes you observe are due to such a discontinuity, the slope would imply an excessive current at right angles to the African coast."

GOSSAMER
off Fécamp

m.v. *Woodwren.* Captain C. T. Lennard, D.S.C. Le Havre to London. Observers, the Master, Mr. P. Woods, Chief Officer, and Mr. I. C. Steverson, 2nd Officer.

12th October 1963. When about 10 miles NNW of Fécamp at 1300 GMT, the rigging, aerials and halliards were observed to be draped with what appeared to be cobwebs which were quite sticky and strong. A piece is enclosed for inspection. The weather was fine and misty with a variable wind of force 1, which later became SE, force 2. The air temp. was 67°F, and the sea 60°.

Position of ship: 49° 55′N, 0° 18′E.

Note. Mr. D. J. Clark of the Natural History Museum comments:

"This phenomenon is not an unusual one. Most spiders distribute themselves by a process called 'ballooning'. This distribution takes place in the spring and summer when newly hatched spiders are dispersing away from the egg-cocoons, where they have spent the winter months. Spiders of certain families, particularly the *Linyphiidae*, the so-called 'money-spiders' mature in the autumn and being mostly very small in size can also take advantage of ballooning as a means of dispersal, and at this time of year the process is most conspicuous. The spiders wait for a day when the weather conditions are suitable, i.e. fine and warm with a strong up-current of air from the ground—the conditions described in this observation would be ideal—they run to the top of grass heads, posts etc. and emit a drop of liquid silk from the spinnerets at the top of the abdomen. This drop of silk is drawn out into a thread by the movement of air currents, and does not become hard merely on contact with the air. When the thread is long enough to carry the weight of the spider, it lets go of its support and flies away. Vast numbers of spiders may be involved and when they eventually land again they break free of their 'parachutes' which again float away to become entangled with thousands of other threads and so cause the phenomenon called gossamer.

The spiders may be carried many miles and at great heights by this means, and in certain favourable years when the population of spiders is very large the ground over large areas may be blanketed with gossamer, and a strange and beautiful sight it is."

PHOSPHORESCENCE

North Atlantic Ocean

m.v. *Cape Franklin.* Captain M. McLeod. Victoria (Brazil) to Middlesbrough. Observers, Mr. G. Anderson, 2nd Officer, and the watch.

28th October 1963. Between 0230 and 0530 GMT the vessel passed through extensive areas of phosphorescence consisting for the most part of parallel bands estimated at from 50–100 ft. in width. They were of a pale white colour and appeared to be stationary. From time to time an Aldis lamp was shone on the sea but nothing of a solid nature could be detected in the water, though occasionally small specks of phosphorescence well out from the ship's side would cross the beam of light. This caused them to turn a fiery red colour. Several samples of sea water taken proved to be quite clear and free from any foreign matter. Weather throughout was overcast with continuous rain. Sea temp. 82·5°F.

Position of ship: 1° 43'N, 27° 30'W.

Indian Ocean

m.v. *Diomed.* Captain W. T. D. McMillan. Dublin to Far East. Observers, Mr. E. J. Watterson, 3rd Officer, and Mr. I. K. Conroy, Extra 3rd Officer.

11th November 1963. From 1450–1530 GMT phosphorescence in the form of tiny dancing specks was observed in the water illuminated by lights from cabin ports. Strong light from the signalling lamp greatly increased the effect and it could by this means be produced a considerable distance from the ship. The glowing patch left after the light was switched off faded away over a period of about 20 sec. In addition to the phosphorescence described, shining the light on the water produced a number of reddish-orange points of light similar in brightness and appearance to glowing cigarette ends. They shone steadily and their distribution was estimated at less than 10 per square foot. They appeared only directly in the path of the signalling light and disappeared the instant it was switched off. During the period of observation, about 10 patches of phosphorescence were seen which initially were about 5 ft. in diameter but spread out slowly to about 100 ft. across, increasing in brightness then gradually fading away. None passed really close to the ship but they appeared whitish rather than the usual green colour. Apart from these patches and isolated specks, no phosphorescence was seen except that caused by artificial light. Sea temp. 84°F. Wind NE'ly, force 1. Sea rippled; low easterly swell.

Position of ship: 7° 30'N, 74° 45'E.

m.v. *Glenogle.* Captain W. J. Moore, D.S.C. Aden to Singapore.

9th November 1963. From 1548 to 1740 GMT luminous disc-shaped objects of a dull turquoise colour were observed a few feet below the surface of the sea. They appeared to be undisturbed by the quite considerable sea and swell running at the time. On focusing the signal lamp on the discs the water within a radius of 60 yd. of them turned a pale green colour. When the lamp was switched off the effect became even more pronounced, the area of luminescence increasing for a period of 5–10 sec. At one stage 25 such discs, of varying brilliance, were present. Numerous round glowing red objects approx. half an inch in diameter were seen throughout the period. In the light from the signal lamp they were visible up to 40 yd. from the ship. The night was dark with good visibility. Wind NE, force 5. Sea temp. 82·5°F.

Position of ship: 6° 49′N, 76° 57′E, to 6° 38′N, 77° 34′E.

Note. Dr. R. H. Kay of the University Laboratory of Physiology, Oxford, writes:

"These extracts from ships' observations are collected together because in the first place they all mention red objects seen when a light is directed on the water. Red pigment is present in many bioluminescent marine creatures and, since very little red light is transmitted by sea water, this colour is as effective in breaking up outlines in a sort of shadow camouflage as is black to our terrestrial eyes.

A second common feature of these reports is that they all contain interesting observations on the effect of a bright light on the luminescence. When, by chance, we have such observations coming together it is tempting to ask whether whenever luminescence is present the observer could arrange to shine the Aldis on the sea and record any increase/decrease/no change in the luminescence. In this way we could together collect some significant data very quickly."

COLLISION WITH WHALES

South Pacific Ocean

s.s. *Dorset*. Captain J. S. Laidlaw. Panama to Apia.

24th December 1963. At 0130 GMT the vessel experienced a bump which was felt throughout the ship and it was realised that some submerged object had been struck. Directly astern a red object was seen floating just below the surface, which was identified as a whale when the vessel was turned about. Blood was spurting from its blow-hole and head. Floating close by was a second whale already dead. The sea in the vicinity of the whales was quite calm, apparently due to the oil exuding from the severely lacerated creatures. There was a distinctly unpleasant smell. The larger whale was estimated to be 50 ft. long, and the other perhaps 35–40 ft. The vessel was steaming at 16·5 kt. and the impact was sufficient to list the vessel to port by 2°.

Position of ship: 4° 01′ S, 115° 03′W.

SOOTY ALBATROSSES

Japanese Waters

m.v. *Turakina*. Captain D. B. Brittain. Auckland to Japan. Observer, Mr. T. Thomson, 4th Officer.

4th December 1963. On the final day before arriving in Japan the vessel was followed by two and, later, three sooty albatrosses. Two were seen at daybreak when the vessel was 35 miles from Tori Shima. At 0400 GMT one of the birds left us but at 0700 three were seen and these followed us for the rest of the day and were still with us at night-fall (0830) when the vessel was some 70 miles from the Japanese coast. The observer was under the impression that these birds were not to be seen in the northern hemisphere. There is little room for doubt as to their identity in the present instance.

Throughout the day the sky was for the most part overcast and there were occasional rain squalls. The wind was SW's, force 4–5, veering to NNE between 0700 and 0730.

Position of ship at 0830: 33° 20′N, 137° 41′E.

Note 1. Captain G. S. Tuck, Chairman of the Royal Naval Birdwatching Society, comments:

"This is a case where, I feel sure, an observer moving from the Southern Pacific Ocean, where he may well have seen sooty and light mantled sooty albatrosses, arrives in a latitude in the North Pacific Ocean exactly within which there occurs (and quite commonly) one of the only three albatrosses occurring north of the equator in the Pacific Ocean alone, and this is an all sooty brown albatross—the black footed albatross."

In a detailed description of the Pacific albatrosses, which we have forwarded to Mr. Thomson, Captain Tuck mentions that whilst there are two varieties of albatross known in the South Pacific—the sooty albatross and the light mantled sooty albatross mentioned above, the North Pacific supports three varieties of albatross—the black footed albatross, sighted by Mr. Thomson; the Laysan albatross, which breeds on the Laysan Islands and the short tailed albatross which is now almost extinct.

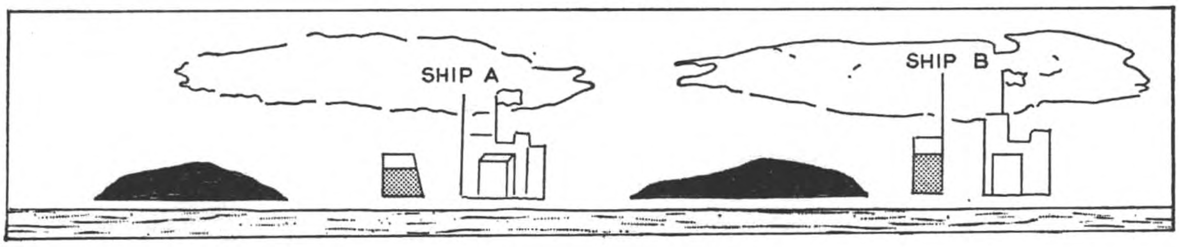
Note 2. We take this opportunity of congratulating the Royal Naval Birdwatching Society on the honour which has been accorded to them by HRH The Duke of Edinburgh, who has become their Patron.

ABNORMAL REFRACTION

Gulf of St. Lawrence

s.s. *Laurentia.* Captain T. S. Graham. Montreal to Glasgow. Observer, Mr. A. McGugan, Chief Officer.

22nd October 1963. The distorted images due to abnormal refraction, shown in the accompanying sketch, were seen at 1131 GMT. The horizontal angle between



A and B was 5° but only one radar target was observed, that being in the azimuth of ship A, which was at a distance of 7 miles. The radar was checked on the 40-mile range and an excellent picture obtained with well-defined echoes up to 35 miles. Since only one target was found, it may be the case that A and B were the same ship. Air temp. 32°F, wet bulb 30°, sea 38°. Wind NNW, force 4.

Position of ship: 50° 36′ N, 58° 34′W.

Note. This observation is of great interest because it is probably an example of three dimensional abnormal refraction. At the location of this observation there can be great variations in sea surface temperature. It appears that two adjacent masses of air had been formed with a rapid horizontal variation of temperature and humidity between them. Some of the light from object A has been bent at the boundary of these air masses causing an image from the direction of B. As the general distribution of temperature and humidity is likely to have been 'patchy' both the images, particularly B, would be distorted.

off Cape St. Vincent

s.s. *Bravo.* Captain J. A. Etches. Lisbon to Gibraltar. Observer, Mr. M. A. Morrill, 2nd Officer.

26th November 1963. At 0315 GMT when the vessel was 4 miles due south of the Cape St. Vincent light a false loom was seen on the reciprocal bearing of the lighthouse, which was so real in appearance that one would have expected the light itself to have been sighted in that direction at any moment. The loom was flashing every 5 sec. as does the St. Vincent lighthouse. As the nearest land was some 240 miles away in the direction of the loom, it was evident that the St. Vincent light itself was undergoing some effect of abnormal refraction. This was borne out by the fact that as St. Vincent drew astern on our port quarter, the loom drew ahead on our starboard bow. Air temp. 59°F, wet bulb 55·5°, sea 62°. Light W'ly wind. Sky cloudless.

Position of ship: 36° 57′N, 9° 00′W.

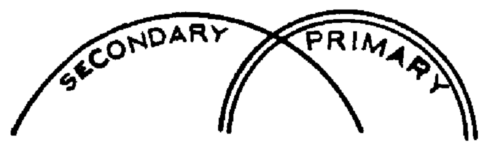
Note. We have now had three occasions on which images have been observed in a reciprocal direction from the object. On two previous occasions it has been suggested that a sharp horizontal increase in moisture content with a sharp fall in temperature along the line of vision, extending over a large vertical plane or one inclined towards the observer in the atmosphere, can act like a mirror causing an observer to see an image of a scene or object behind him. (See *Marine Observer*, October 1962, page 183, and January 1964, page 19.) On the occasion described above the phenomena appear to have been associated with anticyclonic atmosphere subsidence behind a cold front.

INTERSECTING LUNAR RAINBOWS

Indian Ocean

s.s. *Helenus*. Fremantle to Aden. Captain C. T. Collett. Observers, Mr. J. Spain, 2nd Officer and Cadet Hibbert.

31st August 1963. Directly after a shower of rain had passed at 2315 GMT a bright lunar rainbow was seen, having an altitude of about 25°. A very pale bow which seemed to have a slightly larger radius, intersected the first bow as shown in the



sketch. Both were of very short duration enabling a measurement of the altitude of the bright bow, only, to be made. Neither bow showed any colouring.

The moon, age 12 days, was very bright. It bore 247°, at an altitude of 8°. Wind WSW, force 4. Air temp. 76°F, wet bulb 74°, sea 78°.

Position of ship: 6° 58′N, 54° 37′E.

Note. This phenomenon is very rare and the horizontal separation of the two bows cannot be explained. The altitudes of the bows also appear low.

UNIDENTIFIED PHENOMENON

North Atlantic Ocean

m.v. *British Oak*. Teneriffe to Monrovia. Captain A. C. Browne. Observers, the Master and Mr. P. M. Edge, Chief Officer.

27th November 1963. A point of light of about 2nd magnitude with an elliptical glow of approx. 3° diameter and concentric circles of light was observed through binoculars at 1925 GMT. It was first seen bearing 230° at 18° altitude and disappeared 4 min. later bearing 190°, altitude 8°. The sky was cloudless and the atmosphere clear.

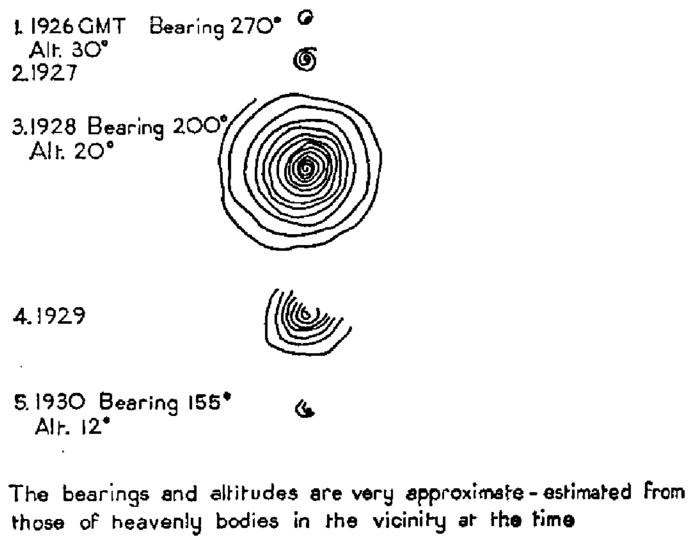
Position of ship: 24° 27′N, 17° 14′W.

West African waters

m.v. *Ripon*. Captain Smith. On passage to Freetown. Observers, the Master and Mr. G. W. Brown, Chief Officer.

27th November 1963. At 1926 GMT an illuminated body was observed bearing 270°, altitude 30°. It appeared at first to have a suffused glow around it, but as the object moved parallel with the ship's course, the glow assumed the definite form of a tight spiral of blue-white light. The spiral expanded to a maximum radius of about 5° with about 12 turns visible at one time when bearing 200°, altitude 20°. The size afterwards diminished until the body faded from sight bearing 155°, altitude 12°, at 1931. As the object moved in azimuth, it also appeared to be gyrating about a centre in an anticlockwise direction and to vary in brilliance. At its brightest the object had a brilliance less than Venus and greater than Altair; its track passed between these two bodies.

The whole phenomenon gave the impression of looking into a conically formed



spring and was indeed a most sensational sight. We can only conjecture that it was an artificial satellite 'gone wrong' or passing through a cloud of meteoric dust.

The accompanying sketches show how the phenomenon appeared to the observers. There was a cloudless sky and bright moonlight at the time.

Position of vessel: 10° 5'N, 15° 59'W.

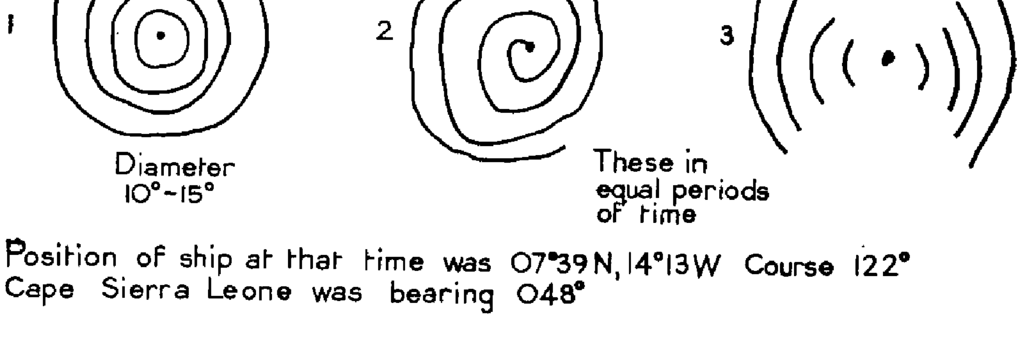
off Sierra Leone

m.v. *Pennyworth*. Captain I. Gault. Middlesbrough to Monrovia. Observers, Mr. J. H. Edwards, 2nd Radio Officer, the Master, Mr. J. Nielsen, Chief Officer, Mr. J. MacKenzie, 3rd Officer, Mr. T. Walker, 1st Radio Officer, and the Chief Engineer.

27th November 1963. At 1900 GMT for approx. 5 min. a bright object having a magnitude greater than any other star or planet was seen in the sky. It appeared to be stationary in the west at an elevation of 40°, for about 2 min. It then moved off rapidly in a SE'ly direction, disappearing about 2 min. later. The bright light from the object radiated outwards, like the ripples from a pebble thrown into a pond; at first in concentric circles, then in a spiral and finally in concentric half-circles. The general impressions of the phenomena seen are shown in the accompanying sketches. The object was definitely not a meteorite, and the course was too erratic for an earth satellite.

Position of ship: 7° 39'N, 14° 13'W.

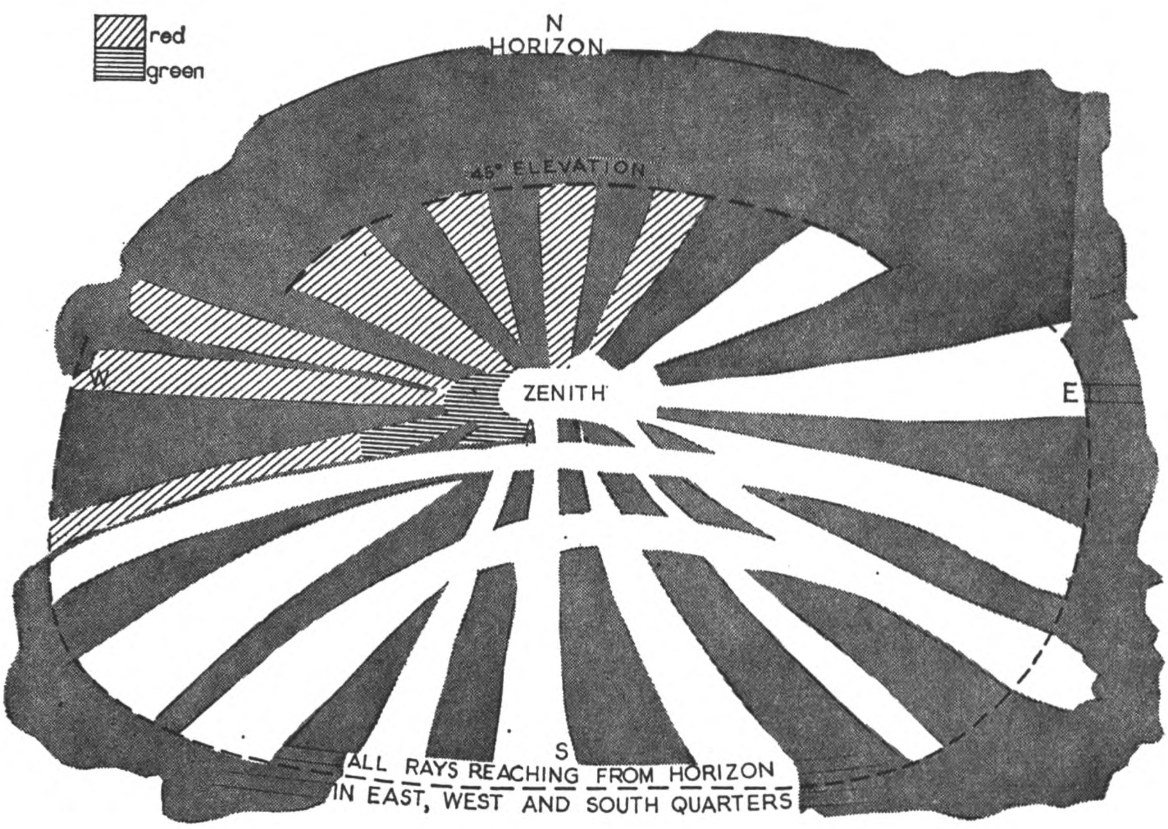
Note 1. What was seen by the ships was undoubtedly an American rocket, *Centaur* 2, launched from Cape Kennedy at 1900 GMT on 27th November 1963. The times and positions indicated



by the three ships agree very closely with calculated values. The odd appearance cannot be explained precisely but it is no doubt associated with the fact that the rocket when seen was still under power or had very recently been so.

Note 2. The observations of these three ships together with the above meteorological office comment have been forwarded to the British Unidentified Flying Objects Research Association.

AURORA



North Atlantic Ocean

O.W.S. *Weather Reporter*. Captain J. W. Clark on Station Alfa.

23rd October 1963. At 2345 GMT a white homogeneous band was observed in the southern sky; this was partly obscured by cloud (there was 6/8 cover at the time). By 0008 the display was in the form of rays which were white and pale green. The display became white again, and was active over the southern sky to an altitude of 90°. The green colour returned at 0035 by which time the brightness had increased and there was only 3/8 cloud cover. At 0055 there were rays from the horizon in the south and from 45° elevation in the N converging on the zenith with some areas green, and some red and white arcs crossing the southern sky as shown in the sketch. At 0100, the display consisted of rays from all quarters except N converging overhead and a short rayed band in the E; by now there was only 1/8 cloud. By 0200 only a very faint white glow and arc was to be seen. Position of ship: 62° 03′N, 32° 20′W.

The auroral reports for the last three months of 1963 made in British ships and received at the Balfour Stewart Auroral Laboratory of the University of Edinburgh are listed briefly overleaf.

We are grateful to the Canadian Meteorological Branch for forwarding two reports made in June and July by the *William Carson*, a ship on the Canadian voluntary observing fleet list. These are also listed.

Mention was made in the July edition of *The Marine Observer* of the auroral outbursts during September and October 1963, which accounted for the unexpectedly long list of observations made during these months. A further sketch from O.W.S. *Weather Reporter* is reproduced here, illustrating a period of activity during October. The ship was in high latitudes at the time the observation was made, but aurora was seen in Great Britain on 8 nights in October, and a report in November came from O.W.S. *Weather Surveyor* on Station Kilo (45°N, 16°W).

The work of making hourly synoptic maps for the northern hemisphere to show every auroral appearance during 1964 and 1965 (The International Years of the Quiet Sun) has been started. There is much information still to come in for the start of the period, but it is already obvious that the maps will make a most effective record. For our charts here in the laboratory, we like to have as much detail as possible of the progress of a display, but it is a great help when plotting the synoptic maps to have some reference to conditions at the exact hour.

We have received a great number of reports of noctilucent clouds from land-based observers and from crews of R.A.F. and civilian aircraft and many splendid photographs have been taken during this present observing season. There is great interest in the origin and extent of these clouds and we shall be interested to know if their frequent appearance this summer has also been noted by observers at sea.

We thank all concerned in making observations, extracting them from logbooks and forwarding data to us, and hope that we shall continue to receive this valuable assistance in our work.

DATE (1963)	SHIP	GEOGRAPHIC POSITION	Λ	Φ	I	TIME (GMT)	FORMS
26th June	*William Carson*	46°20′N 60°06′W	010	58	+73	0800–1100	HA, RA
17th July	*William Carson*	46°25′N 59°55′W	010	58	+73	0830–1045	HA
22nd Sept.	*Baskerville*	53°10′N 41°40′W	040	63	+72	2225–dawn	All forms.
4th Oct.	*Weather Reporter*	62°00′N 32°40′W	060	70	+76	0110–0400	HB, RB, N
5th	*Weather Reporter*	62°02′N 33°01′W	060	70	+76	0100	N
9th	*Weather Reporter*	61°49′N 33°04′W	060	70	+76	0030	RA
10th	*Weather Reporter*	62°11′N 32°20′W	060	70	+76	2310–0245	HB, N
11th	*Weather Reporter*	62°02′N 33°02′W	060	70	+76	2210–0030	RR, N
12th	*Weather Reporter*	62°04′N 32°30′W	060	70	+76	2050–0600	All forms.
	Weather Adviser	58°48′N 18°30′W	070	65	+72	2050–0500	N
15th	*Weather Reporter*	62°42′N 32°38′W	060	70	+76	0100–0300	N
	Weather Reporter	62°52′N 33°12′W	060	70	+76	2135–0545	HA, HB, RR, N
	Weather Adviser	59°02′N 19°14′W	070	65	+72	2350	RA
16th	*Weather Reporter*	62°09′N 32°47′W	060	70	+76	2205–0630	HA, HB, RA, RR, P, N
18th	*Weather Reporter*	62°05′N 32°34′W	060	70	+76	2115–0600	HA, RB, RR, N
20th	*Weather Reporter*	62°01′N 32°30′W	060	70	+76	2045–2145	N
	Weather Adviser	59°00′N 18°57′W	070	65	+72	2132–0100	RB, RR, N
21st	*Weather Reporter*	62°11′N 32°30′W	060	70	+76	2345–0145	HB, N
22nd	*Weather Reporter*	62°11′N 32°30′W	060	70	+76	0545	HB
	Weather Reporter	62°02′N 32°52′W	060	70	+76	2100, 2300	N
23rd	*Weather Reporter*	62°02′N 32°48′W	060	70	+76	0025–0145	N
	Weather Reporter	62°03′N 32°18′W	060	70	+76	2345–0200	HB, RB, RR, N
24th	*Weather Adviser*	59°01′N 19°04′W	070	65	+72	0250–0623	All forms.
	Weather Adviser	59°12′N 19°02′W	070	65	+72	1850–2400	HB, RB, RR, P
	Weather Reporter	62°03′N 32°55′W	060	70	+76	2100–2145	HA, HB, RR, N
26th	*Weather Reporter*	62°07′N 33°40′W	060	70	+76	0300	N
29th	*Weather Reporter*	61°05′N 17°10′W	070	67	+73	2110	RR
30th	*Weather Reporter*	60°07′N 15°00′W	080	65	+73	0310	N
	Weather Adviser	59°13′N 18°58′W	070	65	+72	0445–0452	RR, N
12th Nov.	*Weather Monitor*	52°32′N 19°35′W	060	59	+69	0340–0500	P
13th	*Weather Surveyor*	45°00′N 15°54′W	060	51	+63	2325–2345	N
18th	*Weather Monitor*	52°17′N 20°29′W	060	59	+69	2100–2400	HA, N
19th	*Weather Monitor*	52°32′N 19°55′W	060	59	+69	2200	N
21st	*Weather Monitor*	52°25′N 19°40′W	060	59	+69	0500	N
15th Dec.	*Weather Monitor*	61°50′N 33°12′W	060	70	+76	2300–0200	HA, R
17th	*Weather Monitor*	61°42′N 33°12′W	060	70	+76	2200–2400	N
18th	*Weather Monitor*	61°50′N 33°12′W	060	70	+76	0400 0800–0900	N N
19th	*Weather Monitor*	61°50′N 33°20′W	060	70	+76	2050–0800	All forms.
	Weather Surveyor	58°42′N 17°54′W	070	65	+72	2300–0100	N
20th	*Weather Monitor*	61°50′N 33°54′W	060	70	+76	2000–2400	HB, RB, P
21st	*Weather Monitor*	61°50′N 33°40′W	060	70	+76	0200	P
	Weather Monitor	61°36′N 32°54′W	060	70	+76	2000–0032	HA, HB, RB, P
22nd	*Weather Monitor*	62°00′N 32°50′W	060	70	+76	2140–2400	HA, HB, RR, P, N
23rd	*Weather Monitor*	61°54′N 33°00′W	060	70	+76	0500	P
	Weather Monitor	61°42′N 32°54′W	060	70	+76	2200–2300	HA, HB
	Weather Surveyor	58°54′N 19°06′W	070	65	+72	0001	N
25th	*Weather Surveyor*	59°06′N 18°30′W	070	65	+72	0500	N

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; N = unidentified auroral form.

Meteorological Data by W/T

By M. W. Stubbs
(Synoptic Climatology Branch, Meteorological Office)

Introduction

Weather forecasts provide a great deal of assistance to the Mariner. A chart, however, can greatly assist in the interpretation of these forecasts, and can enable the navigator to supplement the forecast several hours later if the weather changes from the predicted pattern. The following notes are concerned with information which is available via the medium of W/T for the construction of weather charts aboard ships on the North Atlantic.

Broadcasts Available

The time available for the reception of meteorological broadcasts on board ship is limited by the number of radio officers employed on the ship and by the reception of routine traffic lists and navigational warnings. Some of the broadcasts mentioned below will be useful on ships carrying only one or two radio officers whilst others will be useful on ships maintaining a twenty-four-hour wireless watch.

Table 1 shows the normal routine broadcasts issued specially for ships on the North Atlantic. The contents of these transmissions are probably well known and details will not be given here. Table 2 lists a number of transmissions (including some of those in Table 1) which can be used for constructing weather charts for the North Atlantic. The transmissions include both obervations and analyses, and are listed in Table 2 according to the times of the respective charts, that is the times at which the original observations were made. For example, if the 1200 GMT chart is to be constructed, the observations included in the transmission from Quickborn (DDJ) and Horta (CTH) may be utilised but only one analysis message from the four radio stations listed in Table 2 will be required. Table 3 contains details of the frequencies in use.

Forecast charts (i.e. charts showing what the isobaric situation is expected to look like 24 hours ahead) may be received from two stations. Paris (HXZ) at 1030 (all

Table 1. Meteorological data transmitted from Portisheadradio, Halifax, Washington and Horta

Station	Call Sign	Time (GMT)	Type of Message	Hour of Observation
Portisheadradio	GRL, GKA	0930	Forecasts, SHIP, SYNOP	0600
		1130	Analysis, SHIP	0600
		2130	Forecasts, SHIP, SYNOP	1800
Halifax	CFH	0430	Analysis	0001
		0700	Forecasts	—
		1630	Analysis	1200
		1900	Forecasts	—
Washington	NSS	0035	Analysis	1800
		0530	SHIP, SYNOP	0001
		0730	Forecasts	—
		1130	SHIP, SYNOP	0600
		1230	Analysis	0600
		1730	SHIP, SYNOP	1200
		1930	Forecasts	—
		2330	SHIP, SYNOP	1800
Horta	CTH	0930	Forecasts, SHIP, SYNOP	0001
		2130	Forecasts, SHIP, SYNOP	1200

SHIP indicates a coded ship report in code form FM 21C, FM 22C or FM 23C.
SYNOP refers to a coded land station report in code form FM 11C.

Table 2. Radio stations transmitting information from which meteorological charts may be constructed

Time of Chart (GMT)	Ship in Eastern North Atlantic				Ship in Western North Atlantic			
	Observations		Analysis		Observations		Analysis	
	From	At	From	At	From	At	From	At
	Call Sign	GMT	Call Sign	GMT	Call Sign	GMT	Call Sign	GMT
0000 ..	CTH	0930[1]	GYC HXZ FFS	0446[2] 0810 0850[1]	NSS	0530	CFH HXZ	0430 0810
0600 ..	GRL	0930[1]	GFT GRL HXZ	1115[2] 1130 1200	NSS	1130	NSS FFP	1230 1300[1]
1200 ..	DDJ CTH	1315 2130[1]	GYC ECA7 FFS HXZ	1646[2] 1700[1,3] 1750[1] 1900	NSS	1730	CFH HXZ	1630 1900
1800 ..	GRL	2130[1]	ECA7 GFT	2150[1] 2315[2]	NSS	2330	NSS FFP	0035 0100[1]

[1] Follows plain language forecasts.
[2] Usually at this time but may vary from time to time. [3] Broadcast at 1730 if not at 1700.

times in GMT) transmits a 24-hour forecast surface chart for 0600 the next day. Bracknell (GFT) also transmits a 24-hour forecast surface chart in the 1115 and 2315 broadcasts, the forecasts being for 0600 and 1800 the next day respectively. The broadcast from GFT is liable to change in time occasionally as it is primarily intended for the ocean weather ships and is arranged to suit their requirements. The frequencies used for these broadcasts are those given in Table 3.

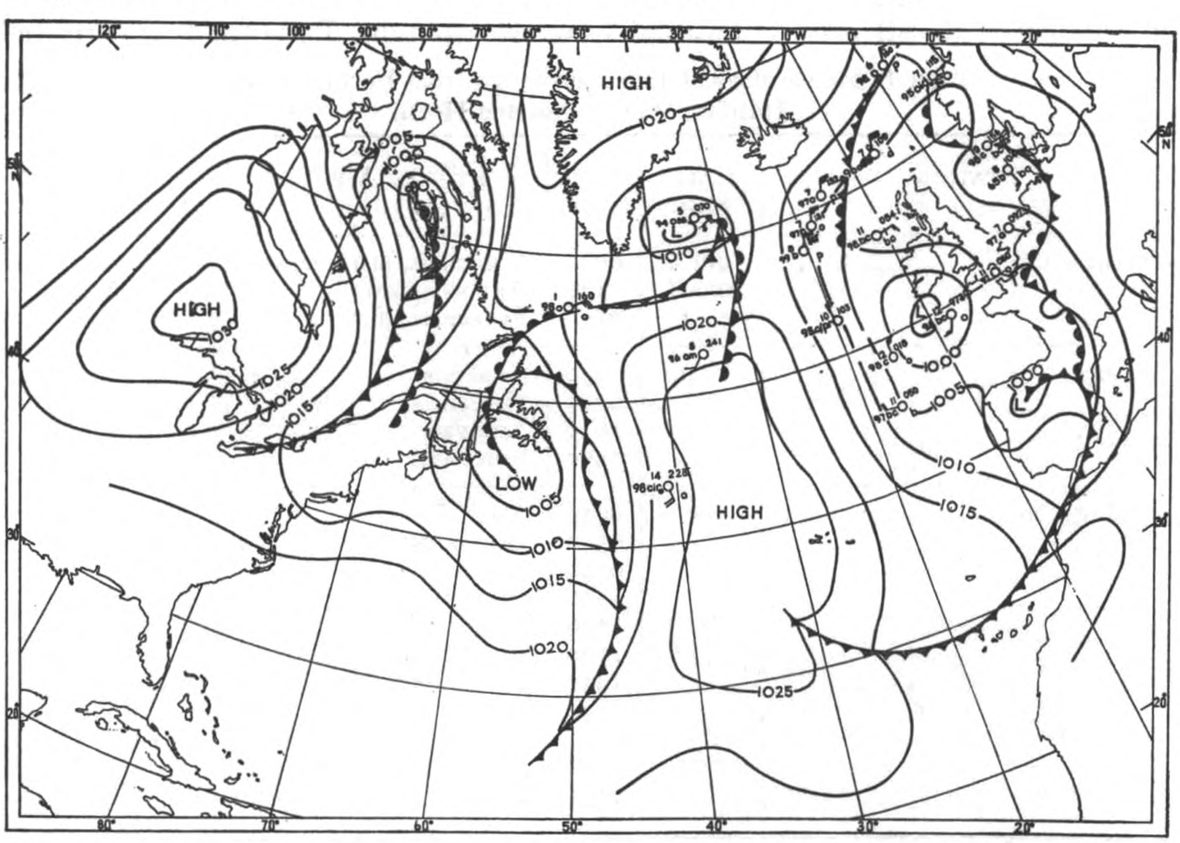


Fig. 1. Surface Analysis, 18th April 1964. Observations from Quickborn (DDJ); analysis from Paris (HXZ).

The choice of broadcasts actually received in a particular ship will depend on the number of radio officers on board and the time available to decode the various messages. For example, in a single operator ship in the Eastern North Atlantic it may be found possible to receive the midnight analysis from the Paris broadcast (HXZ) at 0810 if there is no traffic for the ship in the 0800 roll call from Portisheadradio. The observations transmitted at 0930 from Portisheadradio would then indicate whether any major changes in the synoptic weather pattern were taking place. They would also assume more meaning when used in conjunction with the midnight analysis. The midday chart could be constructed on a single operator ship by using the 1315 broadcast from Quickborn for a selection of ship observations, and one of the analysis messages listed in Table 2. An example is given in Fig. 1 using the Paris (HXZ) analysis. If the weather situation is changing quickly the 1800 chart would be useful and could be constructed using the observations from Portisheadradio at 2130 and tuning to Madrid (ECA 7) at about 2155 for the analysis. Thus it should be possible to have at least one weather map available each day. All the transmissions, with the exception of the one from Fort de France in the French Antilles, have been monitored by the author.

Utilising the Information

Once the W/T message has been received a chart can be constructed from an analysis message in about twenty minutes and the observations received in any one broadcast will take about the same time to plot. In some ships the radio officer may offer to do this task of decoding and plotting the respective messages.

The observations and analyses may be plotted on Metform 1258, 'Plotting chart for use with the Atlantic Weather Bulletin for Shipping.' This chart (21″ × 16″)

Table 3. Key to call signs and frequencies in use

Call Sign	Station	Frequency, Kc/s	Frequency Availability
CFH	Halifax, Canada	115·3; 4,356·5; 6,449·5; 8,662; 12,984; 17,218·4;	All broadcasts
CTH	Horta, Azores	429; 7,351; 3,838; 10,980;	All broadcasts 2130 only 0930 only
DDJ DDH DFN	Quickborn, German Federal Republic	147·3; 11,039; 13,925·6;	1315 broadcast, but see Table 4 for full details
ECA7	Madrid, Spain	296; 3,790; 6,918·5; 14,641;	All broadcasts
FFS FFL	St. Lys, France	8,510; 4,328; 13,096·5;	All broadcasts According to season
FFP	Fort de France, French Antilles	8,674; 12,831;	Broadcast at 0100 and 1300
GFT	Bracknell, England	3,185; 4,016; 5,793; 7,788; 11,525;	Two or three frequencies chosen according to the time of day
GRL	Portisheadradio, England	1,612; 4,268; 6,397; 8,582; 12,858; 17,136·8; 22,431;	For actual frequencies in use see Vol. 1 of the *Admiralty List of Radio Signals*
GYC	Whitehall, England	78·2; 4,301; 6,414·5; 8,614; 12,808·5; 17,031·2;	All broadcasts
HXZ	Paris, France	3,578; 5,925; 7,972·5;	1900 only All broadcasts
NSS	Washington, U.S.A.	121·95; 5,870; 9,425; 13,575; 17,050·4; 23,650;	All broadcasts

is on a scale of 1:20m and may be used in conjunction with the broadcasts on both sides of the Atlantic. The charts are supplied to British voluntary observing ships, free of charge, by any Port Meteorological Office in the United Kingdom on request, and to other ships they are available (printed on both sides), at 15s. per hundred, from the Director-General, Meteorological Office, Met. O. 10a, Bracknell, Berkshire. Another chart which may be useful in the Central and Eastern Atlantic is the Meteorological Working Chart, B147, 'North Atlantic Ocean and Mediterranean Sea' (27″ × 24″), scale of 1:10m, published by the Admiralty, price 24s. per hundred copies. This latter chart is just one of a large range of meteorological working charts obtainable from agents for the sale of Admiralty charts.

Full instructions for decoding the coded observations and the analysis messages are given in the *Ships' Code and Decode Book* published by Her Majesty's Stationery Office at 3s. 6d. and supplied free to British voluntary observing ships. The codes are also set out in *The Admiralty List of Radio Signals*, Volume 3. Most of the observations transmitted are in a shortened code form using only the groups as far as the pressure-temperature group in the FM 11C or FM 21C codes. In some broadcasts the wave group is added. All the code groups are included in the broadcast from Quickborn (DDJ). This station transmits a large amount of meteorological data throughout the day besides that mentioned in Table 2. Although the average merchant ship will not normally require all these data, it is useful to know where and when the available ship reports from the North Atlantic may be obtained. Table 4 gives details of messages, times and frequencies of Quickborn's broadcast.

It is usual British practice for the isobars in an analysis message to be drawn every four millibars, but in the French analyses the isobars are drawn every five millibars.

Table 4. Details of the broadcast from Quickborn

Observation Time (GMT)	Ship Reports Transmitted at			Land Reports Transmitted at		
0600	0715 1015	0745 1130[2]	0815	0610 0745[1]	0620 0815[1]	0715[1] 1120[2]
0900	1015	1045				
1200	1315	1345	1415	1210 1345[1]	1220 1415[1]	1315[1]
1500	1615	1645	1715	1520 1715[1]	1615[1]	1645[1]
1800	1915	1945	2015	1810 1945[1]	1820 2015[1]	1915[1]

Frequencies used

Call Sign	Frequency, Kc/s	Times of Operation	
		16 August to 30 April	1 May to 15 August
DDH 47 ..	147·3	0520—2030	0520—2030
DDJ 5	5,876	0520—0900	0520—0715
DDJ 7	7,646	0520—0900 1800—2030	0520—0900
DDJ 9	11,039	1015—2030	0715—2030
DFN 92L1 ..	13,925·6[3]	1015—1800	1015—2030

[1] Follows ship reports.
[2] First four groups of FM 11C or first five groups plus the wave group of FM 21C, FM 22C or FM 23C.
[3] May be replaced by DFQ, frequency of 16,018·6 kc/s.

Hence, if an estimate of wind speed is required from a chart with an isobar spacing of five millibars, care must be exercised in the use of the geostrophic wind scale printed on the chart since the scale usually refers to four millibar spacing. To obtain a value for the geostrophic wind from five millibar isobars using such a scale, the distance between successive isobars should be measured, and the result obtained from the scale multiplied by $\frac{5}{4}$.

Wave Analyses

Until recently it was possible to receive charts depicting sea conditions (waves) only if the ship was fitted with special facsimile receiving apparatus. In February 1964 the German Federal Republic commenced transmitting a coded wave analysis on W/T via the station at Quickborn. The broadcast is quite short and is at 1750 and repeated at 2030 on the frequencies shown in Table 4. The analysis contains information for the drawing of isopleths of wave height for the North Atlantic and is for 1200 on the day of broadcast. Information is also given on the wave period and direction at the ocean weather ship stations. The code used is the normal FM 45C, International Analysis Code, details of which may be found in Volume 3 of *The Admiralty List of Radio Signals*. The form in which the code is used in the above broadcast is set out below.

The opening preamble is 10001 33388 $OYYG_cG_c$ 88800, where YY is the date and G_cG_c is the time of the observations from which the chart is compiled. The positions of points on the various isopleths of wave height are then given. Each isopleth is labelled by means of the group 772uu where uu is the height of the waves in metres. Table 5 gives the equivalent heights in feet. The height label group is followed by

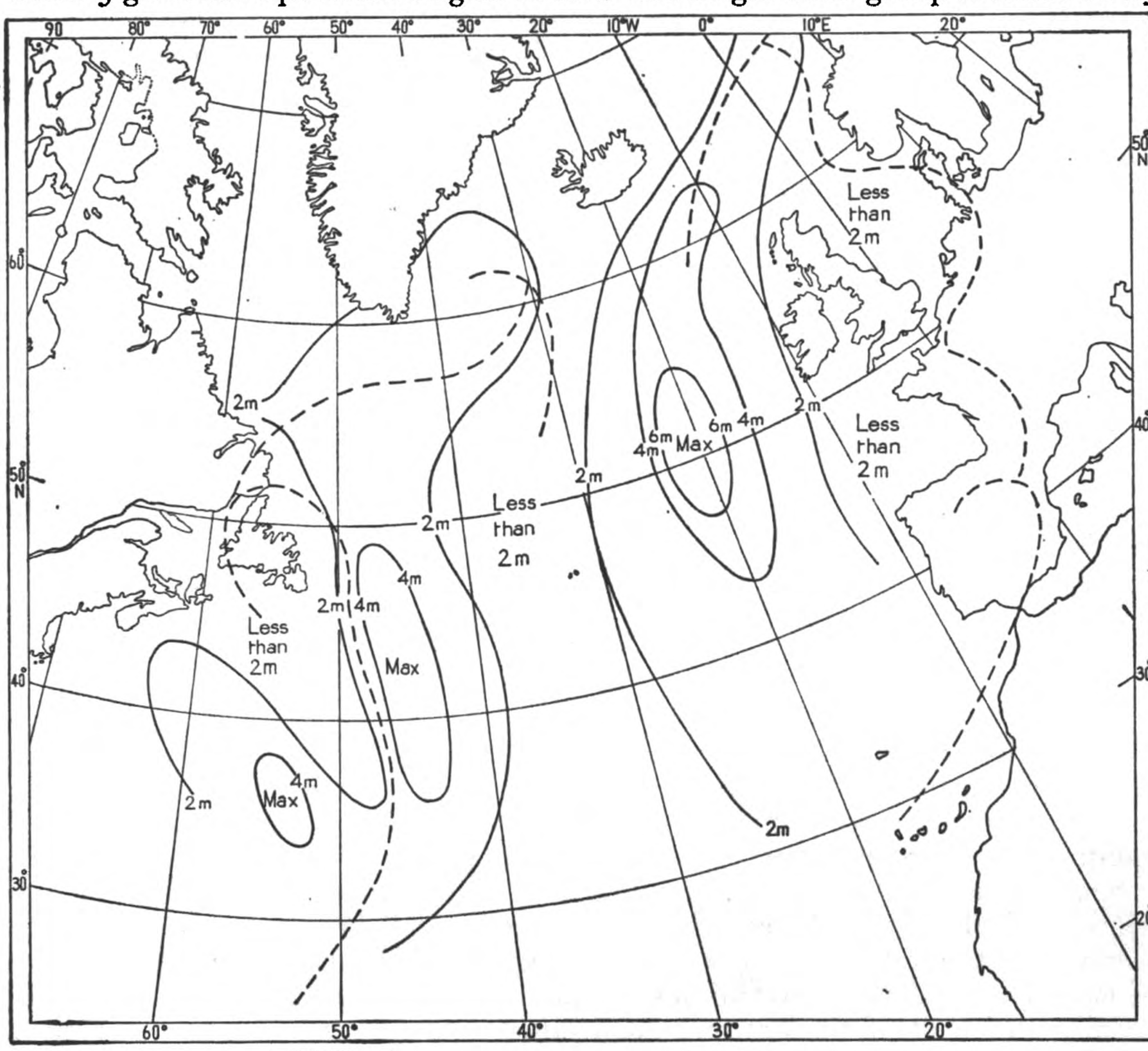


Fig. 2. Wave height analysis, 18th April 1964.

several position groups in the form $QL_aL_aL_oL_o$ where Q, the octant of the globe, is 0 for the longitudes between 0° and 90°W and 3 for the longitude zone 0° to 90°E in the northern hemisphere. These positions define the isopleth if a smooth curve is drawn through the points given. Wave direction and period data at selected points in the Atlantic follow the group 77///. This information is in the form $9d_wd_wP_wP_w$ $QL_aL_aL_oL_o$ where d_wd_w is the direction from which the waves are coming in tens of degrees, and P_wP_w is the period of the waves in whole seconds at the positions given by the position groups $QL_aL_aL_oL_o$.

Fig. 1 shows the surface analysis for 1200 on the 18th April 1964 as received from Paris (HXZ) at 1900. The observations on the chart were received from Quickborn (DDJ) between 1315 and 1328. Further observations from Quickborn were not received as warnings and service messages from Portisheadradio had to be copied at 1330. There were sufficient observations, however, to fill in the details of the analysis. Fig. 2 shows the wave analysis for 1200 on the same day received from Quickborn at 1750. The highest waves were situated in the strong northerly wind flow to the west of the British Isles. The other maxima were situated in the strong southerly wind ahead of the cold front at 47°W and in the westerly wind to the rear of the cold front. The fronts have been dotted on fig. 2.

The wave analysis can prove useful without a corresponding surface analysis, but the latter does assist in explaining the presence of the wave maxima and minima.

Summary

Using the above information it should be possible, even in a ship carrying only one radio officer, to construct at least one meteorological chart during the day together with a wave chart if this is considered to be useful. In times of adverse weather conditions more detailed charts could be drawn using the various observational data available via W/T. These charts then supplement the routine weather forecasts; aided by careful observation of the ship's barometer and the weather conditions in the environment of the ship, the mariner is thus in a better position to navigate his ship safely and on some occasions rather more smoothly.

Table 5. Conversion of metres to feet

Metres	0	2	4	6	8	10	12	14	16
Feet	0	6½	13	20	26	33	39	46	52

Editor's Note. If the ship happens to be fitted with a facsimile receiver, then the maps to which this article refers can be received by radio already plotted—just another form of automation (see the editorial in the July 1964 number of *The Marine Observer*).

551.507.354: 551.326.7

Ice Observing in Canadian Waters

By G. T. Meek

(Marine Sub-Section, Basic Weather, Meteorological Service of Canada)

The descriptive terms 'ropak', 'hummock' and 'polynya' used by Ice Observers are probably as baffling to the average landsman as many of the nautical terms used by seamen. With the large increase in shipping to Canadian ports during the winter months seamen are becoming quite familiar with the ice observer's ice terminology.

Seafarers sailing to St. Lawrence, Gulf and Newfoundland ports during the winter and along the Hudson Bay route to Churchill in the summer will have seen during the last five years, a vast increase in the Canadian Coast Guard's fleet of icebreakers. These powerful vessels play an important part in the winter, in keeping the Gulf of St. Lawrence and other eastern ports open and making it possible for shipping companies to operate safely and economically.

In order that the icebreakers could best be deployed in keeping rivers and ports open and escorting cargo vessels through ice-infested waters with the least loss of time, the Meteorological Branch, Department of Transport, was assigned the responsibility of setting up an Ice Reconnaissance Unit. It was to be responsible for the observing and reporting of ice distribution both from aircraft and ships. The Ice Forecasting Central at Halifax was established to issue advisories and forecasts of ice conditions.

The first Meteorological Branch Ice Observer was assigned to shipboard duties aboard the C.C.G.S. *D'Iberville* in the summer of 1957. Since that time observers have served aboard all the large icebreakers for approximately seven months of the year. The term shipboard ice observer is undoubtedly unique and it is unlikley to be listed in the ship's articles of a conventional merchant ship.

The shipboard ice observer is invaluable to the ice forecaster as he is in a position to supplement the data collected by his colleague, the aerial observer. He is able to examine closely and make detailed observations of the ice conditions immediately around his vessel regardless of the weather. He can determine accurately the ice texture, variations in thickness, snow depth, state of deterioration, and other features. Although the observer's horizon from the ship is limited to five miles or so, he can, with the ship's radar and decca (if available), plot accurate ice edges, orientation and concentrations. Also, the use of the shipboard helicopter has greatly increased the observer's horizon (and is capable of providing the vessel with a reconnaissance over a large area). The observer's daily duties consist of making ice observations every six hours and transmitting them in a synoptic code, compiling a daily technical message of conditions along the ship's track, interpreting ice and weather charts received at scheduled times by facsimile or radio message for the master and ship's officers, arranging for tactical flights with shore-based ice patrol aircraft and making radio-telephone contact with these aircraft when they are in the area; his duties also include supplying ice information to merchant vessels in the area when requested. Perhaps it should be mentioned here that the Department of Transport maintains an Ice Information Officer at Sydney, N.S., during the ice season whose responsibility is to advise ships of the most favourable shipping tracks to various gulf ports, based on the information supplied to him by the Ice Forecasting Central at Halifax. This information can usually be supplemented by additional data from shipboard observers on ice breakers if merchant vessels contact them.

Because of the observer's obvious ties with meteorology it is also one of his responsibilities to assist the ship's officers in the taking of six-hourly weather observations, which are of great assistance not only to the weather forecaster but also to the ice forecaster ashore, if he is to study all the aspects of the ice conditions.

When navigating through ice-infested waters, every day is a 'field day' for the observer, with no set watches, and unless the vessel docks or anchors for the night he may be on duty for eighteen hours. He has little chance of sharing the traditional afternoon watch nap.

The observer's day usually begins with him being called to the bridge at first light in the morning watch and being told to prepare for a 'helicopter recco'. After a briefing with the captain and 'chopper' pilot the observer plots the course to be flown, observing the wind for possible drift and noting any significant landmarks or icebergs in the vicinity of the ship in order that he can plot conditions accurately. The formalities between getting out of one's bunk and take-off usually takes less than twenty minutes and there is certainly no faster way of waking up than by taking off in zero temperatures. On take-off the general procedure for the flight depends on whether the captain wishes a reconnaissance of the area ahead. If so, the pilot will usually fly a triangular track at perhaps one to two thousand feet. This will give the observer a visible horizon of about thirty miles and provide him with a good picture of the ice conditions. These flights are limited to about thirty miles ahead of the vessel, which is far enough to obtain a picture of the ice conditions which will be encountered during the next few hours' or day's operations. When the icebreaker captain wishes the helicopter to provide tactical support to his ship, contact is kept with the vessel's bridge via radio-telephone and an eye is kept open for any navigable leads which the ship could transit safely. If, from the information transmitted to the ship, a route is decided upon, the helicopter will commence 'leading the way', by hovering and leap-frogging from floe to floe and serving as a target for the ship to steer by. This method has proved an invaluable system of navigating through ice, but it has limitations in the Arctic where soundings are still very sparse and shoals numerous. Also when in the Arctic the ice may be snow covered, making it impossible for the observer to ascertain if the ice below is polar ice, which, unlike ordinary winter ice, is ice more than one year old and usually of great thickness and strength. When an icebreaker hits polar ice with any force at all, it is quite common for the ship to be brought up to a sudden stop, usually catching everyone off balance. If the ice observer is unfortunate enough to be leading the ship in the helicopter when this occurs, it is not uncommon for him to receive the blast of the captain's wrath over the radio. However, in cases where an icebreaker has been working in areas of heavy ice for days on end, outbursts of colourful language and taut nerves can only be expected.

Icebreakers are now playing an ever-increasing part in assisting merchant ships into St. Lawrence River and Gulf ports, which until a few years ago were more or less idle during the winter months. Also, with the discovery of new iron ore deposits in Quebec, new ports have been developed along the south coast of Quebec from which the ore is shipped. The aerial and shipboard ice observers are being called upon to play an ever-increasing role during the ice season. With improved observing methods and navigational aids, to say nothing of the great potential of NIMBUS meteorological satellites in ice surveillance, the threat of ice damage to merchant vessels is becoming a rarity, and continuous winter operation of ports in the area is becoming a reality.

551.593.63

Seven Suns in the Sky

By H. Sigtryggsson

(Mr. Sigtryggsson is an Icelandic meteorologist and this article is based upon a translation of an earlier one published in the Icelandic magazine *Vedrid*)

In the past, annalists and other historical writers often described interesting sky phenomena which they had seen or heard about. Sometimes the truth was very mixed in these stories, but most of the historians aimed at being objective in their descriptions.

Björn Jónsson, a member of the Icelandic legislature, was one of these writers. His chief works are the annals of Skardhsá which he wrote in the years 1630 to 1640. Björn was obviously very interested in writing descriptions of natural phenomena, but among them he tells of the serpent in Lagarfljót (Fleet Loch), a direct cousin to the Loch Ness monster. However, in his descriptions he was critical of doubtful phenomena, which obviously were based on superstition, and states that he passes lightly over these.

Björn describes many halo combinations; I quote here some extracts from his works:

1586—"Sickness in Iceland. At St. Martins Mass (i.e. November 11) three moons were seen in the heavens, with one large halo, and one band going through all three. Then came another small halo round the moon, with colours like a rainbow: the outermost part of it was green, the second blue, the innermost reddish yellow, and next to that white round the moon itself."

Here Björn is describing the halo of 22°, parhelia and the parhelic circle, which in this case should be called parselenæ and parselenic circle. The multicoloured rings round the moon, which are distinctly smaller than the halo, are considered to be an example of Hall's rings, though they are rare round the sun, and even rarer round the moon.

(Opposite page 192)

Photo by National Film Board of Canada.

Helicopter returning to C.C.G.S. *d'Iberville* in Norwegian Bay while en route to Eureka, Ellesmere Island, to resupply the weather station.

Photo by Department of Transport.

D.O.T. helicopter on ice survey in Gulf of St. Lawrence—C.C.G.S. *Sir William Alexander* and m.v. *Baie Comeau* in background—February, 1962.

(*Opposite page 193*)

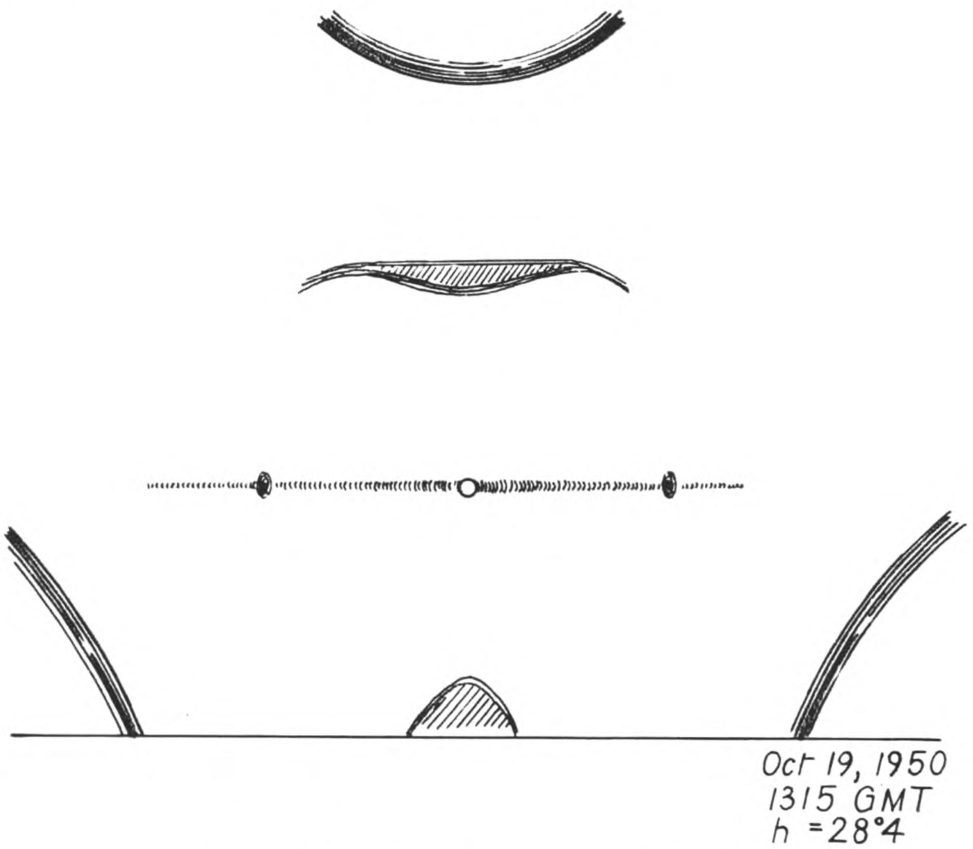
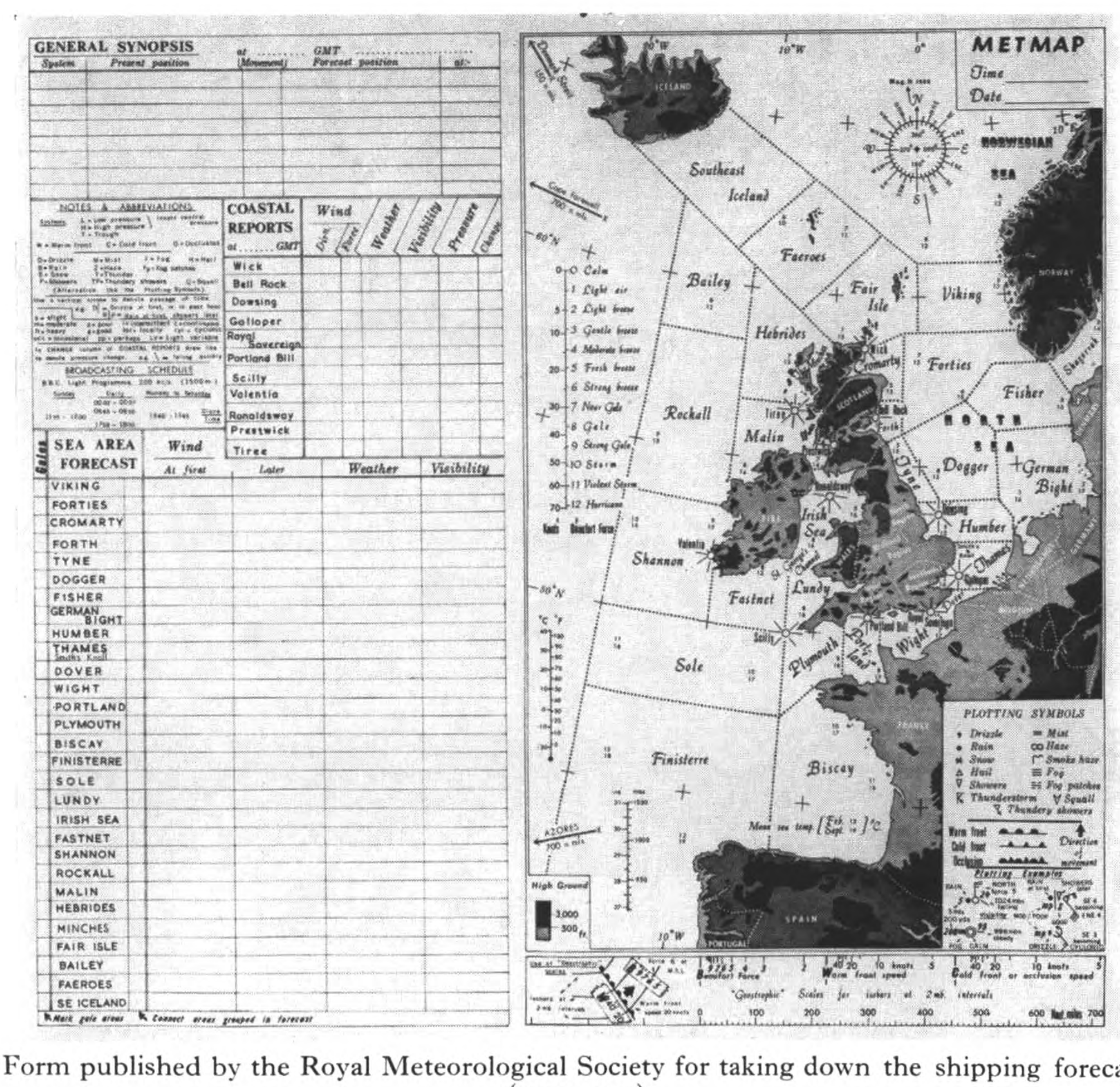


Fig. 3. *See* Seven Suns in the Sky, p. 192.



Form published by the Royal Meteorological Society for taking down the shipping forecast (*see* p. 209).

1614—"In Iceland, on March 14th just after midday, many suns were seen with various rings. They stayed a whole hour, then gradually disappeared as the day passed (as shown in the drawing)."

It would have been interesting to print here the drawing made by Björn, but it has been lost long ago. Those who copied the annals in the past centuries were not very interested in drawings, even if they were an indispensable part of the original.

1615—"A very severe winter. Ice drifted round the south-east coast of Iceland and down into Grindavík, it further drifted past Reykjanesröst (röst = a tidal current) and into Vog (Kirkjuvog) and so around all Sudhurnes. No one remembers such a drifting of ice from the south past the röst to have happened before. Seal-killing on the ice round Sudhurnes. That winter there was seldom seen one sun only, there were not only two or frequently three, but very often four and quite frequently five, then six also; then seven were seen, also eight and some people even saw nine. These suns were seen in circles in the sky with various signs and appearances. Then a likeness to a rainbow was seen, facing the sun, although it was hard frost."

The severity of that winter in Iceland was certainly not exaggerated, and probably not the number of suns either. In severe frosts, such as are common in the polar regions, ice crystals are frequently formed near the ground, and under such conditions haloes and various halo combinations are more frequent than elsewhere. It is clear that in the year 1615 the polar winter accompanied the polar ice to Iceland. It is quite likely that a temperature of minus 25–40°C was common, but it is not certain that storms or snowfall were more frequent than usual. The nine suns seen could have been, beside the sun itself, part of the tangential arc to the halo, the parhelia and the various other bright spots on the parhelic circle, i.e. its intersections with the halo of 46°, the anthelion and the parhelia of 120°. This must have been a winter of many lights. Beside the suns, many arcs and rings were seen, but they are not described fully, except the antisolar halo of 44°, which seems to have been striking, even though it normally appears weak, on the rare occasions of its occurrence. It may therefore be inferred that the other arcs were bright.

For my English readers, who most likely are not familiar with Icelandic place names, I will try to give a short account of the place names mentioned above. Grindavík (Whale Cove) is a small fishing village on S.W. Iceland, about 30 miles from Reykjavik, the capital. Just west of Grindavík is Reykjanes (Peninsula of the Smokes) which is the south-western extremity of Iceland. The places and communities on and around Rekyjanes are collectively called Sudhurnes (southern peninsulas). One of these places is Kirkjuvogur (Church Cove). Off Reykjanes there is a strong tidal current extending out to sea, called Reykjanesröst. All these places are in the vicinity of the present airport at Keflavik. The polar ice came round Iceland from the north and east and past Reykjanes, then it went north, possibly into Faxa Bay.

1625—"An earth-bound winter, with spoiling thaws. It was called the ice-sheet winter. In the spring a sign was seen near the sun. This was a great ring round it, and another ring out from the middle of the sun and extending below it, and there on each side of it were other rings as can be seen here drawn up, if anyone wants to see. These rings were seen fron nine in the morning until early afternoon."

First I must make some clarifying remarks on the weather conditions during this winter. There seem to have been periods of hard frosts with some snowfall, interrupted by light thaws, during which the snow was partially melted, only to freeze to a solid sheet of ice at the onset of the next period of frost. Such thaws made matters only worse for the farmers, who attempted to keep their livestock on pasture as much as possible; hence the name 'spoiling thaws'.

Let us then turn to the description of the haloes. The copyists have done us the disservice of omitting the drawings, but even so it can be assumed that a halo of 46° is being described, and its lateral tangential arcs. I do not feel competent to name the arcs which lay "out from the middle of the sun and extending below it", but it may have been a variety either of the sun pillar or the parhelic circle.

1626—"The winter was exceptionally good after Christmas. A severe spring. A catch of seals on the ice around Skagi. In February a sign was seen with rings near the sun; there was no ring round it but four out from it, each one in a different direction."

It is easy to see that the appearance described is characteristic of calm air, when most of the surfaces of the ice cyrstals are either horizontal or vertical. The halo was not seen, but I imagine that its tangential arcs were seen both above and below the sun (the arc above the sun could also have been the circumzenithal arc) with parhelia on both sides, with secondary sun pillars and portions of the parhelic circle extending from them. A pillar should then also have been near the sun, although it is not directly mentioned. It is also possible that the arcs on each side of the sun were the lateral tangential arcs to the 46° halo.

1640—"Failure of hay. A severe spring. On the 23rd of March, about the second hour after midday, and both before and after that hour, a great ring was seen right round the sky, and it went across the middle of the sun and the two mock suns, which were all clearly seen, and around the main sun was another smaller circle, it went through the two mock suns and then half way up into the great circle, a band went through it below the sun, but up above the two mock suns there were large bright areas also. Up above the sun where the small ring went farthest up, there was an arc, of a beautiful white colour, and the bend looked down (i.e. was concave upwards), and towards zenith in the great ring were white spots of many kinds, and also on the great ring opposite the sun there were five sun circles. Those who saw all the sky, where mountains did not obstruct the view, said that some images which were above the sun had been below it also, and out from it; also images of half a rainbow on each side from it, with the arcs toward the sun."

It is evident that the large ring "right round the sky" is the parhelic circle. The anthelion was also seen and oblique arcs through the anthelion, and the parhelic of 120°. The small ring around the sun which went through the mock suns can hardly have been other than the 22° halo, though it is odd that it is not mentioned by its ordinary name in the Icelandic text. There must have been bright tangential arcs above and below it. A 46° halo round the sun is not described directly, but various phrases in the account point to the probability that both it and the circumzenithal arc were seen. I refer in particular to the sentence "toward zenith in the great ring there were white spots of many kinds". The whole account is a bit difficult to understand, and it seems most likely to me that the phrase "great ring" must refer both to the parhelic circle and the 46° halo. It further seems likely that the lateral tangent arcs to the 46° halo were also present, but were obscured by mountains at Skardhsá.

In leaving Björn and his rings it is worth noting that most of the sky phenomena he describes seems to have been observed in abnormally cold seasons.

In an old chronicle by Paul Vídalín, a judge, there is a characteristic description of a halo complex, which he saw in the spring of 1701. I quote his description in full here.

"On May 25, at midday, a ring was seen in the heavens round the sun, as beautiful as the brightest rainbow above and below the sun; but across the middle of the sun and through this ring went another ring, very large, so that it lay up aloft right over the zenith. Where this great ring crossed the small one, which was around the sun, there were two suns before the sun and after, and another two suns, not so bright, were opposite them on this big ring, so that they seemed to divide the great ring into four almost equal parts, this ring was seen for not over an hour, and the suns disappeared with it, leaving only a halo round the sun. Afterwards, at three o'clock on the same day, the same great ring was seen again round the zenith, and was above the halo round the sun; but inside this great ring was another small ring elongated like an egg; it closed in the great ring at both ends, so that the length of this inner ring was equal to the width of the great ring, but nowhere else was it so wide; near the centre of the inner ring was seen a transverse band, which had the correct colours of a rainbow and was seen for a short time, but the rings themselves were

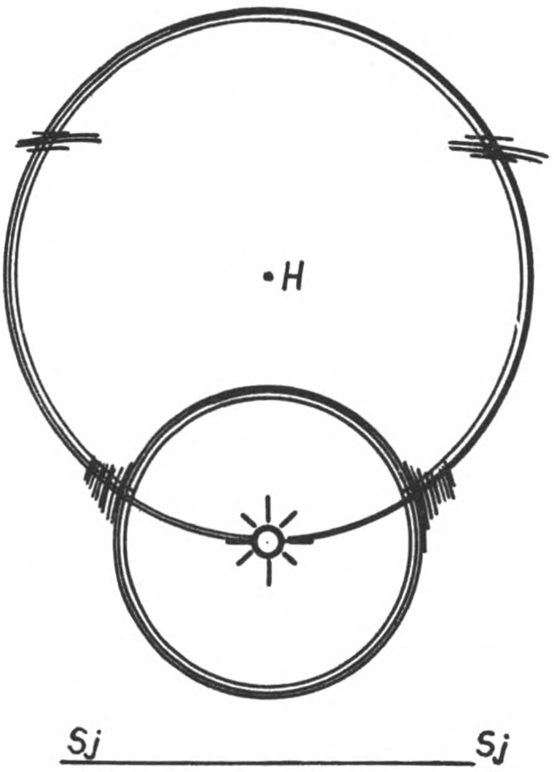


Fig. 1.

a pale white. Meanwhile, there were four suns in the halo round the sun; these rings were seen for little less time than a full hour."

It does not do to take everything the judge says literally here, but the skies must have been a rare and splendid sight. It is rare, too, for two sets of halo phenomena to be seen on the same day. First we shall consider the haloes which were seen near midday. A bright halo is described, probably the 22° halo, but it could also be the 46° halo. Another ring is described, which seems to have gone through both the sun and the zenith (H). On further consideration, however, we can see that this contradicts another of the historian's statements. In northern Iceland, where Paul lived, the altitude of the sun at midday in May is close to 45°. A ring through the sun and the zenith must therefore be of the same size as the halo, the radius of both being near 22°. But, according to the story, the ring through the sun was much larger than the one around it. It must therefore have lain round the zenith and not through it. In my opinion, therefore, the great ring is the parhelic circle. There were bright spots on it 120°, and they and the parhelia divide the parhelic circle into four rather unequal parts. The first figure shows how I imagine this halo complex.

Paul says that the great ring was seen later in the day, but at that time above the halo. This cannot be quite right, because the same parhelic circle is not seen both through the sun and far above it. But it is clear that there was a patch of light above the sun on the halo, and it was probably very bright, since three other mock suns were seen. I imagine that this bright spot above the sun was on the parhelic circle. Such a thing is an uncommon sight but by no means unique. But the spot also formed oblique arcs inside the ring, and I, at least, have not seen such an occurrence described elsewhere. Beside this, a portion of the rare 90° halo was also seen. The second figure is a sketch of this appearance.

I shall close this article by quoting some accounts by one of the members of the British–Norwegian–Swedish Antarctic Expedition in 1949 and 1950. In the Antarctic, halo complexes are frequently seen, many of them in swarms of small ice crystals drifting near the ground. I hope that though the stories are told in the concise language of the scientist they will give an idea of the beauty of the phenomena.

October 19th, 1950, 1315 GMT. Solar altitude 28·4° "Soon after 1300 there passed for about 15 minutes a rather thin 'drift of ice-crystals' in which a composite halo

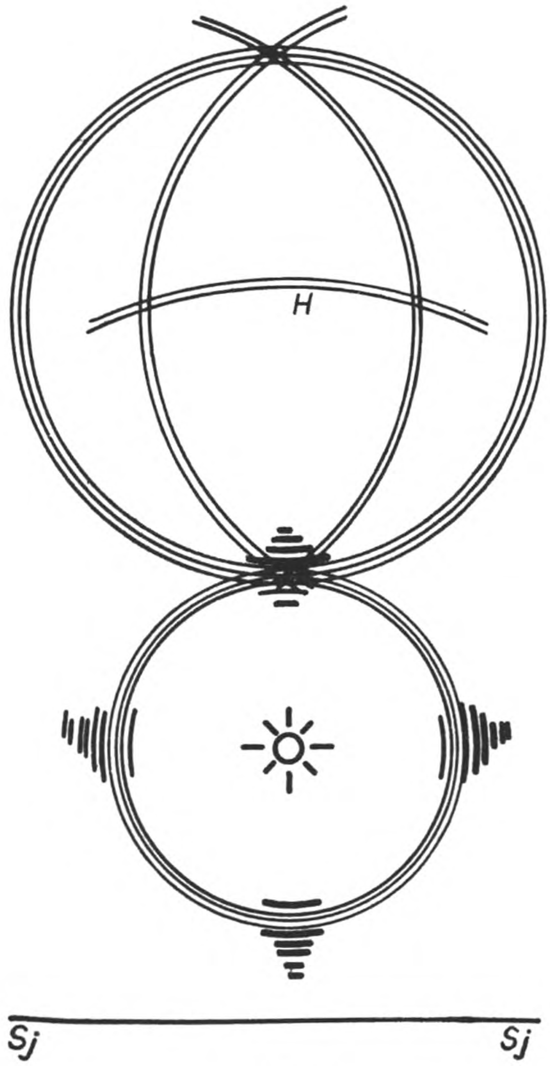


Fig. 2.

was produced" (Fig. 3). "The upper and lower tangential arcs of the 22° halo were of medium intensity with the colour rust-red and whitish yellow. They were the most conspicuous components of the otherwise rather faint halo. The inside of their concave portions (facing outwards from the sun) were lit up by a white veil, and the upper veil was bounded on top by a faint arc, Parry's arc. (Fig. 3 is opposite p. 193.)

The parhelia were rather faint, but clear; the colours were just visible and were exceptionally poor—only rust-red and whitish yellow.

The circumzenithal arc was faint, but could be clearly distinguished; the colours were red and bluish-violet.

The infra-lateral tangential arcs of the 46° halo were faint and weakly coloured and were seen only for a short while.

The parhelic circle was faint and was to be seen only for a few minutes."

It is worthy of attention that the 22° and 46° haloes were not seen, but both their tangential arcs and the parhelia. All the visible bright appearances are due to ice crystal faces being either horizontal or vertical, but the most characteristic features of irregular orientation of the crystals is entirely absent, though they are otherwise common (i.e. haloes). Moreover there is a mention of Parry's arc and the oblique tangential arcs, both of them very rare, but it is very likely that both occurred in the sky phenomena described by Björn at Skardhsá.

September 30th, 1950, 0930–1030. Solar altitude at 0945 16·6°. "At 0900 cloudiness was 1–2/10 and the air was clear, temperature −23°C, wind 210°, 5 m/sec. At 0930 ice-crystals swept over Maudheim, giving rise to frost-mist or frost-fog for about one hour. The halo was seen rather faintly at 0930, and reached its maximum intensity at 0945." (Fig. 4.)

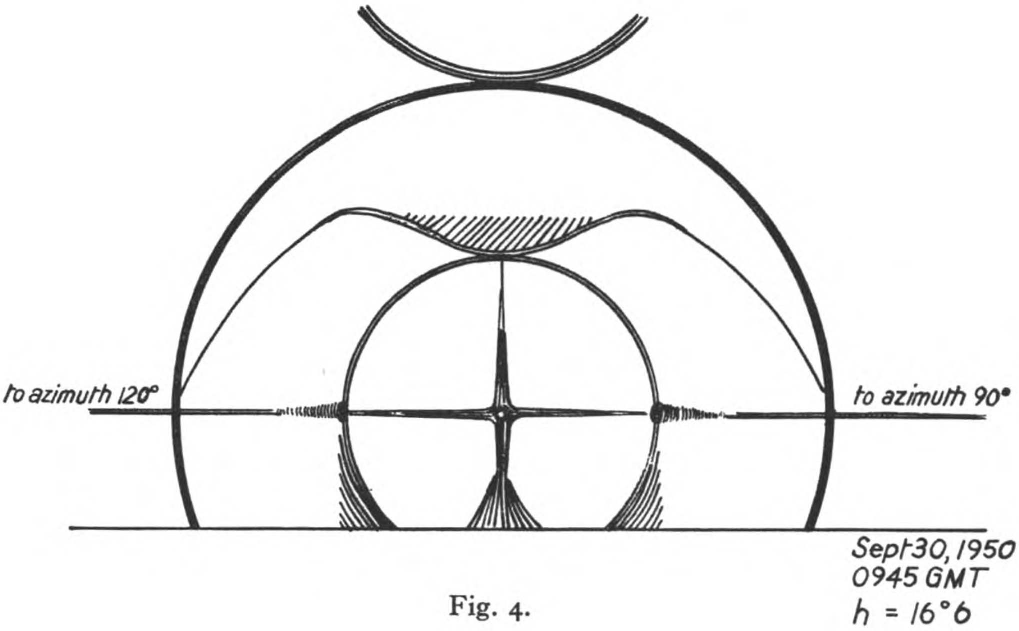


Fig. 4.

"The 22° halo was of medium intensity.

The upper tangential arc of the 22° halo was brilliant and had a white veil in its upper part. The arc could be traced to within 3° of the points of intersection between the 46° halo and the parhelic circle, and the extension of the arc seemed to pass through these points.

The parhelia were brilliant and had white tails.

The 46° halo was of medium intensity.

The circumzenithal arc was rather brilliant, with the colours red, orange, green and blue.

The vertical pillar was faint, but its intensity increased markedly near the horizon; it could be traced from the top of the 22° halo down to the horizon.

The parhelic circle was exceptionally brilliant to a distance of 120° to the left of the sun and 90° to the right; from there it was faint or invisible.

The anthelic arcs were clearly visible—though not brilliant—from the horizon and up to 30–35°. They were white and rather diffuse and intersected at an angle estimated as about 60°."

September 14th, 1950, 1045–1115. Solar altitude at 1100: 13·7°. (Fig. 5.) "In

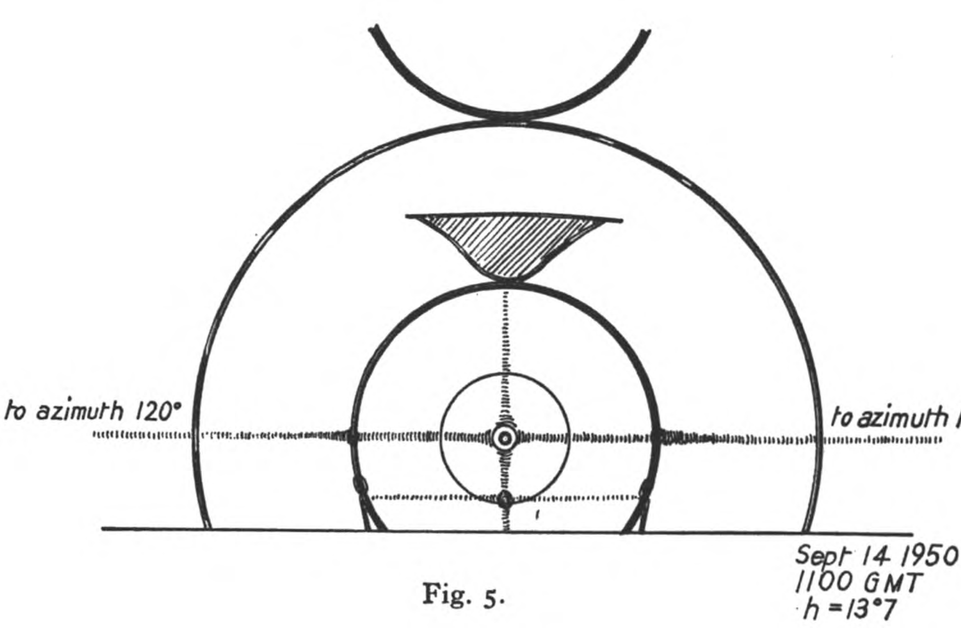


Fig. 5.

the morning there had been fog and low Stratus, but soon after 1000 it cleared up. The wind was S, 4–5 m/sec. and temperature −27°C.

At about 1045 ice-crystals at the lowest levels swept in over Maudheim and a composite halo was produced. The halo had a maximum development 1045–1115, and was then produced within 1–2 km from Maudheim.

The halo decreased in intensity and brilliance after 1115, and at 1200 there remained only the 22° halo with parhelia and the upper tangential arc. At 1245 the halo was gone.

The 22° halo was well developed and marked, and the intensity was the same in all parts.

The upper tangential arc of the 22° halo was the most conspicuous part of the whole halo-display. It had marked colours and the area above its concave part was brilliantly white. This area was bounded in its upper portion by an arc, Parry's arc. The latter was not strongly marked, though certainly not faint; it was, however, impossible to distinguish any colours.

The parhelia were intense and had bright colours and marked white tails.

From the horizon, approximately 3–4° outside the 22° halo, there stretched two coloured arcs—one on each side of the sun. They seemed to merge with the 22° halo some 5° above the horizon. A marked increase in the intensity took place here, and the phenomenon had the appearance of two 'mock-suns'. It was impossible to decide upon the curvature of the arcs, as they were comparatively short.

Inside the 22° halo Hall's halo was seen. It was of moderate intensity, but the colours were faint. In the lowest part of Hall's halo there was a well-marked 'mock-sun' with faint colours. Through the latter and apparently parallel with the horizon there stretched a very faint whitish line, which seemed to join the two 'mock-suns' mentioned above in the description of the lateral arcs of the 22° halo.

The vertical pillar was faint and reached from the top of the 22° halo down to the horizon.

The parhelic circle was faint inside the 22° halo but bright outside, and could be followed to approximately 120° on each side of the sun.

The 46° halo was at times rather brilliant and had bright colours. The circum-zenithal arc was brilliant and had marked colours. A few measurements were made with a sextant."

Many things are dissimilar in these stories, yet they have so much in common that although there are three hundred years and half the globe between the times and places the same sights in the sky seem to have met the eyes of the Antarctic expedition men and of Björn at Skardhsá. It may well be that the weather conditions were similar in 1950 in Antarctica to those of the severe spring of 1640 and the hard winter of 1650 in Iceland when many suns were seen in the sky—even nine.

Note. I am indebted to Professor G. H. Liljequist, Uppsala University, Sweden, for his kind permission to use text and figures from his monograph: *Halo-Phenomena and Ice Crystals.*

Reference

Norwegian–British–Swedish Antarctic Expedition, 1949–52. Scientific Results, Vol. II, Special Studies. G. H. Liljequist: Halo-Phenomena and Ice-Crystals. Oslo 1956.

551.509.1:311.214

Ships' Weather Messages

A recent investigation into the frequency of transmission errors in the first five groups of ships' weather messages, made by comparing 1,000 radio messages, as received at Bracknell, with the corresponding ships' meteorological logbook entries provided the following information:

There were two occasions of a group being missing from messages as received, one omission being the group containing the wind observation and the other the visibility and weather group. On one occasion the units figure of pressure was omitted. In each of these instances the observations had been entered in the logbooks. In addition there were 247 mistakes in 171 of the 1,000 messages examined. The analysis is:

Y	Q	L_a	L_a	L_a	L_o	L_o	L_o	G	G	N	d	d	f	f
5	2	8	10	11	8	5	7	2	2	9	11	12	9	18

V	V	w	w	W	P	P	P	T	T
7	13	7	7	11	11	26	24	10	12

Some 80% of the logbooks examined were fair copies of the rough log which is kept aboard the ship. About 80% of all ships' meteorological logbooks received at Bracknell are fair copies. There is always the possibility that a fair log may contain errors made in copying from the rough log. On the other hand it is likely that any error made, for example, in the application of the Gold slide to mercury barometer reading will be discovered by the officer who does the copying from the rough to the fair log and will therefore read correctly in the fair copy. From a study of the above figures it will be seen that by far the largest number of errors occurs in the tenths and units of the pressure observation. The most likely explanation of this seems to be that errors in the application of the Gold slide correction were found in the copying process and corrected in the fair log. As the fair log is unlikely as a general rule to have been written up until days after the observations were made, no useful purpose would be served by sending a correction to the original message by radio.

From the time the weather message is written out by the observing officer until it is received by teleprinter at Bracknell it is handled by three people—the ship's Radio Officer, the coast station Radio Operator and the Teleprinter Operator. If the message is originally passed to a coastal station which has no direct teleprinter link with the Meteorological Office concerned (e.g. in the U.K. only Portishead has such a link, but a large number of ships' radio messages are passed to stations such as Wick, Lands End, Niton, etc.), it is handled by more than three people and it is fair to assume that errors are sometimes made by all of them, e.g. there may be errors in morse transmission or reception, errors in transcription or errors in teleprinting. Errors are also sometimes caused by the mutilation of signals resulting from atmospheric conditions.

From the careful scrutiny given to the logbooks when they are received at Bracknell we are satisfied that there is little cause for complaint about the normal standard of ships' observations. The result is in fact very encouraging. Errors when they do occur are usually spotted by the inconsistency of an entry with the rest of the report, and previous and subsequent reports. This investigation shows that special care is necessary in making the pressure observations from a mercury barometer fitted with a Gold slide to avoid errors in applying the correction. An arithmetical error is easily made, especially on occasions when the observation has to be made in haste.

A. D. W.

551.501.81:551.515.1277

Radar Photograph of a Deep Depression

(Taken by Mr. R. H. Brass, the electronics officer of the ship, using his own camera.)

The photograph of the PPI radar display which is reproduced opposite was taken on board the *Weather Reporter* at station 'A' (62°N, 32·7°W) at 1100 GMT on 14th October 1963. It shows the echoes from precipitation around the centre of a deep depression which passed very close to the weather ship at that time. The synoptic situation at 1200 GMT and observations from the weather ship at other hours are shown in the figure.

The depression concerned originated as a tropical cyclone in the central Atlantic and moved northwards east of Bermuda on 11th October. Polar air masses became engaged in the circulation of the storm and its structure became generally similar to that of an extra-tropical storm.

Spiral bands such as are seen in the photo are a recognised feature of the radar echoes from tropical cyclones[1] but satellite photographs also show that a spiral structure of the cloud masses is normal in an occluded depression.[2] The reason for the spiral structure is not fully understood but it has provided a valuable method of identifying depressions from satellite observations.

The photograph is of considerable interest as showing the spiral organisation in the radar echoes near the centre of a deep depression. It is rather unlikely that the spiral bands are directly related to the tropical origin of the depression, but the matter must remain uncertain in the absence of further radar observations from intense, symmetrical, mature extra-tropical depressions.

References

1. SENN, H. V. and HISER, H. W.; On the origin of hurricane spiral rain bands. *J. Met., Lancaster, Pa.*, **16**, 1959, p. 419.
2. BOUCHER, R. J. and NEWCOMB, R. J.; Synoptic interpretation of some TIROS vortex patterns: a preliminary cyclone model. *F. appl. Met., Lancaster, Pa.*, **1**, 1962, p. 127.

551.326.7 (261)

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM APRIL TO JUNE 1964

APRIL

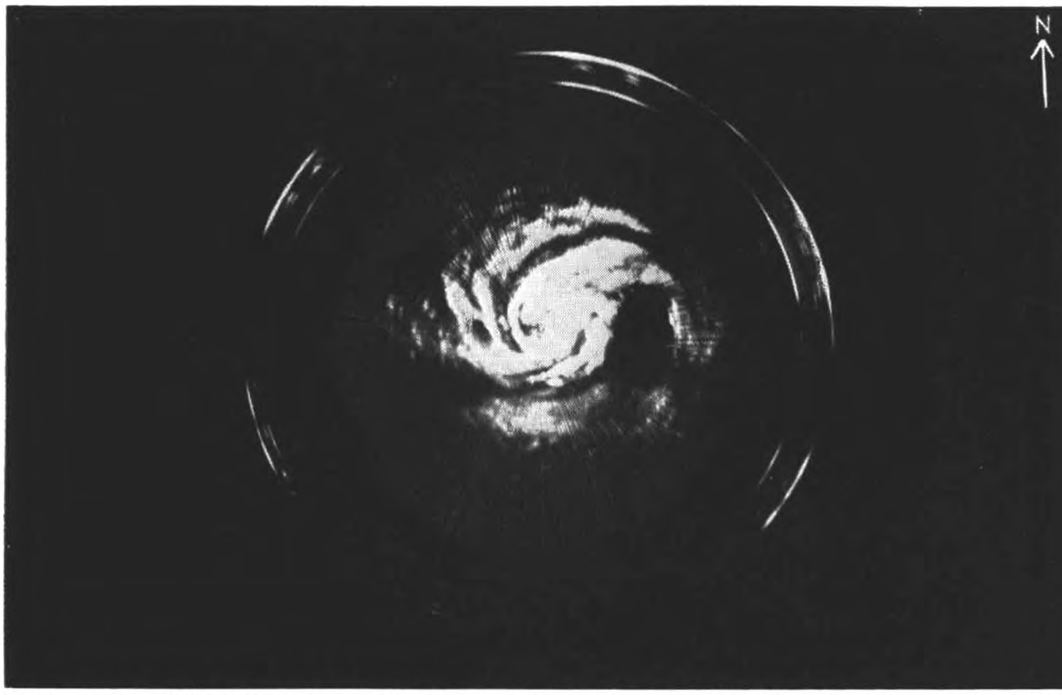
Relevant weather factors. Throughout the month below-normal temperatures were experienced over most of the polar basin, but in sharp contrast Spitzbergen, Iceland, western Europe and the adjacent sea areas were 1–3°C above normal. There was an excess of snowfall over northern Canada but elsewhere in the polar basin precipitation was below normal.

Canadian Arctic Archipelago, Baffin Bay, Hudson Bay and Strait. Abnormally high pressure developed late in the month over Baffin Bay and eastern Canada causing a southerly gradient wind over eastern Canada and the northern Archipelago. There were few changes from March but extensive areas of open water appeared north of 70°N off the east coast of Baffin Island. The southerly winds started the break-up of ice in the shallow water of the extreme south of Hudson Bay, in the north-easterly entrance to the Bay and in the southern part of Ungava Bay. The normal large polynia at the southerly entrance to Smith Sound was not present but large numbers of icebergs (i.e. more than twenty at a sighting) were reported south of this area. The thickness of the fast ice over the northern Archipelago was approximately normal; seven feet of ice occurring locally. Over the continuous ice there was a general snow cover 1–2 ft. thick. The extent of continuous and fast ice in the polar basin north of Canada was considerably in excess of normal.

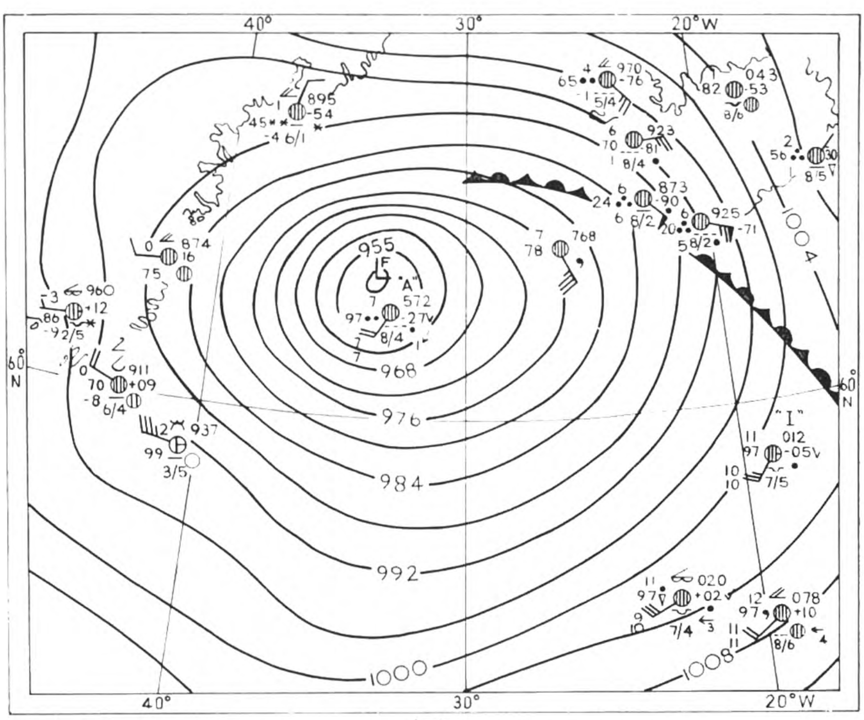
Davis Strait and Labrador Sea. Sea temperature increased off the West Greenland coast. There was a large increase in the number of icebergs off Disko Island where individual land stations observed more than 200. The extent of the pack-ice, generally, was about normal but the number of icebergs drifting southwards off the Labrador coast appeared to be in excess of normal. This was probably the result of a predominance of northerly winds.

Belle Isle Strait. The Strait was blocked by continuous ice and many icebergs throughout April and on into May.

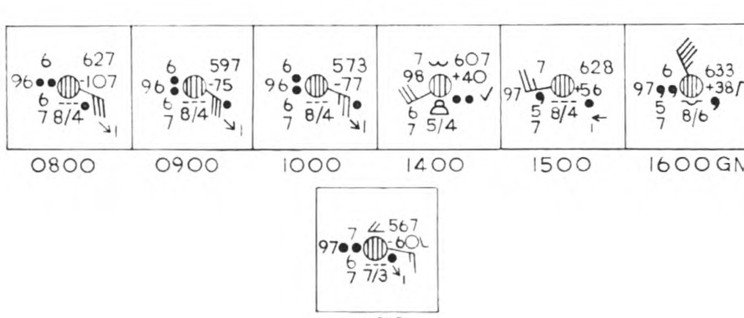
Great Bank and East Newfoundland Coast. Over most of the month weather conditions were not favourable over the Great Bank for an extensive southerly advance of the cold Labrador Current. The area of pack-ice at this time, although normal, disintegrated rapidly on its southerly and easterly boundaries. The number of icebergs was greater than normal; there were more than 1,000 sightings between 45°N and 50°N.



Photograph of the PPI radar display taken on board O.W.S. *Weather Reporter* at 1100 GMT on 14th October 1963.

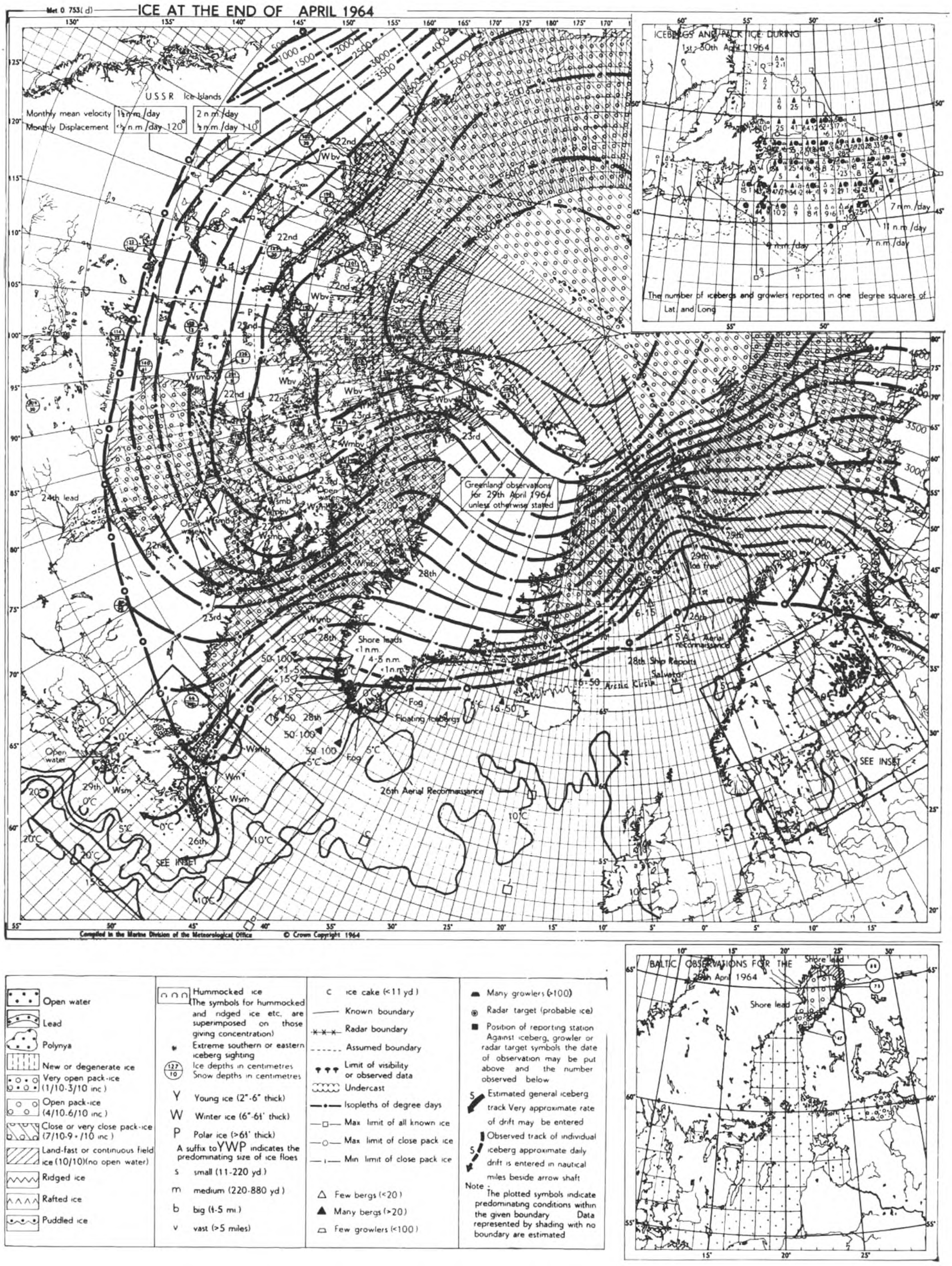


(a)



(b)

Depression near Station 'A' on the 14th October 1963; (a) synoptic situation at 1200 GMT (b) observations from *Weather Reporter*.



—— o —— Air temperature: 0°C isotherm (mean for 20th–29th April).

—— · —— Air temperature: negative degree days, °C.

———— Sea temperature, °C, for 20th–29th April. These isopleths give an indication of the monthly movement of warm and cold water.

— — —— Sea temperature, as above, but only estimated values.

Note. The notes in this article are based on information plotted on ice charts each month, similar to the map above, but on a much larger scale (39 in. × 27 in.). They are available at the price of reproduction on application to the Director-General, Meteorological Office (M.O.1), London Road, Bracknell, Berks. Alternatively, they may be seen at any Port Meteorological Office or Merchant Navy Agency.

Gulf of St. Lawrence. The mass and extent of pack-ice in the Gulf were well below normal. Pack-ice existed on the southern side of the Cabot Strait and towards Belle Isle only. At this time of the year the Gulf is normally almost full of pack-ice of various descriptions. The winter however had not been severe, particularly towards the end of April.

River St. Lawrence and Great Lakes. These were ice free by the end of April. The Swedish ship *Totem Star* (10,400 tons) entered the St. Lawrence Seaway on the 8th of April, the earliest opening in the five years of its history. Difficulties were experienced however from abnormally low water in the port of Montreal due to a lack of water in the Great Lakes.

Greenland Sea. As in March the Arctic water and the mixing zone between Arctic and Atlantic water extended well eastwards into the Norwegian Sea. The warm water west of Spitzbergen penetrated north of 80°N. There had been a very severe winter in Northern Greenland and the very large area of field ice east of Greenland was greatly in excess of normal extending at the end of April to 7·5°E at 74°N. The west coast of Spitzbergen was ice free but there was very open pack to the east. The extent of the fast ice and the number of icebergs off East Greenland were not abnormal. These conditions continued on until the end of May when there was a slight retreat westwards of the large area of pack-ice off Greenland and ice was reforming in the fjords of western Spitzbergen.

Denmark Strait. Atlantic water continued to almost fill the Strait and the Arctic pack and winter ice off eastern Greenland almost disappeared at times except south of Scoresby Sound when from time to time there was an increase in the extent of the pack-ice associated with activity to the north. However the extent of the field ice was generally well below normal. The area of the fast ice and the number of icebergs drifting south-westwards remained approximately normal. These conditions continued on into June but during May large extensive leads appeared all along the Greenland coast with widths of up to 10 miles. Towards the end of June the ice in Scoresby Sound was breaking up and there was a great increase in the number of icebergs drifting southwards and in the area of pack-ice off the coast of Greenland south of the Sound; isolated very open pack-ice was observed off north-west Iceland.

Barents Sea. Approximately normal conditions prevailed in the north-east of the area but southerly winds had affected coastal regions of the White Sea where it seems that the break up of ice occurred towards the end of April, that is, well ahead of normal. We have had no actual reports of the break-up; the above is based on climatic data.

Baltic Sea. At the end of April the only seriously dangerous ice in the Baltic was in the north of the Gulf of Bothnia and the east of the Gulf of Finland where it was from 1–2 ft. thick. The whole of the Baltic was clear of ice by the end of May which was well ahead of the seasonal normal. (See Table 2.)

May

Relevant weather factors. Throughout the month most of the Barents Sea was covered by air of Atlantic origin. Air temperatures remained as much as 9°C below normal over most of the Polar basin but 1°–3°C above normal over sea areas south of Spitzbergen, off western Europe and the land areas of western Europe. Snowfall was in excess of normal generally over the Polar basin.

Canadian Arctic Archipelago, Baffin Bay, Hudson Bay and Strait. Throughout the month thaw conditions existed in Hudson Bay south of Port Harrison where the early break up of

Table 1. Iceberg sightings by merchant ships in the North Atlantic

(This does not include growlers or radar targets)

Limits of Latitude and Longitude		Degrees North and West									
		60	58	56	54	52	50	48	46	44	42
Number of bergs reported south of limit	April	*	*	*	> 1402	> 1400	> 1364	> 624	> 118	> 1	0
	May	*	> 2213	> 2211	> 2200	> 2160	> 1957	> 543	11	0	0
	June	*	> 1979	> 1978	> 1967	> 1895	> 1450	> 415	22	7	0
	Total	*	*	*	> 5569	> 5455	> 4771	> 1582	> 151	> 8	0
Number of bergs reported east of limit	April	> 1402	> 1397	> 1396	> 1384	> 966	> 570	> 258	34	1	0
	May	*	> 2213	> 2209	> 1978	> 1039	> 441	84	5	0	0
	June	> 1979	> 1978	> 1924	> 1640	> 659	> 316	> 92	6	0	0
	Total	*	> 5588	> 5529	> 5002	> 2664	> 1327	> 434	45	1	0
Extreme southern limit	April	42° 56′N, 51° 10′W on 27.4.64									
	May	43° 04′N, 48° 52′W on 22.5.64									
	June	43° 13′N, 49° 10′W on 5.6.64									
Extreme eastern limit	April	46° 47′N, 42° 08′ W on 23.4.64									
	May	46° 05′N, 45° 12′W on 6.5.64									
	June	49° 30′N, 44° 50′W on 23.6.64									

* Probably large numbers, but none sighted in excess of those reported in further south positions or in further east positions.

> ("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.

the ice progressed in the east and south. Open water appeared south of Smith Sound, in Lancaster Sound and locally off the west Greenland coast. The break up of the ice seemed to be aided by the persistence of high atmospheric pressure. The state of the break-up in northern Canada, generally, appeared to be normal at this time. There was however a major decrease in the area of fast and continuous ice in the Polar basin north of Canada. Open water appeared at the northern entrance to Robeson Channel.

Davis Strait and Labrador Sea. The warm Atlantic water continued to move northwards along the West Greenalnd coast reaching 69°N and it also extended and filled most of the Davis Strait. However the extent of the great mass of fast and pack-ice attached to the south-east of Baffin Island was in excess of normal but off the Labrador coast it was less than normal. Observations further south suggest that there must have been large numbers of icebergs moving southwards off the Labrador coast within this pack-ice. The arctic pack and winter ice moving round from eastern Greenland drifted away from the west coast of Greenland north of Cape Farewell spreading north and southwards for 100 to 200 miles.

Great Bank and East Newfoundland Coast. The pack-ice retreated to 50°N but many icebergs continued to drift southwards. There were over 1,000 iceberg sightings between 43°N and 50°N spread between the Newfoundland Coast where icebergs were grounded, and the east side of the Great Bank (west of 45°W). Aircraft reported individual counts of about 600 icebergs over the north-east limits of the Great Bank. 1964 is a moderate to heavy iceberg year.

Gulf of St. Lawrence. Except in the Belle Isle Strait the Gulf was free of ice during this period. Canadian coastguard icebreakers ended their winter season on May 15th; during the season 760 merchant ships passed through the Gulf, of which 313 were assisted some of the time by icebreakers and 447 were given routeing advice. The only serious difficulties were experienced in the Notre Dame Bay area of Newfoundland, where the port of Botwood was closed between March 12th and April 4th (this port although not in the Gulf of St. Lawrence is served by Canadian icebreakers).

Barents Sea. The Arctic water and associated pack-ice appeared to have retreated from south-east Spitzbergen while most of the arctic pack of the north-east Barents Sea also retreated as in a normal season. Climatic conditions continued to suggest a rapid break up of ice in the White Sea.

Table 2. Baltic Ice Summary: April–June 1964

No ice was reported at the following stations during the period: Keil, Tonning, Husum, Emden, Lubeck, Gluckstadt, Bremerhaven, Flensburg, Stettin, W. Norrskar, Visby, Goteborg, Aarhus, Copenhagen, Kristiansandfjord. No ice was reported at any of the stations during June.

Station	April 1964									May 1964								
	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Riga	1	20	19	0	19	3	0	0	538	0	0	0	0	0	0	0	0	—
Pyarnu	1	30	30	24	6	4	25	0	422	0	0	0	0	0	0	0	0	—
Leningrad	29	29	1	0	1	1	0	0	794	0	0	0	0	0	0	0	0	—
Viborg	1	30	30	30	0	0	30	0	—	1	7	7	6	1	2	5	0	—
Gdansk	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	—
Klaipeda	1	19	6	3	3	3	0	0	331	0	0	0	0	0	0	0	0	—
Tallin	1	11	6	0	4	5	0	0	—	0	0	0	0	0	0	0	0	—
Ventspils	3	7	2	0	1	0	0	0	—	0	0	0	0	0	0	0	0	—
Helsinki	1	21	21	8	3	19	0	0	594	0	0	0	0	0	0	0	0	—
Mariehamn	1	7	7	7	0	0	0	0	299	0	0	0	0	0	0	0	0	—
Turku	0	0	0	0	0	0	0	0	527	0	0	0	0	0	0	0	0	—
Vaasa	1	28	28	28	0	2	26	0	586	0	0	0	0	0	0	0	0	—
Mantyluoto	1	12	12	8	0	4	8	0	—	0	0	0	0	0	0	0	0	—
Lulea	1	30	30	30	0	0	15	15	1133	1	15	15	15	0	0	15	0	—
Bredskar	12	20	9	0	2	8	0	0	—	0	0	0	0	0	0	0	0	—
Stockholm	1	20	20	13	7	17	0	0	142	0	0	0	0	0	0	0	0	—
Kalmar	1	9	9	0	9	0	0	0	41	0	0	0	0	0	0	0	0	—
Skelleft ea	1	24	24	23	1	0	14	9	—	0	0	0	0	0	0	0	0	—
Roytaa	1	30	30	30	0	0	2	28	1193	1	20	20	19	0	3	0	17	—
Oslo	0	0	0	0	0	0	0	0	230	0	0	0	0	0	0	0	0	—

CODE:
A First day ice reported.
B Last day ice reported.
C No. of days that ice was reported.
D No. of days continuous landfast ice.
E No. of days of pack-ice.
F No. of days dangerous to navigation, but assistance not required.
G No. of days assistance required.
H No. of days closed to navigation.
I Accumulated degrees-days of air temperature (°C) where known.*

* These figures give a rough measure of first the probability of the formation of sea ice, and later the progress of the growth and of its thickness. They are derived from daily averages of temperature (00 + 06 + 12 + 18 GMT) and are the sum of the number of the degrees celsius below zero experienced each day during the period of sustained frost.

JUNE

Relevant weather factors. There was much cyclonic activity over north-eastern Canada, Greenland, Northern Russia and the adjacent sea areas.

Canadian Arctic Archipelago, Baffin Bay, Hudson Bay and Straits. The normal seasonal developments of open water continued. Large areas of open water appeared off north Baffin Island and west of Hudson Bay.

Davis Strait and Labrador Sea. South of 75°N pack-ice off the Canadian coast began to break up and degenerate. By the end of June there was no pack-ice whatever south of 50°N. However there was continued evidence of large numbers of icebergs moving southwards in the Labrador current. Individual land stations of the West Greenland coast observed up to 50 icebergs drifting northwards but the pack-ice had almost completely dispersed by the end of June.

Belle Isle Strait. The Strait was free of pack-ice by the 24th June well ahead of normal. Numerous icebergs obstructed the easterly entrance and its approaches west of 50°W.

Great Bank and East Newfoundland Coast. The whole of this area was free of pack-ice during June but numerous bergs were reported between 47°N and 50°N but only isolated bergs penetrated south of 47°N. (See Table 1.)

Greenland Sea. The distribution of field ice returned to normal and extensive areas of open water appeared off north-eastern Greenland between 80°N and 83°N. Little change continued in the fast ice off Greenland and individual land stations observed up to five icebergs drifting southwards off the coast. Ice off west Spitzbergen also returned to approximately normal but to the south and east, although the amounts of pack-ice remained well below normal, the ice was advancing southwards towards Bear Island.

Barents Sea. The developments during this month appeared to be normal, but only isolated patches of ice are likely in the White Sea.

SPECIAL LONG-SERVICE AWARDS

Annual awards for especially good work during any one year have been a feature of the Voluntary Observing system for many years. But in 1948 a new award was introduced for long and meritorious voluntary service at sea for the Meteorological Office. Four of these awards, inscribed barographs, are made every year, the qualification for an officer's entry in the 'zone' being a minimum of 15 years, in each of which he has sent us at least one meteorological logbook.

A personal card index of all voluntary observers at sea is kept in the Marine Division; a card is started for an officer as soon as the first meteorological logbook or form bearing his name is received and thereafter a note is made on his card of his every subsequent return, the serial number, date received and the assessment, (excellent, very good or good) given to it. We thus have, on individual cards, a complete record of an officer's voluntary service for us.

The awards are made on the basis of these cards, and each year the cards of officers with 15 or more years' service who have sent in at least one return during the previous year are extracted. Their individual records are then worked up by a formula which considers their length of service and the quality of each meteorological return they have made. This effectively places them in an order of merit, the first four being selected for the awards.

The 15 years referred to can seldom, if ever, be attained in 15 years; time ashore for examination, the laying-up of ships, service in a capacity in which the officer takes no part in the voluntary observing but chiefly service in ships which are not on the voluntary observing list, will all preclude an officer's service from being continuous and we usually find that the qualifying service is spread over 30 or more years.

This year the Director-General of the Meteorological Office is pleased to make the awards to the following shipmasters.

1. CAPTAIN H. C. R. DELL (New Zealand Shipping Co. Ltd.), who sent us his first meteorological logbook in 1934 when he was in the *Northumberland.* In 18 years he has sent in 33 logbooks of which 27 have been classed 'excellent'.
2. COMMODORE J. WHAYMAN, C.B.E., D.S.C., R.D. (Booth Line), who first observed for us in the *Aidan* in 1927. In 20 years he has sent in 41 logbooks, 21 of which have been classed 'excellent'.
3. CAPTAIN F. W. S. ROBERTS (Canadian Pacific Steamships), whose first meteoro-

logical logbook came to us in 1923 from the *Montrose*. Captain Roberts has sent us 133 returns in 21 years and has received the 'excellent' classification 50 times.

4. CAPTAIN R. G. JAMES R.D. (Shaw Savill & Albion Co. Ltd.), who sent us his first meteorological logbook from the *Coptic* in 1932. Since then he has, in 18 years, sent in 38 books, 28 of them being classed 'excellent'.

We congratulate these four shipmasters on the recognition of their valuable voluntary service over many years. They will be personally notified of the award and of the arrangements which will be made for its presentation.

The presentation of the inscribed barograph, awarded by the Director General of the Meteorological Office last year to Captain L. J. Skailes of the Port Line, was made at a little ceremony, on 23rd April 1964, in the main conference room of the Meteorological Office, Bracknell, by Dr. A. C. Best, C.B.E., Director of Services. Captain Skailes had been unable to attend the presentation ceremony last December when barographs were presented to three other shipmasters. He was accompanied by Mrs. Skailes and Mr. Phillip Beeham of the Port Line Marine Dept.

Details of Captain Skailes' long and meritous service as a voluntary observer were given in the October 1963 number of *The Marine Observer*. A. D. W.

UNITED STATES WEATHER BUREAU— AWARD OF SPECIAL SERVICE CERTIFICATES TO BRITISH SHIPS

The October 1963 number of *The Marine Observer* contained the first list of British ships which had been awarded Certificates of Recognition by the United States Weather Bureau for sending them special radio weather messages during the hurricane season, both in the North Atlantic and eastern North Pacific, of 1962.

The issue of these certificates has been continued to cover the hurricane season of 1963; we have recently received from the U.S.W.B. certificates for 68 British ships, all bearing, as customary, a gold seal showing the dates on which the radio weather messages were sent in, and additional seals for nine British ships for attaching to the cerificate which they had already earned in the previous season.

These certificates and seals have all been sent to the ships in the care of their owners. British ships awarded cerificates for the 1963 season are as follows.

1. Ships on the U.K. Voluntary Observing Fleet List:

Athenic, *Booker Venture*, *British Resource*, *City of Khartoum*, *Essequibo*, *Esso Cambridge*, *Esso Canterbury*, *Gloucester*, *Hauraki*, *La Pampa*, *Loch Garth*, *Loch Loyal*, *Matina*, *Middlesex*, *Mirror*, *Monarch*, *Pacific Fortune*, *Pacific Reliance*, *Pizarro*, *Port Vindex*, *Potaro*, *Rangitane*, *Regent Eagle*, *Venassa* and *Wokingham*.

2. Ships not on the U.K. Voluntary Observing Fleet List:

Arianta, *Axina*, *Bardic*, *Border Castle*, *Bridgepool*, *British Lantern*, *British Merchant*, *Cable Restorer*, *Caledonia Star*, *Cerinthus*, *Cienfuegos*, *Clymene*, *Colorado Star*, *Defender*, *Eleuthera*, *El Lobo*, *Esso Oxford*, *Factor*, *Finnamore Valley*, *Gilsland*, *Haminella*, *Hanetia*, *Haustrum*, *Hindustan*, *Hinea*, *Holmside*, *Hopepeak*, *Ivinghoe Beacon*, *La Hortensia*, *Lake Atkin*, *London Splendour*, *Lord Byron*, *Mercury*, *Naess Pioneer*, *Platidia*, *Roland*, *San Fabian*, *San Gregorio*, *Sinaloa*, *Stancloud*, *Stonegate*, *Sunrhea* and *Sylvafield*.

The following British ships were awarded seals for attachment to certificates which they were awarded for their services during the previous hurricane season:

Clement, *Diplomat*, *Jamaica Producer*, *Mauretania*, *Queen of Bermuda*, *Spenser*, *Sugar Exporter*, *Sugar Producer* and *Thirlby*.

We congratulate all the above ships on this recognition of their special services and once again we could comment on the fact that in spite of meteorological satellites and aerial reconnaissance flights, the detailed ship's observation is still of vital importance in the tracking of hurricanes. L. B. P.

CANADIAN EXCELLENT AWARDS

(The following statement has been received from the Director of the Canadian Meteorological Branch)

The winners of the 1964 Canadian 'Excellent' Awards for marine weather observing have been announced, and on p. 206 is a list of the winning ships and ships' officers.

Forty-five awards, in the form of books, were presented to the Captains, Principal Observing Officers and Radio Officers on ocean-going observing vessels which report for Canada.

A 'Ship Award' was presented to the captains of the twenty ships which had done the best overall work, in regard to both quantity and quality of observations. The book chosen for this award was the *Larousse Encyclopedia of Astronomy*. The fifteen Principal Observing Officers whose observations were considered to be the best during the year received a copy of *Men, Ships and the Sea* by Alan Villiers. Ten awards were made to the Radio Officers who made the greatest number of transmissions; the book chosen was the *Oxford Illustrated Dictionary*.

The Canadian Meteorological Branch congratulates the award-winning captains and officers and sincerely thanks all members of the observing fleet for the splendid work that they do.

INDIAN EXCELLENT AWARDS

(From the Director General of Observatories (Forecasting), India)

The Indian Meteorological Department had 46 Selected Ships and 69 Supplementary Ships on the list of the Voluntary Observing Fleet during the year ended 31st March 1963. The observations received from these ships at different forecasting centres were of great value in the day-to-day forecasting of the Department, and in particular for issuing warnings to ships.

The Department wishes to convey its appreciation to all the officers concerned for their valuable co-operation.

It is customary to give awards in the form of books to Captains, Observing Officers and Radio Officers of ships whose meteorological work has been adjudged 'Excellent'. The following ships have been selected for an 'Excellent' Award for the year 1962–63:

Name of Vessel	Owner
Rajula	British India S.N. Co. Ltd.
Jaladhruv	Scindia S.N. Co. Ltd.
State of Bombay	Shipping Corporation of India Ltd.
Jag Tara	Great Eastern Shipping Co. Ltd.
Mozaffari	Mogul Line Ltd.
State of Kutch	Shipping Corporation of India Ltd.
State of Assam	Shipping Corporation of India Ltd.
State of Madras	Shipping Corporation of India Ltd.
Jalapadma	Scindia S.N. Co. Ltd.
State of Maharashtra	Shipping Corporation of India Ltd.
Jalakrishna	Scindia S.N. Co. Ltd.

In addition to the ships mentioned above, the following have been awarded a 'Certificate of Merit' for commendable work done during the same year:

Sirdhana, Jalapushpa, Bahadur, Jaladuhita, Amra, Jag Rani, Andamans, Jalapratan.

Recipients of Canadian 'Excellent' Awards—1964

NAME OF VESSEL	CAPTAIN(S)	PRINCIPAL OBSERVING OFFICER	RADIO OFFICER	OWNERS
Abegweit	B. L. Cousins, H. G. MacKenzie	W. P. Richards		Canadian National Railways
Acadia	J. W. C. Taylor	H. J. Martin		Government of Canada
Atheldulke	W. Meneight, Capt. Elliott			Athel Line Limited
Baffin	W. N. Kettle	J. M. Taylor		Government of Canada
Bluenose	R. E. H. Davies	H. Whitehead		Canadian National Railways
Cartier	A. Kerr			Government of Canada
C. D. Howe	J. A. Ouellet			Government of Canada
Cyrus Field	F. H. Kicks, H. R. Phinney	G. C. Dale	C. Kearney	Western Union Telegraph Co.
d'Iberville	W. Dufour		B. A. Laxson	Government of Canada
Emerillon	S. Henderson	M. Wagner	M. G. MacNaughton	Shell Canadian Tankers Ltd.
Imperial Quebec	B. R. Smith, P. W. Perry, H. MacDonald			Imperial Oil Limited
Imperial St. Lawrence	D. E. Fournier, L. Espinosa	J. A. Hunt	V. Dykeman	Imperial Oil Limited
John A. Macdonald	J. Cuthbert		H. Kristensen	Government of Canada
Kapuskasing	W. Thorne, W. J. Vieau			Government of Canada
Labrador	N. V. Clark		A. W. Murray	Government of Canada
Lakemba	J. S. Steuart, D. M. Dodds	C. L. Cleveland		Pacific Shipowners Limited
Lord Kelvin	H. C. Walmesley, F. H. Kicks, S. S. Moore	D. S. McGarvie		Western Union Telegraph Co.
Narwhal	M. C. Lever			Government of Canada
Oriana	C. Edgecombe	M. D. Rushan	E. R. LeGear	P. & O. Orient Line
Princess of Acadia	A. R. Conley, W. J. Goodwin	J. A. Blinn	C. F. MacMillan	Canadian Pacific Railways
Sir Humphrey Gilbert	G. S. Burdock	D. Daly		Government of Canada
Sir William Alexander	J. Talbot			Government of Canada
Sunprincess	M. Rand, J. J. Tait	G. J. Holden	L. Cosgrove	Saguenay Shipping Ltd.
Thorstream	A. Thorvaldsen	A. Gjevik	A. Boysen	A/S Thor Dahl
Wabana	C. L. Guy			Dominion Shipping Co. Ltd.
Waihemo	A. J. McKenzie, F. W. Young	J. R. Kerswill		Union Steamship Co. of New Zealand

Book Reviews

All about Ships and Shipping, edited by Edwin P. Harnack. 6 in. × 4 in. pp. 723 *Illus.* Faber & Faber, London. Eleventh edition, 1964. 50*s.*

The latest edition of this popular handbook, first published in 1903, contains a great variety of information of interest to all concerned with ships and shipping affairs.

It is in four parts, and in addition to a table of contents at the beginning contains a good index at the end; thus any reference required can quickly be found.

Part I, which comprises 36 of the book's 40 chapters, includes information about the design and construction of ships, navigational instruments, charts, distance tables, Beaufort wind scale, tides, noteworthy ocean voyages in yachts, details of famous ships, national flags, flags of the international code of signals, interesting maritime events, authorities concerned with shipping and their functions and many other useful facts and figures. Part II gives a list of ships of the Royal Navy, Part III particulars of the principal foreign navies, and Part IV particulars of the fleets of the principal shipping companies with their house flags and funnel markings.

The book contains numerous diagrams, plans and illustrations and is well arranged. To have run to eleven editions in sixty-one years is sufficient evidence of its popularity.

It is a pity greater care was not taken in the revision of chapter 6 (Atmosphere). Brief as it is it contains a number of inaccuracies. The statement in the first paragraph that a barometer reading in conjunction with the temperature, humidity and the direction of the wind gives a very reliable forecast of the weather for many hours is not so. These observations from a single station can only provide some indication of the weather to be expected. The square rigged ship criterion shown in the Beaufort wind scale in this paragraph was replaced 25 years ago by a 'state of sea' criterion. Some of the information given in this chapter under the heading 'Weather Wisdom' has no scientific foundation. For example, 'If the full moon shall rise red expect wind', and 'three foggy mornings will be followed by a rain storm.' Again, the sea disturbance table referred to as the Beaufort notation formula has no official recognition although it closely resembles the Douglas Sea and Swell table which has not been used for official weather reporting for many years.

It was surprising to find no mention of the ocean weather ships in such a work as this.

A. D. W.

The Global Sea, by Harris B. Stewart Jr. 8 in × 5¼ in. pp. 122. D. Van Nostrand Company Inc., Princeton, New Jersey. $1.45 (11*s.* 6*d.*)

This is one of the Van Nostrand 'searchlight' paper-bound books, focusing upon specific topics of current international interest. The author is an expert in the subject, for he is Chief Oceanographer of the U.S. Coast and Geodetic Survey. It is surprising how much information about oceanography, which is a very vast subject, he manages to get into such a small book and yet make it a pleasure to read. Nobody who is interested in the sea could fail to derive some benefit from reading it.

In the preface, the author reminds us that the ocean, with all its abundant life and untapped resources beneath it is man's last great resource on earth and if "we are to survive on this earth we must first understand the intricate workings of the Global Sea . . ." In the book itself he points out how little we yet know about it.

The eight chapters into which the book is divided are entitled The Big Sea; Important Facets of the Sea; Buried Landscapes; The Moving Waters; Abundant and Varied Life; the Amazing Liquid; Our Last Resource; and the International Waters. These titles aptly summarise the book's content. Finally there is a very short and surprisingly varied bibliography and an index. The six figures with which the book is illustrated are adequate and useful.

In chapter 2 two pages are devoted to "the sea and meteorology". Here again the author uses few words and stresses the sea's function to act "as a great thermostat to moderate the earth's climate", and the intricate relationship between land, ocean currents and temperature and hence the necessity of a detailed study into this question of interaction between ocean and atmosphere. The author seems rather 'out of his depth', however, when he infers that weather forecasting for oceanic areas is much less accurate than over the land surface and that there is a lack of climatic information from ocean areas. Although this is true in areas where shipping is sparse, the author completely disregards the work of voluntary observing ships and indeed of the weather ships and infers that observations from anchored or drifting buoys are the only answer. Also he shows surprising enthusiasm for artificial climatic control as being the 'first great solution to the over population problem'. In this same chapter he refers briefly to weather routeing and to the potentialities of the nuclear powered cargo carrying submarines. In a later chapter he returns to the question of weather modification and there he admits that this might result in more discomfort to mankind than we have at present! In this chapter he stresses the potential value of accurate long-range forecasting.

In chapter 4, Sea and Swell Waves, Tsunamis (popularly known as 'tidal waves'), the true tidal wave, tidal currents and the surface currents of the ocean are dealt with adequately.

It is when the author gets beneath the ocean that he really comes into his own and in spite of the few words that he uses, his descriptions are graphic and interesting and his English is a pleasure to read. Readers of the Marine Observers' Log will be glad to know their old friend *Trichodesmium* bloom takes a prominent place in the chapter about the abundant and varied life in the oceans.

Perhaps the most interesting part of the book is that in which the resources of the sea (food and minerals) are discussed in some detail.

With its very low price, the book is a bargain.

C. E. N. F.

Weatherwise, by N. L. Peter, F.R.Met.Soc., Senior Lecturer, South Shields Marine and Technical College. 8 in. × 5¼ in. pp. 179. *Illus.* The Pergamon Press Ltd., Oxford. 1964. 25*s.*

The scope of this book is wide and not only are numerous aspects of meteorology discussed but attention has also been given to ocean currents, tides and waves. The reader will find a substantial amount of useful information in the 173 pages of text, but inevitably in a small book covering so much ground the treatment has had to be in many cases very brief, and in his striving for simplicity the author has too often dealt with his subjects in a loose and generalised way which seems likely to leave the reader in some doubt at times as to what exactly was meant. Apart from this there are unfortunately a number of errors and inaccuracies which detract from the value of the book. For example, on p. 8, the boiling point of water is given as 180°F; prebaratics referred to on p. 86 do not show the expected situation in 12 hours' time, but 24 hours ahead. On the same page, storm warnings are said to be issued for winds of force 8 and over: actually they are for winds of force 10 and over. On p. 98 VV is said to represent the visibility in miles; in fact VV is given in code—a very different thing. The station model on p. 101 is a plot of the weather message at the top of p. 99 in which the wind is given as 270°, 15 kt, but in the plotting the wind is shown as 20 kt; a number of other inaccuracies were also noted. The book is quite attractively produced and illustrated by a few photographs and numerous diagrams, but it is expensive at 25*s.* and in the reviewer's opinion the serious reader would get better value by purchasing one of the standard text books on meteorology. G. M. R.

LETTERS TO THE EDITOR

DEAR SIR,

I have read the article on pages 87–90 of the April 1964 number of *The Marine Observer* concerning a method of recording the weather bulletins for shipping broadcast by the B.B.C. on 1,500 metres in the light programme. Your readers may be interested to know that the Royal Meteorological Society now publishes a map and form to help listeners construct their own up-to-date weather maps from these bulletins. (The form is reproduced at a third of its actual size opposite page 193—Editor, *Marine Observer.*) Designed by the editor of *Weather*, these maps cover an area from Iceland to Spain and from 20°W to Germany, and are on a scale of 1:1,000,000. Coastal Reporting Stations are marked as well as the land and sea forecast areas. The map is printed in green to allow pen or pencil plotting to stand out. Geostrophic wind scales for relating pressure gradients to surface winds and speeds of fronts are included as well as mean sea temperatures and various conversion scales. Alongside the map is a form for noting the text of the bulletin and notes and abbreviations for recording the information. Examples and advice on the preparation of METMAPS will be given periodically in future issues of *Weather*. These maps, made up in pads of 24 maps, may be ordered from *Weather*, Royal Meteorological Society, 49 Cromwell Road, London, S.W.7. Price 5*s.* each pad, plus 1*s.* postage.

Yours faithfully,

C. E. WALLINGTON
Editor, *Weather*

Royal Meteorological Society
49 Cromwell Road,
London, S.W.7

DEAR SIR,

Readers of your interesting article on Hurricane *Flora* (1963) in the July 1964 issue of *The Marine Observer* might like to know that an examination of United States Weather Bureau publications reveals that it was the first hurricane since 1892 to cross the Windward Islands as far south as Tobago. However, in 1961 a tropical storm moved across the Islands a little further north but did not attain hurricane force until it entered the Carribbean, whilst in both 1955 and 1929 a tropical storm also passed on a similar track but neither at the time had developed into a hurricane.

It is interesting to note that five hurricanes passed very near to Tobago between 1886 and 1892, a record which everyone must sincerely hope will never be repeated.

Yours faithfully,

Met. O. 5a. R. K. PILSBURY

Personalities

RETIREMENT.—CAPTAIN M. E. BEWLEY retired on the 31st March 1964 after 47 years at sea, 36 of which were served with the Manchester Liners, his last command being the *Manchester Mariner*.

After showing a keen interest in the sea from an early age, sailing yachts and small boats with his father, who had been at sea in sail, Maurice Edwin Bewley began his sea career as an apprentice with E. J. Sutton and Company in the s.s. *Gracefield*, during the first world war in 1917. After passing for second mate he spent some years in tankers with the Anglo-Saxon Petroleum Company and later joined Manchester Liners in April 1928 as third mate of the *Manchester Division*. He obtained his Master's certificate in 1930, and was promoted to his first Command, the Canadian ship *Westmount Park*, in September 1944. During the next 20 years Captain Bewley subsequently commanded most of the Manchester Liners fleet and in 1962 was appointed to *Manchester Mariner*, in which ship he remained until retirement.

Captain Bewley's record with the Meteorological Office dates back to 1930 whilst serving in the *Manchester Hero*, and in 18 years' observing he has sent in 35 logbooks, 8 of which have been classed 'excellent'. He received an Excellent Award in 1959.

We wish him health and happiness in retirement.

J. R. R.

RETIREMENT.—CAPTAIN A. BRIDGWATER retired from the sea on 30th April 1964 after nearly 45 years at sea, except for a few months, all of which was in the service of the Cunard Line, his last ship being *Media*.

After training on H.M.S. *Conway*, Allan Bridgwater made his first voyage as an apprentice in the *Vennonia* of the Cunard Line; passing for his second mate's certificate in January 1923 he continued as a junior officer in the company. On passing his Master's certificate in February 1928 Captain Bridgwater served for six months with Stanley and John Thompson Ltd., but in October of that year he rejoined Cunard Line on the permanent staff as Junior 3rd Officer of the *Antonia*.

Captain Bridgwater was appointed to his first command, the *Samaritan*, in June 1943; he was subsequently in command of many Cunard ships both on the Mediterranean and North Atlantic trades, including the *Lycia*, *Phrygia*, *Andania* and *Media*, all four of which he commanded on their maiden voyages.

Captain Bridgwaters' record with the Meteorological Office goes back to 1924 when serving in the *Verbania*, and in 10 years' observing he has sent in 29 logbooks, 13 of which have been classed 'excellent', he received an Excellent Award in 1933 whilst in *Scythia*.

We wish him many happy years of retirement.

J. R. R.

RETIREMENT.—COMMODORE C. R. TOWNSHEND retired from the Port Line on 31st May 1964, after nearly 47 years' service with the Port Line.

Claude Reginald Townshend made his first trip to sea as an apprentice with the Commonwealth and Dominion Line, later to become the Port Line, in November 1917, and served in many of the Company's vessels until appointed to his first command, the *Port Saint John*, in February 1943. He subsequently commanded nine of the Company's vessels, his last being the *Port Auckland*. On 1st September 1963 he was appointed Commodore of the Fleet.

Commodore Townshend had an outstanding record with the Meteorological Office dating back to 1921, when he submitted his first logbook from the *Port Victor*. His name appeared in the first list of Excellent Awards published in *The*

Marine Observer on June 1924, and his name appears also in this year's list, a span of 40 years. His drawing of a lunar halo made in 1923 when he was 3rd Officer of the *Port Hunter* still appears in the *Marine Observer's Handbook.*

In 22 years of observing Commodore Townshend has sent in 44 logbooks of which 41 were classed as 'excellent', and he has received Excellent Awards on 11 occasions. In 1958 he was the recipient of an inscribed barograph, the Special Long Service Award of the Meteorological Office.

We wish him health and happiness in his retirement.

J. C. M.

Notices to Marine Observers

FORECASTS FOR SHIPPING BROADCAST BY THE B.B.C.

From the night of 31st October–1st November 1964, the B.B.C. will broadcast a forecast for shipping at 0202 (clock time) instead of 0002.

Although this change is at the request of the B.B.C., it will have practical advantages. It takes about 5½ hrs. between observations being made and the forecast being issued by the B.B.C.; in summer the 0000 BST (2300 GMT) forecast could not be based on the 1800 chart and the forecast had to be made primarily on the 1200 chart.

The forecast at 0202 will therefore be able to be based on more recent information throughout the year.

NAUTICAL OFFICERS AND AGENTS OF THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE, GREAT BRITAIN

Headquarters.—Commander C. E. N. Frankcom, O.B.E., R.D., R.N.R., Marine Superintendent, Meteorological Office (Met.O.1), London Road, Bracknell, Berks. (Telephone: Bracknell 2420, ext. 282.)

Captain A. D. White, R.D., Lt.-Cdr. R.N.R., Deputy Marine Superintendent. (Telephone: Bracknell 2420, ext. 284.)

Lieut.-Commander L. B. Philpott, D.S.C., R.D., R.N.R., Nautical Officer. (Telephone: Bracknell 2420, ext. 283.)

Mersey.—Captain J. R. Radley, Port Meteorological Officer, Room 709, Royal Liver Building, Liverpool 3. (Telephone: Central 6565.)

Thames.—Mr. J. C. Matheson, Master Mariner, Port Meteorological Officer, South Side, King George V Dock, Silvertown, London, E.16. (Telephone: Albert Dock 3931.)

Bristol Channel.—Captain F. G. C. Jones, Port Meteorological Officer, 2 Bute Crescent, Cardiff. (Telephone: Cardiff 21423.)

Humber.—Lieut.-Commander E. R. Pullan, R.D., R.N.R., Port Meteorological Officer, c/o Principal Officer, Ministry of Transport, Trinity House Yard, Hull. (Telephone: Hull 36813.)

Clyde.—Captain R. Reid, Port Meteorological Officer, 118 Waterloo Street, Glasgow, C.2. (Telephone: Glasgow City 4379.)

Forth.—Captain G. N. Jenkins, 'Fairwind', Kings Road, Longniddry, East Lothian. (Telephone: Longniddry 3138.)

Tyne.—Captain P. R. Legg, c/o F. B. West & Co., Custom House Chambers, Quayside, Newcastle upon Tyne. (Telephone: Newcastle 23203.)

Southampton.—Commodore D. M. McLean, D.S.C., R.D., Southampton Weather Centre, 160 High Street, Southampton. (Telephone: Southampton 20632.)

Fleet Lists

The following lists give the names of Selected and Supplementary Ships which voluntarily co-operate with meteorological services of the British Commonwealth; these lists were not received in time for inclusion in the July number.

Malaysia (Information dated 15.4.64)

Name of Vessel	Captain	Observing Officers	Senior Radio Officer	Owner/Manager
Bentong	E. E. Fenwick	N. D. Miranda	Felix Tan Yew Kim	Straits S.S. & Co. Ltd.
Bidor	R. H. Sidley	Ali bin Hakim	Yue Fook Wing	Straits S.S. & Co. Ltd.
Hoi Houw	O. Utseth	S. Andenes, Knut Tjosvoll, K. R. Rosandtro	Pieter Joubert	Boustead & Co. Ltd.
Kah Poh	S. J. Harvey	Budin bin Ahmad, Mohd. Noor bin Lanang	Nik Ismail bin Nik Sar	Ho Chiang Shipping Co. Ltd.
Katong	H. W. Wilkinson	Goh Choo Keng	Bobby Pang Ting Kwai	Straits S.S. & Co. Ltd.
Kelantan	C. Clayton	C. T. Lu, Yueng Hei Chit, Chan Kam Kwong	K. S. Murthy Rao	Barretto Shipping & Trading Co. Ltd.
Keningau	N. R. Murray	H. P. Davies, A. J. Phillips	K. A. Menon	Straits S.S. & Co. Ltd.
Kimanis	W. G. Bradshaw	Peter Ho Kia Tuang	S. R. Bharucha	Straits S.S. & Co. Ltd.
Kim Hock	L. W. Evans	B. Harris	M. Moazzamadal	Guan Guan Ltd.
Kinabalu	G. Coupar	A. C. Andrews	Tan Yee Seng	Straits S.S. & Co. Ltd.
Kunak	J. M. Harkness	R. D. Nicolson, A. N. Francis	Lee Yuen Fatt	Straits S.S. & Co. Ltd.
Kuda Mas	A. B. Durrant	Z. A. McCarthy, Mohd. Sar bin Derus	Leung Chi Chung	Guan Guan Ltd.
Perak	G. C. Carter	M. F. James	Ow Yong Heng Leong	Straits S.S. & Co. Ltd.
Perlis	K. G. Gough	Abdul Aziz bin Akbar Khan	Yong Phang Cheong	Straits S.S. & Co. Ltd.
Recorder	I. G. Dryburgh	G. J. Ayrton, C. W. Thompson, N. J. Rice, J. S. Heathcote.	J. Boalsch	Cable & Wireless Ltd.

Pakistan (Information dated 1.1.64)

Name of Vessel	Call Sign
Selected Ships:	
Al Husani	AQAH
Al Sayyada	AQAS
Anwarbaksh	AQAM
Fatehabad	AQEM
Kareem	AQVE
Mustali	AQLY
Ocean Endurance	AQBW
Pakistan Prosperity	AQAZ
Safina-e-Hujjaj	AQLW
Safina-e-Mustrat	AQLM
Shams	AQLN
Supplementary Ships:	
Dacca City	AQEO
Jahangirabad	AQEN
Safina-e-Arab	AQVA

Pakistan has 15 Auxiliary Ships.

India (Information dated 26.5.64)

Name of Vessel	Owner
Selected Ships:	
Amra	British India S.N. Co. Ltd.
Andamans	Shipping Corporation of India Ltd.
Bahadur	Asiatic S.N. Co. Ltd.
Bharatmitra	Bharat Line Ltd.
Bharatratna	Bharat Line Ltd.
Daressa	British India S.N. Co. Ltd.
Dwarka	British India S.N. Co. Ltd.
Indian Exporter	India S.S. Co. Ltd.
Indian Merchant	India S.S. Co. Ltd.
Indian Pioneer	India S.S. Co. Ltd.
Indian Reliance	India S.S. Co. Ltd.
Indian Shipper	India S.S. Co. Ltd.
Indian Trader	India S.S. Co. Ltd.
Islami	Mogul Line Ltd.
Jaladhan	Scindia S.N. Co. Ltd.
Jaladharama	Scindia S.N. Co. Ltd.
Jaladhruv	Scindia S.N. Co. Ltd.
Jalapadma	Scindia S.N. Co. Ltd.
Jalaprakash	Scindia S.N. Co. Ltd.
Jalaputra	Scindia S.N. Co. Ltd.
Jalausha	Scindia S.N. Co. Ltd.
Jalavihar	Scindia S.N. Co. Ltd.
Jalazad	Scindia S.N. Co. Ltd.
Jalajawahar	Scindia S.N. Co. Ltd.
Kampala	British India S.N. Co. Ltd.
Karanja	British India S.N. Co. Ltd.
Mohammedi	Mogul Line Ltd.
Mazaffari	Mogul Line Ltd.
Nalanda	Shipping Corporation of India Ltd.
Nicobar	Shipping Corporation of India Ltd.
Pradeep	Dept. of Lighthouses and Light-Ships, Govt. of India.
Rajula	British India S.N. Co. Ltd.
Santhia	British India S.N. Co. Ltd.
Saudi	Mogul Line Ltd.
Sirdhana	British India S.N. Co. Ltd.
State of Bombay	Shipping Corporation of India Ltd.
State of Kutch	Shipping Corporation of India Ltd.
State of Madras	Shipping Corporation of India Ltd.
State of Orissa	Shipping Corporation of India Ltd.
State of Travancore-Cochin	Shipping Corporation of India Ltd.
Subadar	Asiatic S.N. Co. Ltd.
Umaria	British India S.N. Co. Ltd.
Supplementary Ships:	
Ajanta	Shipping Corporation of India Ltd.
Ashok Jayanti	Jayanti Shipping Co. Ltd.
Bharatbhushan	Bharat Line Ltd.
Bharatkesari	Bharat Line Ltd.
Gandhi Jayanti	Jayanti Shipping Co. Ltd.
Indian Endeavour	India S.S. Co. Ltd.
Indian Industry	India S.S. Co. Ltd.
Indian Renown	India S.S. Co. Ltd.
Indian Resolve	India S.S. Co. Ltd.
Indian Resource	India S.S. Co. Ltd.
Indian Security	India S.S. Co. Ltd.
Indian Splendour	India S.S. Co. Ltd.
Indian Strength	India S.S. Co. Ltd.
Indian Success	India S.S. Co. Ltd.
Indian Tradition	India S.S. Co. Ltd.
Indian Triumph	India S.S. Co. Ltd.
Indian Trust	India S.S. Co. Ltd.
Jag Doot	Great Eastern Shipping Co. Ltd.
Jag Ganga	Great Eastern Shipping Co. Ltd.
Jag Jamna	Great Eastern Shipping Co. Ltd.
Jag Jiwan	Great Eastern Shipping Co. Ltd.
Jag Laxmi	Great Eastern Shipping Co. Ltd.
Jag Mitra	Great Eastern Shipping Co. Ltd.
Jag Rahat	Great Eastern Shipping Co. Ltd.
Jag Rani	Great Eastern Shipping Co. Ltd.
Jag Shanti	Great Eastern Shipping Co. Ltd.
Jag Tara	Great Eastern Shipping Co. Ltd.
Jag Vijay	Great Eastern Shipping Co. Ltd.
Jaladhanya	Scindia S.N. Co. Ltd.
Jaladharti	Scindia S.N. Co. Ltd.
Jaladhir	Scindia S.N. Co. Ltd.
Jaladuhita	Scindia S.N. Co. Ltd.
Jaladurga	Scindia S.N. Co. Ltd.
Jalagovind	Scindia S.N. Co. Ltd.
Jalagopal	Scindia S.N. Co. Ltd.
Jalakirti	Scindia S.N. Co. Ltd.
Jalakrishna	Scindia S.N. Co. Ltd.
Jalamani	Scindia S.N. Co. Ltd.
Jalamayur	Scindia S.N. Co. Ltd.
Jalamudra	Scindia S.N. Co. Ltd.
Jalaprabha	Scindia S.N. Co. Ltd.

India (*contd.*)

Name of Vessel	Owner
Jalapratap	Scindia S.N. Co. Ltd.
Jalapushpa	Scindia S.N. Co. Ltd.
Jala Ratna Usha	Scindia S.N. Co. Ltd.
Jalaveera	Scindia S.N. Co. Ltd.
Jalavijaya	Scindia S.N. Co. Ltd.
Jalavikram	Scindia S.N. Co. Ltd.
Jalavishnu	Scindia S.N. Co. Ltd.
Jalarajendra	Scindia S.N. Co. Ltd.
Jalavallabh	Scindia S.N. Co. Ltd.
Krishna Jayanti	Jayanti Shipping Co. Ltd.
Laxmi Jayanti	Jayanti Shipping Co. Ltd.
Rama Jayanti	Jayanti Shipping Co. Ltd.
Rajah	Asiatic S.N. Co. Ltd.
Ranee	Asiatic S.N. Co. Ltd.
Sanchi	Shipping Corporation of India Ltd.
State of Andhra	Shipping Corporation of India Ltd.
State of Assam	Shipping Corporation of India Ltd.
State of Bihar	Shipping Corporation of India Ltd.
State of Gujrat	Shipping Corporation of India Ltd.
State of Kerala	Shipping Corporation of India Ltd.
State of Maharashtra	Shipping Corporation of India Ltd.
State of Punjab	Shipping Corporation of India Ltd.
State of Rajasthan	Shipping Corporation of India Ltd.
State of Uttar Pradesh	Shipping Corporation of India Ltd.
Vishva Jyoti	Shipping Corporation of India Ltd.
Vishva Kirti	Shipping Corporation of India Ltd.
Vishva Mangal	Shipping Corporation of India Ltd.
Vishva Maya	Shipping Corporation of India Ltd.
Vishva Nidhi	Shipping Corporation of India Ltd.
Vishva Prabha	Shipping Corporation of India Ltd.
Vishva Prem	Shipping Corporation of India Ltd.
Vishva Shanti	Shipping Corporation of India Ltd.
Vishva Sudha	Shipping Corporation of India Ltd.
Vishva Usha	Shipping Corporation of India Ltd.

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[*Subjects of* Book reviews, Editorials, Notices to Marine Observers, Photographs, *and persons named in* Retirement *and* Obituary *notices, are indexed under those general headings.*]

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Meteorological Office (Marine Division) Atlases

The following are published by the Marine Division of the Meteorological Office and may be purchased from the bookshops of Her Majesty's Stationery Office at any of the addresses on the title page. Copies are available for reference by shipmasters and shipowners in the offices of Port Meteorological Officers.

Meteorological Atlases

Monthly Meteorological Charts of the Atlantic Ocean. Met.O.483, 1948, reprinted 1959. (60°S–70°N, 80°W–40°E) (19½″ × 24″) 180*s.* (post 3*s.* 3*d.*)

Monthly Meteorological Charts of the Western Pacific. Met.O.484, 1945, reprinted 1956. (60°S–60°N, 100°E–155°W) (16¾″ × 23¾″) 105*s.* (post 2*s.* 9*d.*)

Monthly Meteorological Charts of the Eastern Pacific. Met.O.518, 1950, reprinted 1956; further reprint in the press. (60°S–60°N, 160°W–60°W) (17½″ × 24½″) 147*s.* (post 3*s.* 3*d.*)

Monthly Meteorological Charts of the Indian Ocean. Met.O.519, 1949, reprinted 1959. (50°S–30°N, 20°E–120°E) (16½″ × 22½″) 126*s.* (post 2*s.* 9*d.*)

The above four atlases contain monthly charts of wind, barometric pressure, air and sea temperature, and other meteorological elements including some typical tracks of tropical revolving storms.

Monthly Sea Surface Temperatures and Surface Current Circulation of the Japan Sea and Adjacent Waters. M.O.M.447, 1950. (20°N–47°N, 110°E–150°E) (20″ × 17″) 7*s.* 6*d.* (post 9*d.*)

Monthly Sea Surface Temperatures of Australian and New Zealand Waters. Met.O.516, 1949. (50°S–10°S, 100°E–180°E) (19¾″ × 12¼″) 10*s.* (post 7*d.*)

Monthly Sea Surface Temperatures of the North Atlantic. Met.O.527, 1949, reprinted 1950. (30°N–68°N, 80°W–15°E) (19¾″ × 12¼″) 10*s.* (post 7*d.*)

Monthly Meteorological Charts and Sea Surface Current Chart of the Greenland and Barents Seas. Met.O.575, 1959. (60°N–80°N, 30°W–120°E) 126*s.* (post 2*s.*)

This atlas contains a generalised surface current chart for the area and monthly charts of wind, barometric pressure, air and sea temperature, and other meteorological elements.

Current Atlases

Currents of the Indian Ocean. Met.O.392, 1939, reprinted 1963. (50°S–30°N, 20°E–140°E) (22″ × 34″) 12*s.* 6*d.* (post 10*d.*)

South Pacific Ocean Currents. Met.O.435, 1938, reprinted 1959; new edition in the press. (60°S–0°, 140°E–70°W) (22″ × 34″) 12*s.* 6*d.* (post 1*s.*)

The above two atlases contain quarterly "current arrow" and "current rose" charts.

Quarterly Surface Current Charts of the Atlantic Ocean. Met.O.466, 1945, reprinted 1962. (60°S–70°N, 80°W–20°E) (22½″ × 18″) 32*s.* 6*d.* (post 1*s.* 6*d.*)

Quarterly Surface Current Charts of the Western North Pacific Ocean with monthly chartlets of the China Seas. Met.O.485, 1949, reprinted 1962. (0°–60°N, 98°E–160°W) (21″ × 16″) 35*s.* (post 1*s.* 2*d.*)

Quarterly Surface Current Charts of the Eastern North Pacific. Met.O.655, 1959. (0°–60°N, 160°W–65°W) (23″ × 17″) 15*s.* (post 10*d.*)

The above three atlases contain current rose charts, predominant current charts and vector mean current charts.

Ice Atlases

Monthly Ice Charts of the Arctic Seas. M.O.M.390a, 1944. (60°N–80°N, 80°W–110°E) (12″ × 7″) 3*s.* 6*d.* (post 5*d.*)

Polar ice, mean limits of sea ice, extreme limits of sea ice, extreme limits of bergs.

Monthly Ice Charts of the Western North Atlantic. Met.O.478, 1946. (37°N–53°N, 72°W–35°W) (12″ × 7½″) 4*s.* (post 7*d.*)

Mean limits of pack, extreme limits of pack, mean limits of bergs, extreme limits of bergs.

Climatological Charts

Climatological and Sea-Surface Current Charts of the North Atlantic Ocean. Met.O.615, 1958, reprinted 1964. (5°S–60°N, 100°W–40°E) (40″ × 25″, folded to 13″ × 8″) 41*s.* the set (post 1*s.* 3*d.*)

One chart for each month, based on information in Met.O.483, Met.O.466 and Met.O.478 (above).