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Editorial

Some thirty-six years ago the writer made his first crossing of the North Atlantic ocean. The passage took fourteen days. In the succeeding years, he was to make many much longer passages in other oceans, but time has not dimmed the memory of that first ocean journey and his initial wonderment that there could be so much sea.

In May 1960 he made the journey again, as the guest of the British Overseas Airways Corporation on a proving flight of their Rolls Royce 707. This passage, again from London to New York, was accomplished in little over seven and a half hours and the homeward run, the following day, in somewhat less. At an altitude of 39,000 feet, where one is outside the influence of depressions and other meteorological nuisances, a speed of some 500 knots was reached in considerably more comfort than was the 12 knots of 1925, and had it not been for the routine R/T contacts with the ocean weather ships on Station Juliett (52° 30′N, 20° 00′W) and Station Charlie (52° 45′N, 35° 30′W) which are made by all aircraft operating on the Great Circle track, he could easily have forgotten that he was indeed repeating his maiden voyage.

The sense of changing times experienced on this flight had already been felt the previous summer during a coastal voyage which he made in a Selected Ship. This feeling was heightened by seeing on the saloon staircase a photograph of an earlier ship of the same name wherein the master and he had been respectively 3rd and 4th officers thirty years before. The power of reminiscence is inherent in all sailormen and indeed even after one comes ashore, the company in which [illegible] is happiest is the company of one's former shipmates and contemporaries in sea service. That there never was a ship like the last one, no one will deny, for time softens the memories of the open bridge, the flush deck, the cabin which opened on to the weather deck and the coaling in tropical ports. These things, together with masts and upperworks innocent of any navigational devices, are less than a memory with many of those who use the sea today.

Many who read this editorial will undoubtedly have gone to sea long before 1925. But when one ponders on the changes which have come about during the working life of one who, by present-day standards, has barely attained middle age—the widespread installation of the gyro compass, echo sounder, radar and electronic navigation aids, the stability computer, port radar services and even the loud hailer—one may be excused for wondering what the next step will be. Already the doppler navigator, the inertia navigator and the radio sextant are in production, whilst underwater cargo vessels are at least in the planning stage.

But the sea itself does not change. "Study her a thousand years and she's not a day older", said Max Pemberton's Captain Black, "say that you've mastered her and she'll beat the life out of you, for she owns no master. The shore's her enemy and it's there she fights her battles."

That the battle along the coast is a never ending one is exemplified by the number of calls made on the lifeboats of the Royal National Lifeboat Institution. Going back the mere thirty-six years mentioned above, we find that in 1925 the Service answered 204 calls whilst in 1959 the boats were called out 865 times. Actual figures can be misleading and this more than fourfold increase in the lifeboats' activities over the years, despite a reduction in the number of boats maintained, from 218 to 153, mainly due to their increased range, can be partly attributed to the greater use made of coastal waters, particularly for pleasure and recreation, and the greater availability of the lifeboats due to the fitting of R/T in so many seagoing vessels. Nevertheless a breakdown of the figures brings out one encouraging factor from the Meteorological Office point of view. For whilst in 1925, 48% of the calls made on the lifeboat were for services to "motor vessels, steamers, barges, motor boats, etc." and 36% to fishing vessels, in 1959 the percentage of the total calls to these classes of ship had been reduced to 18 and 21·6% respectively. These are the vessels who may be said to be weather conscious, the responsible users of the coastal waters, the professional mariners who will listen to the weather forecasts and act accordingly. It does not seem presumptuous to conclude that the improvement in the coastal weather services over the past thirty-six years has helped in the reduction of the casualty rate around the coasts.

Unhappily there are still the irresponsible others who will venture out to sea without regard to the impending weather. It would be unfair to place all amateur seamen in this category. Nevertheless, the calls to "sailing yachts, sailing dinghies, sailing boats, coastal cruisers and motor yachts" have grown from 5% in 1925 to 22·1% in 1959, whilst the calls to "small boats, canoes, rubber dinghies, etc." have grown from 3% of the total in 1925 to 12·3% in 1959.

If there is one lesson which can be learned from these figures, it is that it does not do to take chances, for the sea is without mercy and never forgives.

One purpose of the Meteorological Office, indeed the purpose for which it was originally constituted over one hundred years ago, is to ensure that the mariner will not have to take this chance. That partial success has been attained gives us some satisfaction but there is yet a long way to go. The standard of our work and the quality of our services for shipping are still, as they have always been, directly proportional to the voluntary observations from ships, and it is only by continuance of our mutual efforts that the question of the safety of life at sea will ever be resolved.

L. B. P.

THE MARINE OBSERVERS' LOG

April, May, June

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.

TROPICAL REVOLVING STORM

Arabian Sea

s.s. *Leicestershire*. Captain E. D. Brand. Aden to Colombo.

17th May 1960. At about 0900 GMT in position 11° 12′N, 56° 08′E, course 100°, speed 15 kt., the vessel came under the influence of a tropical storm. The pressure was 1001 mb., the wind W's, force 7 and the sky overcast. By 1230 the barometer stood at 998·6 mb. and the wind was WSW, force 9. Sky overcast. The position then was 11° 03′N, 57° 00′E. At 1500 the barometer began to rise, the wind being WSW, force 8–9. By 1800 the pressure had reached 1003 mb., and the wind had backed to SW, force 8: the sea was rough with a heavy SW swell. The sky was now only partly clouded. It was estimated that the cyclone centre was nearest to the vessel in position 14° 00′N, 58° 30′E, and that it was moving in a W'ly direction. Thereafter, the barometer continued to rise and the wind remained SW, force 6. Rain squalls were not experienced until 0000 on 18th, when the vessel was bearing about 145°, 230 miles from the centre of the storm.

Note. This observation was forwarded to the Deputy Director-General of Observatories, India Meteorological Office, who comments:

"The tropical storm under reference was considered to be a severe cyclonic storm with a core of hurricane winds. This disturbance had started as a depression in the south-east Arabian Sea centred in 9°N and 70°E on 10th May 1960. Moving north-westwards it concentrated into a cyclonic storm centred in 15°N, 63°E by 1200 GMT on 14th May. Later, it moved west-south-westwards and, according to the analysis of observations then available, the storm was centred within 1° of 14°N, 58° 30′E at 1200 GMT on 17th May.

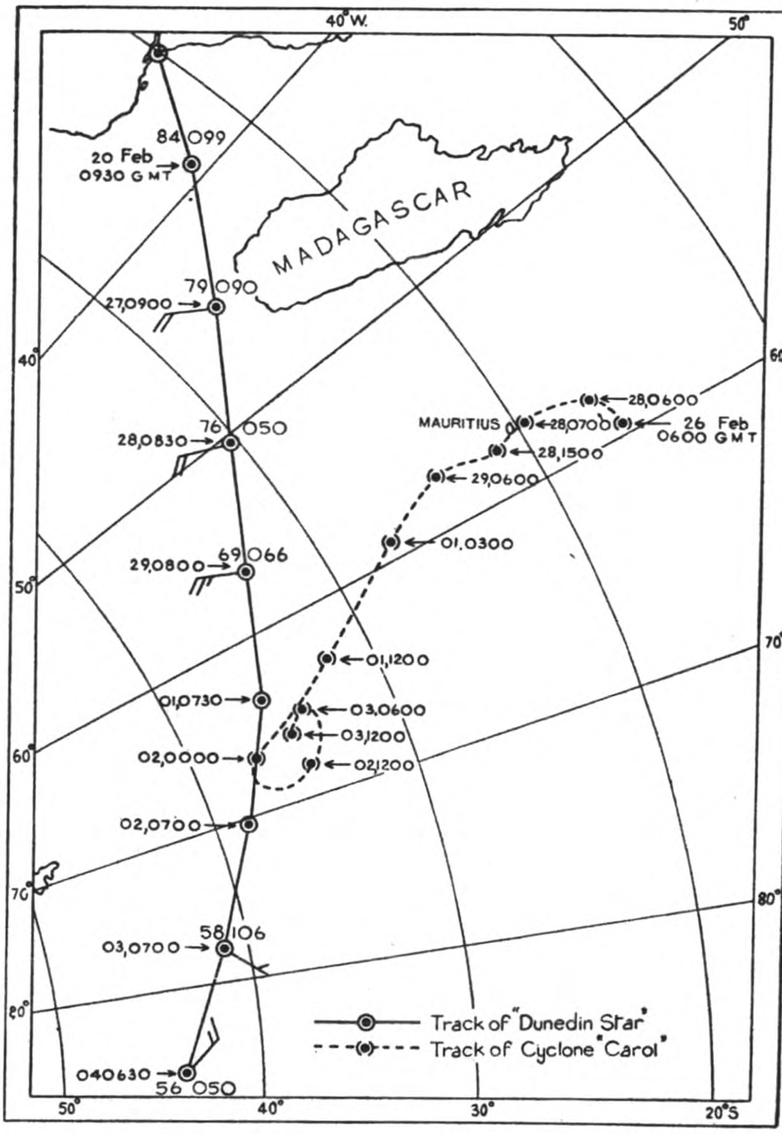
"We had received some observations from s.s. *Leicestershire* during the storm period which were useful in determining the storm centre, and for issue of the forecasts. However, a few more observations from the neighbouring areas would have been very helpful.

"Kindly convey my thanks to Captain E. D. Brand for arranging to transmit these important observations."

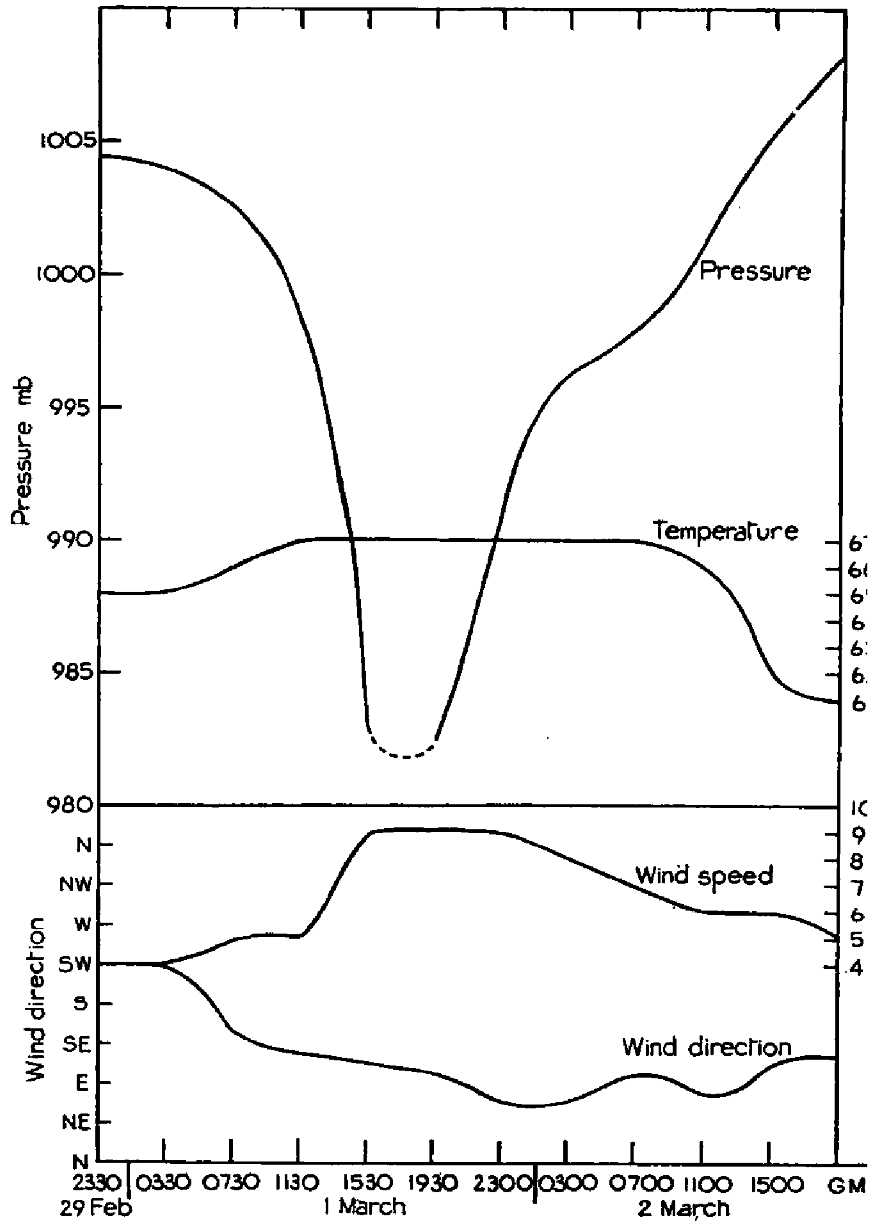
Indian Ocean

s.s. *Dunedin Star.* Captain R. H. Stark. Beira to Melbourne. Observer, Mr. P. V. J. Sanders, 3rd Officer.

28th February 1960. The approach of Cyclone 'Carol', the track of which is reproduced here, was clearly indicated by the usual signs, viz., widespread high cloud, rapidly falling pressure, wind backing and increasing, and heavy swell. At the nearest approach of the cyclone, the sky was overcast with low cloud and there



Intersection of the tracks of *Dunedin Star* and cyclone 'Carol', with observations.



(Observations were taken at the times shown on the time scale: the curves have been drawn through these points.)

Tracks of *Dunedin Star* and cyclone 'Carol', with observations.

was continuous torrential rain from 0730 GMT on 1st March to 0030 on 2nd March. Storm warnings were received from Mauritius, Colombo, Cape Town, Nairobi, Amsterdam Island and also from m.v. *Tremorvah.*

CURRENT RIPS

North Pacific Ocean

s.s. *Pipiriki.* Captain F. S. Angus. Balboa to Auckland. Observers, the Master and all officers.

16th May 1960. At about 1300 GMT the vessel entered an area of many surface disturbances, apparently caused by the meeting of different currents. The sea was calm and the eddies were seen in all directions: they occurred very frequently until about 2100, when they were less often seen and not so well marked. Current rips continued to be seen, however, during the next three days until nightfall on 19th when the vessel was in position 3° 24'S, 102° 03'W. Observations at noon on 17th showed that a strong E'ly set had been experienced: on the 18th a p.m. stellar fix established that a SW'ly set had occurred. During the rest of the period the experienced set was between S and W. The vessel was steaming throughout at about 15½ kt. on a course of 245°. Sea temperature showed the following ranges: on 16th, 82°F to 79½°; on 17th, 82° to 80°; on 18th, 80° to 73½°; on 19th, 74° to 79°.

Position of ship at 1300 on 16th: 5° 47′N, 83° 02′W.

Note. This is a very useful observation of a sea area of very complex flow, where water masses of different origins meet and where complex vertical exchanges are possible. s.s. *Pipiriki* crossed the sea area where the cold Peru current converges with the equatorial current. Cold water upwells to the south off the coast of Peru and flows northwards past the Galapagos Islands, converging with the warm equatorial water. The special character of this area is clearly evident in *Monthly Meteorological Charts of the Eastern Pacific Ocean.* See, for example, maps of mean sea temperature and range of sea temperature. See also *Quarterly Surface Current Charts of the Eastern North Pacific.*

Red Sea

m.v. *British Advocate.* Captain J. H. Jones. Port Said to Persian Gulf. Observer, Mr. D. G. Ashurst, 2nd Officer.

22nd May 1960. At 0948 GMT when the vessel was 10·1 miles off the Brothers Lighthouse on a bearing of 159½°, a disturbance on the sea was noticed which was attributed to the meeting of two currents. An excellent radar echo showed that the axis of the rip lay in a line 220°–040° and covered a distance of 8½ miles, the vessel being 4½ miles from the eastern end of the disturbance. The speed of the vessel before entering the rip was 14 kt. but in the disturbed area it dropped to 12 kt. The temperature of the sea surface, taken by bucket, was 75°F at 0600; it rose to 80° by 1200. Wind NNW, force 3. Sea slight.

Position of ship: 26° 09′N, 34° 55′E.

Note. This report is of very great interest because it gives details of a part of the Red Sea at a time when the mean ocean current flows contrary to the general atmospheric circulation. This must be associated with upwelling and subsidence of water masses. Mr. Ashurst has observed a water-mass discontinuity or sea frontal surface. This is confirmed by the ship's reduction in speed caused by an increase in the northward component of the ocean current.

Indian Ocean

m.v. *Port Pirie.* Captain L. J. Skailes. Aden to Melbourne. Observer, Mr. C. H. P. Brown, 3rd Officer.

5th June 1960. At 0610 GMT the vessel passed into a current rip lying from W to E and extending for about 2 miles. The surface of the sea became violently disturbed but the rip had no apparent effect on the steering or the ship's progress through the water. Sea temperatures: 67°F (before entering rip), 64° (after entering rip). Sea slight, with low or moderate sw'ly swell. Wind SW, force 3.

Position of ship: 28° 52′S, 103° 42′E.

Note. This observation is located near where the West Australia current diverges from the southern ocean current. The line observed probably marked a local division of water masses, and the fall in temperature suggests upwelling.

CHANGES IN SEA TEMPERATURE

North Atlantic Ocean

s.s. *Marengo.* Captain J. K. Marrow. Baltimore to Leith.

7th January 1960. Between 0000 GMT in position 41° 30′N, 52° 24′W and 1200 GMT at 42° 30′N, 49° 24′W a fall of 25°F was recorded as the vessel reached the northern limit of the Gulf Stream. Weather, heavily overcast with good visibility.

13th March 1960. St. John's N.B. to Newcastle.

At 0300 GMT, in position 44° 21′N, 46° 18′W, the sea temperature at the condenser intake was 54°F. At 0600 in 44° 47′N, 45° 40′W, the temperature by insulated bucket was found to be 39·5°, a fall (ignoring the difference in the method of measuring) of 14½° in three hours.

28th April 1960. Baltimore to Newcastle.

At 0300 GMT in position 40° 00'N, 50° 00'W, the sea temperature at the condenser intake was 64°F: at 0400 it was 61° but by 0600 it had fallen to 48° only. Using the insulated bucket, the temperature was 49·5° at 0600, and 46° at both 0700 and 0800. The depth of the intake was 26ft. Speed 13½ kt. Course 078°. Slight sea and swell.

Note. The location of these great changes of sea temperature is of interest. However, it would have been preferable for the whole sequence to have been of bucket readings, so that they could be more accurately compared with each other. The insulated bucket at present in general use should ensure accuracy. It is always difficult to verify intake readings.

DISCOLOURED WATER

Some of these observations have been accompanied by *unpreserved* samples of sea water. This omission has detracted from their value. Dr. T. J. Hart, of the National Institute of Oceanography, states:

"Samples are most easily fixed by adding a *little* strong formalin to the sea-water. If no formalin is available, surgical spirit will do. The latter is not ideal, causing some cloudy precipitate, but totally unpreserved samples can be almost useless, and this is so disappointing when a lot of trouble has been taken over their collection."

[Bottles for samples together with preservative, supplied by the National Institute of Oceanography, are obtainable on request from Port Meteorological Officers at Cardiff, Glasgow, Liverpool, London and Southampton.]

Arabian Sea

m.v. *Clan Maclean.* Captain H. Whitehead. Cochin to Aden. Observers, the Master, Mr. E. Jackson, Chief Officer and Mr. R. Harden, 3rd Officer.

5th April 1960. Between 0400 and 0700 GMT the vessel passed through an extensive area of some substance resembling sand or fish spawn. This lay in bands about 2 to 6 ft. in width, which extended for a great distance in an E–W direction on both sides of the ship: they were muddy looking and a deep yellow in colour. A sample was taken, and in it there appeared to be small pieces of oats: the water had a peculiar smell and when shaken it looked slimy and greasy. No weed was present but one or two small insects were seen to be floating about. Similar reports were made by this vessel in October 1958 when off Cape Guardafui. Air temp. 81°F, sea 88°. Wind E, force 3. Sea slight.

Position of ship: 9° 54'N, 72° 18'E.

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

"Both the sample bottles contained a heavy concentration of *Trichodesmium*, the typical Red Sea form but one which is also found quite often in the Indian Ocean and more rarely elsewhere."

South Pacific Ocean

s.s. *Hemiglypta.* Captain R. F. Garrod. Buenos Aires to Curaçao.

8th May 1960. Between 1100 and 1500 GMT the sea, which was calm, had a fairly even covering of red plankton and this, although quite thin, had a tendency to gather into dense bands. These were irregular in shape and lay mainly in an E–W direction (the plankton within the bands themselves had a NE–SW orientation). The surface of the water where free of plankton, had the appearance of having a film of thin oil lying on it, but no smell was noticed. The discoloration appeared to extend to a considerable depth below the surface. Sea temp. 85°F. Wind, light and variable.

Position of ship: 21° 48'S, 139° 24'W.

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

"This report quite possibly refers to a dinoflagellate bloom. Such have been reported close inshore farther south along the Brazilian coast. The possibility of a *Trichodesmium* bloom, like those so common farther offshore in the Brazilian current, cannot be ruled out; but these commonly give a straw-coloured rather than a red appearance.

"There is thought to be a local centre of 'dynamic upwelling' off C. Frio (hence its name) and the complications caused by the Victoria and Montague banks could also be expected to enrich the surface layers, favouring local concentrations of plankton, but I do not know of any detailed work having been done there."

Peruvian Waters

s.s. *Reina del Mar*. Captain J. E. Evans. La Libertad to Callao. Observers, Mr. D. Pugh, 2nd Officer and Mr. J. Swan, Apprentice.

10th May 1960. Between 1900 and 2100 GMT the vessel passed through patches of red coloured water, some of which were very vivid. Samples were taken which suggested that red dust particles were suspended just below the surface of the water. The discoloured area continued for about 12 miles, but its width was unknown. Sea temp. (condenser), 65°F.

Position of ship: 8° 24'S, 79° 43'W.

Note. See note under following observation.

m.v. *Rangitata*. Captain A. Hocken. Callao to Balboa. Observers, Mr. B. C. J. Jones, 3rd Officer and Mr. J. MacKinnon, Quarter Master.

15th May 1960. At 1630 GMT, while steaming northwards, large areas of discoloured water were seen which had the same shade as chocolate or cocoa. When a sample was taken however, it was found that, in small quantity, the sea water was quite transparent. This was thought rather strange as the discoloration observed on the sea surface seemed to be extremely opaque. Sea temp. (bucket) 60°F.

Position of ship: 8° 45'S, 79° 41'W.

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

"The positions of the red or chocolate discolorations observed by the *Reina del Mar* and *Rangitata* lie slightly north and south of Ferrol Bay, and the short time interval makes it a reasonable assumption that the same outbreak was responsible for both, the normal northerly set being frequently absent, or even reversed, when these *aguaje* phenomena have been recorded on that coast.

"Samples were taken by both ships but most unfortunately were not preserved, so that the contents were much decayed and many organisms unrecognisable when they reached me. *Rangitata's* observers noted that the sample appeared transparent, and though the centrifuge brought down numbers of Coccosphaeriales, including *Calyptrosphaera spp.*, it is probable that the organisms producing the discoloration were concentrated a little below sampling depth.

"The samples from m.v. *Reina del Mar* contained a very dense green sediment of the remains of micro-organisms, autolysed and stinking owing to lack of preservative, with motile sulphur bacteria rampant. Only the remains of those microscopic algae with hardened exoskeletons—diatoms, dinoflagellates, silicoflagellates and a few Coccosphaeriales—could be identified with confidence; and these seemed only sufficient to represent the normal rich phyto-plankton of the coastal water which tends to a green tint in contrast to the deep blue of the open ocean in those latitudes. The bulk of the organic remains consisted of what seemed to me to be decomposing debris from dense swarms of a ciliate protozoan such as *Cyclotrichium* (formerly *Mesodinium*). These organisms have been observed to form intense reddish discolorations in many parts of the world, notably off South Africa, South West Africa, British Columbia, and in Wellington harbour, New Zealand (Bary & Stuckey, 1953). Incidentally they were almost certainly seen by Darwin during the voyage of H.M.S. *Beagle* (1831–6) near Valparaiso.

"These ciliates contain numerous minute (4 m) 'platelets' (Lohmann, 1907) thought to be symbiotic algae like the zoochlorellae of the Radiolaria. These are responsible for the colour which is greenish-olive after death. The red effect is mainly a refractive one when the organisms are very densely crowded, but a few contain red pigments also when the organisms are alive. It is probable, though not proven, that the 'platelets' may be able to survive as independent plants after the dissolution of the protozoa.

"*Cyclotrichium* has the exasperating property of exploding when exposed to too strong light, or when treated with most normal preservatives. Fixation however is sufficient to leave some few recognisable to those accustomed to them. A degree of negative phototropism as found by Bary and Stuckey would account for concentration a little below the surface, such as seems to have partially defeated m.v. *Rangitata's* efforts at sampling.

"I was fortunate in being able to show the samples both to Mr. R. I. Currie of the National Institute of Oceanography and to Professor Bary (now of British Columbia), who have both seen the after-effects of *Cyclotrichium* swarms in other parts of the world. All three of us agreed that this was almost certainly another example, although we cannot swear to it owing to the decomposed state of the samples.

"Discoloured water phenomena have long been known to be a feature of the Peru coastal current, and some of them seem to be involved with the disastrous fish-mortalities usually occurring about the time of the New Year. These are more likely to be caused by dense dinoflagellate blooms than by *Cyclotrichium* swarms, for the latter cannot yet be linked with mortality phenomena in the analogous regions where they have been observed. It is becoming recognised that discolorations due to different organisms (often with much the same visual effect) may occur at different times in the same sea areas. This should demonstrate the importance of sampling in such regions, so that the micro-organisms which do not affect other forms of life adversely may be distinguished from those causing mortalities.

"Only then will it be possible to take action against the deadly ones."

RADAR RESPONSE FROM CLOUD

Barents Sea

s.t. *St. Loman.* Skipper J. Dobson. Observer, the Skipper.

15th June 1960, 1000 GMT. We were towing our trawl at 4 knots in a 120° true direction. I observed three rain clouds appear on the radar screen, one was approximately 10 miles square and the other two were about 3 miles square down to the sea. The wind was 080° light, brilliant sunshine, there had been mirages and a lot of refraction. I watched these rain showers, they first appeared 4 miles 30° on the starboard side as they came off the land. They moved across my head from starboard to port in an 060° direction, and in one hour they had travelled 12 miles. Then the smaller ones appeared to travel away in a 130° direction, whilst the larger one kept going in an 060° direction. They were all getting smaller on the radar screen and at 15 miles the smaller two looked to be about one mile square and the large one at 15 miles appeared to be 4 miles square. I lost them at about 20 miles on the radar screen.

Position of ship: 69°N, 37°E.

Note. Captain F. J. Wylie, Director of the Radio Advisory Service, comments:

"This is a most interesting report, particularly as it suggests that the precipitation observed on the radar was subject to high altitude atmospheric conditions in which the wind component was at variance with the surface wind observed by Skipper Dobson.

"There is a dearth of radar operational reports from Arctic waters and any information, including detection ranges of land, is most welcome."

UNIDENTIFIED RADAR ECHO

North Atlantic Ocean

s.s. *Marengo.* Captain J. K. Marrow. Hull to Halifax.

25th May 1960. A radar echo was plotted at 0340 GMT and it was found to be that of a stationary object; no lights were seen, nor were flashing signals answered. The echo was picked up at 9 miles and showed fairly well: it was intermittent at 5·2 miles, the nearest approach, and when abaft the beam it was not detectable beyond 7 miles. The weather was cloudless and there was an auroral glow, but no moon. Visibility was very good, with ships' lights being seen up to a distance of 20 miles. The sea was rippled with a low swell.

Position of ship: 45° 42'N, 52° 57'W.

Note. This observation was probably of icebergs. However, the extreme uncertainty of the nature of the target is typical of the difficulties of interpreting radar records when navigating in areas where ice is likely to be a serious hazard.

VIOLENT STORM

at Iskenderun (Alexandretta), Turkey

m.v. *Lingula*. Captain L. E. Grant. Istanbul to Iskenderun. Observer, Mr. J. S. McKenzie, 3rd Officer.

20th March 1960. While lying at the submarine pipeline berth we were struck by a squall at 0100 SMT, which immediately freshened up to force 8 or 9 and continued to increase still further. Our stern ropes were snapped one after the other like pieces of string and the vessel swung violently round to her two anchors: she had been lying head to NW and the wind came from the SE. By 0130 the wind was constant at force 10–11 with frequent gusts of force 12. Visibility was seriously affected by driving spray and the whole ship was coated with a heavy layer of salt: the vessel was only six cables from the shore, and there was an offshore wind, yet in less than an hour it was impossible to see through the wheelhouse windows due to the layer of salt. The wind continued to blow at force 8–10 till 2000, when it abated. With the decrease in speed, there was a sandstorm which reduced visibility to 3 cables. By midnight the wind was force 2 and the visibility almost nil. At 0500 the sandstorm cleared, the wind died out and we re-berthed soon after 0800 on 21st. Locally this wind is known as Yarik Kaya, after a huge chasm in the mountain which acts as a funnel for the wind. My informant said that the wind either lasts for 24 hours or until the rain comes, when it dies away. He added that in 20 years he could not remember it reaching the force which it did in this storm. The lowest barometer reading during the storm was 1002·9 mb.

Note. From the description, this phenomenon would seem to be of the 'cold air avalanche' type. Cold air accumulates in mountain regions under a certain pressure distribution. Then a fall of pressure, in this case probably centred away to the SW in the Cyprus region, opens the flood gates as it were, and the heavy, cold air plunges down the mountain slopes, the wind speed being considerably intensified through any gaps in the hills.

Similar cold air avalanche effects are reported from the coast of British Columbia.

The association of the sand storm with considerable abatement of the wind is a normal occurrence. It is the strong wind which whips up the sand or dust but it tends to remain suspended at considerable altitudes until the wind force abates and the particles can then settle out. As the wind decreases, the horizontal visibility becomes progressively worse until the majority of the dust has settled.

With regard to the wind blowing 'until the rain comes'—there is probably a crude correlation between the wind blowing and the rain coming. The cold air stream will provide the energy to intensify the depression and the convergence and convection associated with the intensifying depression is likely to cause rain sooner or later.

TRADE WIND STORM

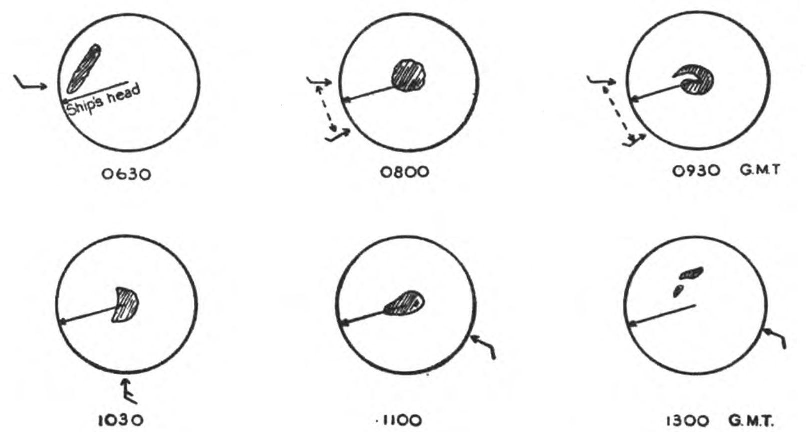
South Pacific Ocean

m.v. *Gloucester*. Captain J. S. Laidlaw. Vancouver to Adelaide. Observers, the Master, Mr. M. J. Collins, 3rd Officer and Mr. W. Henderson, Chief Radio Officer.

21st April 1960. At 0630 GMT a belt of heavy rain was observed on the radar screen at a distance of 20 miles. It lay in a direction 110°–290° and was 35 miles in length. A good deal of lightning was seen, visually, flashing from what appeared to be very high towering Cb. Weather at the time: Wind W, force 1; Air temp. 82°F, wet bulb 76°, sea 86°.

At 0745 the vessel entered the rain area and for the next two hours precipitation was extremely heavy, and although there were a few breaks when there was drizzle only, the rain never ceased. On the radar screen it completely blotted out the picture up to a distance of 15 miles all round. Lightning was continuous and vivid, some flashes lasting 3–4 sec. When the rain area was entered the air temp. and wet bulb both fell to 74½°F.

At 0930, it was observed that the whole storm had changed direction and was now following the ship; previously it had been coming in from about 4 points on the starboard bow, although the wind was from W to SW. At 1030 it was S, force 4. By 1130 the wind was E'S, force 3, the lightning had died away and the rain had decreased. All lightning finally ceased by noon but rain continued to fall. The storm finally cleared away to starboard at 1300. Between 0800 and 1130 much St. Elmo's fire was seen in all rigging, which looked as if it had been splashed with phosphorescent paint: on the main wireless aerial, green blobs that seemed to be a foot in diameter ran along it from forward to aft. The radio operator on watch from 0800 to 1000 reported the complete disorganisation of the radio equipment, all aerials charging and discharging to earth with loud cracks and vivid flashes, making the radio room a rather unhealthy spot. The accompanying sketches show



the storm as seen on radar, which was on the 40 miles range—rain normally shows up at 20 miles on this set. The course was 240° at $14\frac{1}{2}$ kt.

Position of ship at 0830: 14° 05'S, 172° 41'W.

Note. This is an interesting account of a storm in the Trade Wind belt of the Southern Pacific, quite near to the inter-tropical convergence zone. The radar record of the areas of precipitation, giving the development of the shape and movement of the storm, is of particular interest.

THUNDERSTORM

North Atlantic Ocean

s.s. *Bristol City*. Captain J. N. Ramsay. Norfolk to Avonmouth. Observer, Mr. M. J. Winter, 2nd Officer.

14th June 1960. Lightning was seen in the north after 1600 GMT and a large storm was clearly defined on the radar screen. It was moving at about 15 kt. in an E'ly direction and by 1715 the sky had become very threatening. The wind began to veer and increase and by 1730 was W'S, force 9–10, when very heavy rain began. As the storm approached, many small waterspouts were observed in close proximity to the vessel. Flashes of lightning were very near the ship as the storm centre passed, and rain and spray reduced the visibility almost to nil. By 1815 the wind was E'N, force 3, and the rain had decreased to moderate or slight. Air temp. 70°F, sea 78°.

Position of ship at 1730: 37° 50'N, 71° 10'W.

Note. This is an example of cold air moving southward over warm water, producing violent instability similar to that associated with tropical storms.

VESSEL STRUCK BY LIGHTNING

North Atlantic Ocean

s.s. *Esso Manchester*. Captain L. C. Smith. Bowling to Cartagena. Observers, the Master and Mr. W. J. Whyte, 3rd Officer.

18th May 1960. At approximately 0100 GMT the vessel encountered a violent line squall, which, from radar observations, had an average breadth of 5 miles and appeared to be over 100 miles in length. The vessel passed through the line diagonally and cleared it at approximately 0200. During this time there was almost continuous lightning accompanied by thunder, and one flash struck the vessel amidships, leaving a strong smell of burning. On emerging from the squall, it was found that the air temperature had fallen from 73°F to 68°. The wind varied in direction from SW to NW and for the most part was rather strong.

Position of ship: 27° 00'N, 48° 40'W.

Note. This is a useful account of a ship's passage through a North Atlantic line-squall formed in a polar or Arctic air mass.

SHIP-MADE CLOUD

Peruvian Waters

m.v. *Rangitata.* Captain A. Hocken. Callao to Balboa. Observers, Mr. B. C. J. Jones, 3rd Officer and Mr. J. MacKinnon, Quarter Master.

15th May 1960. At 1630 GMT, the exhaust gases rising slowly from the funnel were seen to change gradually from blue-grey to white and after some minutes a small puff of what seemed to be fair weather cumulus formed over the vessel at an estimated height of 100–200 ft. above the sea. Air temp. 70·4°F, dew point 64°. Wind S'W, force 4–5. Ship's course 010° at 16·3 kt.

Position of ship: 8° 45'S, 79° 41'W.

Note. It is probable that the exhaust gases from the ship's funnel provided atmospheric nuclei, water-vapour and heat sufficient to start the precipitation of water droplets in the atmosphere a few hundred feet above the ship. A similar observation was reported in the Indian Ocean by s.s. *Himalaya* in January 1959 (*The Marine Observer*, January 1960). The exhaust gases could have assisted the cloud produced by s.s. *Himalaya.*

WHALE SHARKS

Gulf of Aden

s.s. *Clan Sutherland.* Captain F. H. Turton. Tanga to Aden. Observers, the Master, Mr. M. P. R. Turner, Chief Officer and Mr. W. Gay, Radio Officer.

21st June 1960. When the vessel was off Ras Alula at 0430 GMT it passed through a school of what appeared to be whale sharks. They numbered approx. 100–150 and were sunning themselves just under the surface. Their overall length was about 15–20 ft. and they had a spade-shaped head which seemed to be about 5 ft. across. The back was mottled and the tail and dorsal fin were particularly conspicuous. Sea temp. 85°F.

Position of ship: 12° 00'N, 50° 00'E.

Note. See Note under following observation.

s.s. *Kenya.* Captain S. A. Richards. London to East Africa.

14th August 1960. When approaching Cape Guardafui, several schools of large shark-like fish were seen, ranging between 10 and 20 ft. in length. In colour, they were a dark grey to black, with white spots on the nose and the dorsal fin. On each side of the head there were 4 or 5 gill-like openings. Each school consisted of about 30–40 fish and these seemed to be moving in pairs within the shoal. The creatures were very similar to the illustration of a basking shark shown on page 102 of *The Fishes of the British Isles*, by J. Travis Jenkins. Sea temp. 86°F, depth 105 fm.

Position of ship at noon: 10° 48'N, 51° 30'E.

Note 1. Mr. N. B. Marshall, of the Natural History Museum, comments:

"The *Clan Sutherland's* description and drawing [not reproduced here] must be of a whale shark (*Rhincodon typus* Smith). I think the sharks seen by the *Kenya* were most likely to have been of this species also. This is the largest of all modern fishes (it grows to a length of at least 60 ft.). It is found in the tropical belts of all oceans and, like the basking shark, feeds on plankton. It may also take small fishes.

"The observation of a school of these sharks is of particular interest. It is known to gather in schools but the numbers in any school are hardly ever given, hence the special value of this record. The observers may also like to know that the whale shark is so unwary and sluggish that it is occasionally rammed by ships."

Note 2. It is interesting to note that there is only about 115 miles between the positions of the above two observations.

SHARK

South China Sea

s.s. *Oxfordshire.* Captain N. F. Fitch, M.B.E. Hong Kong to Singapore. Observer, Mr. I. F. Smith, 3rd Officer.

3rd May 1960. At 1030 SMT, when the vessel was proceeding in a slight sea, a large fish leapt out of the water right alongside. The observer was fortunate in obtaining a good view as the creature appeared a second time, but at a greater distance away on the starboard quarter. It was estimated to be roughly 30ft. long, was very streamlined with a sharp pointed snout and was grey atop with white underneath; the predatory type mouth was well forward on the underside. The general appearance was that of a shark. The fish continued to play in the wash, breaking the surface but never again leaping out: it kept up easily with the vessel, which was making 16 kt. Though it could be seen under-water with the aid of binoculars, the shape of the tail could not be discerned. There appeared to be no fins, but a strong dorsal ridge was very noticeable. The creature accompanied the vessel for half an hour during which time the ship passed through two patches of spawn, but it disappeared as the second patch was left behind. Sea temp. 84°F. Waves 5 ft. high.

Position of ship: 11° 30'N, 111° 00'E.

Note. Mr. N. B. Marshall, of the Natural History Museum, comments:

"The fish seen must certainly have been a shark. The great size suggests a white shark or man-eater, which grows to a length of nearly 40 feet. It is a strong active fish with a streamlined appearance, but is not known to leap out of the water (as do mako sharks). However, the first (and only) leap observed could be put down to sudden shock.

"The record of the fish's speed is interesting. Any such observations will be welcome, as we know all too little of the speeds of oceanic fishes."

PHOSPHORESCENCE

North Atlantic Ocean

m.v. *Ripon.* Captain W. A. Kyne. Glasgow to Monrovia. Observer, Mr. W. Baxter, 2nd Officer.

30th April 1960. Between 0120 and 0130 GMT the vessel passed through an area of intense phosphorescence in which there were patches of 'milky sea' and bright flashing lights: in other parts the phosphorescence showed a steady glow. Wave tops were clearly visible when they broke, emitting a greenish light, and the bow wave of a ship two miles away was plainly seen. Echo soundings showed no bottom when in the area, but soon after leaving it the depth changed quickly from 80 to 50 fm. Sea temp. 60°F.

Position of ship: 11° 10'N, 17° 16'W.

Arabian Sea

m.v. *British Consul.* Captain J. Mason. Abadan to Mombasa. Observer, Mr. D. M. H. Scott, 2nd Officer.

6th May 1960. At 0000 GMT, when the ship was between Masira Island and Ras Madraka, an unusual sample of phosphorescence was observed in the sea temperature bucket. When the thermometer was withdrawn a luminous spot moved up the scale, which when isolated on a fingertip proved to be a small animal-like

object. It was transparent and more or less elliptical in shape with two dark brown dots at one end, resembling eyes: at the other end there was a lighter brown area similar to a miniature X-ray photograph of an abdomen. The creature was about $\frac{1}{10}$ in. long, with appreciable roundness and solidity. There was a bright blue luminous spot at the fore end, where a mouth normally would be, and this moved slightly from side to side. On squeezing the object, some resistance was felt before it burst, releasing a droplet of liquid of appreciable size. The luminous spot remained inside the deflated 'skin' and glowed brightly for several minutes: it finally faded out after about one hour. Sea temp. 81°F.

Position of ship: 19° 48'N, 58° 42'E.

Note. Dr. J. P. Harding, of the Natural History Museum, comments:

"This is a very clear description of the ostracod *Pyrocypris*. The specimen most likely to be found in the Arabian sea is *P. chierchiae* Müller."

Indian Ocean

m.v. *Port Auckland.* Captain C. R. Townshend. Aden to Melbourne. Observers, Mr. G. J. Botterill, 3rd Officer, the Quarter Master and Lookout man.

19th April 1960. At 1600 GMT the vessel passed through a patch of phosphorescence in the form of vivid purple globes about a foot in diameter. At this time, the bridge fire hydrant was turned on to wash down a spilt cup of tea, and phosphorescence poured on to the deck in the form of numerous small spots of colour which were quite solid and could be smudged with the finger. A sample was taken and examined, but to all intents and purposes it looked like ordinary sea-water and was later thrown away by mistake.

Position of ship: 7° 20'S, 77° 50'E.

BIRDS

Colombo

m.v. *Trevince.* Captain F. G. Bolton. Colombo to Geelong.

10th May 1959. At 0630 Local Time, as the ship left Colombo, it was accompanied by dozens of Indian crows. By evening four crows were seen roosting on the after end of the boat deck near the galley. Six days later one of them had disappeared. Later, on 21st May, it was found dead in No. 2 bilge, having flown or been blown down a ventilator. By this time the crows were frequently taking flights all round the ship, and after remaining mute for the first six days were now croaking merrily.

From 22nd May, by which time a considerable number of albatrosses were accompanying the ship, the crows remained very close to the ship, perhaps nervous of such large companions. No attempt was made by them to leave either off Cape Leeuwin, Western Australia, or when five miles from Cape Otway (Victoria). The three crows were still flying around the ship inside Port Philip Bay and flew ashore when the ship reached Geelong (Victoria) on 29th May.

North Atlantic—Pacific

m.v. *Rakaia.* Captain F. G. Bevis. London–Curaçao—Colon—Balboa—Timaru.

5th June 1960. When about 400 miles W of Cape Finisterre, a homing pigeon landed on board in an exhausted condition. On its right leg was a band marked NUHW T1881 59. The ship proceeded to Curaçao and later passed through the Panama Canal, and yet the bird preferred to remain on board. Finally, on 20th June, when 600 miles W of Equador, it flew away towards the Galapagos Islands.

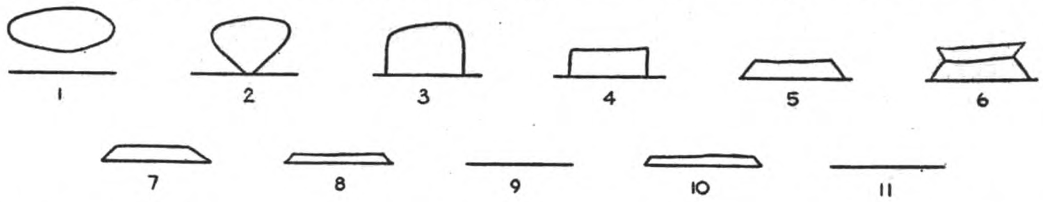
Note. Captain G. S. Tuck, of the Royal Naval Birdwatching Society, comments that the above two observations are very unusual.

ABNORMAL REFRACTION

South Atlantic Ocean

m.v. *Durham.* Captain R. Hollingdale. Cape Town to Las Palmas.

14th June 1960. Between 1736 and 1743 SMT this evening the sun assumed the



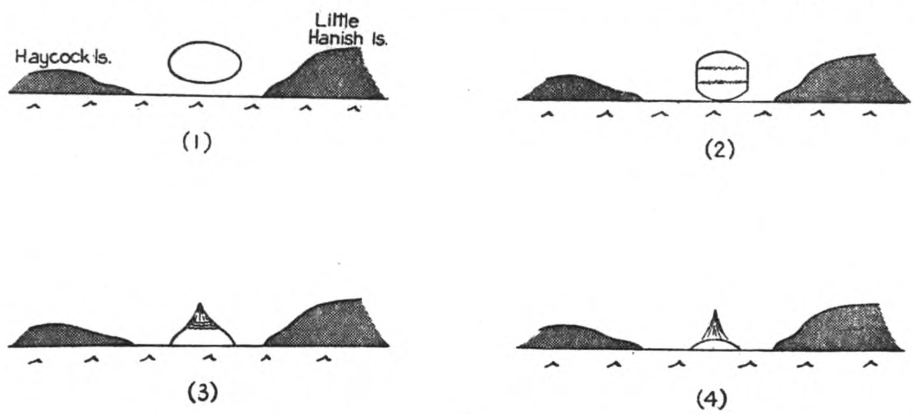
shapes shown in the accompanying sketches as it descended towards the horizon. Air temp. 62°F, sea 62°. Relative humidity 83%. Wind SE, force 2. No cloud.

Position of ship: 29° 34′S, 14° 29′E.

Red Sea

m.v. *City of Swansea.* Captain G. R. Horan. Calcutta to Montreal. Observers, Mr. H. Townsend, 3rd Officer and Mr. B. M. Norwell, 4th Officer.

29th May 1960. The accompanying sketches show four successive stages as the sun set between Haycock and Little Hanish Islands. In sketch (3) the upper limb



seemed to separate from the rest of the disc, and became roughly conical in shape with a green tinge at the edges. Just before the sun disappeared below the horizon, the cone dissolved for about 2 sec. into a sheet of green flame extending 2° to 3° above the horizon. Air temp. 89°F, wet bulb 83·7°, sea 88°. Wind, light and variable. Visibility excellent.

Position of ship at 1800 GMT: 14° 12′N, 42° 42′E.

Note. These interesting aberrations of the sun's image would arise from abnormal vertical temperature variations in the atmosphere, as would the final spectacular display of the green flash.

m.v. *Port Wyndham.* Captain R. H. Finch. Aden to Suez. Observers, Mr. D. Atkinson, 3rd Officer and Mr. J. Gladston, Apprentice.

22nd April 1960. Very pronounced abnormal refraction at 2300 GMT caused 'The Brothers' light to be seen at a distance of 53 miles, the dipping distance being 20·8 miles. The masthead lights of three vessels were also observed flashing red, white and green in turn. This condition persisted until 0200 on 23rd, when the sky, which had been covered with a thin veil of cirrostratus, began to clear very quickly. The light then disappeared and was picked up later at its dipping distance.

Air temp. 79°F, wet bulb 70°, sea 77·5°. Wind light and variable. Sea smooth.

Position of ship: 27° 07′N, 34° 25′E.

Note. m.v. *Port Wyndham* experienced abnormal visibility caused by atmospheric conditions produced by the abnormal sea conditions associated with phenomena similar to those reported by *British Advocate* (page 58) at a position very near the location of this report.

The change in colour of a distant light from white to green or, less often, to red, is a comparatively rare phenomenon, arising from refraction, and is most likely to be seen when abnormal refraction occurs.

SCINTILLATION AND GREEN FLASH

South Pacific Ocean

m.v. *Port Wyndham*. Captain R. H. Finch. Panama to Suva. Observer, Mr. I. Lister, 2nd Officer.

30th June 1960. Whilst I was watching Jupiter set at 1440 GMT, through binoculars, it changed from its normal yellow colour to a dull red. Several stars in the vicinity were flashing white, red and green, but these variations were not noticeable without the aid of binoculars. At 1446 as Saturn set it showed a brilliant red, not visible to the naked eye, and as it finally disappeared there was a distinct green flash. Shortly afterwards at sunrise there was a brilliant green flash clearly visible to the unaided eye. Air temp. 80°F, wet bulb 77°, sea 80°. Visibility excellent. Wind SE, force 3.

Position of ship at noon: 8° 12′S, 137° 42′W.

Note. These aberrations are consistent with abnormal atmospheric conditions. It appears that the light from Saturn was almost completely resolved. The brilliant green flash confirms the special character of the atmosphere at that time.

RED FLASH AT MOONRISE

South Altantic Ocean

m.v. *Deseado*. Captain W. S. Thomas. Santos to Las Palmas. Observer, Mr. J. McCaughrean, 2nd Officer.

19th May 1960. The moon on rising at 0339 GMT was seen, when examined through binoculars, to have assumed the distorted appearance shown in the

sketch. As the lowest part of the limb cleared the horizon a brilliant red flash was observed which lasted for 1½ sec. approx. Cloud present was ⅛ C_L 1 and $\frac{2}{8}$ C_L8. Air temp. 79°F, wet bulb 71°, sea 81°. Wind E'S, force 3. Sea slight, no swell.

Position of ship: 14° 25′S, 36° 30′W.

Note. The red flash is a similar phenomenon to the green flash, and the abnormal vertical distribution of temperature and water vapour content in the atmosphere that produced the abnormal refraction intensified the red flash.

IRIDESCENCE

Red Sea

s.s. *Esso Exeter*. Captain S. R. Dance. Persian Gulf to Suez. Observer, Mr. R. Phillips, Extra 3rd Officer.

4th May 1960. At 1510 GMT the sun went down behind a thick bank of cloud about 5° in altitude. Five min. later a patch of C_M7 or C_H9 turned a brilliant blue colour which was much brighter than the sky: the extreme edges of this cloud were a bright purple. Gradually other cloudlets developed iridescence, most of them assuming one predominant colour, some being a brilliant ruby red, others a vivid green or blue. A number were yellow or mauve around the edges. At 1530 the highest patch of iridescent cloud was 9° 40′ in altitude and by then it had changed from a single colour to a multicolour mosaic type with a combination of reds, greens, blues, mauve and yellow. By 1535 all the colours had vanished; at 1540 well-defined, pale yellowish-pink rays were observed spreading from behind the cloud to an elevation of 45° and these remained visible till 1555. Later, long whirls and sheaves of cirrus spread across the whole sky. Visibility was good throughout the period.

Position of ship: 14° 48′N, 42° 13′E.

RADIO FADE-OUT

Cabot Strait

s.s. *Pipiriki.* Captain F. S. Angus. Cornerbrook to Curaçao. Observers, Mr. J. B. Ashford, 3rd Officer and Mr. S. L. Adams, Chief Radio Officer.

6th May 1960. While on passage from Cornerbrook towards the Cape Breton shore, intermittent complete fade-outs were observed on the medium wave bands, lasting between 30 and 60 sec. The last fade-out occurred at 0059, after which normal conditions returned.

During this time the radar was giving echoes of ships at a distance of 40 miles—the maximum range. Strong echoes were returned, the strength being that usually obtained with this set at 15 miles under normal conditions. It was not known whether this exceptional radar performance was connected with the radio fade-out, or not. The sky was overcast throughout, and much visual abnormal refraction was in evidence. Air temp. 40°F, wet bulb 38·5°, sea 38°. Wind, light and variable. Occasional light showers of rain.

Approx. position of ship: 48° 50′N, 59° 00′W.

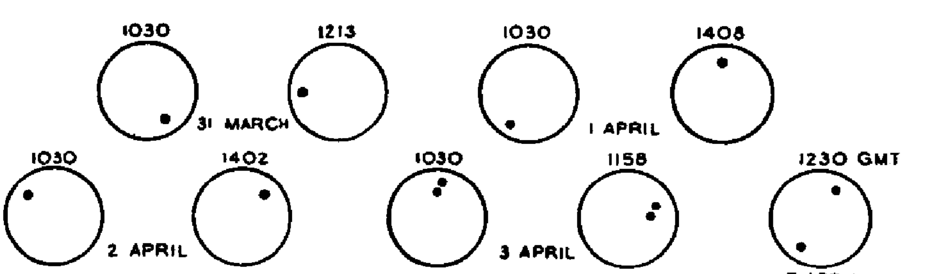
Note. This demonstrates the fundamental difference between medium wave reception and very short wave reception. Transmissions via the ionosphere (e.g. medium waves) are affected by phenomena in the high atmosphere like cosmic radiations and particles, but the ultra-short radiations which follow optical paths are modified by the lowest layers of the atmosphere and then propagation can be improved by favourable gradients of temperature and humidity.

SUNSPOTS AND RADIO RECEPTION

South Atlantic Ocean

s.s. *Ramillies.* Captain D. F. Miller. River Plate to Antwerp. Observers, Mr. D. A. Harries, 2nd Officer, Mr. C. Thomas, 3rd Officer and Mr. V. A. Cottuli, Radio Officer.

31st March 1960. While 'shooting the sun' this morning, a large sunspot was seen at the bottom right hand side: by noon it had moved to a position about half way up the left side. As the Radio Officer had reported bad radio reception it was decided to keep a watch on the spot to see what developments occurred during the



following days. These are shown in the accompanying sketches. *Radio Officer's report:* On 31st March I noticed that communication with the U.K. was becoming difficult during daylight hours, very little being heard on 12 mc/s. upwards. That night it was found that the B.B.C. on 25 metres was being very poorly received; previously reception was very good on this wavelength. On 1st April communications with the U.K. were almost completely cut off, so much so that it was not possible to get a message through to Portishead and it was relayed by Hong Kong Naval Radio Station. That afternoon Portishead was raised on 22 mc/s. at good strength but within 15 min. it faded away to nothing. Contact was made on 17 mc/s. and it was found that the message sent via Hong Kong had not been received.

That night the B.B.C. was again very poor except on 41 metres. On 2nd April communications on frequencies above 12 mc/s. improved somewhat and by the following day conditions had returned to normal.

Position of ship at 1030 GMT on 31st: 3° 40′S, 32° 40′W.

Note. See Note under observation on page 72.

AURORA

The following notes have been received from Mr. James Paton, of the Aurora Survey:

"The observations of aurora made in ships during the period 1st April–30th June 1960 are listed in the table below, which has been prepared by Mrs. Hallissey, research assistant at the Balfour Stewart Auroral Laboratory of the University of Edinburgh.

"We are very grateful to the observers who have provided us with this information, which has been plotted on charts showing the characteristics and development of aurora during each night. Our laboratory continues to serve as a World Data Centre for aurora and the charts are available for consultations by geophysicists of any country.

"We are glad to report that during the past four years auroral information has been provided in greater quantity and detail by British ships than by those of any other nation.

Date (1960)	Ship	Geographic Position		Λ	Φ	I	Time (GMT)	Forms
1st Apr.	*Pampas*	48°10′S	64°00′W	004	−37	−43	0035–0100	G
	Rowallan Castle	37°00′N	12°12′W	070	43	+56	0200–0215	G, R
	Nottingham	35°16′S	124°38′E	200	−46	−68	1155–1520	G, RA, HA, R, S
	Cornwall	35°20′S	117°30′E	190	−46	−69	1150–1230	G, R
							1600–1630	RA
							2030–2105	G, R
	Galway	36°10′S	122°50′E	190	−47	−68	1400	G
	Stratheden	33°30′S	118°00′E	190	−46	−69	1215–1430	HA, R, S
							1600–2200	G, RA, R, S
	Cambridge	35°40′S	133°30′E	200	−47	−68	1240–1600	G, HA, R, S
	Strathaird	35°30′S	138°00′E	210	−45	−67	1600–1715	G, R, S
2nd	*Marengo*	58°45′N	5°30′W	080	62	+72	0200–0235	R, S
	Baskerville	46°20′N	60°00′W	010	58	+73	0200–0500	RA, RB, R, C
	Galway	36°30′S	124°40′E	190	−47	−68	2030–2045	G, R
3rd	*Marengo*	57°40′N	15°00′W	070	63	+72	0120–0200	L, G
7th	*Weather Recorder*	64°00′N	33°30′W	070	70	+76	2230–2335	RA
11th	*Weather Recorder*	62°15′N	31°38′W	070	70	+75	0215–0305	RA
							2350–0015	R
12th	*Welsh City*	01°00′S	98°07′E	170	−12	−24	2100	HA
	Weather Recorder	61°46′N	31°42′W	060	69	+75	2345–2400	HA
13th	*Weather Recorder*	61°46′N	31°42′W	060	69	+75	2350–2400	HA (P)
14th	*Weather Recorder*	61°46′N	31°42′W	060	69	+75	0001–0003	G, RA
16th	*Weather Recorder*	62°12′N	31°00′W	060	70	+75	2325–2345	R
17th	*Weather Recorder*	62°12′N	31°00′W	060	70	+75	0300	RB, S
	Welsh City	23°08′S	111°17′E	180	−35	−58	1745–1830	C
18th	*Byland Abbey*	56°30′N	06°48′E	090	58	+69	0001–0115	G
	Weather Recorder	62°25′N	31°12′W	060	70	+75	0015–0100	R, C
24th	*Echo*	51°07′N	01°45′E	080	53	+65	0122	L
	Port Jackson	38°23′S	139°40′E	210	−48	−69	1330–1335	G, R
25th	*Clan MacDonald*	—	—	—	—	—	1045–1800	G, R, F
27th	*Silverdale*	53°24′N	5°30′W	080	57	+69	2030–2400	G, R
28th	*Weather Watcher*	59°00′N	18°48′W	070	65	+72	0130–0300	RB (P), F, C
	Rialto	46°09′N	52°07′W	020	57	+71	0140	RA
	Corinaldo	26°50′S	44°40′W	020	−16	−25	0245	S
	Fanad Head	45°20′N	36°14′W	041	54	+67	0230–0320	G, R
29th	*Weather Watcher*	59°12′N	19°06′W	070	65	+72	2359	G, HB
30th	*Weather Watcher*	59°12′N	19°06′W	070	65	+72	0300	G, HB
	Gothic	37°00′S	173°15′E	250	−42	−64	1730–1800	G, (P)
	Jason	35°39′S	120°44′E	190	−47	−69	1247–1705	L, RA, R
	Rangitata	43°11′S	173°17′W	270	−45	−67	1300–1345	G, L
	Imperial Star	35°29′S	119°22′E	190	−46	−69	1645–1730	R, S
	Journalist	34°00′S	26°16′E	090	−34	−66	1712–1805	HA
	Southern Cross	34°46′S	21°17′E	080	−34	−65	1715–1800	G, R
	Dominion Monarch	32°00′S	33°48′E	120	−38	−62	1730–1745	G
7th May	*Weather Watcher*	59°12′N	19°00′W	070	65	+73	0020–0100	HA, R, S
							2359	G
25th	*Zinnia*	49°20′N	60°00′W	010	61	+74	0140–0240	RA, HA, R
26th	*City of Birmingham*	46°10′N	73°00′W	360	58	+76	2200–0230	HA, HB, R, S(P)
29th	*Jason*	49°25′N	7°15′W	080	54	+66	0030–0210	G, R
1st June	*Manchester Vanguard*	50°08′N	43°50′W	030	61	+71	0350	HA
4th	*Port Lincoln*	44°18′N	62°00′W	010	56	+73	0500–0730	RA, HA, R
	Suffolk	41°00′N	56°00′W	020	52	+69	0430–0600	L, G, R
	Torr Head	38°18′N	69°54′W	360	50	+70	0630–0800	G, R
22nd	*City of Swansea*	48°00′N	69°00′W	360	60	+76	0230–0530	G, HA
27th	*Alsatia*	42°05′N	61°21′W	010	53	+72	0230–0430	HA
30th	*Gloucester City*	43°55′N	52°53′W	020	55	+69	0155–0230	RA, R, S

Λ = geomagnetic longitude Φ = geomagnetic latitude I = inclination

(See explanation of magnetic co-ordinates in *The Marine Observer*, July 1960, page 147.)

We should like to record here our deep indebtedness to the late Mr. E. W. Barlow, who was largely responsible for the early organisation of these highly successful observations, which are proving of the utmost value in geophysical studies.

"The sketches and excellent crayon drawings which accompany reports are proving been very useful. Some of these have reproduced on slides for use in lectures."

AURORA AND RADIO RECEPTION

Indian Ocean

s.s. *Stratheden.* Captain L. A. Hill, D.S.C., R.D. Fremantle to Adelaide. Observers, Mr. J. K. Blackburn, 2nd Officer, Mr. S. C. Meredith, Supplementary 2nd Officer, Mr. I. Gibb, 3rd Officer, Mr. A. D. Henderson, 4th Officer and Mr. P. Maloney, Senior Radio Officer.

31st March 1960. At 2000 GMT auroral light was seen on the southern horizon in the form of a diffuse white glow with occasional beams resembling searchlights which rose from the centre up to an elevation of between 13° and 20°.

Position of ship: 33°S, 115°E.

1st April. At 1215 GMT two reddish circular patches of aurora some 5° to 10° in diameter were observed in the southern sky. These merged into one, and two well-defined streaks of white light appeared in the middle of the red patch rising to 30° to 40° in altitude: at the same time there was in the background a white arc similar to a greatly elongated rainbow, extending in azimuth from approx. 150° to 210°, and to an altitude of 8°. At 1400 this arc intensified and another reddish patch approx. 5° in diameter was seen in the SW at an altitude of 20°. It extended until it covered the south western sky and was accompanied by brilliant white beams of light which emanated from the central part of the arc. At 1430 the beams and the reddish patch faded somewhat. By 1600 the aurora took the form of a low arc of bright white light visible from 120° through S to 240°. During the next 30 min. the display gradually got more intense until at 1630 it consisted of a curtain of light rising from just above the horizon to about 45° altitude. From then until 1645 the colour changed in certain places, mainly between 150° and 120°, so that the upper portions of the aurora were a deep red gradually changing through yellow to a yellowish blue just above the horizon. At 1645 the colour quickly faded and the whole aurora died away, to become merely a band of light extending about 20° on either side of S which, except for infrequent rays, remained at a steady intensity until 2000. During the period 1600 to 1645 numerous beams of light were seen radiating from the main aurora; from 1630 to 1645 they had a side to side movement. At 2035, after a lapse of two hours, the aurora again increased in intensity and rays were seen to emanate from a point about 20°E of S. Patches of orange light gradually changing to purple partly covered the SSE sky up to an altitude of 15°.

Shortly after sunrise, a large number of sunspots were observed.

Position of ship at 1800: 32° 12′S, 115° 12′E.

Comments of Radio Officer. With reference to radio communications during the display of the aurora on 1st April, it was noticed that between 1225 and 1235 the 16 and 22 mc/s. bands went dead—the continentals usually 'roar' in. All frequencies between 16 and 22 mc/s. were quiet. Between 1330 and 1340, conditions improved but when an increase in the intensity of the aurora occurred between 1400 and 1410, communications on the 16 and 22 mc/s. band failed completely. At the same time last night (31st March) communications were good, Portishead Radio, Bristol, being received first call, strength 3 to 4. It was noticed that the frequencies affected were the higher ones (16 to 22 mc/s.) rather than the lower ones (8 to 12 mc/s.). At 1315 no signal was heard at all between 20 and 25 mc/s. On looking outside I saw the aurora was very intense over a very wide arc. Radio conditions in the period 1600 to 2000 were hopeless on all short waves above 8 mc/s., but some Chinese language broadcasts were heard on the 31, 25 and 19 metre broadcast bands. M/F propagation was also affected to a lesser degree, stations fading out completely for a few seconds at a time, around 1900. Sydney Radio's news broadcast on 8 mc/s. was clear but faint and occasionally faded out for short periods. St. Lys Radio (France) was strength 2 and fairly steady on the same frequency.

Note. Mr. G. O. Evans, of the G.P.O. Radio Research Branch, comments on the above two observations:

"The ionospheric disturbance which occurred from 31st March to 2nd April was one of unusual severity in its effects on radio circuits incoming to the United Kingdom. On 1st April almost every circuit was interrupted to some degree. This disturbance was associated with a large sunspot which was visible from 30th March to 7th April, and a solar flare which was observed by the Royal Observatory on the afternoon of 30th March. The severe magnetic storm which followed the solar flare, and which reached a maximum in the late afternoon of 1st April, was the cause of the auroral displays. By the afternoon of 2nd April, daytime conditions on all circuits appeared to have returned to normal, but disturbed conditions were again experienced on the night of 2nd/3rd April.

"When the reports of these two vessels are combined with information on poor radio conditions which the Post Office received from Barbados, Hong Kong and Singapore, they show that this particular disturbance caused severe interruption to the reception of high-frequency radio signals over a large part of the earth's surface."

551.506.2(988):551.515.13:551.547

The Greenland Sea—Birthplace of Depressions

By G. J. Jefferson, M.Sc.

(Climatological Research Division, Meteorological Office)

Although well to the north of most shipping routes and only normally visited by vessels of the fishing fleets, the Greenland Sea is an area of considerable meteorological interest. Lying just to the east of the north part of the great Greenland ice-cap which has an elevation of about 8,000 ft., and rises in parts to 10,000 ft., it is a region where air flow in the lowest two miles of the atmosphere is subject to considerable constraints. The normal west to east or south-west to north-east movement of depressions which occurs during most of the year farther south in the North Atlantic is not possible. Since there is no air below about 10,000 ft. to the west, owing to the presence of the ice-cap, surface depressions are not able to arrive from this direction. Depressions which do pass into this region come from the south or occasionally round the north of Greenland from the Canadian Arctic, though the latter are not usually of much significance in themselves.

Above the level of the ice-cap, however, the air suffers no such impedance and is able to flow freely across. Depressions at these higher levels, too, are able to move freely across in much the same way that they do at sea level farther south. When such a high level depression or trough moving across North Greenland from west to east reaches the east coast, sudden and unexpected pressure falls may occur at sea level, causing any pre-existing depression to deepen rapidly or forming a new depression where none existed previously. Indeed, the pressure falls which sometimes occur are probably unmatched anywhere on earth except possibly in the very local areas affected by the passage of tropical revolving storms. Deep depressions on occasion appear in this way quite suddenly, replacing high pressure areas of fine weather by the full severity of gales and blizzards within a period of hours. The importance of such sudden developments to ships in the area is obvious.

Such a case occurred on 3rd–4th January 1954, shown in Figs. 1 and 2. At midnight on 2nd–3rd (Fig. 1) a ridge of high pressure with weak pressure gradients and light winds extended from west of the British Isles, northwards across the Norwegian Sea and Spitsbergen, to the North Pole. Weather in Spitsbergen and in north-east Greenland was fine and there was broken cloud at Jan Mayen, Bear Island, and Hope Island. Pressure was above 1,030 mb. over most of the sea area between Spitsbergen, Iceland and north-east Greenland, and in spite of some drizzle in Iceland and snow in south-east Greenland, there was little to indicate what was to follow. An elongated depression lay along the west coast of Greenland with little to suggest any sudden movement. Twenty-four hours later (Fig. 2) a

(In all Figures, the tinted areas indicate land above 1,000 m.)

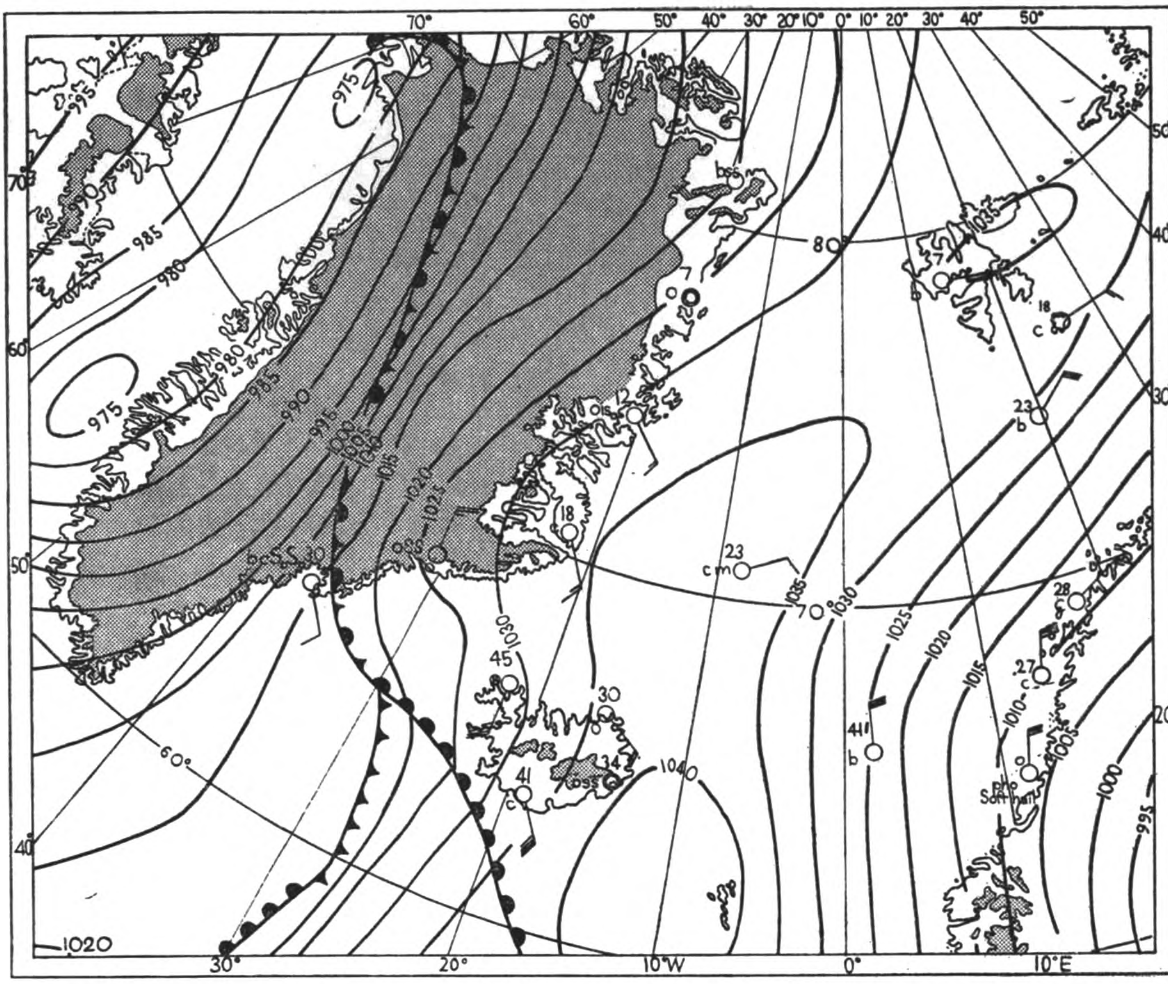


Fig. 1. Surface synoptic chart, 3rd January 1954, 0000 GMT.

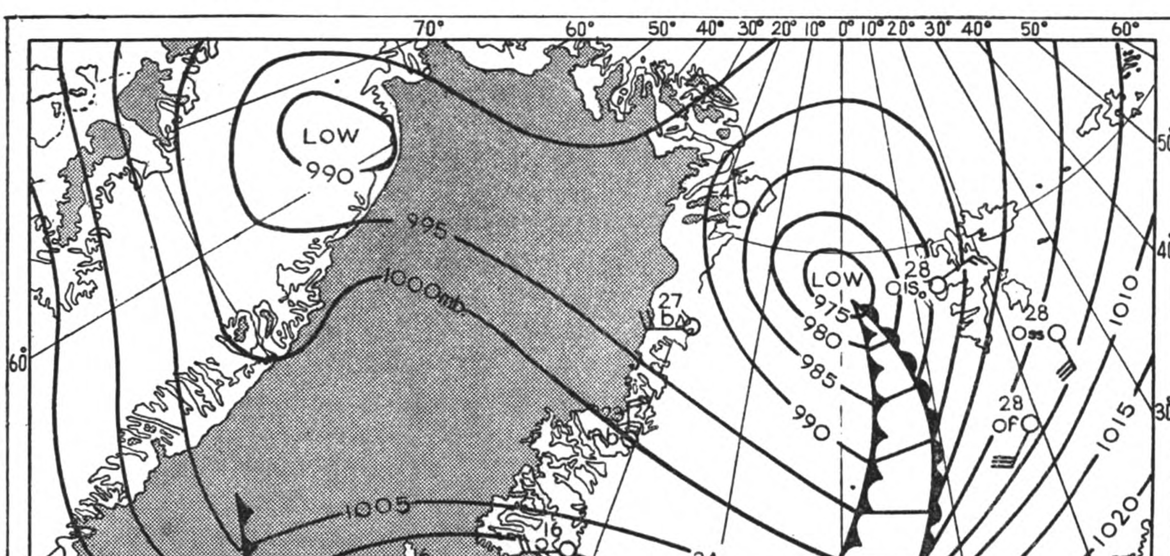


Fig. 2. Surface synoptic chart, 4th January 1954, 0000 GMT.

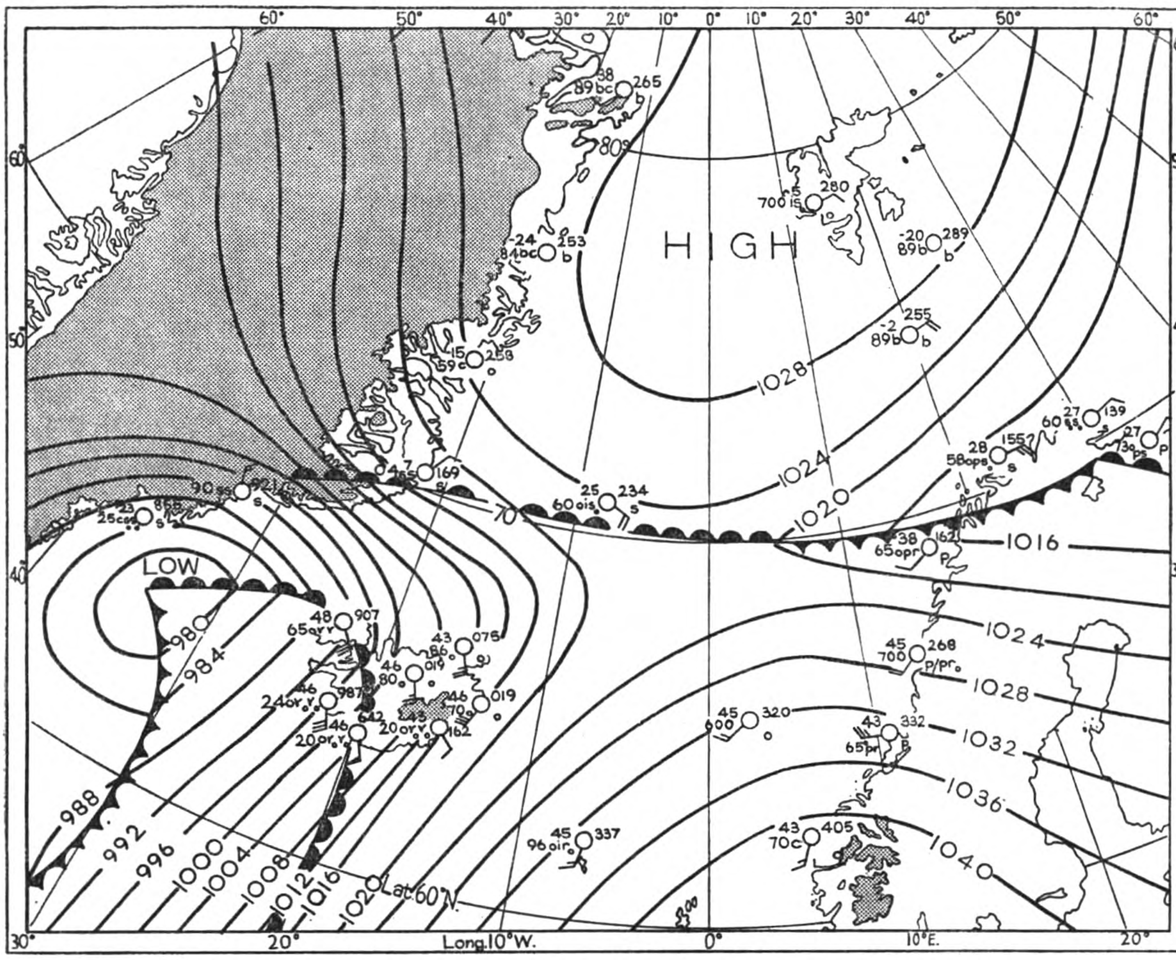


Fig. 3. Surface synoptic chart, 7th February 1960, 0000 GMT.

deep depression had formed off north-east Greenland and was moving towards Spitsbergen. The pressure at the centre of this depression was below 975 mb., about 55 mb. lower than at the same place 24 hours earlier, while over the whole of the northern part of the Norwegian Sea it was below 1,000 mb. Strong winds and snow were giving blizzard conditions in Hope Island and Spitsbergen and, although not shown on the chart, similar conditions must have prevailed over quite a large part of the northern Norwegian Sea and the Greenland Sea.

Once formed, such a depression tends to deepen further as cold air from the polar basin is drawn into it by the northerly flow between the coast of north-east Greenland and the depression centre. Although the example illustrated in Figs. 1 and 2 formed well to the north, this type of occurrence is not unknown farther south.

A particularly striking example occurred in the period 6th–8th February 1960, illustrated in Figs. 3–5. In Fig. 3, a depression of 978 mb. has reached the Denmark Strait from the south-west and seems about to pass between Iceland and Greenland. Few depressions indeed run the gauntlet of the Denmark Strait unscathed and neither did this one. Twelve hours later, a new small centre of a little below 1,004 mb. has formed in the southern part of the Greenland Sea. Twelve hours after this (Fig. 4), this small centre has become deeper than the previous main centre which now lies near Cape Brewster at the mouth of Scoresby Sound. After the next 12 hours (Fig. 5), the northern centre is now the only one left and has deepened by no less than 20 mb., to 964 mb. Furthermore, it has become much larger, with steep pressure gradients and gale force winds over the whole of the Greenland Sea and most of the Norwegian Sea.

The observations from Jan Mayen, set out in the table below, illustrate the effect of this sudden development in producing conditions when serious icing of the superstructure of vessels can occur due to the freezing of sea water, as described

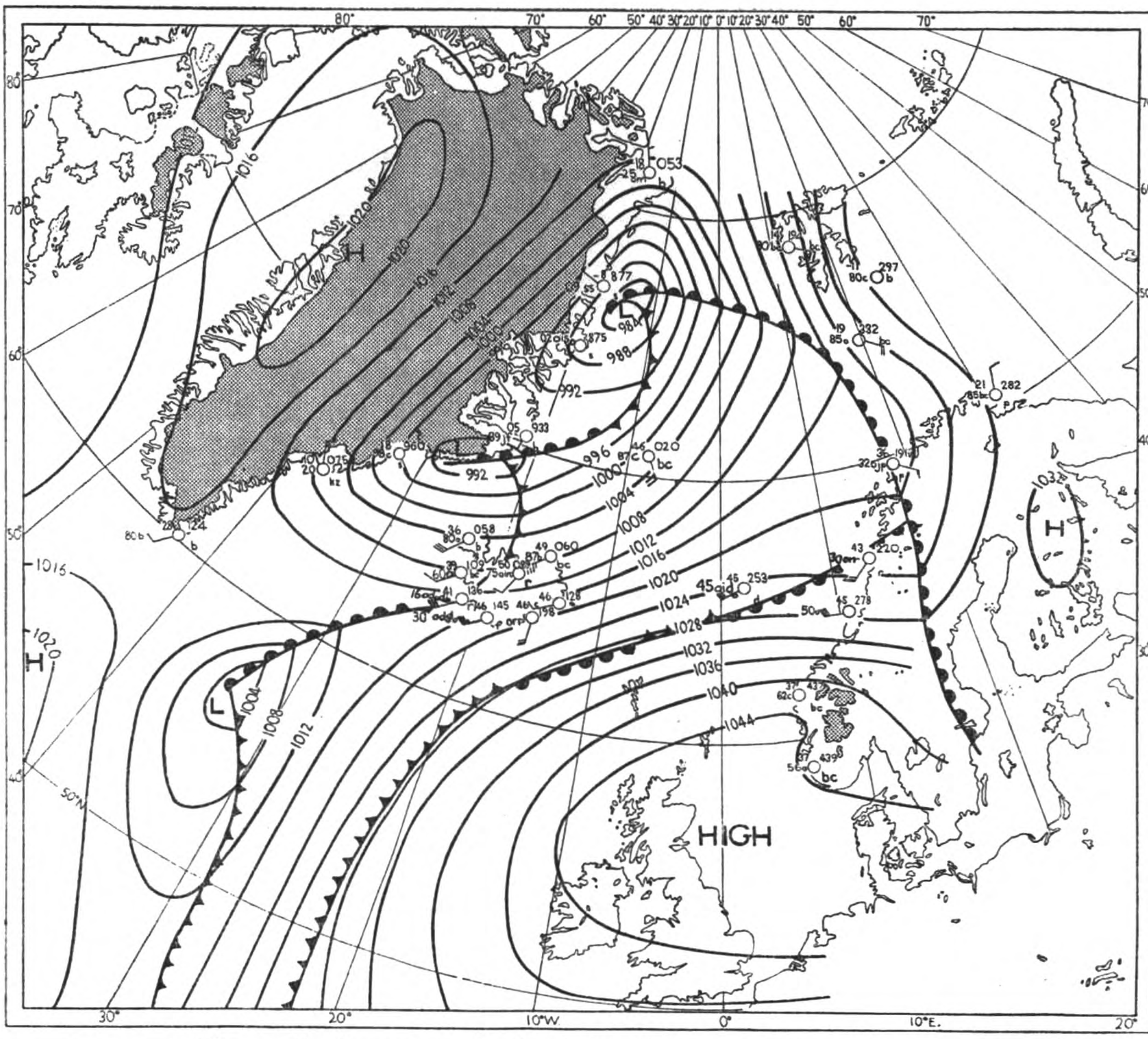


Fig. 4. Surface synoptic chart, 8th February 1960, 0000 GMT.

by Hay.* By 1200 GMT on 8th February, when this deepening had taken place, the wind had veered and freshened to a WSW gale of 35 kt. with hail showers and a temperature of 30°F. Only three hours later, at 1,500 GMT, the wind had veered a little and freshened to 43 kt., but the most significant change for shipping was the fall of temperature from 30°F to 19°F as cold air from the coast of north-east Greenland was drawn across in the circulation of the newly deepened depression. Such conditions of low temperatures and gale force winds lasted for at least 24 hours and must have been widespread early on 9th February over a large part of the central Norwegian Sea, as well as over the Greenland Sea. The depression at this

Weather Conditions at Jan Mayen, 8th–9th February 1960

Date	Time (GMT)	Wind Direction	Wind Speed (kt.)	Temperature (°F)	Present Weather	Visibility (nautical miles)
8.2.60	0900	200°	30	32	Mist	6
	1200	230°	35	30	Slight shower of hail	1
	1500	250°	43	19	Light snow shower	1
	1800	280°	30	19	Precipitation within sight but not at station	0·7
	2100	300°	40	18	Light snow shower	5
9.2.60	0000	310°	40	18	Light snow shower	2
	0300	300°	35	18	Light snow shower	1·2
	0600	320°	50	18	Light snow shower	1·5

* *The Marine Observer*, April 1956, page 89.

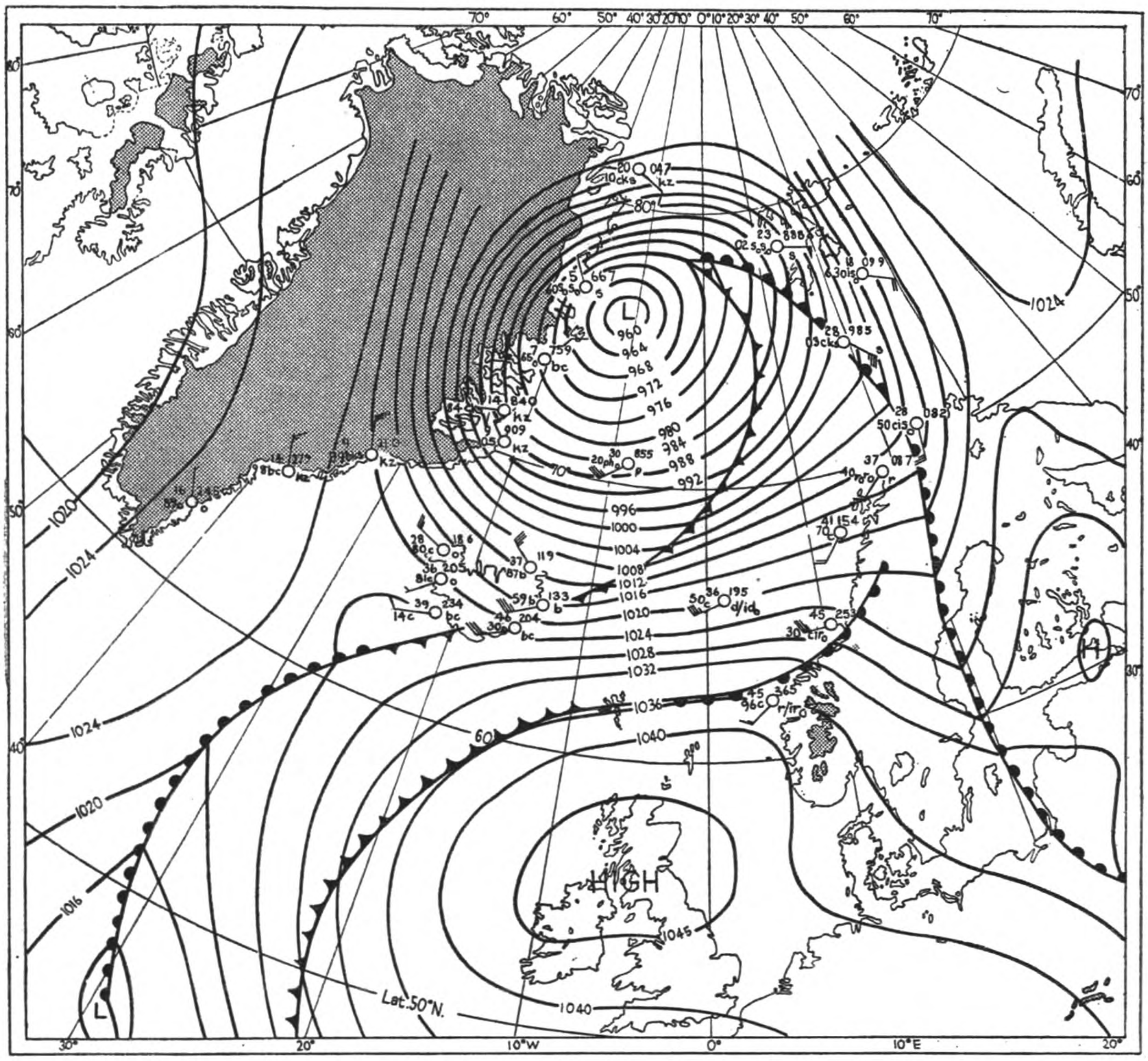


Fig. 5. Surface synoptic chart, 8th February 1960, 1200 GMT.

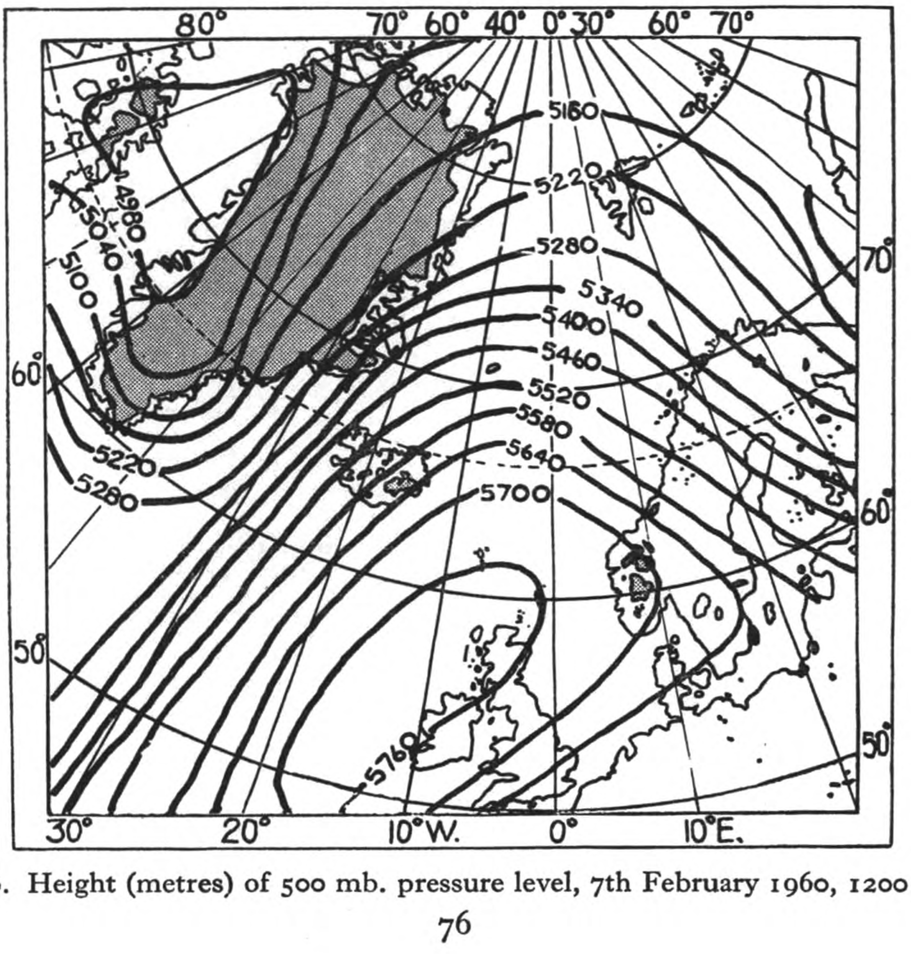


Fig. 6. Height (metres) of 500 mb. pressure level, 7th February 1960, 1200 GMT.

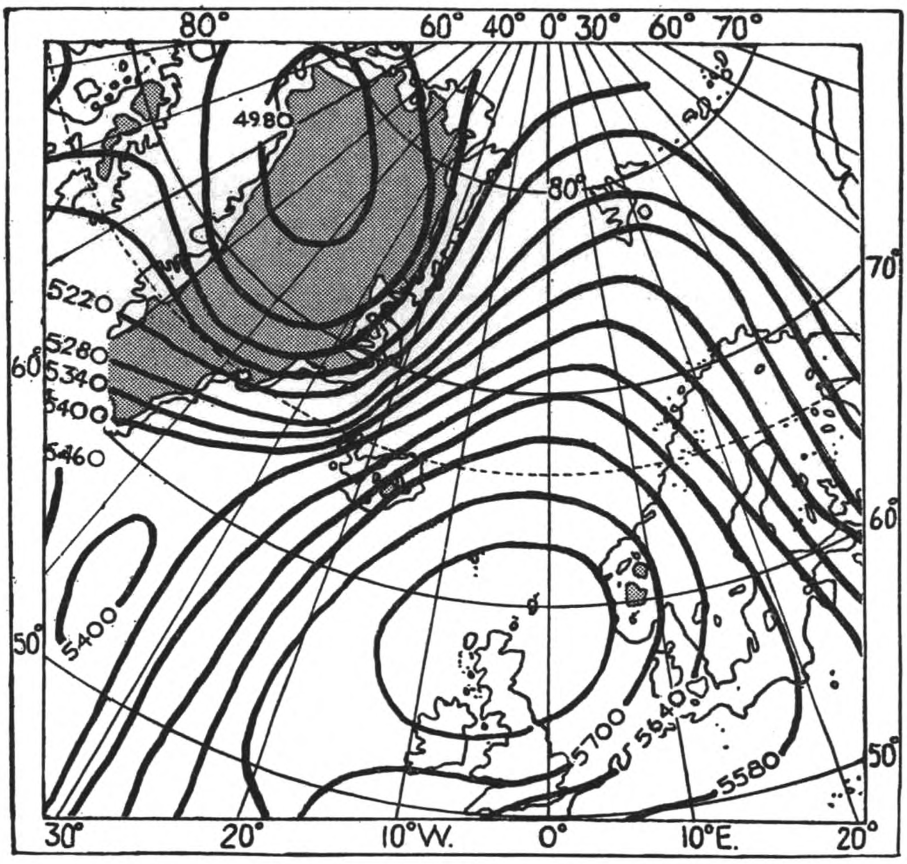


Fig. 7. Height (metres) of 500 mb. pressure level, 8th February 1960, 0000 GMT.

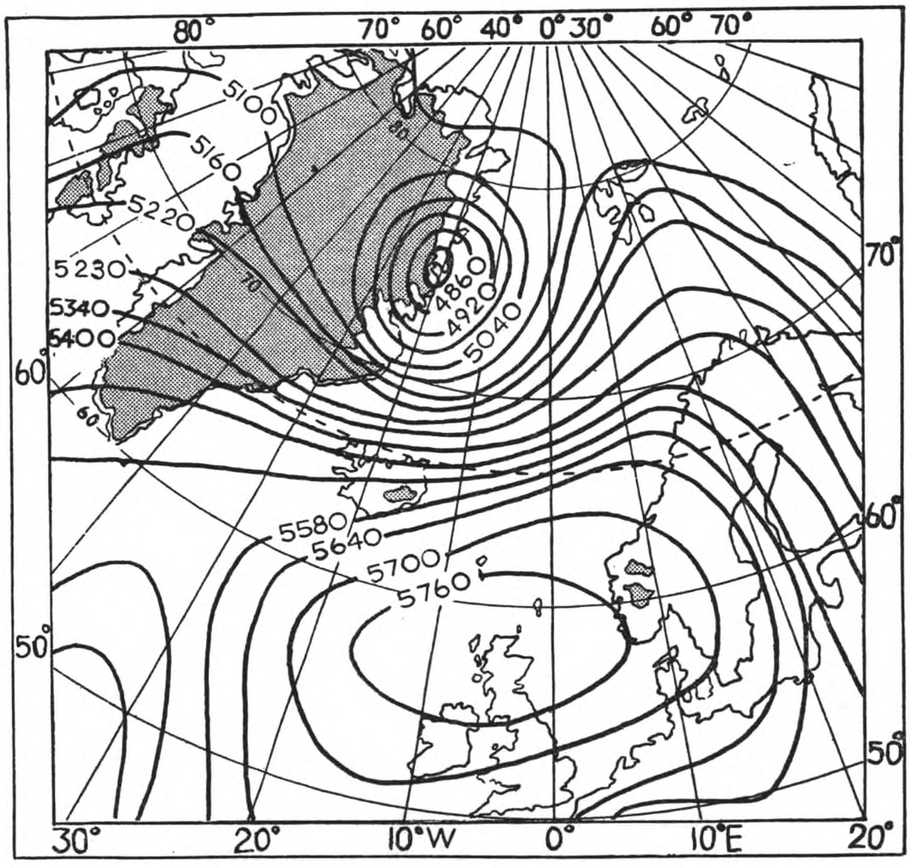


Fig. 8. Height (metres) of 500 mb. pressure level, 8th February 1960, 1200 GMT.

time was moving eastward past Spitsbergen towards the Barents Sea, maintaining its depth and size largely unchanged.

The north-eastward movement of the depression into the Denmark Strait, and with some distortion, past Scoresby Sound into the Greenland Sea, was what might have been forecast from the succession of surface charts. What was more unexpected, however, was the rapid deepening and enlarging of the depression until it had become a major feature of the pressure distribution. The upper air charts (Figs. 6 to 8) help to provide the answer to this. These are for a level of 500 mb. (around 18,000 ft.), well above the orographic obstruction of air flow provided by the Greenland ice-cap. These charts show that at 500 mb. a depression had moved eastwards across north Greenland, arriving on the eastern side at a time which coincided pretty closely with the arrival of the surface low from the south-west.

Boyden * has described how surface pressure tends to fall on the eastern side of an upper air trough and existing depressions tend to deepen when they arrive there. The charts show that the rapid deepening of the depression in this example actually took place when the upper level depression was approaching the east coast of Greenland. Once the surface depression had deepened and the air flow round it strengthened, it tended to maintain its depth with the help of the cold air drawn in behind from the Polar basin as it moved away eastwards.

This is a particularly good example since the upper low was well marked. In many cases, however, deepening of this kind would be difficult to forecast since an upper low or even a trough would not be easy to find over Greenland on the 500 mb. chart, due mainly to the very thin network of upper air soundings available in this area.

Editor's Note.—The sudden and dangerous changes of weather in this area, illustrated in these maps, emphasise in a graphic manner the need of a meteorologist to have as much weather information as possible from shipping in these waters. Meteorological stations which make upper air observations in this part of the world are obviously rather widely scattered and their observations are not always readily available; surface observations may well be the first warning of a sudden and dangerous weather situation developing. Even if the upper air observations are available, surface observations are still necessary or desirable in order to confirm what is happening. It is hoped, therefore, that the masters of all merchant ships and the skippers of all trawlers operating in this area will send radio weather messages to coastal radio stations whenever circumstances permit. The more information the meteorologist has at his disposal, the more accurate the weather forecasts he can issue.

Incidence of Ice in the Approaches to North America during the Decade 1946–1955

By G. A. TUNNELL, B.SC.
(Marine Division, Meteorological Office)

Introduction

Icebergs and pack-ice which drift southwards during the spring and summer every year out over the Great Bank are of great interest to mariners because from time to time they cause great hazards and obstruct the main trade routes of the North Atlantic Ocean. Associated with these in obstructing the general trade of the North Atlantic is the annual freeze-up of the Gulf of St. Lawrence and the River St. Lawrence, and the obstruction by pack-ice and icebergs of the Belle Isle Strait.

One can expect relationships between the behaviour of the ice on the Great Bank, and that in the St. Lawrence estuary and Gulf, because both are greatly influenced by the Labrador current.

Icebergs and pack-ice are brought down to the Great Bank from Baffin Bay, the Davis Strait and the Canadian Arctic archipelago during the spring and summer in the cold Labrador current and are dispersed in the wide zone where this cold current and the warm Atlantic water mix at the edge of the Gulf Stream.

Considerable amounts of water from the Labrador current enter the Gulf of St. Lawrence each year and influence the distribution of water temperatures. Hence

* *The Marine Observer*, January 1960, page 30.

the heat content of the waters of the Gulf is much affected by the strength of the Labrador current: in years when it is strong, ice tends to form early and in great amounts. The duration of ice in the Gulf of St. Lawrence is, therefore, likely to be related to the numbers of icebergs moving southward in the Labrador current because they also are related to the strength of this current.

Considerable amounts of ice data have been received in the Marine Division of the Meteorological Office in recent years and it is of interest to consider variations over the decade 1946–1955, i.e. the ten years directly after the Second World War, and to see whether any relationships of this kind can be recognised.

The southward movement of icebergs

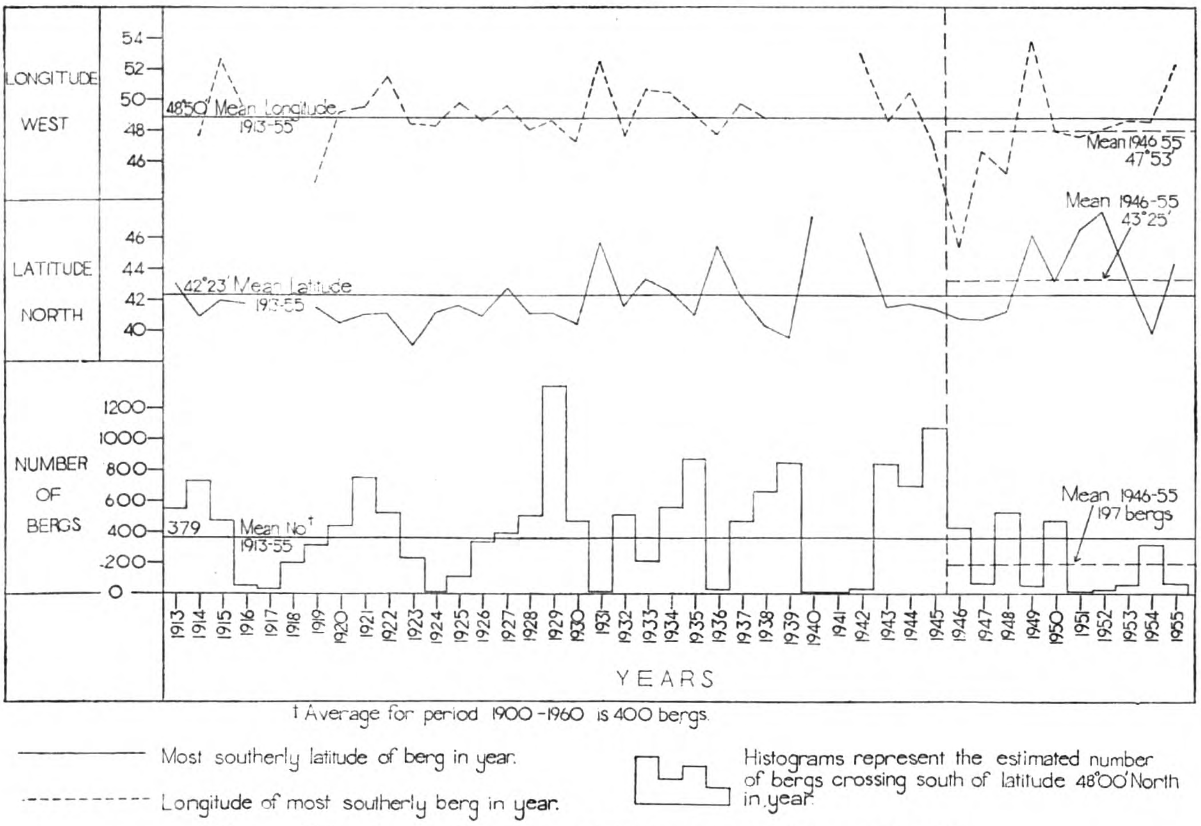


Fig. 1. Numbers of icebergs drifting south of latitude 48°N.

Fig. 1 gives a block diagram of the numbers of icebergs that moved south of 48°N during each year of the period 1913–1955, with the annual extreme southerly positions of observed icebergs. The latter have been included so that mariners can observe, in addition to the frequency of icebergs, the extent of their southerly penetrations across the trade routes. It will be seen later that although the extreme southerly penetration is correlated with the number of icebergs moving south, these can disagree significantly (e.g. in 1947, a low iceberg year, icebergs penetrated south of 41°N). [The information in all Figures has been supplied by the International Ice Patrol of the United States Coast Guard.]

Over a long period, 400 icebergs per year on the average are observed to drift south of 48°N and their average extreme southerly penetration is approximately to 43°N. There is a clear tendency for high and low iceberg years to be grouped together. This grouping indicates that oceanographical factors, which determine the number of icebergs that drift south each year, tend to persist over several years.

1946–1955 was a decade of few icebergs. The average number of icebergs that moved south of 48°N during this period was 197, less than half the long period average. Also, the numbers were either more than 300 or less than 100. The average of the extreme southerly iceberg sightings was slightly north of the long period average. Rarely during this period was it necessary for ships to use track A (which runs approximately along the 40th parallel west of the 47th meridian).

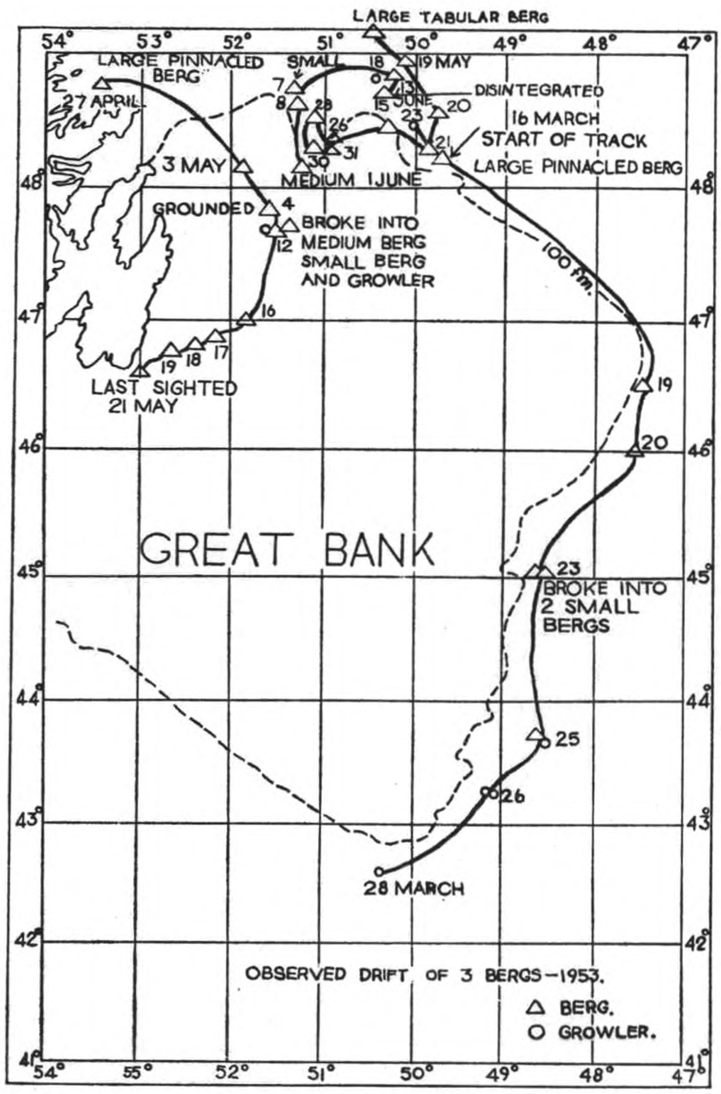


Fig. 2. Three typical iceberg tracks.

Three typical tracks of icebergs observed during 1953 are given in Fig. 2. They illustrate the variability and character of iceberg tracks. One can see how an iceberg may travel with a speed as high as approximately 1 knot down the 48th meridian, while another may travel at half this speed into the shallow areas of the Great Bank, and a third have no definite movement at all and progress round in a small area in a purely random manner.

Icebergs move generally southwards in ocean currents guided by the contours of the Great Bank along the 100 fathom line, tending to move approximately along the 48th meridian, while many tend to spread eastwards approximately along the 44th parallel.

The area to the east and south of the Great Bank is a complex mixing zone between the Labrador current and the Gulf Stream. The mixing of the waters of these two currents takes place in great whirls, sometimes many miles in extent, and the icebergs move under the influence of successive whirls. They rapidly disappear when they drift into the warm Atlantic water. The location and extent of this mixing zone decides the final distribution and southwards displacement of icebergs over and around the Great Bank—although the number of icebergs moving south is probably decided by events, particularly the weather, occurring in the Arctic over a considerable period. The persistency in the number of icebergs flowing south of 48°N each year suggests that this period is at least one year, but the occurrence of isolated years of high or low numbers of icebergs, like 1947 (low), suggests that there may also be shorter term influences.

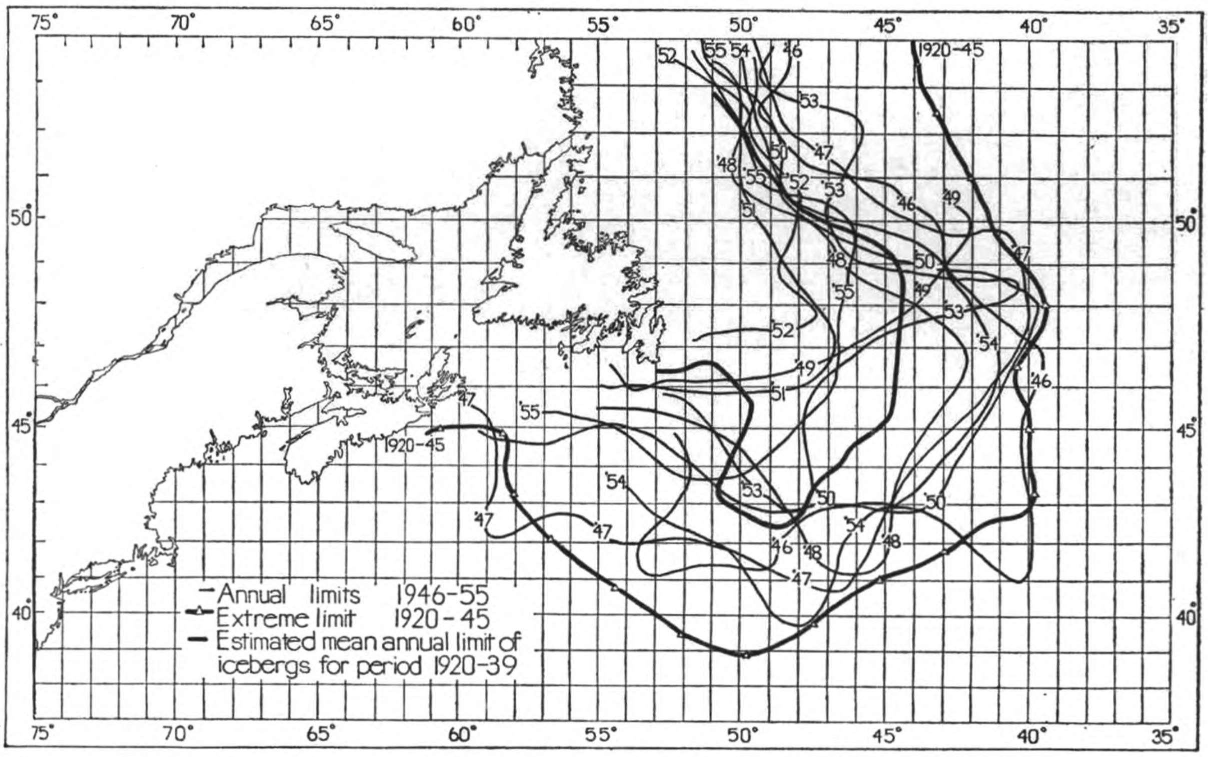


Fig. 3. Annual limits of observed locations of icebergs for each year 1946–1955, and extreme limit 1920–1945.

Fig. 3, which gives the extreme limit of the location of icebergs for each year of the decade 1946–1955, with the extreme limit in the period 1920–1945 and the estimated mean limit for the period 1920–1939, shows that the extent of the easterly and southerly drifts of icebergs south of 50°N was not exceptional. North of 50°N the easterly limit of the icebergs was beyond the average annual limit on most occasions but well inside the extreme limit. This suggests that north of 50°N the Labrador current was wider than normal during 1946–1955. Although the easterly limit of the location of icebergs depends on the seasonal mean width of the Labrador current, its exact position depends also on the large short-term fluctuations in the current velocity (i.e., direction and speed), and on the size of the whirls of the mixing zone between the Labrador current and the Atlantic water of the Irminger current. The relatively small spread of limiting positions north of 50°N, when compared with the great spread further south, suggests that the variations in the current width and mixing zone to the north were less than those off the Great Bank.

Southward drift of pack-ice from Arctic regions and the movement of pack-ice out of the Gulf of St. Lawrence through the Cabot Strait

Fig. 4 gives the annual limits of the eastward and southward penetrations of pack-ice moving from Baffin Bay and the Canadian Arctic archipelago southwards through the Davis Strait and over the Great Bank. Pack-ice containing many icebergs is released in the Canadian Arctic archipelago and Baffin Bay in spring and early summer. The pack-ice is greatly influenced by wind and weather; having a much shallower draught than the icebergs, it moves mainly in the surface waters of the Labrador current and is moved and greatly modified by the wind. The movement of icebergs, on the other hand, is not usually affected by the weather, except by extreme conditions, sufficiently intense and extending over a long enough period and sufficiently large area to interrupt and change radically the ocean current system. (It is possible, however, for sufficiently strong and persistent winds to move great masses of ice contrary to the ocean current.)

When the pack-ice eventually reaches the Great Bank, it encounters a shallow layer of Atlantic water lying over the cold Labrador current and it is fairly rapidly

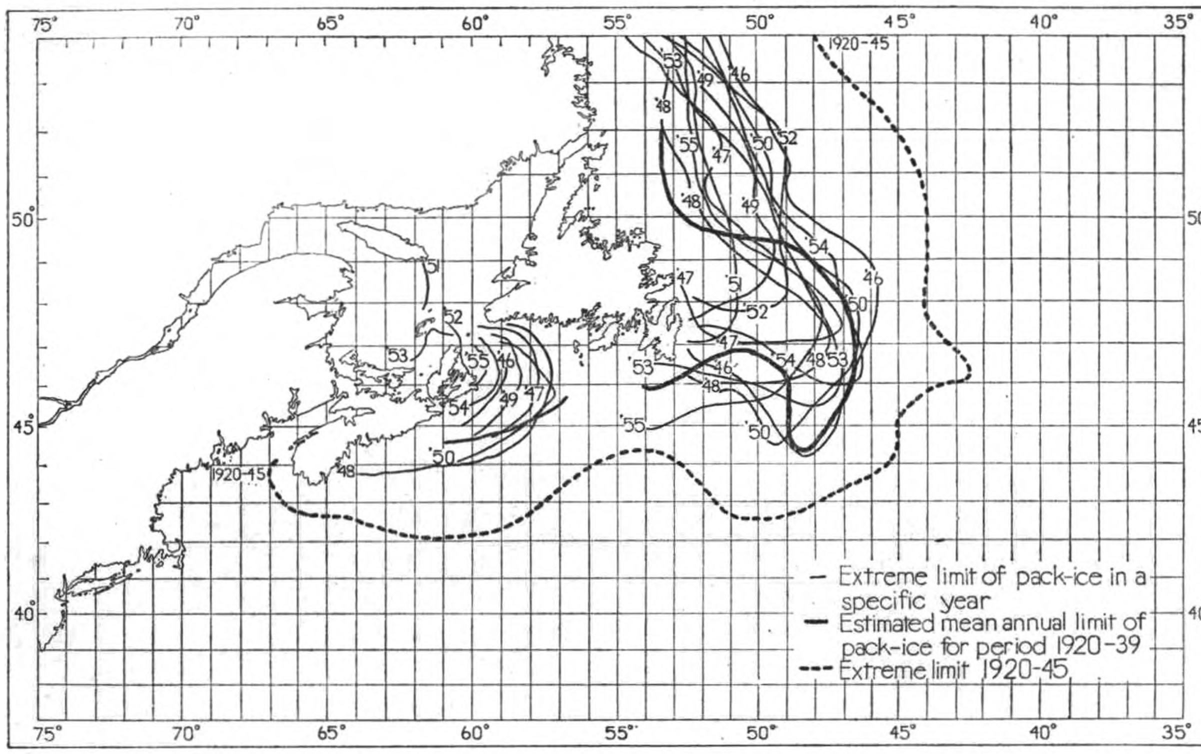


Fig. 4. Annual limits of pack-ice for each year 1946–1955, and extreme limit 1920–1945.

dispersed and melted. However, the icebergs, with their greater draught, continue to move southward well beyond the area of the pack-ice, i.e. they move in the main body of the Labrador current. Fig. 4 is analogous to Fig. 3 and confirms that the southerly and easterly drift of the pack-ice was closely correlated with the drift of the icebergs. For example, during 1951 when there were very few icebergs, the extent of pack-ice was much below normal, while in 1946, a relatively high iceberg year, when icebergs penetrated beyond the extreme limit for the period 1920–1945, pack-ice was very extensive over the Great Bank.

Fig. 4 includes lines showing the extreme limit of pack-ice for the period 1920–1945 and the estimated mean limit of pack-ice in the period 1920–1939. During the decade 1946–1955 the extreme limit was never approached, and to the south-east, over the Great Bank, the extent of the pack-ice was in most years less than normal. North of 50°N, on the other hand, it extended eastward well beyond its normal limit in almost every year. In this respect, the behaviour of the pack-ice differed from that of the icebergs, which frequently approached the 1920–1945 limit in the vicinity of the Great Bank. During this decade it appears from Fig. 4 that the pack-ice drifted through the Cabot Strait less extensively than over the period 1920–1939, confirming that there was probably on average less ice than normal in the Gulf of St. Lawrence over this decade of fewer than normal icebergs.

Ice in the Gulf of St. Lawrence and the Belle Isle Strait

In the Gulf of St. Lawrence ice forms, disperses and melts in a single season. The duration and extent of this ice depends largely on the winter weather; the effect of the Labrador current is important but secondary. To examine the effect of the Labrador current upon the formation of ice in the Gulf of St. Lawrence, it is necessary to compare the frequency of icebergs moving south of 48°N in the spring and summer with the ice in the Gulf during the winter immediately previous to the iceberg season. One would expect small amounts of ice when the number of icebergs that moved south of 48°N was low, and in fact this is usually true. For example, during the years 1951–1953, when few icebergs moved south of 48°N, there was not sufficient ice in the south-east of the Gulf for ice-fields to drift extensively through the Cabot Strait. There were, however, exceptional years during the decade 1946–1955. In 1947, a low iceberg year, there was an extensive movement of pack-ice out of the Gulf through the Cabot Strait. This was probably because frequent abnormally strong easterly winds in February 1947 drove almost all the pack-ice and many icebergs out of the Labrador current, beaching them in bays and inlets and turning what appeared from earlier reports to be a possibly heavy iceberg year into a light one.

In order to examine further the dependence of the St. Lawrence ice upon the Labrador current, the following four diagrams have been plotted.

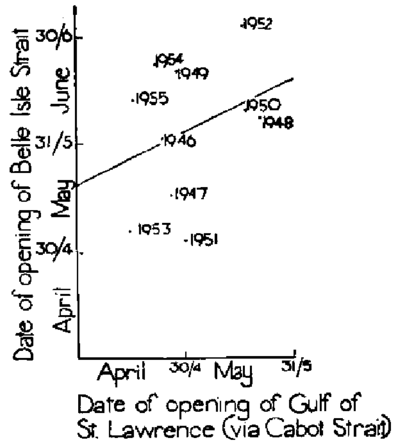


Fig. 5. The correlation between the dates of opening of the Gulf of St. Lawrence (through Cabot Strait) and Belle Isle Strait.

In Fig. 5, the time of opening of the Belle Isle Strait is plotted against the time the Gulf of St. Lawrence was clear to shipping (unassisted) through the Cabot Strait. The diagram shows that there is a slight tendency in any year for the Belle Isle Strait and the Cabot Strait routes to open early or late together.

In Fig. 6, the following have been plotted against the yearly numbers of icebergs moving south of 48°N.

(i) The extreme southerly positions of observed icebergs (Fig. 6*a*).
(ii) The date of opening of the Gulf of St. Lawrence (via Cabot Strait) (Fig. 6*b*).
(iii) The date of opening of the Belle Isle Strait (Fig. 6*c*).

The straight lines in these diagrams suggest the following relationships:

(i) In general when large numbers of icebergs moved south, they penetrated far to the south. The variability of the extent of the southerly penetration was greatest when there were few icebergs moving south (Fig. 6*a*).
(ii) In years when large numbers of icebergs moved south of 48°N, the Gulf of St. Lawrence tended to be free of ice and open for shipping via the Cabot Strait later than in other years (Fig. 6*b*).
(iii) The time of opening of the Belle Isle Strait did not appear to vary with the number of icebergs moving south but the variability in the time of opening was great, extending over two months during years when small numbers of icebergs moved south of 48°N, but was small when large numbers moved south. When more than 400 icebergs moved south, the time of opening of the Belle Isle Strait varied within the range of ten days only. The high variability in the date of opening of the Strait in years when numbers of icebergs moving south was small, was due to two factors. When few icebergs moved south, their southward penetration was curtailed and there was an increased likelihood of their remaining at the entrance to Belle Isle Strait and blocking the shipping lane. On the other hand, during these same years there was a tendency for pack-ice to clear the Strait early. These two conflicting influences tended to make a high variability in the time of opening of the Strait (Fig. 6*c*).

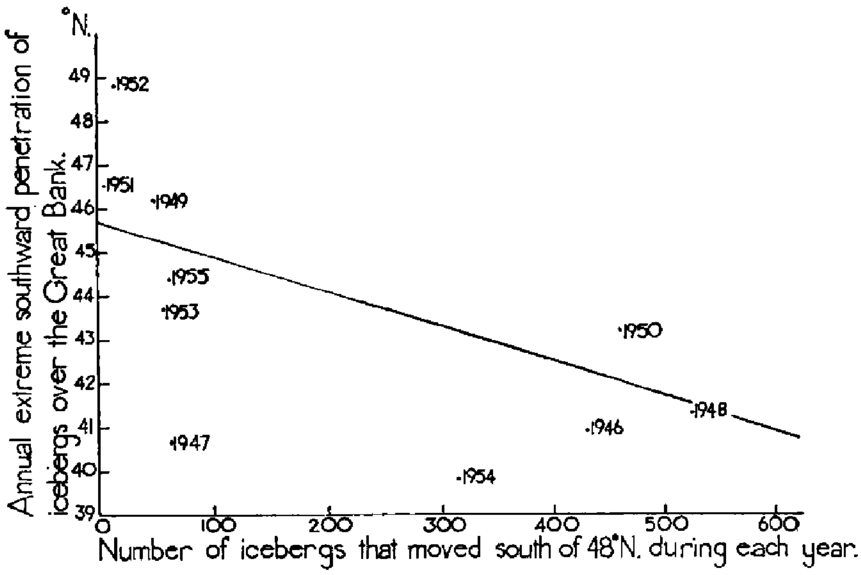


Fig. 6 (*a*).

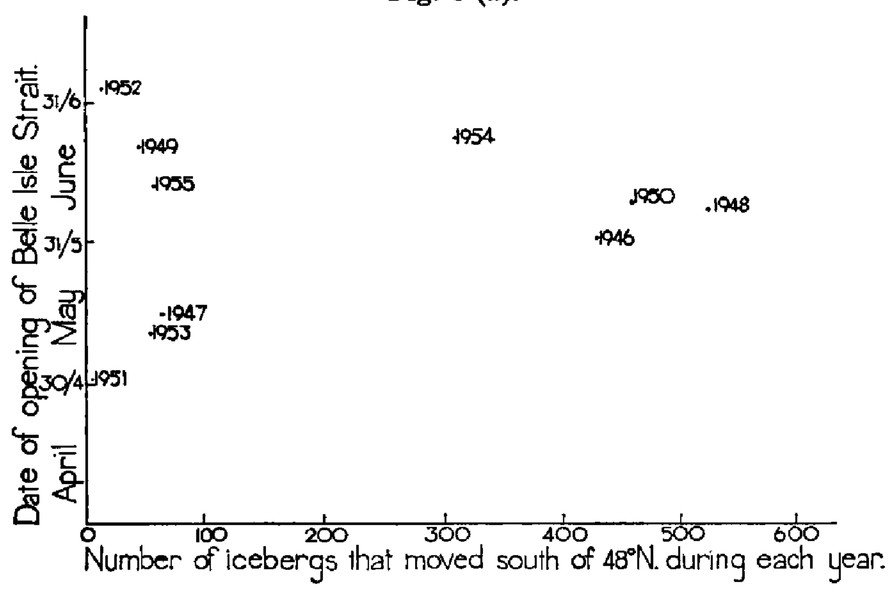


Fig. 6 (*b*).

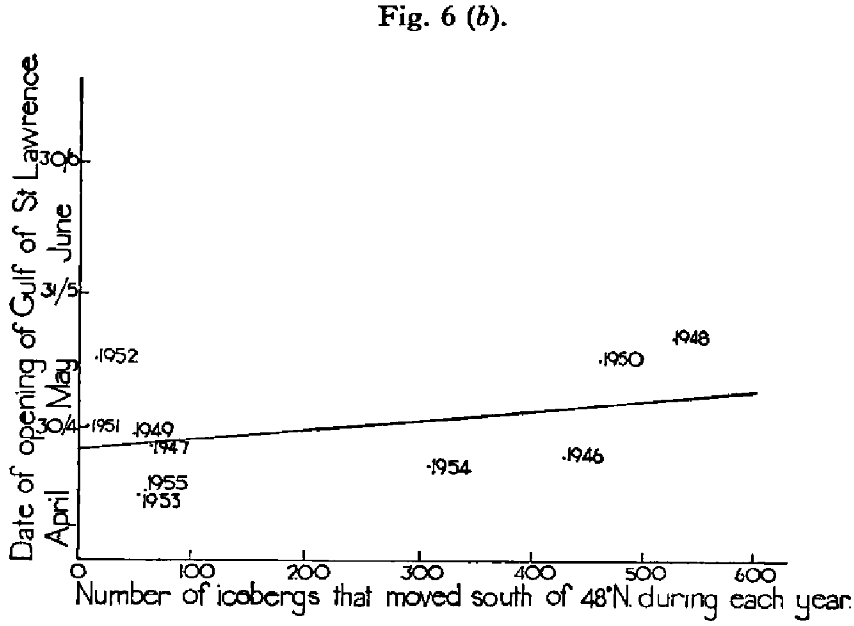


Fig. 6 (*c*).

Fig. 6. Variation of

(*a*) the annual extreme southward penetration of icebergs over the Great Bank

(*b*) the date of opening of the Gulf of St. Lawrence via Cabot Strait

(*c*) the date of opening of Belle Isle Strait

with the yearly total of icebergs observed south of 48°N.

Conclusion

During this decade 1946–1955 fewer icebergs than normal moved south of 48°N although the extent of the southward penetration of isolated icebergs was at times great. The southward and eastward movement of pack-ice over the Great Bank was in general less than normal, but the eastward extent was greater than usual north of 50°N. Throughout the decade the association of pack-ice over the Great Bank and in the Gulf of St. Lawrence with the character of the Labrador current and its interaction with the Gulf Stream were clearly evident. It was also evident from the 1947 iceberg season that periods of abnormal weather could greatly modify the occurrence of icebergs and pack-ice.

The movement of icebergs and the incidence of ice in the Gulf of St. Lawrence are controlled by ocean currents that are unsteady and highly fluctuating. The cold water makes great inroads into the warm water, and the warm water makes great inroads into the cold water, and icebergs and pack-ice are modified by these fluctuating sources of heat and by the weather. Any measurements of ocean currents, sea temperatures, or observations of ice that mariners can make will be of great help in the understanding of this system. A few observations are not adequate: such a highly fluctuating system can only be studied by means of thousands of observations. The United States Coast Guard carries out many highly scientific measurements during the ice season, but the story can only be completely unravelled after analysis of the many thousands of observations provided by merchant ships which travel this area daily. The interaction of the Labrador current with the Gulf Stream may not only be a factor in producing ice hazards to merchant ships; it may also be an important element in deciding the weather of the whole of the North Atlantic.

INTERNATIONAL INDIAN OCEAN EXPEDITION

The International Council of Scientific Unions (ICSU), through the medium of its Special Committee on Oceanic Research (SCOR), is organising an International Indian Ocean Expedition, the purpose of which is the systematic study of physical oceanography, chemical oceanography, meteorology, marine biology, marine geology and marine geophysics in that ocean during the period 1960–1964.

The Indian Ocean is particularly suitable for an international project of this nature for it is the only ocean where, over large areas, the winds and the ocean currents reverse themselves seasonally. It is therefore a very convenient area for studying the formation, evolution and decay of wind and ocean currents; more understanding of the monsoons might lead to more accurate forecasting of their onset and intensity. Although little is known about the geophysics and biology of this ocean, it seems likely that it will provide particularly useful information about such problems as the distribution of fish population and plankton and the processes that have shaped the sea bed and distributed the sediments.

The programme which the committee has in mind is somewhat similar to that which was organised on a world-wide basis for the International Geophysical Year, but in this case it will be concentrated in the one ocean, and it should therefore be possible to make a more detailed study of the various problems concerned. A total of twenty to twenty-five research vessels from various countries are expected to take part in the project and some of the countries will use relatively large ships suitable for carrying out a substantial meteorological programme. Ships from Australia, France, Japan, United Kingdom, U.S.A. and U.S.S.R. are expected to take part. The whole of the Indian Ocean will be covered, including the Bay of Bengal and the Arabian Sea and extending perhaps as far south as 55°S, certainly as far as 40°S. It is expected that the British research ships taking part in the project will include H.M. Surveying Ship *Owen* and the new research vessel which is planned to replace the National Institute of Oceanography's ship *Discovery II*.

The period 1960 to mid-1962 is in the nature of a preliminary period, during which a limited number of oceanographical expeditions are taking place, and much planning is being done. During 1961–1962, for example, the Hydrographer proposes that H.M.S. *Owen* will be working on a route Aden–Mombasa–Karachi–Seychelles–Bombay–Adu Atoll–Mauritius, and her programme will include gravity and magnetometer measurements, deep soundings, deep bathythermograph observations, continuous sea surface observations, water samples, and surface meteorological observations at the standard synoptic hours.

The major effort is to be concentrated in the central and northern parts of the Indian Ocean (including the Bay of Bengal and Arabian Sea).

SCOR has recommended that the maximum possible meteorological programme be conducted aboard the various research ships and shore stations surrounding the Indian Ocean, particularly in the area north of 20°S, and meteorological services are expected to give advice and help to the expeditions regarding the meteorological problems which need to be studied. The problems envisaged by the committee for studying include the interchange of energy between ocean and atmosphere, temperature variations, radiation measurements and rainfall.

At the meeting of the Commission for Maritime Meteorology (CMM) in Utrecht in August 1960, a representative of SCOR was present, and the project was given detailed discussion. The commission realised that the great number of research vessels operating in this area, where shipping is usually sparse, would give a unique opportunity to make and report meteorological observations which would not only contribute to meteorological research in general, but benefit the expeditions themselves. The commission accordingly recommended that:

(*a*) Meteorological services bordering the Indian Ocean should endeavour to extend the coverage of their weather forecasts with a view to covering collectively the whole of that ocean.

(*b*) Meteorological services in the area should examine the possibility of issuing weather charts by facsimile broadcasts for the period of the project (particularly the period 1962–1964).

(*c*) Meteorological services in the area endeavour to make available, on request, copies of daily weather maps of the area.

(*d*) Meteorological services of countries which are providing research ships for taking part in this project should arrange that the following meteorological programme be carried out aboard these ships:

  (i) Surface and synoptic observations
  (ii) Radio sonde observations and, if possible, radar wind observations
  (iii) Wave measurements, if possible.

(*e*) Meteorological services, especially those of countries bordering the Indian Ocean, make special efforts to recruit additional voluntary observing ships plying the Indian Ocean during the period in question.

(*f*) All Selected, Supplementary and Auxiliary Ships be informed that the Indian Ocean Expedition is in progress and be requested to transmit, during the period of the expeditions, as many synoptic reports as are practicable.

(*g*) Meteorological services which receive reports by radio from ships in this area take special steps to ensure that all such reports are speedily disseminated for the benefit of all concerned.

This recommendation of the CMM is now being given urgent consideration by the various member countries of the World Meteorological Organisation. Those countries which are providing research ships for the project will undoubtedly do their best to arrange that as ambitious a meteorological programme is carried out aboard such ships as possible, bearing in mind the oceanographical and other observations which will have to be made, the number of scientists the ship can accommodate, and the amount of money that is available. Obviously, in each country, there will be priorities to be considered.

Also there is no doubt that all the member countries of the World Meteorological

Organisation will do their best to encourage voluntary observing ships trading in the Indian Ocean to play their part in making their observations regularly each standard hour and in transmitting those observations by radio. In addition to Selected and Supplementary Ships, special efforts will undoubtedly be made to recruit Auxiliary Ships which will be asked to make their observations when in the sparse areas of the Indian Ocean, particularly. Port Meteorological Officers in various ports bordering the Indian Ocean will undoubtedly have quite a busy time with this object in view.

The masters, deck officers and radio officers aboard British Selected, Supplementary and Auxiliary Ships trading in this area during the period of the project (from now until the end of 1964) *are asked to make special efforts accordingly. If an observation time falls outside the hours of duty of the Radio Officer, the observation should nevertheless be made—it can be transmitted when the Radio Officer does come on watch. Even if it is not practicable to transmit a particular observation for any reason, that observation may still prove useful for research purposes afterwards.*

This ambitious international project shows that the scientists and the governments of the world are becoming increasingly aware of the need to find out more about what exactly happens beneath and above the oceans and in the interaction between ocean and atmosphere, for various practical and economic reasons. It is perhaps surprising that we do not know more about the oceans when one considers that they occupy about three-quarters of the world's surface. But the problems which need to be studied are so difficult and expensive to solve, that it is only by considerable international effort that one can hope to achieve much result. This is what this expedition is endeavouring to do. The food potential of the oceans, for instance, is enormous but its proper exploitation requires a study of all aspects of oceanography and also of meteorology. And it may be that more knowledge of the meteorology of the Indian Ocean will prove helpful in solving certain agricultural problems, for example, in India or in Africa.

So the ship's officer who contributes voluntary observations to this expedition can feel he is taking part in a really worthwhile international project.

C. E. N. F.

Weather Centres

By N. B. Marshall, B.SC.
(Public Services Branch, Meteorological Office)

In August 1959 there was opened in Kingsway, London, the first 'weather shop' or, to give it its full title, "Weather Information Centre". This marked the beginning of a new development in the provision of meteorological services to the general public and has already proved a great success, not only in achieving the primary aim but also in supplying industry, commerce and, indeed, mariners, with a more personal and tailored service than can be expected from routine press and broadcast issues of forecasts. As will be mentioned later further centres have already been opened in Glasgow and Manchester and, of particular interest to seamen, steps are now being taken to open a new combined Weather Centre and Port Meteorological Office at Southampton.

For many years the London Forecasting Office in Kingsway was the main channel through which information flowed from the Central Forecasting Office (at one time actually located in Kingsway, but since 1940 at Dunstable in Bedfordshire) to the outside world of the Press and television broadcasting. There was one exception to this generalisation in that the routine B.B.C. 'sound' forecasts both for land areas and for shipping (1500 m.) have been passed from the Central Forecasting Office direct to Broadcasting House by teleprinter. Between the First and Second World Wars, as may be recalled, the 'weather window' of Adastral House, then situated at the corner of Kingsway and Aldwych, was a well known feature and always attracted interested passers-by. The emphasis was, perhaps, rather on the aviation aspect of meteorology, naturally since the Air Ministry, whose building it was then in, controlled both military and civil aviation. That particular display fell a victim of Hitler's war and its later revival was made difficult for a time as a result of the then location of the London Forecasting Office on the eighth floor of Victory House.

Many visitors to the Festival of Britain Exhibition in 1951 found much to interest them in the Dome of Discovery, in which one of the most active and popular displays was the working meteorological office. This proved so popular that it was, after the closing of the actual Festival, partly revived in the Meteorological Office Centenary Exhibition and subsequently in the itinerant exhibition which was sent round the principal cities of the country.

In museums, art galleries, departmental stores, etc., this exhibition attracted large crowds and proved that there was a public demand for a regular first-hand weather service. The number of telephone calls to existing meteorological offices increased at such an alarming rate, particularly at times of really inclement weather such as heavy rain or fog, that some new planning to meet the growing demand became essential.

As will be known to many readers, the various sections of the headquarters of the Meteorological Office, until this year located in Kingsway, Harrow and Dunstable, are now being united in a new combined headquarters at Bracknell in Berkshire. This pending move necessitated finding a new home for the London Forecasting Office. After much thought the Meteorological Committee, under the Chairmanship of Lord Hurcomb, recommended using the ground-floor accommodation in Princes House (opposite the new Stoll Building and only a few doors from Her Majesty's Stationery Office shop), where could be placed a combined operational forecasting unit and a public weather information centre (see photographs opposite this page and 89). Generous window space made it possible to reintroduce the old weather map in a new form, using up-to-date display methods so that hourly instead of twice-daily changes could be made. (It should be mentioned here, however, that ship reports, whether from ocean weather ships or from the voluntary observing fleet, are only changed every three or six hours, this being dependent on the hours of observation. Whenever known, the name of the reporting ship is given alongside its weather data.) Also displayed in the window are recent, present and forecast isobaric charts, topically housed in mock television cabinets so convincingly presented that many onlookers have believed that they were viewing actual television transmissions; an illuminated moving text based on the current automatic telephone weather service forecasts—a most popular feature; and a distant-reading thermometer and anemometer giving conditions on the already famous new Air Ministry roof. In addition, with the help of Air Ministry publicity and an increasing number of outside users, there have been set up small displays illustrating the co-operation between the Meteorological Office and public utilities such as the Central Electricity Generating Board, the gas industry, broadcasting, the General Post Office and various commercial and industrial organisations.

The British Travel and Holiday Association produced some interesting photographs and diagrams illustrating the relationship between seasonal weather and holidays while a more recent exhibit showed examples of the effects of extreme weather on transport—by land, sea and air. From time to time charts or diagrams of topical weather interest, e.g. the dry summer of 1959 and the equally wet 1960, the chance of a 'white Christmas', etc., have, with the help of the Climatological Services Division, been added to the window, often at short notice. This window has undoubtedly been a very popular success, as the size of the crowd round it at lunch time will confirm. Two to four dozen people can often be counted at one time gazing at the exhibits and the flow of spectators is sometimes at the rate of one every five seconds. But visitors are also welcomed inside the Centre where, in contemporary-style surroundings, their weather enquiries may be answered at a

The 'shop window' of the London Weather Centre (see page 88).

(*Between pages 88 and 89*)

Photo by Charles Wilson

(*a*) Observed at Newton Stewart, Wigtownshire, on 25th–26th June 1960.

Photo by J. Paton

(*b*) Observed at Abernethy, Perthshire.

NOCTILUCENT CLOUD (see page 97).

Photo by J. Paton

Photo by J. Paton

NOCTILUCENT CLOUD OBSERVED AT ABERNETHY, PERTHSHIRE

(see page 97).

A.A. road patrols and from that organisation's urban offices and also from police headquarters over much of Lancashire, Cheshire and Derbyshire. Users of Salford Docks and of the Manchester Ship Canal have not been slow in discovering advantages in studying the synoptic situation before planning operations. It is hoped that it will be possible shortly to send duplicated charts and forecasts to Liverpool for the benefit of masters leaving the Mersey. If the Marine Superintendents of the various lines were prepared to arrange for the collection and distribution to their ships, such charts could be made available almost immediately.

Mention has not, so far, been made of radar facilities. On the roof of the London Weather Centre there is installed a weather radar scanner, and alongside the forecast bench on the ground floor is placed the tube on which can accurately be traced the location and movement of rain. With experience the forecasters are able to estimate the time of arrival and cessation of such precipitation and also to judge, roughly at least, its degree of intensity. Such information is promptly relayed to the organisers of such sporting events as Test Matches and Wimbledon tennis, not to mention national spectacles in London, e.g. Trooping the Colour, etc. Accurate warnings up to two hours ahead of the arrival of showers can be of commercial value to such undertakings as London Transport, and to those controlling the loading or unloading of ships in the docks.

It is with this last item in mind that it is hoped, if at all possible, to utilise weather radar at the proposed new centre in Southampton. It is felt that shipping in the port may welcome such a facility while it is confidently expected that not only Trinity House Pilots but also shipmasters and Marine Superintendents of the various companies will be glad to call in and study both the actual and forecast charts over Europe and much of the North Atlantic Ocean.

Those sailing from ports other than London, Glasgow, Liverpool and Southampton may well ask when they, too, may be equally favoured. It is not possible, in an article such as this, to indicate if and when this may happen. A Weather Centre is expensive, both initially and in running costs, and before a new one is opened it is necessary to be satisfied that the actual and potential demand is of sufficient size to justify the expenditure. Nevertheless, the needs of those who go down to the sea in ships from places other than those described above have not been forgotten.

In conclusion, it may be stated that while any member of the public is welcomed in the existing Centres, specialist users of the weather services, especially seamen, are particularly invited and, it is hoped, will make use of their facilities.

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC FROM OCTOBER TO DECEMBER 1960

At end of October 1960

RELEVANT WEATHER FACTORS

October 1960 was exceptional in that air masses over western Europe and northern Asia were considerably colder than normal while those over Greenland and north-eastern Canada were much warmer than normal. The coldest air in the northern hemisphere was over the Russian side of the Arctic basin. Cold air penetrated occasionally southwards from the Arctic basin over central and north-western Canada and extensively over northern Asia.

Depression activity in the eastern half of the North Atlantic was further south than usual but in the Western Atlantic activity was displaced to the north-west; there was considerable activity south of the Davis Strait causing a westward extension of the Icelandic low. Pressure was well above normal over Greenland and the Arctic basin and sea areas north-west of Europe.

CANADIAN ARCTIC ARCHIPELAGO, HUDSON BAY AND STRAIT

Amounts of ice in the shallow waters of the Canadian Arctic Archipelago were slightly above normal. Elsewhere, warm air masses ensured less than normal amounts of field-ice. The Hudson Bay remained clear of ice except in the north-east.

(*Opposite page 89*)

Crown copyright

The forecast room of the London Weather Centre (see page 88).

Dr. I. E. M. Watts (left) presenting barograph to Captain J. L. Baines (see page 97).

counter by members of the staff supplied with a wealth of actual and forecast weather data, and armed with the wherewithal to give 'off-the-cuff' replies to queries of a climatological nature. Questions asked range from the topical "Will it be foggy in South London tonight?" to "Where do you recommend I retire to next year as I suffer from bronchitis?", "Is it likely to be rough in the North Sea tomorrow?", "Which month do you suggest we take our holidays in Majorca—we don't want it too hot but do like warm sea bathing", to "What is the time of civil twilight in Moscow on 29th May next year?" (This last is not, of course, a meteorological problem at all but the existence in the window of an extremely accurate crystal-controlled clock and of simple astronomical data invite such questions.) Visitors such as industrialists, lawyers, etc., requiring weightier replies are referred to a forecaster or to the appropriate branch, climatological or marine. Telephone enquiries answered from the forecast bench behind the scenes have noticeably increased, it is believed as a result of the opening of the shop, as may be gathered from the following figures of annual totals of enquiries received:

Year	1957	1958	1959	1960
Enquiries	77,282	98,634	114,225	177,925

In times of really bad weather nearly 2000 calls daily are received with a peak density of about twelve a minute!

The London Weather Centre caters for broadcasting in various ways. From its staff come the weathermen (so well known on B.B.C. Television) who nightly just after six o'clock discuss the weather experienced during the day and expected on the morrow. During the summer too, the popular "Your Holiday Weather" is broadcast on the B.B.C. Light Programme direct from the office, by the same people. Independent Television is also served from London Weather Centre. Forecasts for the Press, and charts published by certain newspapers, are also prepared in this same office.

Of vital importance to mariners sailing to and from the Port of London is the daily issue, from the same source, of special charts for shipping which, conveyed quickly to Gravesend by rail, are taken on board outgoing ships by the pilot and are thus made available to the bridge. The Port of London Authority Thames Navigation Service at Gravesend also has at least twice-daily advice from this Centre which, being equipped with an appropriate V.H.F. receiver, is able to intercept the Channel 12 and 14 broadcasts giving, among other things, Thames Estuary weather conditions.

The opening of the Weather Centre in London was followed some months later by the inauguration of another in Glasgow. Here, owing to difficulties over accommodation it has, so far, been impossible to have a shop front, and the actual location of the office is somewhat out of the business part of the city. Nevertheless, behind the scenes, work goes on very much as in London, if on a smaller scale. The general public has its telephone weather enquiries answered and such utilities as the railways, the South of Scotland Electricity Generating Board, the Scottish Gas Board, as well as the Port of Glasgow Authority, shipbuilders and industrialists generally are provided with forecasts and weather statistics (these latter often supplied by the long-established meteorological office in Edinburgh), either routine or ad hoc. Schemes are afoot by which duplicated charts and forecasts will soon be made available to masters of ships leaving the Clyde. Any future development here should inevitably be in the direction of close liaison between the Glasgow Weather Centre and the Port Meteorological Officer and through him with the mercantile world.

At Manchester the Centre is housed, most fortunately, in the Royal Exchange buildings, the shop being sited just inside the ground level arcade leading from Exchange Street. Its window has proved to be quite a focal point in the city centre and large crowds scan the various charts and diagrams exhibited. In addition to receiving the normal teleprinter and facsimile messages common to most meteorological offices, Manchester Weather Centre also has available weather reports from

BAFFIN BAY

There appeared to be considerably less than the normal amounts of field-ice in Baffin Bay, particularly immediately west of Greenland, except in the far north. Few icebergs were reported, but this was probably due to lack of observations. (Neither ships nor aircraft surveyed the area.)

DAVIS STRAIT

This area was generally free of ice except for small numbers of icebergs reported moving northwards along the Greenland coast and southwards off Labrador. By the end of the month, a few icebergs only were reported south of 60°N off the Canadian coast.

GULF OF ST. LAWRENCE, GREAT BANK AND BELLE ISLE STRAIT

The Gulf of St. Lawrence remained largely free of ice, while icebergs were not being reported south of 52°N at the end of October. The Great Bank was therefore free of ice and the Belle Isle Strait was not obstructed. (See Table 1 for analysis of iceberg reports from merchant ships.)

EAST GREENLAND COAST SOUTH OF 70°N

Amounts of ice of all types were well below normal, although icebergs were again reported off north-western Iceland.

EAST GREENLAND COAST NORTH OF 70°N

Ice developments were generally less than normal with moderate numbers of icebergs moving southwards off the coast.

SPITZBERGEN AND BEAR ISLAND

Little or no ice was reported either off the west coast of Spitzbergen or off Bear Island. However, low mean temperature and northerly mean monthly wind suggested extensive development of field-ice east of Spitzbergen, and east and south-east of the Barents Sea.

BALTIC SEA

Very little ice formed in the Baltic Sea during October—this is not unusual. (Table 2 summarises the incidence of ice in the Baltic Sea.)

At end of November 1960

RELEVANT WEATHER FACTORS

The cold air over the Polar basin, although approximately of normal temperature or slightly warmer than normal, extended into northern Asia and over central and western Canada. A relatively narrow stream of Arctic air frequently moved across north-eastern Canada into the North Atlantic where extensive cyclonic activity developed causing warm maritime air masses to move over western Europe and into the sea areas east of Greenland. Warm air masses appeared to penetrate into the Arctic from the Western Pacific Ocean, while there was evidence of atmospheric subsidence and warming in the anti-cyclones that extended over Greenland and adjacent sea areas.

CANADIAN ARCTIC ARCHIPELAGO, HUDSON BAY AND STRAIT

From general climatic considerations it appeared that amounts and thicknesses of ice were approximately normal over the Canadian Arctic archipelago, including the Hudson Bay area. There were, however, indications that considerable amounts of open water existed to the south-east of the Hudson Bay.

BAFFIN BAY

Amounts of field-ice appeared to be less than normal. Little or no field-ice was reported off western Greenland and also very few icebergs. Few icebergs were also reported off north-eastern Canada, probably because of lack of observations.

DAVIS STRAIT

Amounts of field-ice appeared to be less than normal, while small numbers of icebergs moved northwards off the south-west coast of Greenland. The southward flow of icebergs off Labrador had ceased by the end of November, indicating that by that time most icebergs were frozen-in off Canada to the north.

GULF OF ST. LAWRENCE, GREAT BANK AND BELLE ISLE STRAIT

This area remained largely ice-free during November and it will be seen from Table 1 that up to the end of the month no icebergs were being reported in any North Atlantic shipping lanes.

Table 1. Icebergs sighted by merchant ships in the North Atlantic

(This does not include radar targets)

LIMITS OF LATITUDE AND LONGITUDE		DEGREES NORTH AND WEST					
		58	56	54	52	50	48
Number of bergs reported south of limit	OCTOBER	8	8	8	3	0	0
	NOVEMBER	2	2	2	2	1	0
	DECEMBER	0	0	0	0	0	0
	Total	10	10	10	5	1	0
Number of bergs reported east of limit	OCTOBER	8	8	6	3	0	0
	NOVEMBER	2	2	2	0	0	0
	DECEMBER	0	0	0	0	0	0
	Total	10	10	8	3	0	0
Extreme southern limit	OCTOBER	51°00'N, 50°00'W on 3.10.60					
	NOVEMBER	49°36'N, 52°15'W on 22.11.60					
Extreme eastern limit	OCTOBER	51°00'N, 50°00'W on 3.10.60					
	NOVEMBER	49°36'N, 52°15'W on 22.11.60					

Table 2. Summary of ice conditions reported from a selection of places in the Baltic Sea

	LENGTH OF SEASON		ICE DAYS			NAVIGATION CONDITIONS			ACCUMULATED DEGREE-DAYS
	A	B	C	D	E	F	G	H	I
OCTOBER 1960									
Lulea	25	31	7	0	0	7	0	0	129
NOVEMBER 1960									
Lulea	1	30	30	26	0	23	7	0	295
Skelleftea	20	30	9	0	0	5	0	0	
Bredskar (Umea)	22	23	2	0	0	2	0	0	
Roytaa	19	30	12	12	0	0	12	0	314
Oulu	19	30	12	12	0	3	9	0	218
Yxspihlaja	21	30	10	0	0	2	0	0	
Vaasa	19	30	12	0	0	5	0	0	90
Viborg	18	30	13	13	0	13	0	0	
Leningrad	18	30	13	11	2	13	0	0	120
Pyarnu	21	21	1	0	0	0	0	0	11
DECEMBER 1960									
Lulea	1	31	31	31	0	0	16	15	492
Skelleftea	1	31	31	13	0	25	0	0	
Bredskar (Umea)	8	31	23	1	0	23	0	0	
Alnosund	27	31	5	0	0	5	0	0	177
Roytaa	1	31	31	30	1	0	0	31	522
Oulu	1	31	31	31	0	1	26	0	377
Yxspihlaja	1	31	31	23	0	5	18	0	
Vaasa	1	31	31	23	0	22	2	0	178
Viborg	1	31	31	31	0	29	2	0	
Leningrad	1	9	9	0	9	9	0	0	136
Pyarnu	—	—	0	0	0	0	0	0	7

ICE WAS NOT REPORTED AT THE FOLLOWING STATIONS:

Aarhus
Copenhagen
Kiel
Stettin
Gdansk
Klaipeda
Riga
Helsinki
Turku
Mariehamn
Mantyluoto
W. Norrskar
Stockholm
Norrkoping
Visby
Kalmar
Goteborg
Oslo
Kristiansand

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 degree days (°C)

East Greenland Coast South of 70°N

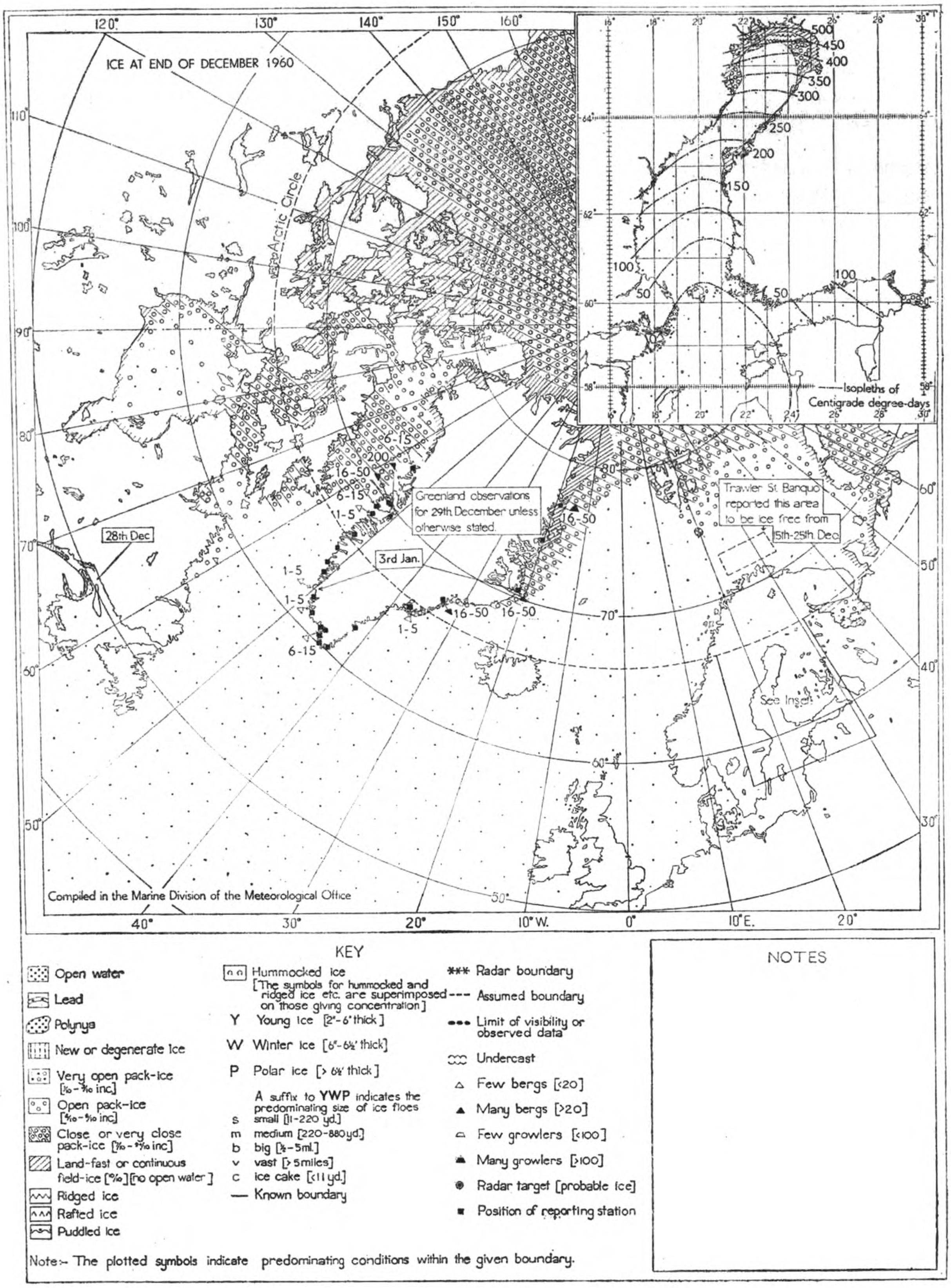
There was more landfast ice in bays and inlets than usual, particularly in the extreme south. The southward movement of icebergs also appeared to increase.

East Greenland Coast North of 70°N

Ice developments appeared to differ little from normal.

Spitzbergen and Bear Island

Little or no ice was reported from the west coast of Spitzbergen and Bear Island. It appears likely from the distribution of mean monthly temperatures and pressures that



Distribution of sea ice at end of December 1960.

Note. **In the Baltic Sea inset, isopleths of Centigrade degree-days are included to indicate the progress of the seasonal cooling of seawater and ice. These give a rough measure of first the probability of the formation of sea ice, and later the progress of the growth of the thickness of the ice. They are derived from observations taken at 0600 G.M.T., and are the sum of the number of degrees Centigrade below zero experienced at this time for each day during the period of sustained frost.**

extensive, well developed ice fields existed to the east of Spitzbergen and on the margins of the Barents Sea east of 40°E.

BALTIC SEA

This continued to be a relatively light ice year in the Baltic Sea with well established fast- and pack-ice only in the extreme north of the Gulf of Bothnia.

At end of December 1960

RELEVANT WEATHER FACTORS

Conditions during December resembled those in November, except that the atmosphere over the Arctic basin to the north of Greenland and the Barents Sea had cooled considerably and had become cooler than normal.

CANADIAN ARCTIC ARCHIPELAGO AND BAFFIN BAY

Very little information was available for this area, except that there was a clear dearth of field-ice off the coast of western Greenland, except in the extreme north. Small numbers only of icebergs were observed off western Greenland by land stations, and there were no reports from Canadian areas.

DAVIS STRAIT

Few icebergs and very little field-ice were reported off south-west Greenland. The flow of icebergs off Labrador had apparently ceased. (See Table 1.)

GULF OF ST. LAWRENCE, GREAT BANK AND BELLE ISLE STRAIT

By the end of December, considerable amounts of ice had formed in the lower St. Lawrence and in the approaches to the river along the south coast of the estuary, Northumberland Strait and in Chaleur Bay. However, most of the Gulf, including Belle Isle Strait, was largely free of ice and the approaches to the St. Lawrence estuary were unusually clear of ice. The Great Bank also remained free of ice.

At the time of going to the printer (February), pack-ice almost covered the Gulf of St. Lawrence, extending south-eastwards through the Cabot Strait. Frequent strong and cold north or north-westerly winter winds may lead to amounts of pack-ice and numbers of icebergs greatly in excess of normal over the Great Bank in the spring and summer of 1961.

EAST GREENLAND COAST SOUTH OF 70°N

Field-ice was apparently largely below normal in amount, with moderate numbers of icebergs moving southwards off the coast.

EAST GREENLAND COAST NORTH OF 70°N

Ice developments appeared normal, although conditions were favourable for an increase of flow of polar pack-ice out of the Arctic into the sea areas to the east of Greenland. Moderate to large numbers of icebergs were reported moving southwards off the coast.

SPITZBERGEN, BEAR ISLAND AND NORTH OF THE BARENTS SEA

Reports indicated that the amounts of pack-ice were increasing from the north and east around Spitzbergen and Bear Island, and were probably in excess of normal. This was consistent with the predominating weather conditions over the month of December, which suggested possible movement of Polar pack into the Barents Sea to the east of Spitzbergen. It was also likely that ice developments to the east of the Barents Sea were in excess of normal.

BALTIC SEA

At the end of December the amounts of ice in the Baltic Sea remained below normal. Fast-ice had formed with areas of pack-ice in coastal areas in the northern half of the Gulf of Bothnia and small amounts of ice formed in the extreme east of the Gulf of Finland. A high level of cyclonic activity in the eastern North Atlantic ensured a preponderance of maritime air over the Baltic, and only in the extreme north was Polar or Arctic air experienced

G. A. T.

AUSTRALIAN PORT METEOROLOGICAL AGENTS

(Received from the Australian Director of Meteorology)

The Australian Meteorological Service has arranged a Port Meteorological Agency in the ports of Sydney and Melbourne and will have a similar agency in the port of Fremantle at an early date. The object of the agencies is to maintain meteorological liaison with and to recruit reporting ships in Australian waters, to acknowledge the co-operation rendered by the captain and officers of reporting ships, and to check and maintain their meteorological equipment.

The persons selected for engagement as Port Meteorological Agents possess long navigational experience either as ship's master or in other responsible capacity and are given a special course of meteorological training to fit them further for the fulfilment of their tasks. Each agent operates in the closest liaison with the Deputy Director of the Bureau of Meteorology in the same capital city; in the case of Fremantle an Agency office will be located at the main dock. Ships' officers desiring the service of these Port Meteorological Agents should contact the Bureau of Meteorology in the capital city. The Agents are keenly interested in their new work and are anxious to make personal contact with the master and observing officers of the recruited reporting ships of all countries visiting the ports of Sydney, Melbourne or Fremantle.

The Hong Kong Fleet of Weather Observing Ships

By CDR. W. P. GOODFELLOW, D.S.C., V.R.D.
(Marine Liaison Officer, Royal Observatory, Hong Kong)

In the records of the then "Hong Kong Observatory" for the year 1892 is noted the appointment of a Meteorological Assistant who was the sister of the Director, Dr. Doberck. It is mentioned in connection with this rather unusual appointment that Miss Doberck had already for a number of years occupied herself copying weather data from the deck logs of ships visiting the colony, and by so doing had earned the sobriquet of "Typhoon Annie" amongst the officers of ships in the port. It is of interest to read that this was then the only method available in Hong Kong of obtaining weather data from the China Sea and Western Pacific.

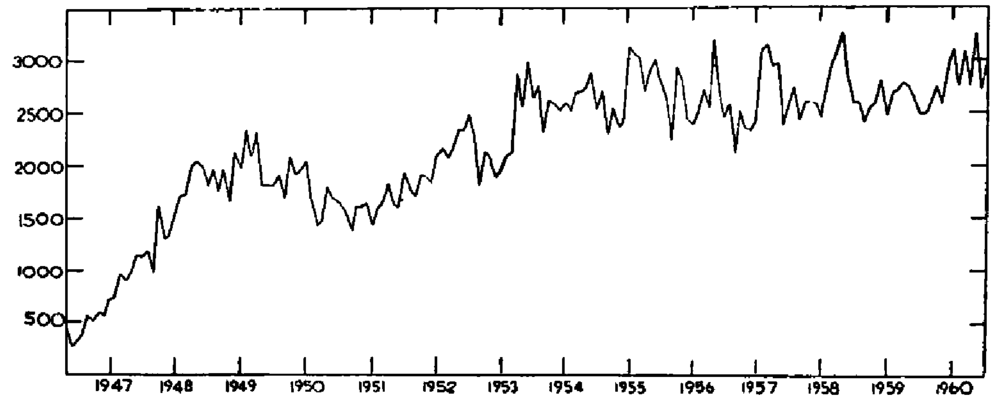
No attempt to provide special meteorological logbooks to ships was made in Hong Kong until very much later. There is no record of instruments being supplied until 1948, but there can be no doubt about the value which was placed on weather reports from ships when the use of wireless telegraphy became general.

In 1923, the Director of the "Royal Observatory" in his annual report to the Governor, deplored a decrease of 30% in the number of weather reports received by radio from British ships and stated: "This serious matter is engaging the attention of the Government." In his report for the following year he was able to write: "The question of regular observations from ships by wireless telegraphy was taken up vigorously by the Chamber of Commerce with gratifying results." In 1924, 665 weather reports were received by W/T from British ships. In 1923 the number had been 196.

What steps were taken by the Chamber of Commerce is not related, but they were followed by an increase of over 300% in the number of reports received, so it may well be they were vigorous as well as effective.

During the last quarter of 1946, the first quarter in the post-war period for which records are available, a monthly total of about 360 ship reports were received here by radio, of which about 260 were from H.M. ships. In the course of the next few months, Scientific Officers (then named "Professional Assistants") began to visit ships, but these visits were few and far between, because the officers making them were on the forecasters' watch keeping roster and had little time for this work. To supplement the visits, the help of ship owners was solicited in requesting their masters to have regular weather observations made and transmitted to Hong Kong by radio. The response was immediate. The graph plotted for the number of reports each month rose steeply, and the average monthly total for the last three months of 1947 was about 1,080 reports (see over). This, I feel, amply demonstrates the willingness to co-operate and the interest in weather which is displayed by the great majority of ships' officers.

With the help of the officers in ships of all nationalities, the number of weather reports received by radio in Hong Kong has continued to rise. In recent years the total received each month has frequently been in excess of 3,000.



Monthly totals of ship reports received by radio at the Royal Observatory, Hong Kong.

Hong Kong, having the major shipping lanes between Singapore, Japan and the Philippines crossing its area of responsibility, and with a number of well-frequented routes radiating from its port, is in a good position to receive weather reports from ships. These reports are vital for our marine and aviation forecasting services, and are used in tracking typhoons and to provide the information on which are based the great majority of the typhoon warnings we issue.

The Royal Observatory is well placed for the study of this particularly dangerous form of weather phenomenon, which requires all available information from the storm field.

Coded weather reports received by radio are not quite adequate for this purpose. The code restricts the accuracy with which instrumental measurements can be reported, and the possibility of errors in coding, transmission and receipt cannot be discounted. For this reason a local form of meteorological logbook for use in ships was devised, and in 1948 it was decided to recruit voluntary observers in ships to observe and record weather data, for the study of the problems associated with marine meteorology.

Ships based on Hong Kong, and which spent a major part of their sea time east of Singapore, were canvassed. The major task was to find those whose masters and officers were prepared to take observations and make full and regular entries in a meteorological log throughout their voyages. They also had to undertake to send coded weather reports to weather centres other than Hong Kong whenever their voyages took them outside our area.

There was a growing number of ships which reported weather to Hong Kong regularly when in our area, and we did not lack volunteers, though to undertake what we asked was a much bigger commitment than merely making weather reports by radio in a restricted area.

Then, as now, the size of our observing fleet was limited only by the number of ships provided with reliable and accurate instruments by their owners or builders, and by the lack of funds to purchase certificated instruments to lend to poorly equipped ships.

Fortunately, a number of ships were found which had on board a reliable and accurate mercurial barometer, and these ships were provided by the Royal Observatory with a whirling psychrometer, sea temperature thermometer and protector. They formed the major part of the Fleet in 1950 when, at the end of the year, there were fifty ships regularly co-operating with us in this way.

Today the total has risen to seventy, of which forty have certified M.O. pattern mercurial barometers, all have whirling psychrometers or Stevenson screens and some have been provided with rain gauges, hand anemometers and barographs.

We can equip no more ships with instruments, even though we have frequent applications from the masters of ships which trade in the east. The annual cost of replacing those which are broken in use, or becomes unserviceable, absorbs all available funds. Only when ships are sold and return instruments on loan, or when the services of a well equipped ship are volunteered, can new names be added to our Fleet List.

The ships comprising the Hong Kong Voluntary Observing Fleet are generally of smaller size than those in the fleets of other countries. This may account for the high mortality rate amongst barometers and thermometers, but the fleet's noteworthy characteristic is that it is composed of ships of six different nations. We have, therefore, as in Hong Kong itself, the representatives of many nationalities working amicably together to their mutual benefit and for the common good.

HONG KONG AWARDS FOR THE I.G.Y.

At a ceremony held in Hong Kong in November 1960, and attended by representatives of local shipping companies and by the Director of Marine, barographs were presented to Captain J. L. Baines and Captain G. R. Torrible by the Director of the Royal Observatory, Dr. I. E. M. Watts (see photograph opposite page 89). Captain Torrible, the Marine Superintendent of China Navigation Co. Ltd., was standing proxy for Captain J. McKinlay who was unable to attend.

The barographs were awarded for the best meteorological logbooks kept on board Hong Kong weather observing ships during the International Geophysical Year and Period of International Geophysical Co-operation. The ships commanded by Captains McKinlay and Baines were the s.s. *Anshun* of the China Navigation Co. Ltd. and the s.s. *Johore Bahru* of the Great Southern Steamship Co. Ltd.

As is inevitable in a Hong Kong based ship, there were many changes among the observing and radio officers of both ships during the award period. However, there were some whose entries in the meteorological log were particularly accurate and who regularly made reports and cleared them by radio to shore stations. To these officers, whose names appear below, the Royal Observatory sent copies of *Meteorology for Mariners* or *Equatorial Weather*, as a token of appreciation for a good job well done.

s.s. *Anshun*. 1.7.57–30.9.58. Observing officers: P. J. Mooney, R. A. Elder, P. S. Fleming. Radio officer: S. F. Leung.

s.s. *Johore Bahru*. 1.10.58–31.12.59. Observing officers: U. C. de Burgh, Lo Man Shu, Ho Ying Hon. Radio officer: Wong Ting Choy.

As Dr. Watts remarked, this was the first occasion that awards of this nature have been made to the masters and officers of Hong Kong voluntary observing ships. Therefore, it was most gratifying that the barographs, awarded for meteorological work carried out on board ships during the I.G.Y., should be presented to two masters who have served in the Hong Kong observing fleet throughout the post-war period, and who have always given their full co-operation, and encouraged their officers in their interest in weather and weather observing.

W. P. G.

NOCTILUCENT CLOUDS

The following note has been received from Mr. James Paton of the Department of Natural Philosophy of the University of Edinburgh, requesting voluntary observers at sea to record observations of noctilucent clouds (i.e. luminous night clouds) whenever they are seen. Mr. Paton is already known to many readers in connection with his work for the Aurora Survey (e.g. page 70 of the present "Marine Observers' Log").

Mr. Paton writes:

"During the summers of 1959 and 1960 the usually rare noctilucent clouds were seen quite often.

"These lovely clouds are situated at a height of about 50 miles, far above normal clouds. They become visible along the northern horizon (the southern horizon in the southern hemisphere) when the sun is between about 6° and 15° below the horizon and have a delicate filigree pattern (rather like cirrus) and pearly-white, sometimes tinged with blue, colour. Their nature is unknown but they may consist of dust (perhaps meteoric in origin) which has collected in sufficient quantity at a height of 50 miles to become visible in reflected sunlight. At this great height the clouds remain sunlit for all or parts of summer nights. (See photographs between pages 88 and 89.)

"They may be visible in latitudes between about 45° and 65° during the period from mid-May to mid-August in the northern hemisphere and from mid-November to mid-February in the southern hemisphere (though, as far as we know, there has been no recorded observation in the southern hemisphere).

"Investigations of these clouds are proceeding in the U.S.S.R., in Sweden and in the United Kingdom. We, in Britain, are anxious to record as fully as possible every occurrence of the clouds and received valuable assistance during last summer from night flying crews of the R.A.F. We would welcome the addition of observations over a much wider area, that could be provided by observers in ships.

"Observers in ships are asked to keep watch for these clouds during the short summer nights in both the northern and southern hemispheres. The nature of the information required is very similar to that for aurora and an example is given here:

DATE 1960	TIME GMT	LATITUDE	LONGITUDE	MAXIMUM ELEVATION ABOVE HORIZON	EXTENT OF CLOUDS IN AZIMUTH
June 18–19	0110	55°42′N	10°15′W	11° at azimuth 010°	342° to 060°

"If other duties permit, further observations on this pattern may be made at intervals during the night, and a description of the clouds with a sketch may be added.

"It is interesting to watch the clouds appear progressively further eastwards as the sun moves eastwards below the horizon. Just before the clouds vanish in the brightening sky before dawn, they may actually be seen momentarily in the south-west (in the north-west in the southern hemisphere). Records of events of this kind are of great importance.

"Quite apart from the scientific value of these observations, a great display of noctilucent clouds is an unforgettable sight. An observation in the *southern* hemisphere will have historical importance as being likely to be the first record of the appearance of these clouds in that hemisphere."

Observations of noctilucent clouds can be recorded in the "Additional Remarks" pages of the meteorological logbook, and will be forwarded to Mr. Paton.

THE FISHERY PROTECTION SQUADRON

One of the less publicised services provided by the Royal Navy's Fishery Protection Squadron is the broadcasting of weather forecasts and warnings to the distant-water fishing fleets working in Icelandic and Arctic waters.

A qualified meteorological officer is attached to the Squadron and it is his duty to prepare routine forecasts for the fishing grounds and necessary warnings of dangerous weather, such as gales, or conditions in winter favourable for the icing of ships' superstructures.

Forecasts are prepared twice daily and are broadcast to the fishing fleet by voice on their working radio frequency. Warnings are broadcast as soon as the need for them becomes apparent to the forecaster.

The Squadron Meteorologist has necessarily to work in rather cramped quarters and he lacks some of the more sophisticated aids enjoyed by his colleagues ashore and in bigger ships. Nevertheless, there is no doubt that the results achieved are valuable and that the service provided is appreciated by the trawlers.

REPORTS ON BIRDS AT SEA

Extracts from meteorological logbooks which contain references to birds are forwarded to the Royal Naval Birdwatching Society (R.N.B.W.S.). These reports are studied and correlated with other reports which the Society receives from its members.

During 1960 thirty-one separate reports were forwarded in this way.

Captain G. S. Tuck, R.N., Chairman of R.N.B.W.S., tells us of the interest which the society derives from receipts of these reports. Although it is true that quite a number do not provide sufficient information on which to identify the birds seen, or alternatively are too evident to merit worth-while comment, a reply has been sent to the masters of the ships concerned in twelve instances, either identifying the species where in doubt or providing information on the subject.

In referring in particular to land bird reports, Captain Tuck has made the following observations:

> "Over a short period it is not possible to point to any general conclusions as to the movements of land birds over the sea. Some reports indicate clearly the passage of a ship over the broad stream of well established migration routes. Others, however, show equally clearly the many land birds that occur far out to sea. How many and what species may be following routes as yet imperfectly known, and how many are castaways set far out from land by contrary winds, are matters which in time these reports may help to clarify. One thing is certain. A ship at sea is a haven of rest for many exhausted birds, and once on board they are sometimes carried hundreds of miles off course by their unwillingness to leave this safe refuge, even contrary to their migratory instinct. An example of this is recorded in the January 1961 'Marine Observers' Log' (page 16).
>
> "On rare occasions land birds have been recorded taking passage all the way from one continent to another, but these passages must be considered exceptional. Unless birds are of the type that can find acceptable diet on board—although we can quote the unusual case of a peregrine falcon remaining a whole week at sea, and leaving its perch daily to capture storm petrels following in the wake—they rapidly grow weak and do not survive many days.
>
> "A chaffinch and blue tit have accompanied a ship from Denmark to Cape Town, a myrtle warbler has completed the passage from Canada to England."

Captain Tuck mentions the identification from meteorological reports of such sea birds as Hawaiian petrels, red-footed boobies, red-tailed tropic birds, black-footed albatrosses, little auks and others. He will always be glad to hear direct from those at sea, and letters should be addressed to him at Prattendens, Bury, Pulborough, Sussex.

Official Publication

STATE OF SEA CARD

This new Meteorological Office publication, to be issued free to all ships of the Voluntary Observing Fleet, has been made possible by the ready response of mariners to the request made to them in 1959 for good photographs for this purpose.

The photographs illustrate the appearance of the sea corresponding to the Beaufort Wind Scale and are intended to aid observers in estimating the strength of the wind in knots when making their routine weather reports. They will also be of benefit to yachtsmen and others, in predicting their state of sea from wind forces given in radio weather bulletins.

The range of wind speed and the mean wind speed are quoted for each force; the description of the sea according to the 'Sea Criterion' laid down by the World Meteorological Organisation is also given.

The card is published by H.M. Stationery Office. It is obtainable either unfolded $21\frac{1}{2}'' \times 14\frac{1}{2}''$, with cord for hanging, at a price of 5s. od. (M.O. 688), or as a foldable card, $10\frac{3}{4}'' \times 14\frac{1}{2}''$, price 6s. od. (M.O. 688A).

Book Reviews

The Unfortunate Ship: The Story of H.M. Troopship "Birkenhead", by J. Lennox Kerr. 8 in. × 5½ in. pp. 190. *Illus.* Geo. G. Harrap & Co. Ltd., London, 1960. 15s.

Almost everybody is probably familiar with Thomas Hemy's impressive painting, "The Wreck of the *Birkenhead*". The ship has broken her back—the fo'c'sle rises at a crazy angle; the troops stand with courageous dignity in their ranks, but with difficulty owing to the listing deck of the doomed ship, while the women and children cluster near the lee bulwark waiting to get into the boats.

The author has had quite a lot of sea experience and in this book he endeavours to place before us the true facts of what happened to the *Birkenhead* on that night in February 1852 when she went ashore on Birkenhead Rock, off Danger Point, South Africa, when on passage from Simonstown to Algoa Bay. She had on board about 640 people, including 7 women and 13 children and about 490 troops; all the women and children were saved but 454 men lost their lives.

In the publisher's note concerning the book, reference is made to the evidence that the author has produced in an endeavour to clear the reputation of the ship's commander who (as is not unusual!) was blamed for the stranding. Unfortunately the commander lost his life so was unable to give evidence on his own behalf.

On deciding to review this book I felt sure that some reference would be made to ocean currents in relation to the stranding, having in mind the known vagaries of currents in this area and the number of strandings in various parts of the world which have been attributable to currents—so it was a disappointment to find that no mention of currents is made.

The author reproduces a chart used at the Court Martial which followed the stranding and produces much evidence about the possible changes of compass deviation from that shown on the ship's deviation card. He tells us that the *Birkenhead* was one of the earliest iron ships and that because, in those days, nobody really knew much about the vagaries of compass deviation in an iron ship, it is possible that therein lay the cause of the tragedy.

But Admiralty Chart 2082 and the modern Africa Pilot Vol. III give us an added possibility as to the cause of this stranding. A note on the chart says that "between Cape Hangklip and Cape Agulhas" (the area where the ship was) "the current occasionally sets 080° at 1 knot". The pilot amplifies this with the words "more dangerously towards the land, with sometimes, a rate exceeding 1 knot". But it seems unlikely that the chart or the pilot of 1850 contained such warnings.

The *Birkenhead* was provided with an engine and paddles, as well as sails, and as it was a calm night she was proceeding under power alone. Assuming her speed, in accordance with the evidence, to be about 7 knots, she could easily have set in two miles from the time of her last landfall to the time she struck. A half point of incorrect deviation could have set her in another mile. The Birkenhead Rock itself is over a mile off shore, so that if the commander had set a course for a position five miles off the Cape, a combination of current and deviation could easily have caused the stranding.

The author tells us that there was a leadsman in the chains and that about ten minutes before she struck he seems to have found bottom in about 12 fathoms, but the officer on watch does not seem to have heard, to report it, nor did anybody else. It was a clear calm night, so there were no meteorological complications.

The author describes in an entertaining way the long struggle that the Admiralty put up against the entry into service of these 'new fangled' iron ships. The loss of the *Birkenhead* seems to have provided the 'die-hards' with plenty of material for their "I told you so" attitude, and delayed progress for some appreciable time. But no doubt lessons were learned from the tragedy.

The author provides a graphic 'pen picture' of what life must have been like aboard a trooper in those days and gives much detail of the events following the eventual foundering of the ship. He also has a lot to say about the manner in which the Court Martial was conducted and the condemnation of the commander of the ship by the press.

The book is well illustrated and it is intriguing to read.

C. E. N. F.

The Harrap Book of Sea Verse, arranged and edited by Ronald Hope, O.B.E., M.A., D.PHIL. 8 in. × 5¾ in. pp. 208. George G. Harrap & Co. Ltd., in co-operation with the Seafarers Education Service, London, 1960. 15s.

In producing an anthology of sea poetry, the first for more than forty years, Dr. Hope has performed a service to all lovers of the sea and its literature.

To many seamen, sea poetry spells Masefield, the Master Mariner and Poet Laureate, and Masefield spells sea poetry. It is good to see four of his poems included, indeed one of the greatest pleasures of dipping into an anthology is to meet old friends. But Dr. Hope has introduced us to many new friends as well, linking their careers where possible with the sea.

The anthology spans more than twelve hundred years: the earliest poem, *The Seafarer*, may well have been written as early as the 8th century A.D., whilst the latest inclusions are from authors yet serving at sea, some of them prize winners in the competitions organised by the Seafarers Education Service.

Among the poets of the modern Merchant Navy, it is good to notice contributions from three who are, or were, members of the corps of Voluntary Marine Observers: Attwood Robson, today one of the older generation of seamen, a consistent observer for us in the *Mauretania* and *Berengaria* for ten years from 1923 to 1933, gives us, in his poem *Testament*, the impressions which a long life at sea have made upon him; A. C. Wehner, who sent us twelve meteorological logbooks from the *Powell* between 1954 and 1956, has treated us to a very fine description of a wave; whilst A. M. Morrison, who observed for us in the *Caltex Canberra* in 1957, has chosen for his subject the Tower Hill Memorial. It is perhaps not surprising with their background that each of these three should have brought meteorology into his verses, the first who served in sail, the second whose poem is wholly on a meteorological phenomenon and the last who looks back on a generation which he did not know with the plea "Breeze of the sea breathe soft upon these names . . .".

Undoubtedly there is an affinity between meteorology and nautical poetry and there are few of the hundred and seventy or more poems in the anthology which do not bring in the weather in some way, from John Donne's *Storm* to the *Channel Passage* of Rupert Brooke, better known for his quiet and very English verse and from whom these verses on seasickness come as rather a surprise.

For Epilogue, Dr. Hope has chosen part of the 107th psalm. There could have been no better choice, though it might have been more appropriate to have chosen the more poetic Psalter translation rather than that of the Authorised Version.

From his early days, the reviewer never went to sea, even during the war, without his copy of Masefield. Were he at sea today, there is no doubt that this much-travelled volume would have a companion, the *Harrap Book of Sea Verse*. It is well worthy of a place on the bookshelf of any seaman and could justifiably be regarded as an investment rather than a purchase.

L. B. P.

Personalities

RETIREMENT.—CAPTAIN R. F. HELLINGS retired on 31st December last from Trinder Anderson & Company, after 43 years at sea.

Ralph Finch Hellings commenced his seagoing career in 1917 as apprentice with the Hain Steamship Co., in the *Trewellard*. After passing for 2nd Mate in 1922, Captain Hellings continued to serve with Hain's, and whilst in the *Tredenham* in 1924 the vessel was sold to the Federal 'P' steamers and renamed *Pareora*. Captain Hellings transferred with the vessel, and in 1931 transferred again, with the *Ardenvohr* to Trinder Anderson and Company.

Passing for Master in 1927, Captain Hellings was appointed to his first command, the *Ardenvohr*, in 1932, subsequently commanding *Kaimata*, *Kaituna*, *Limerick* and *Donegal*, in which ship he completed his service, leaving her in November 1960 pending retirement.

Captain Hellings' record with the Meteorological Office dates back to 1924, when he was serving in the *Tredenham*. During 15 years' observing he has sent in 29 logbooks, 12 of which have been classed 'excellent'.

Other members of Captain Hellings' family have records with the Meteorological Office, his brother whilst in command of the *Cornish City* as long ago as 1927, and his son, J. D. Hellings, who is now serving as Chief Officer in the N.Z. S. Co.'s *Otaio*.

We wish him health and happiness in retirement. J. R. R.

RETIREMENT.—COMMODORE E. T. N. LAWREY retired from the sea in December 1960 after 47 years' service.

Edward Thomas Noel Lawrey went to sea in January 1913 in Messrs. W. J. Tatem's steamer *Torrington*. He continued his apprenticeship in the *Braunton* and *Torridge*, in both of which he was torpedoed in the First World War.

He passed for 2nd Mate in December 1916 and joined the Commonwealth and Dominion Line, later to be known as the Port Line, as 3rd Officer of their *Port Hardy*. In this ship also he was torpedoed.

He passed for Extra Master in 1921 and was appointed Chief Officer of the *Port Denison* in 1927. Ten years later he was appointed to his first command, the *Port Adelaide*. Sailing unharmed through the Second World War, he was appointed to command the *Port Victor* after her reconversion from an auxiliary aircraft carrier in 1949. He became Commodore of the Port Line in 1958.

By his retirement the Meteorological Office loses one of its more senior voluntary marine observers, for it was as long ago as 1920 that we received his first meteorological logbook, when he was in the *Port Macquarie*. In 16 years since then, Commodore Lawrey sent us 39 logbooks, a large proportion of which were assessed 'excellent'. He received Excellent Awards in 1949, 1954 and 1955, and in 1953 was awarded an inscribed barograph for his long and zealous service on our behalf.

We wish him health and happiness in his retirement.

L. B. P.

RETIREMENT.—COMMODORE F. L. OSBORNE retired in November last after 52 years at sea, over 40 years of which were served with the Manchester Liners.

Frederick Louis Osborne first went to sea in sail, as an apprentice in the *Blytheswood* belonging to De Wolf of Liverpool, in 1908. After passing for 2nd Mate in 1914, he served with the Larrinaga Steamship Co., Eagle Oil and Blue Funnel Lines, and then, after obtaining his Master's Certificate in 1919, he joined the Manchester Liners as 2nd Officer of the *Manchester Importer*.

Commodore Osborne was appointed to his first command, the *Manchester Exporter*, in 1938. He subsequently commanded many of the Manchester Liners, his last command being the *Manchester Mariner*, in which ship he served as Commodore of the company for some months before retirement.

Commodore Osborne's record with the Meteorological Office commenced in 1932 whilst serving in the *Manchester Commerce*. During 20 years he has sent in 45 logbooks, 9 of which have been classed 'excellent'. He received Excellent Awards in 1948 and 1950.

We wish him many years of happy retirement. J. R. R.

RETIREMENT.—CAPTAIN S. F. SHEASBY retired in November 1960 from the sea, completing his last voyage in command of the *Menastone*.

Sydney Frederick Sheasby first went to sea in 1906, at the age of 17, in the sailing vessel *Cadogan* owned by Martin Tucker of London and, having sailed as 3rd and 2nd mate in that ship, went into steam in 1911. He later obtained his 'Square rigged' Master's Certificate.

At the outbreak of the First World War he was in a German port, and was a prisoner of war throughout hostilities.

His first command in 1922 was the *Inveresk*, a sailing vessel converted to steam.

Captain Sheasby sailed unharmed throughout the Second World War and after a very varied career he was appointed to command the *Menastone* in 1954, and brought this vessel into the voluntary observing fleet. During the last six years Captain Sheasby has sent us 11 meteorological logbooks, of which eight have been classed 'excellent'. Most of these logbooks covered voyages to Archangel and the Kara Sea, more data having been received from these northern waters from the *Menastone* than from any other ship. He obtained Excellent Awards in 1954–55, 1955–56, 1958–59 and 1960–61.

Whilst in eastern Canadian waters in the spring of 1957, Captain Sheasby forwarded some first class photographs of ice which are now in our Ice Album at Bracknell. In the October 1956 number of *The Marine Observer* we published his report of aurora seen in 70° 38′N, 42° 38′E, probably the most remote report of this phenomenon that we have ever received.

We wish him health and happiness in his retirement. J. C. M.

OBITUARY.—We regret to record the death of Mr. E. W. BARLOW, B.SC., F.R.A.S., which occurred at his home at Wadhurst, Sussex, on 9th January.

Until his retirement at the age of 71, in November 1958, Edward William Barlow had served for 32 years in the Marine Division of the Meteorological Office. A short sketch of his career appeared in the January 1959 number of *The Marine Observer*.

Though comparatively unknown, even by name, to the vast majority of seafarers, Mr. Barlow's work on their behalf lives in the Meteorological Office atlases of ocean currents and sea-ice which were all compiled under his direct supervision from the observations of British ships, and in the corresponding text in the Admiralty Sailing Directions. With the exception of the Ch'ang Chiang (formerly the Yangtze Kiang) Pilot, which does not call for such information, Mr. Barlow had revised the ocean current and ice text in all the 74 volumes, in many of them twice and in a few of them three times, as increasing knowledge made a new edition possible.

His mark is left also in the past numbers of *The Marine Observer*, for until his retirement he was responsible for the selection of the items for the Marine Observers' Log and, as an expert on bio-luminescence, he continued in his retirement to collect all the reports of phosphorescence sent in by ships and to comment on such as were published.

The Marine Division mourns a valued colleague who, though not a sailor himself, had been so long with us as to have absorbed much of our spirit and outlook.

We extend our sympathy to his widow and son. L. B. P.

OBITUARY.—The death of CAPTAIN T. R. REID, Commodore Master of Messrs. H. Hogarth & Sons Limited, at the Royal Victoria Hospital, Edinburgh, on 5th December 1960, is noted with deep regret.

Thomas Rendall Reid was born at Leith on 9th November 1895, the son of a shipmaster sailing from that port.

His seafaring career was noteworthy in that he served for 50 years in ships of the same company. At the age of 15 he commenced his apprenticeship in the *Baron Ogilvie*. After completing his apprenticeship in 1914 he obtained his 2nd Mate's

Certificate and served in several of the company's ships during the First World War.

He obtained his Master's Certificate in 1921 and in 1926 was appointed to command the *Baron Sempill*. From then onwards he commanded no fewer than 17 of the company's ships.

During the Second World War he saw service in every ocean and was engaged in most of the major operations of the war at sea, being in the Western Pacific at the time that the first atom bomb was dropped over Hiroshima. He was awarded all service medals, and the Coronation Medal in 1953.

Captain Reid was an enthusiastic marine observer, becoming a member of the corps of voluntary marine observers when he commanded the *Baron Fairlie* in 1951. He subsequently contributed 19 meteorological logbooks, nine of which were classed 'excellent'.

We extend our condolences to his widow in her bereavement. R. R.

OBITUARY.—We regret to record the death of SKIPPER HARRY G. SELF, which occurred at sea on 7th November 1960, whilst he was in command of the trawler *Northern Eagle*, owned by Messrs. Northern Trawlers, Ltd. of Grimsby.

Skipper Self sailed for Northern Trawlers as mate for about three years before the Second World War. In February 1940 he joined the Royal Navy as a Temporary Skipper R.N.R. and served in a minesweeping trawler until 1941. After a period of shore duty he was appointed to command a tank landing craft and served in the Middle East during the siege of Tobruk and the advance of the 8th Army to Alamein. He was wounded in the North African operations and spent some time ashore there in hospital.

From June 1944 he served in home waters in combined operations in command of landing craft and was promoted to Temporary Skipper Lieutenant R.N.R. in 1944. He was released from the Royal Navy in October 1945 with the acting rank of Skipper Lieutenant R.N.R. He then rejoined Northern Trawlers as Skipper, sailing in the *Hertfordshire*, *Northern Sun* and *Northern Foam*. In 1949 he was appointed to his first new ship, the *Northern Queen*, and subsequently brought out two more new ships, the *Northern Sceptre* and the *Northern Eagle*, which he joined in 1955.

A letter from the owners to the writer of this notice states, "during the post war period, Skipper Self became Northern Trawlers' most successful skipper. He was admired by all who knew him and his deeply regretted death leaves a gap it will be most difficult to fill".

Skipper Self was a voluntary marine observer of considerable standing over the past few years and sent regular weather reports from the high latitudes in which he trawled.

He leaves a widow and a son, a deep sea marine engineer, to whom we extend our sympathy. W. H. C.

LATE NOTICE—M.O. LEAFLET No. 3

This leaflet, which gives details of weather bulletins and gale warnings for coastwise shipping and fishing vessels, has recently been reprinted. The old (1958) edition is now obsolete.

Copies of the leaflet may be obtained free from Port Meteorological Officers, Merchant Navy Agents, or from the Marine Superintendent, Meteorological Office (M.O.1), London Road, BRACKNELL, Berks.

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. M.O.483, 1948, reprinted 1959. (60°S–70°N, 80°W–40°E) 180*s.* (post 3*s.* 3*d.*)

Monthly Meteorological Charts of the Western Pacific. M.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. M.O.518, 1950, reprinted 1956. (60°S–60°N, 160°W–60°W) (17½″×24½″) 147*s.* (post 3*s.* 3*d.*)

Monthly Meteorological Charts of the Indian Ocean. M.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. M.O.516, 1949. (50°S–10°S, 100°E–180°) (19¾″×12¼″) 10*s.* (post 7*d.*)

Monthly Sea Surface Temperature of the North Atlantic. M.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. M.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. M.O.392, 1939, reprinted 1956. (50°S–30°N, 20°E–140°E) (30″×20″) 10*s.* (post 7*d.*)

South Pacific Ocean Currents. M.O.435, 1938, reprinted 1959. (60°S–0°, 140°E–70°W) (22″×34″) 12*s.* 6*d.* (post 1*s.* 0*d.*)
The above two atlases contain quarterly "current arrow" and "current rose" charts.

Quarterly Surface Current Charts of the Atlantic Ocean. M.O.466, 1945, reprinted 1957. (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. M.O.485, 1949. (0°–60°N, 98°E–160°W) (21″×16″) 25*s.* (post 11*d.*)

Quarterly Surface Current Charts of the Eastern North Pacific. M.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 Western North Atlantic. M.O.478, 1944. (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. M.O.615, 1958. (5°S–60°N, 100°W–40E°) (40″×25″, ıoldee to 13″×8″) 36*s.* the set (37*s.* with folder) (post 1*s.* 2*d.*)
One chart for each month, based on i nformation in M.O. 483, M.O. 466 and M.O. 478 (above).

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