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DIVISION OF THE METEOROLOGICAL OFFICE

VOL. XLII

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*Letters to the Editor, and books for review, should be sent to the Editor, "The Marine Observer,"
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Report of Work for 1971

(MARINE DIVISION OF THE METEOROLOGICAL OFFICE: VOLUNTARY OBSERVING FLEET AND OCEAN WEATHER SHIPS)

1. Voluntary Observing Ships

At the end of the year the British Voluntary Observing Fleet was comprised as follows:

- (a) 517 Selected Ships, including 2 trawlers, which are supplied with a full set of meteorological instruments on loan and which make observations in code every six hours and transmit them to the appropriate coastal radio station wherever their voyages take them.
- (b) 42 Supplementary Ships, including 14 trawlers, which make less detailed observations than Selected Ships and are supplied on loan with only a barometer, air thermometer and screen. They use an abbreviated code for their messages.
- (c) 64 coasting ('Marid') vessels, and one lightship, which make sea-surface temperature observations in U.K. coastal waters and transmit them in a special code by W/T or R/T. When in the North Sea, the coasting ships include in their messages wind, weather and visibility observations.
- (d) 14 lightships and 1 light-tower which make observations of wind, waves, visibility, air and sea temperatures; 13 of these send coded reports by R/T, the other two record their observations for climatological purposes only. The Royal Sovereign light-tower and the *Dowsing*, *Galloper* and *Varne* lightships report barometric pressure using the precision aneroid. Reports from the first three are included in the BBC weather bulletins for shipping. The *Galloper* also reports barometric tendency but the time limit imposed on BBC weather bulletins does not permit the inclusion of barometric tendencies from the others.
- (e) 30 trawlers which make non-instrumental observations only and transmit them by W/T or R/T, using an abbreviated code, to radio stations in the U.K., Canada, Iceland, Norway or U.S.S.R. depending on the area in which they are fishing. In addition to these, 2 trawlers now figure in the Selected Ships' List and 14 in the Supplementary Ships' List.
- (f) 36 Auxiliary Ships which make and transmit visual observations similar to those made by trawlers, with the addition of pressure and air temperature readings from the ships' own instruments (using the 'Shred' code). These ships do this work only when in areas where shipping is known to be sparse.

The numerical strength of the Voluntary Observing Fleet has barely been maintained during the year and the hoped-for target of an annual increase of 50 ships still seems very far from being realized. At the end of the year the total number of ships on the Selected and Supplementary lists was 559; at the beginning of 1971 it had been 575.

This has been due to two basic causes; firstly, a shortage of instruments in the earlier part of the year and, secondly, the overall building programme of the larger shipowners whereby their fleets of conventional cargo ships are being replaced by container ships, bulk carriers and super-tankers. One of these newer types of ship is often able to do the work of six or even eight conventional ships by virtue of their size, their speed and newer methods of cargo handling.

In one six-month period during 1971, although 34 ships were recruited to the Voluntary Observing Fleet, the total number of ships on the list actually decreased by 12, there being 46 ships withdrawn during the same period owing to sale to

foreign registries, being broken up or laid up, possibly for conversion. This decrease, nevertheless, involved 80 movements of instruments between a ship and the Port Meteorological Office; in happier circumstances 80 movements of instruments could mean 80 recruitments. The brighter side of this sombre picture is the fact that in these six months there were 34 volunteers; were it not then for the withdrawals, the target could be met.

The British Voluntary Observing Fleet includes ships of many shipping companies and Table 1 shows the variety of trade routes on which they are engaged.

Table 1. Average numbers of British Selected and Supplementary Ships on main trade routes to and from the U.K.

Australasia	93	Pacific Coast of North America ..	7
Far East	94	Europe	36
Persian Gulf	36	Falkland Islands and Antarctic ..	3
South Africa	50	World-wide 'tramping'	93
North Atlantic	91	Near and distant-water fishing ..	16
West Indies	27		
South America	13		

A number of shipping routes will, for many years, undoubtedly be served only by conventional cargo ships but so long as the present policy of 'scrap and build' continues there will inevitably need to be many more recruitments than withdrawals if the size of the Voluntary Observing Fleet is to be increased; and the resources of the Port Meteorological Offices, already fully extended, will be strained to the utmost.

As automation in ships becomes more general it is probable that shipmasters will be less inclined to undertake the making of weather observations although the real need for observations will increase as, over the years, more accurate methods of weather forecasting are introduced. Many observers at sea are well aware that satellite photographs provide a limited amount of useful meteorological information but this in no way reduces the need for the invaluable surface or upper-air observations regularly received from voluntary observing ships. It is pleasing to note that the year's logbooks have shown no deterioration in the quality of the observations made nor in the corresponding number of radio weather messages sent and the enthusiasm of most officers for observing seems unabated. Nevertheless, the fact has to be faced that the number of officers carried in ships is, in general, being reduced with a corresponding reduction in crew strength. It has been mentioned in the shipping press that by the end of the next decade few cargo ships will carry a total crew of more than fifteen.

During two typical days, one in June and one in December, the total number of reports from ships received in the Central Forecasting Office at Bracknell from various sources is shown in Table 2.

A Port Meteorological Officer was appointed to Southampton and commenced duty on 1st September; the port had been unattended for well over a year though, in the interim, urgent commitments had been attended to by officers from the Port Meteorological Office in London or from Bracknell. It was not possible to give adequate coverage in this way and all too many observing ships visited Southampton, often as their only port of call in the U.K., without having their meteorological requirements attended to.

During the year the Marine Division has been indebted to many Port Meteorological Officers in Commonwealth and foreign ports for visiting British voluntary observing ships and for withdrawing their complete outfit of meteorological instruments, often at short notice, when any of them were sold abroad.

Table 2. Total number of reports received at Bracknell by various sources from ships during two typical days in 1971

	<i>JUNE</i>	<i>DECEMBER</i>
Direct reception from		
British ships in eastern North Atlantic	84	77
Foreign ships in eastern North Atlantic	32	43
British trawlers in North Sea	13	15
British merchant ships in North Sea	32	46
	<hr/> 161	<hr/> 181
Via other European countries		
Ships in eastern North Atlantic	304	357
Ships in Mediterranean	52	49
Ships in North Sea	88	131
Ships off North Russia	17	14
Ships in other European waters	18	6
Ships in Pacific	39	22
	<hr/> 518	<hr/> 579
Via North America		
Ships in North Atlantic	421	377
Ships in North Pacific	596	667
Ships in other waters	12	21
	<hr/> 1029	<hr/> 1065

2. Ocean Weather Ships

The British Weather Ships completed 24 years of service in the North Atlantic during the year. The present four ships, ex 'Castle' class corvettes built for the Royal Navy in 1944, have now been operating as weather ships for about 12 years and continue to give satisfactory service despite their age. They co-operated with the French ships and Dutch ship *Cumulus* in operating station 'Alfa' for about nine months of the year and stations 'India' and 'Juliett' continuously. The operation of station 'Kilo' was shared by the two French ships and the Dutch ship *Cumulus*. Station 'Mike' was operated continuously by the two Norwegian ships. Stations 'Bravo', 'Charlie', 'Delta' and 'Echo' on the western side of the North Atlantic were manned continuously by weather ships operated by the U.S. Coast Guard. All the weather ships in the North Atlantic are financed internationally through the International Civil Aviation Organization, the operating countries bearing the greater part of the cost. All ships made hourly surface and six-hourly upper-air observations. The following additional observations were regularly made by British ships: solar radiation balance, sea temperature and salinity down to the sea bed, magnetic variation and surface sea-water sampling. The biological sampling programme for the Institute for Marine Environmental Research was intensified during the year with an investigation of the vertical distribution of plankton throughout the year in the upper 500 metres at Station 'India' using the Longhurst/Hardy Plankton Sampler; six voyages were made by a marine biologist for this purpose. In association with the investigation into vertical plankton hauls, water samples for phytoplankton analysis and extra net hauls for analyses of toxic organo-chloride residues in the plankton were made.

Communication and navigational facilities were provided for transatlantic aircraft by all the British ships, and air/sea rescue equipment was kept in a constant state of readiness. Search and rescue exercises were frequently carried out in which RAF Shackleton aircraft sometimes participated.

3. General

In May a second ship of the Sugar Line was equipped to take radiosonde soundings and we are much indebted to the Sugar Line management for their help in enabling us to fulfil our obligation to equip a small number of merchant ships for this task as part of the World Weather Watch programme.

The number of marine inquiries, most of them from solicitors, shipping companies, universities and industry was about the same as for the past two years.

4. Awards to Voluntary Observing Ships

'Excellent' awards were again given to the ships which had sent in the most careful and painstaking logbooks during the year and tribute must be paid to five distant-water trawlers who figure in the list. Barographs were presented to four shipmasters for their long and zealous voluntary meteorological work at sea.

The books selected for awards were *Cassell's English Dictionary*, *Weather Lore*, by Richard Inwards and *The University Atlas*.



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.

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

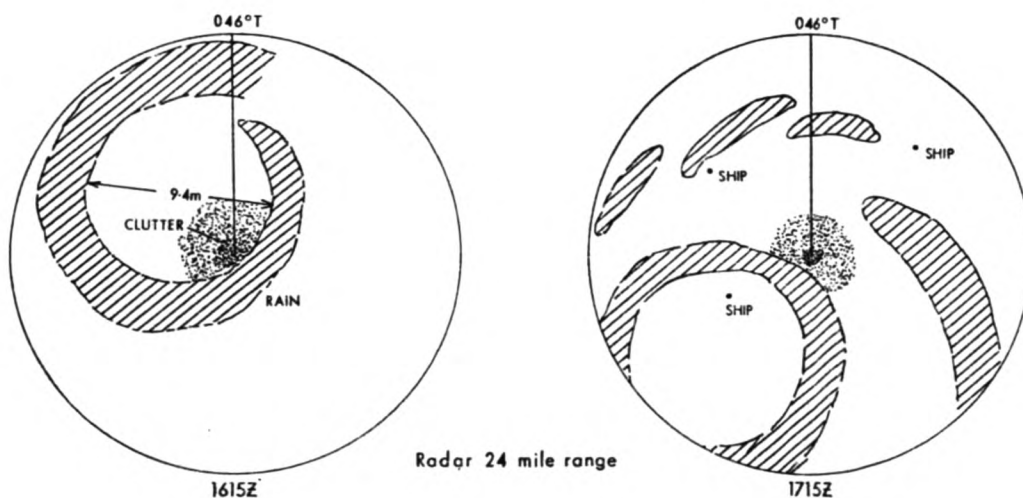
TROPICAL STORM 'BABE'

South China Sea

m.v. *Amoria*. Captain D. A. Laidler. Singapore to Yokkaichi. Observers, Mr. R. J. Payne, 2nd Officer and Mr. P. J. Watson, 3rd Officer.

3rd May 1971. While on passage to Japan reports of the tropical depression Babe were received. As the track and speed indicated that the depression was passing well astern of the vessel our course and speed were maintained. From 1200 to 1400 GMT on the 3rd the sky was overcast, there was a NNE'ly wind and the barometer dropped 2-3 mb. At 1400 rain commenced and the barometer continued to fall slowly, the wind freshening. At 1515 the barometer began to fall sharply and the rain became very heavy, causing bad visibility; the wind strengthened to force 8-9 and backed to NNW.

At 1555 we entered the vortex, the wind having completely dropped away; the sky was overcast with light rain; pressure was then 996 mb and still falling. At 1620 the wind became variable, both in direction and strength, with a confused sea. It was found impossible to obtain wet- and dry-bulb temperature readings due to the amount of spray entering the marine screen even when placed on the lee side. The sky was overcast with C_L7 which appeared to be less dense towards the centre of the vortex. At 1630 the barometer had fallen to 994.5 mb.



Lightning was first observed at 1650 but only a few flashes were seen. At 1653 it was noticed that the barometer was rising and the rain had stopped. The wind was gusting to force 11, causing a great amount of spray to be blown off the confused sea, the height of the waves being in excess of 20 ft. By 1700 the barometer had risen to 996.4 mb, the wind was SE's and gusting to force 10 or 11 with rain patches around the vessel but by 1715 the wind had dropped to force 8 and had backed to SE'E. The barometer had then risen to 999.1 mb and the sea had dropped to about 15 ft. Although the rain had stopped the visibility remained less than 5 miles; there was also a moderate amount of marine bioluminescence.

At 1815 the vessel ran into heavy rain which lasted for about 10 min. By 1900 the SE'ly wind had dropped to force 7, light to moderate rain was falling and there was extensive lightning. Heavy rain at 1930 reduced the visibility to $\frac{1}{2}$ mile but by 2000 the barometer had steadied at 1003.3 mb and visibility had improved to 3 miles.

Position of ship at 1200: $15^{\circ} 54' N$, $117^{\circ} 12' E$.

Note. Tropical storm Babe, born on 3rd May to the west of Luzon, moved north and later north-east to pass to the north of Luzon on the 5th. This same disturbance became extra-tropical and, after crossing the Pacific Ocean, lashed Vancouver on the 16th.

LOCALIZED WIND CHANGES

South China Sea

m.v. *Strathconon*. Captain D. J. Harrison. Hong Kong to Kobe. Observer, Mr. M. Reed, 2nd Officer.

16th June 1971. At 0730 GMT a series of parallel streaks was seen ahead, crossing the intended track and extending to the limit of visibility. At this time the wind was steady at 6 kt from 100°T. The streaks were 4–5 cables apart and 1–1½ cables in width and lay 050°/230°T by compass bearing. On entering the first streak it was found to be wavelets caused by the wind abruptly backing to 040°–050°T and reducing to approx. 3–4 kt. On leaving the streak the wind veered to its original direction and speed; the edges of the streaks were clearly defined as confused wavelets. At the next streak, and for the remaining streaks, about 20 in number, the wind increased to perhaps 10 kt on either side of the streak but the change of direction was similar in each case. The final streak was crossed at 0840 when the wind steadied to 095°T at approx. 8–9 kt. At 0800: Air temp. 30.6°C, wet bulb 26.4°. Fine and cloudy. Excellent visibility. Course 078°T at 21 kt.

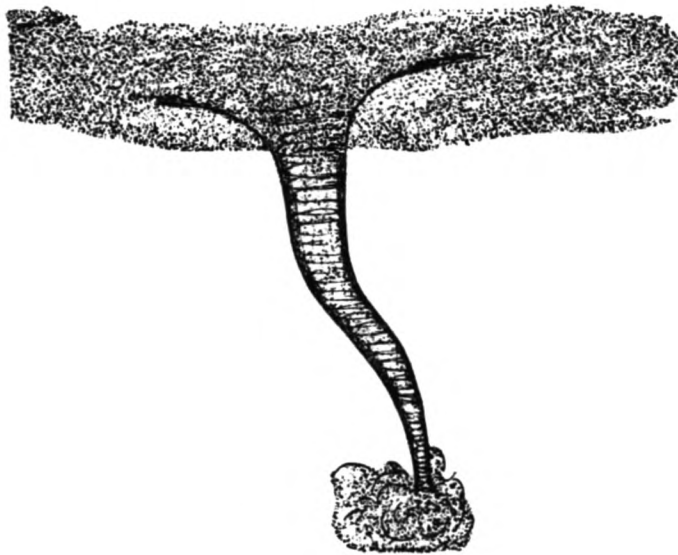
Position of ship at 0730: 22° 28'N, 115° 17'E.

WATERSPOUT

Eastern North Pacific

m.v. *Fremantle Star*. Captain J. G. King. Los Angeles to Balboa. Observer, Mr. B. Lipscombe, Chief Officer.

14th May 1971. At 1155 GMT, after the vessel had been running through moderate rain showers for several hours, she approached a belt of rain which, from the radar, appeared to be made up of many showers of different intensities. The belt, which was about 3 miles deep and 12 miles in length, lay across the ship's track, running about 160°/340° and moving very slowly eastward. From the underside of what was thought to be a Cb cloud a waterspout, thin and dark, was seen to be reaching to the water. The ship was 2 miles away at this time (distance obtained from radar).



The waterspout was working across a small area of the sea. By the time the ship was a mile off the spout appeared to be pulsating about its mid part; it had broadened generally and appeared to have developed a light cone with hard, dark edges. On looking through binoculars a strong helical movement could be seen along a large part of the waterspout, while the foam that sprang off the sea beneath it was moving vigorously anticlockwise. At times it broke at its mid part but quickly re-formed. The spout then settled down in a near vertical position and, as the ship approached

to within $\frac{1}{4}$ mile of it, one could see clearly with the naked eye the vicious cork-screwing motion of the water vapour forming the spout. It continued to expand in diameter along its length until it was only slightly tapered. As it expanded the turbulence within the spout diminished and, as it expanded further, another small, hard waterspout started moving down from the cloud inside what was now a very weak column of water vapour. This second waterspout barely reached the surface of the sea and soon disappeared. Meanwhile, from the time the ship was close to the first waterspout, a thunderstorm had developed and lightning was striking the waves about half a mile away. Short, very heavy bursts of rain were striking the ship for 5–10 sec at a time. Sometimes it was falling vertically and sometimes being blown by a wind shifting from N to NNW. The vessel then passed under the edge of the cloud and ran out of the turbulence into a near flat calm with winds of 1–2 kt. The pressure initially was 1011 mb which fell to 1010.5 mb and then rose to 1012.1 mb where it steadied. Wet- and dry-bulb temperatures throughout were 25.0°C. The whole episode lasted about 10 min and was preceded by about 5 min of heavy rain. The weather later settled into a pattern of light to moderate showers with N'y winds of 3–4 kt and about $\frac{4}{8}$ C_L3. There were also medium and high clouds.

Position of ship: 13° 10'N, 93° 30'W.

LIGHTNING

Indian Ocean

s.s. *Orsova*. Captain A. J. Field. Fremantle to Durban. Observers, Mr. B. Minter, Jnr. 2nd Officer and Mr. R. Bird, 4th Officer.

24th April 1971. From late afternoon to late evening a violent electrical storm was experienced by the ship. During the latter part of the 4–8 watch lightning in the form of sheets had been seen at frequent intervals in the west and south-west. At 1815 GMT the wind backed from S to SSW and heavy rain commenced. The lightning now occurred every 5 sec, lighting the whole ship and horizon in daylight colouring. Most of the lightning was sheet, reflected all round the horizon by clouds, but on two occasions balls were seen commencing in the south at an altitude of approximately 40° and rolling across the sky to the north, the time of transit being approx. 3 sec as were the sheet flashes. No thunder accompanied the balls of lightning. Occasionally about ten forks of lightning would shoot upwards from a large Cb cloud but this occurrence was rare as was fork lightning generally throughout the storm. At 1915 the wind veered to NE and the ship slowly came out of the rain belt. The lightning persisted until 2300, the frequency of the flashes slowly lessening. The duration of the lightning was approx. 8 hours with a flash rate of 5 sec occurring for 4 of the 8 hours. Two interesting points noted during the storm were (a) that at the height of the storm the barometer rose about 2.0 mb and (b) the radar picture was very comparable to an ESSA satellite picture of a tropical storm, with a cold front leading about 15 miles away from the disturbed centre in a NW'y direction.

Position of ship: 29° 42'S, 44° 10'E.

25th April 1971. We had another electrical storm although it did not last as long as the one on the previous night. Lightning commenced at approx. 1800 GMT and ceased by 2200, the peak of the storm occurring at 2000 when very heavy rain was experienced for half an hour. The end of the storm was distinctly marked by a sky half covered by cloud, the other half being bright starlight. The storm differed from the one during the previous evening in that thunder was heard though only in a low rumbling key during the peak half-hour of the storm. Forked lightning of every kind was experienced together with the sheet lightning. The lightning present was:

1. Beaded lightning—where various parts of the fork indicated different intensities of light.
2. Rocket lightning (very prevalent)—the fork often breaking up and recurring

about 10° further across the sky, giving the appearance of crows' feet across the sky.

3. Ball lightning of smaller intensity than the previous night, once again occurring with no sharp report of thunder.

4. Blue flashes and orange flashes—the blue being predominantly above the earth, the orange or reddish-white streaking down to earth in very thick lines and lasting approximately 4 sec.

5. The most unusual lightning perceived was a series of loops across the horizon as shown below.



In both storms the lightning was predominantly above the earth; only occasional bolts streaking earthwards. The barometer once more reached a peak in the second storm but not so distinctly as during the previous evening.

Position of ship: $29^\circ 50'S$, $34^\circ 36'E$.

Note. The line squalls, displaying vigorous electrical activity, may have been associated with cold fronts sweeping eastwards across the south-western part of the Indian Ocean.

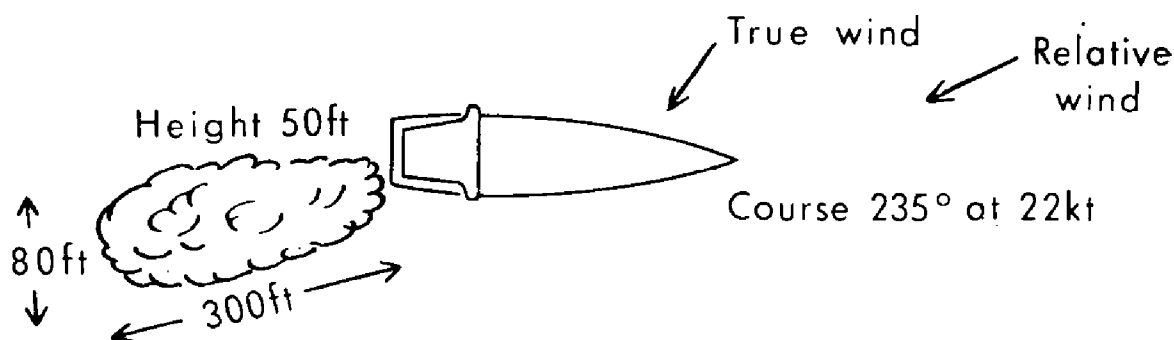
SHIP-MADE CLOUD

North Atlantic Ocean

s.s. *Atlantic Causeway*. Captain R. O. Venn. Greenock to Halifax. Observer, Mr. M. St. E. Cardew, 3rd Officer.

22nd April 1971. At 1900 GMT a dense white cloud was formed from the stern of the ship and lasted for 15 min. At the time the vessel was not making smoke other than a light-brown haze. Air temp. 10.8°C , wet bulb 10.2° . Wind S'W, force 3. Cloud C_{L5} , base 100–200 ft.

Position of ship: $46^\circ 45'N$, $42^\circ 47'W$.



Note. Though the shape of the ship's superstructure may have contributed, the most likely cause of the cloud was the hot air emitted from the funnel. This hot air, on mixing with the moist air blowing over the ship (fog patches were reported earlier), would cause the air to rise further and form a plume of cloud.

SHALLOW FOG

Table Bay

m.v. *Prometheus*. Captain F. N. Curphey. Singapore to Liverpool. Observers, Mr. J. E. McGregor, Sen. 2nd Officer and Mr. B. J. Kay, 2nd Officer.

29th April 1971. At 0045 GMT, as the ship was proceeding into Table Bay, the sea surface was covered by a layer of fog similar to sea smoke, height about 10 ft. The visibility on the bridge (height 70 ft) was not affected at all and other ships' lights could be seen at 11 miles although visibility was nil at sea level. The sea-smoke effect ended at 0100; by this time the ship had stopped to exchange crew

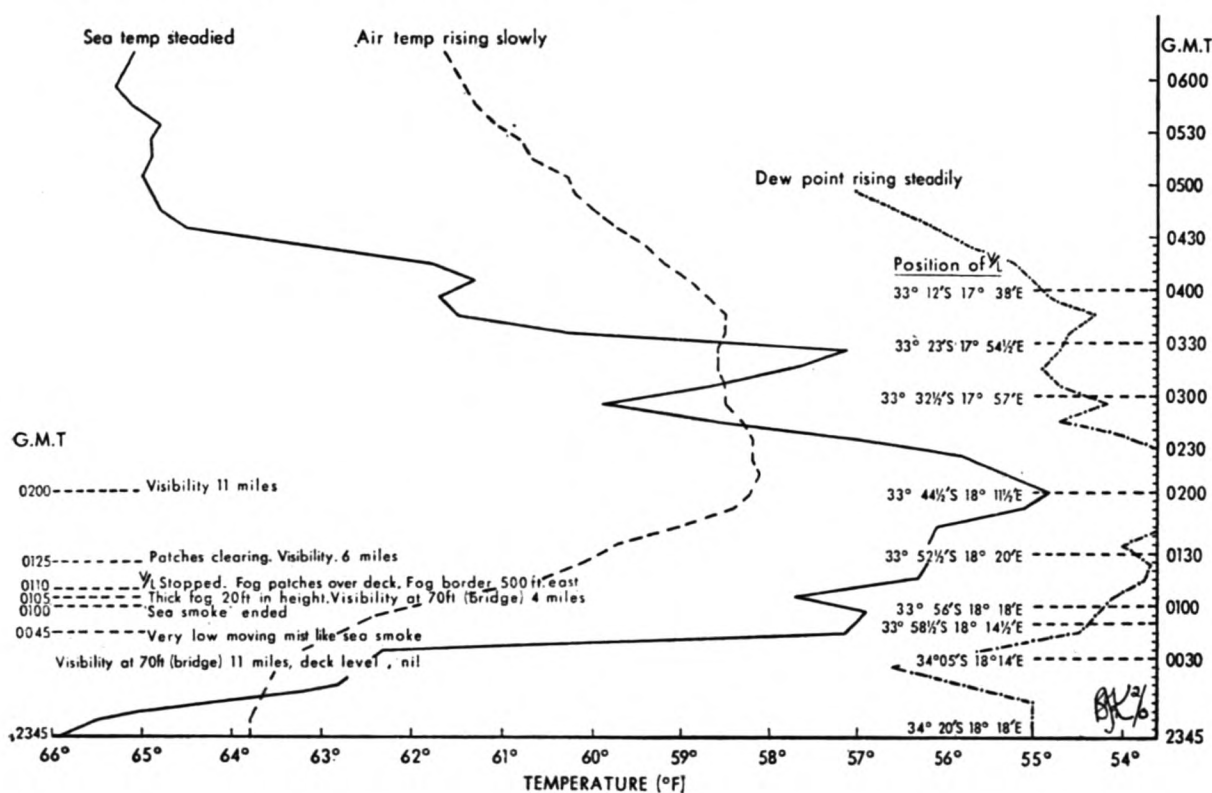
mail with a small launch from Cape Town. The ship was now lying in thick fog about 20 ft in height and the launch was only partially visible alongside. Visibility at bridge height had then dropped to 4 miles and the fog banks could clearly be seen surrounding the ship. An estimate of the maximum depth of the fog was 75 ft to the east of the ship.

At 0130 the ship proceeded on its course north with visibility steadily improving and by 0200, when the ship was clear of Table Bay, visibility had improved to 11 miles and no fog was again encountered.

The temperatures shown in the graph were taken from an electrical recorder. When an air-temperature check was made at 0600 the meteorological thermometer read 63.6°F and the recorder 61.5° —a discrepancy probably due to the recorder being fixed on the leeward side.

Position of ship at 0030: $34^{\circ} 05'S$, $18^{\circ} 14'E$.

Position of ship at 0125: $33^{\circ} 44'S$, $18^{\circ} 11'E$.



Note. The formation of shallow fog was due to the lowering of sea-surface temperatures in Table Bay, leading to a lowering of the temperature of the air just above until saturation was reached and fog formed. The air-temperature graph from the *Prometheus* (taken at bridge level) reflects this cooling but a comparison of dry-bulb and dew-point curves reveals that saturation was not reached at the height of the bridge. The occurrence of cold water in Table Bay was probably due to upwelling from off-shore winds.

NAVIGATIONAL AID

Eastern North Atlantic

m.v. *Priam*. Captain W. R. Willis. Rotterdam to Singapore. Observers, Mr. A. Henry, Snr. 2nd Officer and Mr. R. Fitzpatrick, 2nd Officer.

15th March 1971. At 0150 GMT the vessel passed through a severe hail shower. Although of short duration (7 min) there was a 1.5°C drop in air temperature and the Decca Navigator, which had been used till that time, was seen to be completely out of alignment. The red and green lane indicator meters jumped three lanes and the L.I. meter was not zeroing but kept giving readings every second which had no bearing on the sequence whatsoever. At 0215 the vessel was clear of the hail area and the Decca was reset. After checking the readings the set was found to be working

efficiently once more and the proper sequence of readings given. Whether the severity of the hail shower and the drop in temperature were directly responsible for the behaviour of the Decca Navigator during that 10–15 min period is open to discussion, but prior to and after the hail had passed well clear the set was working normally.

Position of ship: $47^{\circ} 23' \text{N}$, $6^{\circ} 22' \text{W}$.

Note. Mr. A. J. Ramsay, Marine Technical Manager, Decca Navigator Company Ltd., comments:

"The Decca Navigator receiver operating at frequencies in the 100 kc/s band can, under certain circumstances, be interfered with by severe precipitation static from snow or, in this case, hail. This possibility is referred to on page 177 of the *Admiralty List of Radio Signals*, Vol. V and in the Decca Navigator Data Sheet Book supplied with every installation, under the heading 'Weather Effects' on page 7 of Section 5B. Under this heading it states: 'The performance of the Lane Identification Meter and the Decometers can be affected by snow or precipitation static. Under such conditions caution must be exercised and Lane checks carried out.'

"These interruptions of reception are infrequent and normally are only of a few minutes' duration and are not general when encountering rain or snow but are specific to such showers when highly charged with electricity.

"It has also been noted on rare occasions that the leading edge of a front, as it passed over, has affected the stability of Decca readings."

SANDSTORM AND BIRDS

Persian Gulf

s.s. *Mitra*. Captain D. A. Doyle. Mina' al Ahmadi to Singapore. Observer, Mr. D. T. Kirkwood, 2nd Officer.

24th–25th April 1971. On the evening of the 24th, while alongside at Sea Island, Mina' al Ahmadi, a violent sandstorm was experienced which lasted for some 7 hours. Sand had been in suspension for quite a few days since the vessel had entered the Persian Gulf, the wind having been variable w to N, force 3–6, but the visibility was never seriously affected. The vessel anchored for about a day and a half off Sea Island waiting to berth (some 9 miles off shore) and during this time experienced mainly NW'ly winds, force 4–6. The ship became inundated with birds, the main type being a bright green with yellow breast and a long, slightly curved beak, but there was also a fair array of swallows and small wren-like birds. Many of these, chiefly the bright green ones, stayed with the vessel right across the Arabian Sea during the trip to Singapore.

The sandstorm started about 1630 LMT on the 24th with no apparent warning and persisted until 0030 on the 25th when the wind dropped and the air began to clear. Visibility had been reduced to about 200 yd and by the time the storm was over the vessel bore a decided resemblance to Blackpool beach. Even after repeated hosing down, sand was still in evidence over a week later and it was only the heavy rain showers experienced in the Bay of Bengal which cleaned the vessel up properly.

Position of ship on 24th: $29^{\circ} 04' \text{N}$, $48^{\circ} 09' \text{E}$.

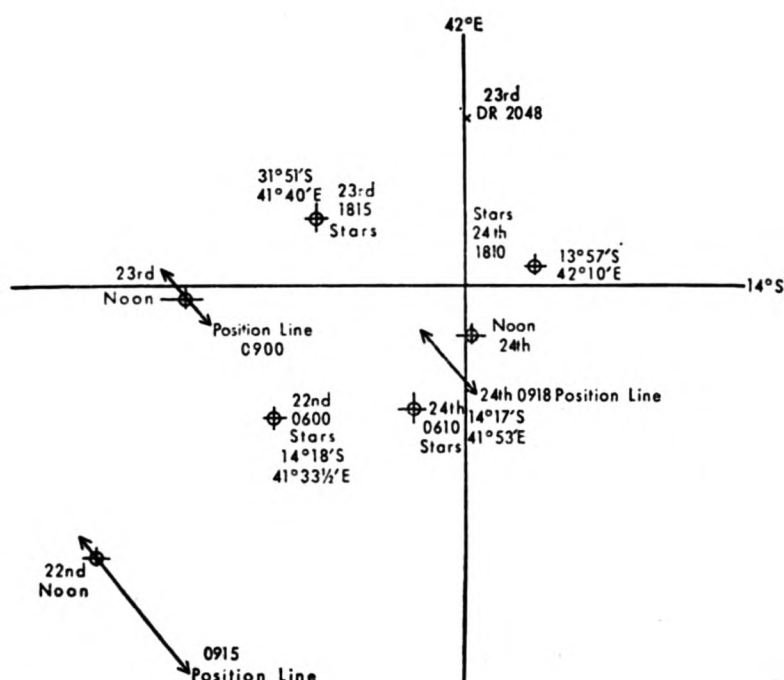
Note. Captain N. B. J. Stapleton of the Royal Naval Birdwatching Society identified the bright green birds as Blue-cheeked Bee Eaters (*Merops superciliosus*) on a northward migration.

STRONG CURRENTS

Mocambique Channel

m.v. *British Splendour*. Captain J. Horner. Mina' al Ahmadi to La Plata, Argentina. Observers, Mr. L. G. Short, Chief Officer, Mr. G. R. Ticehurst, 2nd Officer and Mr. D. Wraight, 3rd Officer.

22nd–24th May 1971. The following sea-surface current observations were made when the vessel was stopped and not under command, thus at the full mercy



of the wind. During this time she was lying beam on to the wind and sea continuously, the wind being mainly s'ly force 4 with an average s'ly swell. The method of fixing the ship's position was a longitude followed 3 hours later by a latitude, being the only method available. Morning and evening star positions were not being taken due to cloudy/overcast skies but were taken later when clouds allowed. It was noticeable that the set and drift was in the opposite direction to that expected by all those concerned. The diagram is a tracing of positions found on Chart No. 2110, with an explanation of the order of events and positions. Times are SMT (GMT + 3 hours).

- 22nd 0600 Star sights (4). $14^{\circ}18'S$, $41^{\circ}33\frac{1}{2}'E$. Altered course to $209^{\circ}T$.
- 0900 Stopped. Vessel N.U.C., drifting.
- 0915 Position line obtained.
- 1212 Latitude found. No allowance for estimated set and drift. Position $14^{\circ}38'S$, $41^{\circ}10'E$.
- 23rd 0900 Position line obtained.
- 1210 Latitude found. Position $14^{\circ}02'S$, $41^{\circ}22'E$. Set and drift of 018° , 38 miles between the two noon positions.
- 1815 Star sights (3). $13^{\circ}51'S$, $41^{\circ}40'E$.
- 2048 Vessel under way. Course set $190^{\circ}T$. Speed estimated 5 kt.
- 24th 0600 Vessel stopped. N.U.C., drifting.
- 0610 Star sights (3). $14^{\circ}17'S$, $41^{\circ}53'E$.
- 0918 Position line obtained. Approx. set and drift from stars 051° , $7\frac{1}{2}$ miles.
- 1209 Latitude obtained using set and drift as above to give noon position $14^{\circ}07'S$, $42^{\circ}01'E$.
- 1810 Star sights (4). $13^{\circ}57'S$, $42^{\circ}10'E$. Set and drift from a.m. stars 041° , 25 miles.
- 2000 Vessel resumes passage, bound for Durban.

Note. The current pattern within the Moçambique Channel is complex and not fully understood. Though there is a predominantly sw'ly set on the western side the currents elsewhere show considerable variability. From the limited information available and the fact that the observer gives a position at 2048 on the 23rd from which the ship steered a course of $190^{\circ}T$ at 9 kt it cannot be ascertained how the vessel arrived at the 0610 position on the 24th. Although the vessel was in a loaded condition some leeway would have been made to the northward and it appears that an unusually strong counter-current prevailed during the period 22nd–24th May.

DISCOLOURED WATER

Eastern North Atlantic

m.v. *Theseus*. Captain R. L. Brett. Durban to Liverpool. Observers, Mr. A. S. Jagers, Extra 2nd Officer and Mr. T. McBride, A.B.

19th May 1971. At 2330 GMT a large streak of white water was seen, rather similar to a long breaker seen at night. The streak stretched about $\frac{1}{4}$ mile on each side of the ship, lying E/W at right angles to the coastline. For about 15 min after the ship had passed through the streak the wake was clearly visible for about 2 miles astern. No reaction was obtained from shining the Aldis light on the streaks or on the surrounding water and no spots of bioluminescence were seen all night. A sample was taken with the sea-water bucket as the vessel passed through the streaks and it was treated with formalin. Weather fine and clear. Wind NE, force 4-5. Sea temp. 20°C.

Position of ship: 16° 16'N, 18° 11'W.

Note. Dr. G. T. Boalch of the Marine Biological Association of the U.K., The Laboratory, Plymouth, comments:

"The sample from the *Theseus* contains several types of phytoplankton. Members of the coccolithophoridae are quite abundant. These are small plant cells covered with calcite plates. They are quite common in oceanic waters and on occasions do become dense enough to give the water a 'milky' appearance. Although in this sample these organisms do not appear to have been sufficiently abundant to have coloured the water I can only assume that this must have been the case. The streaks were presumably due to the effects of wind and water movement collecting the organisms together. The presence of numbers of coccolithophorids in this area has been reported by scientific expeditions since the 1920s."

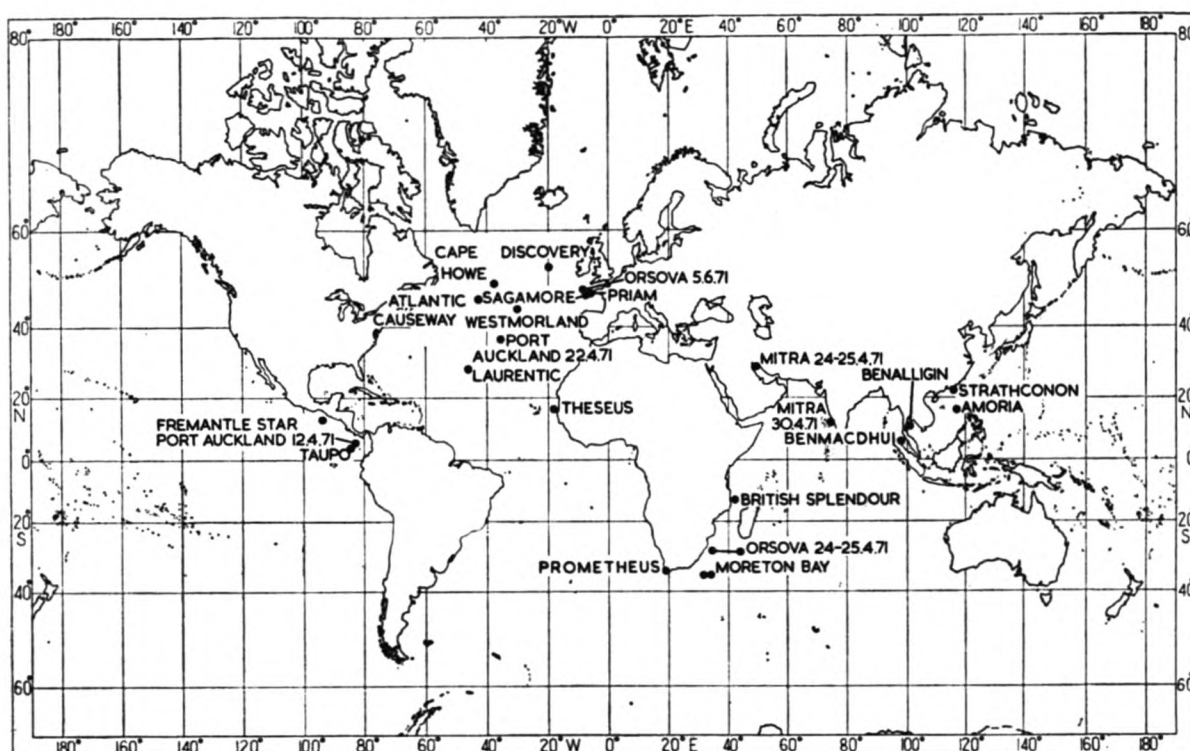
BAT

Indian Ocean

s.s. *Moreton Bay*. Captain R. A. Wilson. Rotterdam to Fremantle. Observers, The Master, Mr. R. T. Wood, 1st Officer, Mr. B. V. Chipperfield and Mr. D. R. Embury, 2nd Officers, and Mr. J. McQueen, Seaman I.

28th June 1971. At 0530 GMT a bat (or flying fox) was sighted flying around the vessel for a short length of time. At 0900 the bat was again sighted. It appeared to be exhausted as it was flying into the containers on deck. It left the container deck after about 5 min and flew around the stern for about 10 min. It then landed on the bridge wing and lay stretched out flat. An approach was made towards it but it took off again and landed in the lifeboat on the deck below, hanging first by its front claws which were an inch long and then upside-down. It seemed to be trying to sleep although there was brilliant sunshine at the time (midday). Its colouring was mainly light brownish-yellow with black at the end of its tapered 9-inch body. The face was black with a pink tongue and, when the mouth was closed, four teeth were showing. The full wing span was about 12-14 inches.





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

After staying in the lifeboat for about 30 min it flew off again and disappeared amongst the containers on deck. A search was made but it was not seen again.

The ship's course was 090°T at 22.5 kt. At 0600 the nearest land was 210 miles away. The bat might have landed on board as the ship rounded the southern tip of Africa the previous morning. Wind NW, force 3-4.

Position of ship at 0530: $35^{\circ} 19'S$, $32^{\circ} 20'E$.

Position of ship at 0930: $35^{\circ} 17'S$, $33^{\circ} 52'E$.

Note. Mr. J. Edwards Hill, Mammal Section, Department of Zoology, Natural History Museum, comments:

"The bat observed aboard the *Moreton Bay* off the coast of South Africa seems likely to be the Egyptian Fruit Bat, *Rousettus aegyptiacus* (E. Geoffroy). This species is distributed through much of Africa, including Cape Province, and, as the logbook entry suggests, the bat may well have come aboard as the ship rounded the tip of Africa and was perhaps nearer to the coast than at the time of sighting."

BIRDS

Atlantic and Pacific Oceans

m.v. *Port Auckland*. Captain G. Carling. Auckland to Hull via Panama Canal. Observer, Mr. G. P. Robinson, Supernumerary. (Reported by Mr. V. Marchesi, 3rd Officer.)

27th March-27th April 1971. During the course of the voyage a record was maintained of all sea-bird sightings. In all, 55 different species were identified of which 18 were members of the petrel family, 6 different gannets, 9 gulls and 11 members of the tern family.

Among the more interesting observations were, in the Atlantic, the large numbers of Greater Shearwaters encountered on 22nd April ($36^{\circ} 48'N$, $36^{\circ} 07'W$) and a Pomarine Skua which visited the ship every morning from 20th April ($29^{\circ} 51'N$, $48^{\circ} 26'W$) until last seen on 24th April ($42^{\circ} 09'N$, $21^{\circ} 04'W$) a distance of approx. 2,000 miles. There is no guarantee that this was the same bird; however, it would

seem unlikely to have been five different birds when more than one was never seen at any one time.

In the Pacific Ocean, the main migration north of southern petrels was not observed. However it is perhaps worth recording the very widespread observation of Buller's Shearwaters from the Hauraki Gulf on 27th March right across the Pacific almost to Panama. This bird was regularly seen (12th April, 5° 11'N, 82° 30'W) though never in large numbers and often only a single bird.

Eastern North Atlantic

m.v. *Sagamore*. Captain A. W. Cameron. Birkenhead to Nouadhibou (formerly Port Etienne), West Africa. Observer, Mr. J. H. F. Taylor, 3rd Officer.

21st May 1971. At 0800 GMT a bird was discovered on the main deck of the ship and died soon afterwards. It was mainly white with a light-grey middle, the tips of the wings were nearly black with patches of white and its beak was orange with a bright red patch. The body length was 16 inches, wing span 41 inches and the beak 2½ inches long. It had a ring attached to one of its legs inscribed "Inform British Museum, London S.W.7, GM 38225".

Position of ship: 47° 30'N, 7° 48'W.



Note. Mr. C. Mead of the Ringing and Migration Section, British Trust for Ornithology, was able to identify this bird from their records as a young Herring Gull (*Larus argentatus*), ringed at Skokholm, Pembrokeshire (51° 42'N, 5° 16'W) on 29th June 1967.

s.s. *Orsova*. Captain F. B. Woolley, R.D., R.N.R. Cherbourg to Bermuda. Observers, all deck officers.

5th June 1971. At 0815 GMT a racing pigeon was found on the wing of the bridge in an exhausted state. He was placed in a box and given some bread and milk with a sprinkling of glucose on top. For two days he resisted any type of food and an injection of glucose mixture proved to no avail. Corn, rice and maize were then attempted, once more sprinkled with glucose, and this combination proved to be successful. The bird slowly returned to form and hopped around the chart room plus an occasional flight between the wing of the bridge and the monkey island but never showed any inclination to leave. Whilst never becoming completely tame he appeared to be quite satisfied with staying on the ship and we decided to keep him till Bermuda. On arrival we cast him over the side and he did not return. His number was noted on a ring on his left leg as 38 NU 70E. On his other leg he had another ring with no writing, apparently made of plastic material. Air temp. 13.0°C. Wind NE, force 4. Visibility 2 miles.

Position of ship: 48° 02'N, 08° 49'W.

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

"The pigeon which landed on the *Orsova* did in fact come from the south-west of England and was probably engaged in a flight from Luxembourg. There are racing pigeon enthusiasts all over the world including Bermuda and I have no doubt that the pigeon will make its home with them and that eventually we shall hear from the finders. When we do I will let you know so that the ship's officers can be informed of what happened to the bird they most kindly looked after."

INSECTS

Arabian Sea

s.s. *Mitra*. Captain D. A. Doyle. Mina' al Ahmadi to Singapore. Observer, Mr. D. T. Kirkwood, 2nd Officer.

30th April 1971. During the evening, as we were approaching the Indian coast, several crickets were heard and one was eventually found. It was of the *Gryllus bimaculatus* species [as in *The Marine Observer*, October 1970], having black legs, black head and a brown body. It was kept in a tin for a few days and seemed to thrive on lettuce and water until eventually it escaped. Its chirruping, at its loudest during the early hours of the morning, was recorded on tape and, when played back, seemed to really set it off so that it reached a really piercing crescendo that could only be stopped by shaking its tin. Most of the crickets were only on the ship for about a day but a few found their way into the emergency generator room and apparently survived there for quite a few days.

About the same time as the crickets came on board a few large dragonflies were found and one which was caught alive was set down near a cricket. The dragonfly made no attempt to move but the cricket was off like a shot, apparently not liking the company it was being forced to keep!

Position of ship: 12° 12'N, 74° 30'E.

Eastern Pacific Ocean

m.v. *Taupo*. Captain E. F. H. Allen. Balboa to Wellington. Observers, Mr. M. Barnett, 3rd Officer and Mr. J. Lavin, A.B.

10th May 1971. At 0215 GMT an insect was found on the bridge wing. A green flashing light had been seen coming from the deck; on closer inspection it was discovered to be an insect which could make its tail glow a bright-green colour. Obviously this was some sort of warning or recognition signal. The insect was about $\frac{5}{8}$ inch long with 4 legs and 2 black antennae. It was sandy-brown in colour although the underside of the body, especially at the tail, was almost white. The hard wing cases had sandy-brown and dark-brown stripes from head to tail. An attempt was made to preserve this specimen but unfortunately it dried out and lost all recognition. As there is nothing about preserving like specimens in the *Marine Observer's Handbook*, some information would be very useful.

Position of ship: 4° 05'N, 84° 40'W.

Note 1. Mr. C. M. F. Hayek of the Department of Entomology, Natural History Museum, comments:

"The insect with the green flashing light is a member of the family Lampyridae which includes the glow-worms and fire-flies. It is not possible to identify the species without examining the specimen. The light which is generally shown by both sexes, though that of the female may be brighter, helps them to locate each other. Some species show their lights continuously, or irregularly, but the lights of others are distinctive, flashing or occulting or even a mixture of the two."

Note 2. An article giving hints for collectors of insects was published in *The Marine Observer*, October 1970.

(Opposite page 60)



Pilot whales seen from R.R.S. *Discovery* (see page 61)



Captain C. A. Bradshaw (right) being presented with a barograph and centennial plaque by Mr. J. R. H. Noble in Toronto (see page 82).

(Opposite page 61)

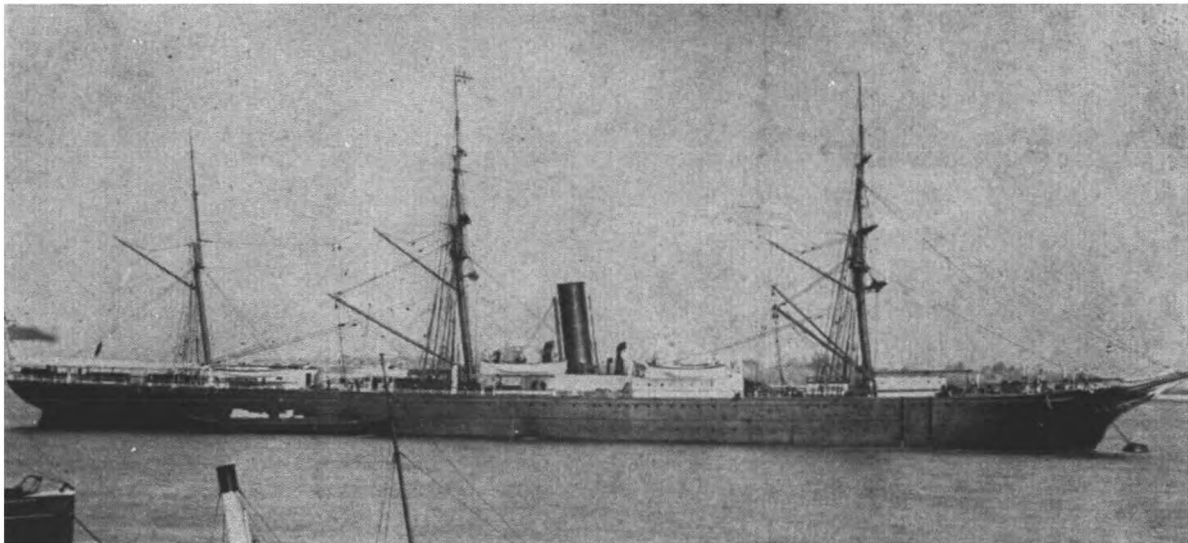


Photo by permission of the National Maritime Museum, London
Lusitania

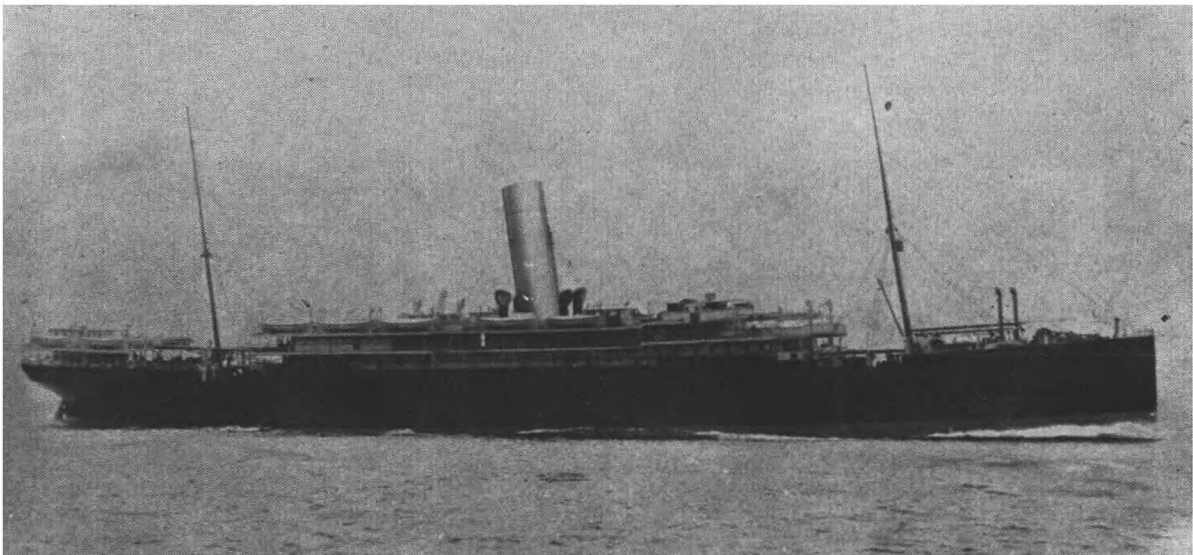


Photo by permission of the National Maritime Museum, London
Orcoma

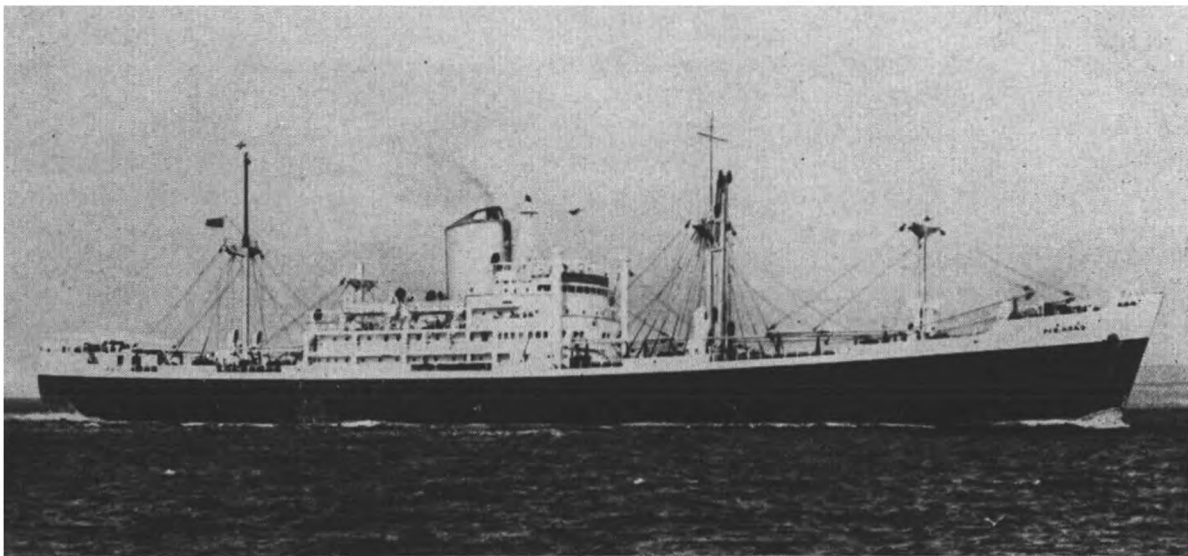


Photo by courtesy of Pacific S.N. Co.
Pizarro

THREE SHIPS OWNED BY THE PACIFIC STEAM NAVIGATION CO (see page 81).

WHALES

North Atlantic Ocean

R.R.S. *Discovery*. Captain G. L. Howe. On station. Observers, the Master and all officers.

28th–30th May 1971. On three successive days we had pilot whales visit the ship and come very close indeed. (Whales had been sighted earlier, almost certainly the same school, but they did not approach as closely.) During these visits we were proceeding at 2 kt, towing nets with acoustic 'pinger' controls operating at around 10 kc/s which we believe is around whale-communication frequency. Their chatter was easily picked up on the Precision Echo-sounder loudspeaker and they gave us quite a lot of chat. The whistles heard during the last visit were almost exactly that of the first part of a 'wolf whistle'. Estimates of the number ran at about 70 whales including a number of calves, possibly about 6 in number. The larger ones measured 20–25 ft in length and one calf cannot have been more than 6–8 ft in length. One particular action of theirs was the whole school thrashing about in the propeller wash, only 20–30 ft from the stern. When they came alongside they came as close as 10 ft. Photographs were taken at about 2030 on the 30th (*see* opposite page 60). Also at the times of the school visits there were dolphins in their company staying near but in a separate group to the whales. The dolphins never came really close. They had a white stripe along the side, separate from the white under-belly.

Position of ship (approx.): 53°N, 20°W.

m.v. *Westmorland*. Captain J. A. North. Curaçao to Liverpool. Observers, Mr. L. J. Hesketh, 3rd Officer and Mr. M. J. Morrall, Radio Officer.

11th June 1971. During the forenoon watch the vessel went through a school of about 100 whales, which passed down the side of the ship about 300 yd away. Most of them were travelling in small groups, usually of about 3 or 4, each group including at least one fairly large whale 35–50 ft in length. They had distinct fins and appeared to be a dark bluish-grey. The whales blew every 8 or 15 sec according to their size. When the larger ones blew the cloud of vapour could be seen for about 4 sec. Their general direction was E'ly and it is thought that they were fin whales. Air temp. 15.0°C. Course 058°T at 19½ kt.

Position of ship: 44° 14'N, 30° 40'W.

Note. Mr. S. G. Brown of the Whale Research Unit, National Institute of Oceanography, comments:

"Thank you for the reports of sightings of whales from the *Discovery* and the *Westmorland* and also for the three photographs relating to the *Discovery* report. We were pleased to receive these two records and to see the photographs which confirm the identification of the pilot whales. The account of their behaviour, etc. agrees with previous observations made from Ocean Weather Ships and other vessels and we have records in May of other years from weather ships at Station 'J' [52° 30'N, 20° 00'W] close to the position of the present observations.

PHOSPHORESCENT WHEELS

Gulf of Siam

m.v. *Benalligin*. Captain T. Fyfe. Port Swettenham to Bangkok. Observers, Mr. W. E. Van Geyzel, 2nd Officer and Mr. J. Elder, Cadet.

22nd April 1971. When the vessel was approximately 113 miles NW of Ponto Wai, phosphorescence in the shape of large cart-wheels was observed, sometimes revolving clockwise and at other times anticlockwise. This phenomenon was first observed at 1849 GMT (0149 SMT). At this time the spokes of the wheels appeared to be revolving anticlockwise and at 1852 the spokes changed to a clockwise rotation. Shortly after, it was noted that as one cart-wheel rotated in a clockwise direction, the

other was doing the opposite. By 1859 these rotating spokes had slowly faded out, leaving bright flashes in the water which disappeared by 1900.

This phenomenon appeared again between 1925 and 1935. It was first seen coming from ahead and moving in a sw'ly direction. A few minutes later it abruptly changed to the opposite direction. This time we looked especially for mist patches but none were observed. The degree of luminosity was difficult to assess and, although it was not enough to read by, the spokes could be seen coming from at least a mile off. The time interval of the spokes was no more than $\frac{1}{2}$ sec and the spokes were about 10 ft wide. It was noted that before, during and after these observations, lightning was visible but no thunder was heard. Air temp. 28.9°C , wet bulb 26.5° , sea 28.6° . Course 338° at $15\frac{1}{2}$ kt.

Position of ship: $11^{\circ} 00' \text{N}$, $101^{\circ} 22' \text{E}$.

LUMINESCENCE

Malacca Strait

s.s. *Benmacdhui*. Captain D. Wright. Durban to Penang. Observers, Mr. T. D. Corbett, 2nd Officer and Mr. A. Rowe, Cadet.

22nd April 1971. At 1815 GMT, after the vessel had been moving through an area of generously speckled bioluminescence for about 2 hours, a diffused flashing was observed about 2 miles ahead. On entering the area the flashing was seen to originate from a system of parallel bands of luminescence of a pale-green colour. The bands lay approximately along the ship's course line (WNW/ESE) and were moving to the NNE from a point about 4 miles SSW of the ship. The width of the bands was between 60 and 70 ft (approx. ship's beam) and they were moving across the ship at regular $1\frac{1}{2}$ sec intervals, giving a speed of 24 kt. The ship passed through the area in 8–10 min, thus the bands were about 2 miles in length. The bands appeared to be about 10 ft under the surface and the brilliance caused a diffused glow over the whole ship with each flash. The recommended experiment was tried with the Aldis lamp to see if any difference was noted but none was observed. Air temp. 29.5°C , sea 31.6° . Course 095°T . Wind calm.

Position of ship: $5^{\circ} 45' \text{N}$, $97^{\circ} 55' \text{E}$.

North Atlantic Ocean

m.v. *Laurentic*. Captain J. L. Stobbs. Curaçao to Belfast. Observers, Mr. R. G. Hodgkinson, 3rd Officer and Mr. A. Geeves, A.B.

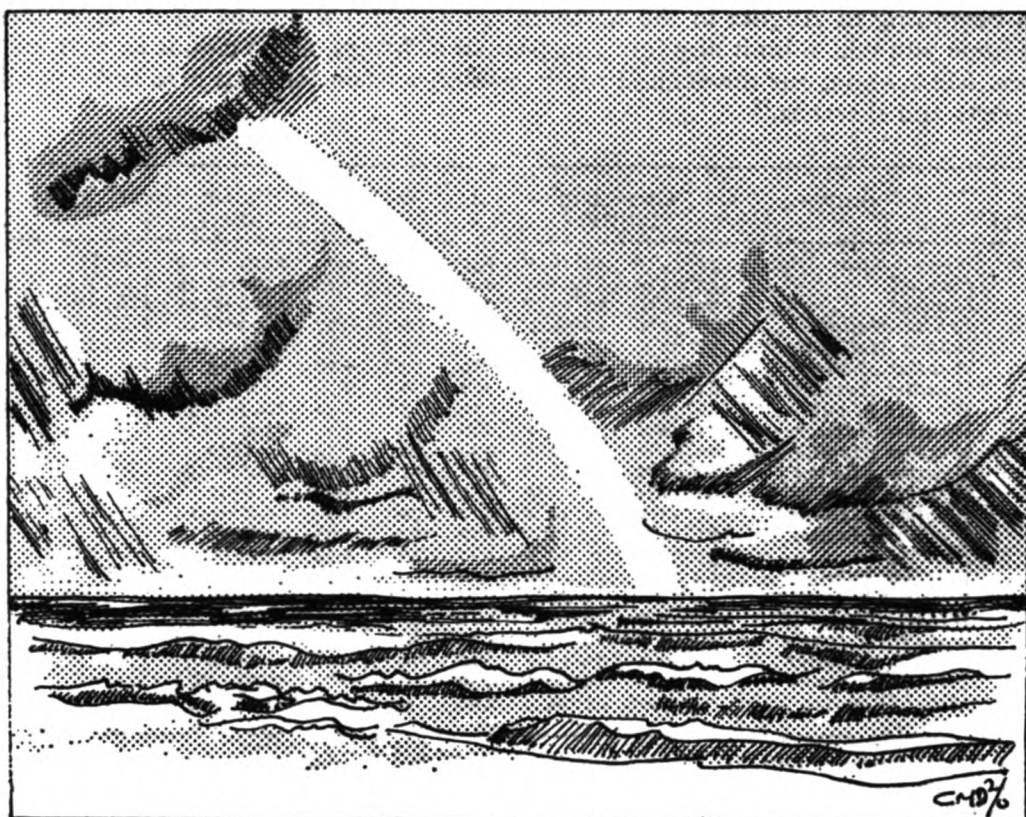
23rd April 1971. At 0220 GMT very marked luminescence was observed in the bow wave lighting up the forepart of the ship as if it was moonlight. When the Aldis lamp was used the sea around the ship lit up, looking very milky. (The echosounder had no effect.) The brightest patches appeared to be congregated around patches of weed. The luminescence took the form of a white glow made up of what appeared to be millions of individual dots and in the Aldis beam red and green spots like cat's eyes could also be seen. These dots would be about the size of a sixpence whereas the white dots were very small. When the Aldis was switched off, the glow lasted only about 5 sec. No activity could be observed further than about 80–100 ft from the ship's side. However, it is possible that the Aldis beam did not penetrate the surface of the sea at that distance. Air temp. 23.1°C , wet bulb 20.2° , sea 23.0° . Pressure 1022.0 mb. Wind w'ly, force 1–2. Course 058° at 18 kt.

Position of ship: $28^{\circ} 25' \text{N}$, $46^{\circ} 17' \text{W}$.

LUNAR RAINBOW

North Atlantic Ocean

m.v. *Cape Howe*. Captain C. Strachan. Pointe Noire, Bay of Seven Islands to Newport, Mon. Observers, Mr. C. MacDonald, 2nd Officer and Mr. T. Ayres, A.B.



10th May 1971. At 0340 SMT a partial lunar rainbow was observed. The moon was full, altitude about 15° . The rainbow was whitish-grey and, had it been complete, would have had a radius of 25° – 30° . It lasted about 10 min. Air temp. 4.8°C , dew-point 3° . Cloudy with showers.

Position of ship: $50^{\circ} 00' \text{N}$, $37^{\circ} 41' \text{W}$.

AURORA

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

"Listed briefly below are the reports from British ships of aurora observed during the three months April–June 1971, with the addition of some received recently for past dates.

"During the three months there were five occasions—9th/10th, 14th/15th, 21st/22nd April and 6th/7th, 17th/18th May—when the figure of 6 was reached in the 0–10 scale of geomagnetic activity, a figure of 8 being recorded around midnight GMT on 14/15th April. The associated obviously large-scale auroral display was not extensively reported because of cloudy conditions, at home and overseas. The *Weather Adviser* was about to be relieved at 'Alfa' by the *Weather Monitor*, and observers on both ships reported aurora on this night, but they too were viewing between cloud. Some of the activity would, on this occasion, have been to the south of their positions. A 'curtain' type rayed band was overhead in Scotland, and rays and a glow were observed from as far south as northern France by the pilot of an aircraft flying from Zürich to London.

"For two hours before midnight, local time, on 28th/29th June, aurora was observed by officers of the *Mabel Warwick* when the ship was south of Anticosti Island—seemingly a favoured area for auroral observations—when the appearance and development of arcs first from the east and then from the west coincided with the hours of darkness.

"The noctilucent cloud-observing season began at the end of May. The *Weather Surveyor* observers reported a display on the night of 25th/26th June. Unfortunately it was not possible to confirm this display from observations in the British Isles where there was almost continuous low cloud but, since the cloud was described as resembling rippled cirrocumulus, it was assumed to be noctilucent cloud. The fact that geomagnetic activity was at a moderately high level indicated that part of the display, that similar to a quiet arc, might in fact have been an auroral arc.

"By the time these notes are published, the noctilucent cloud-observing season (end of

May to beginning of August in the northern hemisphere) will once again be approaching, and we hope you will submit any (even suspected) sightings of the clouds as well, of course, as aurora. Meanwhile, our thanks and admiration once again for your care and trouble taken over reports and sketches."

DATE (1970-71)	SHIP	GEOGRAPHIC POSITION		Λ	ϕ	I	TIME (GMT)	FORMS
5th Sept.	<i>Nova Scotia</i>	49°23'N	48°26'W	030	60	+72	0315-0400	RR, N
8th	<i>Dunadd</i>	52°24'N	53°02'W	020	63	+75	0430-0745	HA, RA, RB
12th	<i>Dunadd</i>	50°15'N	59°10'W	010	62	+75	0400-0515	HA, RB, RR
15th Feb.	<i>British Mallard</i>	69°39'N	18°58'E	120	67	+77	1800-1810	HB, RB, RR, N
26th	<i>British Mallard</i>	57°08'N	—	—	—	—	0001-0500	HA, RR, N
4th Apr.	<i>Weather Adviser</i>	62°08'N	33°03'W	060	70	+76	2315	RA
12th	<i>Weather Adviser</i>	62°06'N	33°06'W	060	70	+76	0200	HB
14th	<i>Weather Monitor</i>	58°32'N	17°43'W	070	64	+72	2205-2332	HB, RR, N
15th	<i>Weather Adviser</i>	61°58'N	32°27'W	060	70	+76	0500-0530	HA, RR, P
	<i>Weather Monitor</i>	59°53'N	23°00'W	070	67	+74	2250	N
16th	<i>Weather Monitor</i>	60°09'N	24°16'W	060	67	+74	0300, 0400	N
17th	<i>Weather Monitor</i>	61°22'N	29°19'W	060	69	+75	0310	HA, N
18th	<i>Weather Monitor</i>	61°54'N	31°30'W	060	70	+76	0040-0310	HB, N
19th	<i>Weather Monitor</i>	61°40'N	32°46'W	060	70	+76	0050-0110	HB
21st	<i>Dunadd</i>	55°50'N	28°00'W	060	63	+72	2235-2350	RB, RR
	<i>Weather Surveyor</i>	58°16'N	17°00'W	070	65	+72	2305-0200	All forms
23rd	<i>Weather Surveyor</i>	58°57'N	19°04'W	070	65	+72	0050-0300	N
24th	<i>Weather Surveyor</i>	59°00'N	18°30'W	070	65	+72	0001	N
7th May	<i>Weather Surveyor</i>	59°08'N	19°03'W	070	65	+72	0106-0300	RA, RB, RR, N
14th	<i>Weather Reporter</i>	62°00'N	32°40'W	060	70	+76	0200	RR
26th June	<i>Weather Surveyor</i>	58°54'N	19°29'W	070	65	+72	0052-0203	HA
29th	<i>Mabel Warwick</i>	Anticosti Island		010	60	+75	0215-0430	HA, RA, RR

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

Three Thousand Million People—only one Biosphere*

BY DR. K. LANGLO

(Deputy Secretary-General, World Meteorological Organization)

A story circulated in the world press a few months ago concluded that one single jaguar fur coat may have been made at the cost of the lives of 300 Brazilian Indians. Why 300 lives? Because the jaguar, as a species, is at the point of being eliminated by unscrupulous hunting and, instead, the jungle is becoming overcrowded with all sorts of smaller animals, such as rats, which normally would have been eaten by the jaguars. These smaller animals carry with them a serious disease which kills large numbers of Indians. Therefore the figure 300. This is only one of many examples of the fact that the human being, *homo sapiens*, by ignorance or voluntarily, is changing the delicate balance of biological or physical processes in the biosphere. The purpose of this article is to demonstrate very briefly the complexity of the associated problems and how meteorologists and hydrologists are becoming more and more involved in problems of an inter-disciplinary nature.

We know that the human race has existed for about two million years, but the serious question raised by scientists today is: Will the present form of life on our planet continue for millions of years or only for a few decades?

Population, food and energy

One of the first problems that comes to mind is the relation between food and population. In the course of two million years up to 1920, the world population reached 1,000 million and it is estimated to reach 7,000 million by the year 2000. Will we, by means of the 'green revolution' and other scientific developments, be able to feed all these people? The experts are not all in agreement on this, but many believe that the important question is not whether we can produce enough food but rather what would be the environmental consequences if we attempted to feed the growing populations. There are many meteorological and hydrological aspects of food production which I will not dwell on here but one of the problems is the enormous loss in food production due to wind erosion. This matter has also another interesting aspect: wind erosion contributes significantly to the amount of particulate matter present in the atmosphere and is one of the important factors influencing the amount of solar radiation reaching the Earth's surface. We shall later see how important this matter is for studies of climatic changes.

The general problem of waste disposal and the danger of pollution of air, land, fresh water and oceans is so well known that I will only mention as examples that in 1968 the average American threw away almost 300 cans, 150 bottles and 140 kilograms of paper and that when Heyerdahl and his international crew crossed the tropical Atlantic with *Ra II* they passed through vast areas of visibly polluted sea. The problem of sea pollution is not only one of waste disposal, but is also linked with exchange processes between the atmosphere and the ocean; here again we are faced with an inter-disciplinary problem.

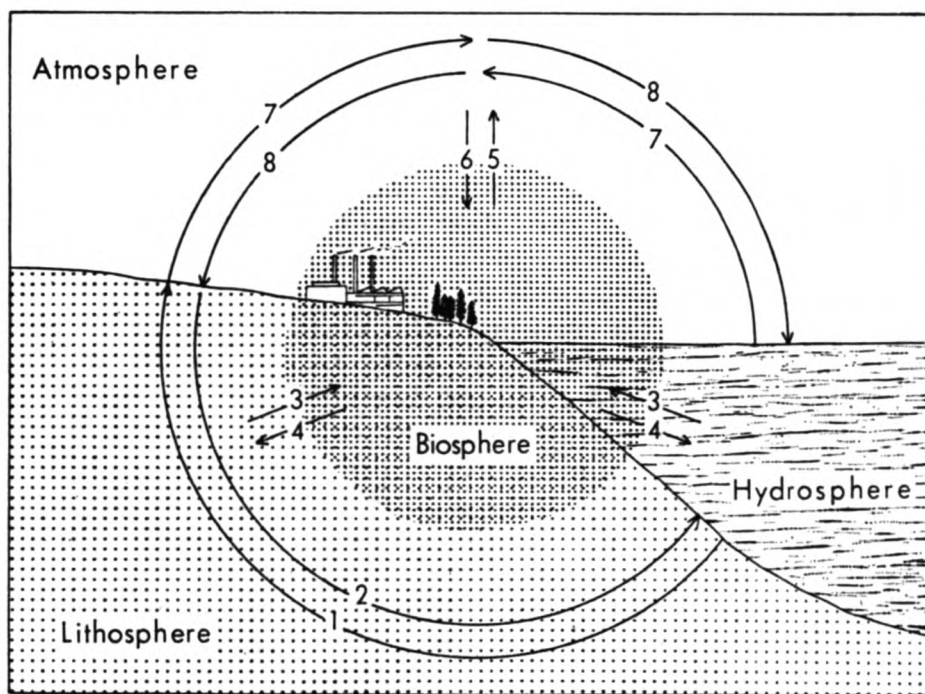
Turning now to the possible consequences of the increasing use of energy and the changing sources of this energy, it is worth noting that by the year 2000 the expected energy consumption in North America, for instance, will be more than doubled and that while at the beginning of this century coal contributed 75 per cent of the consumed energy, a similar percentage is now coming from burning oil and gas. The possible consequences of this will be discussed later.

* This article is based on an informal talk given by the author to the WMO Staff Association and is reproduced from the *WMO Bulletin*, Vol. XX, No. 4, October 1971, with the kind permission of the Editor.

The question has been raised whether the increasing use of man-made energy can have any influence on the climate. If in 50 years' time the rest of the world has reached the present level of energy consumption in the United States, the total annual man-made energy will, according to F. Singer, be about 1/1,000 of the annual energy which the Earth radiates back to space. This is a small amount, but according to Professor Budyko it may be enough, disregarding other factors, to turn the present unstable climate into a stable climate.

Chemical cycles in the biosphere

Let us now take a closer look at the biosphere which, for the present purpose, may simply be defined as "that part of the lithosphere, hydrosphere and atmosphere where life can exist". We know that one of the fundamental processes in the biosphere is the utilization of solar energy by the vegetation, in the presence of water (H_2O), for the photosynthetic reduction of carbon dioxide (CO_2) from the atmosphere to form organic compounds (CH_2O) on the one hand, and molecular oxygen (O_2) on the other. If we examine the chemical composition of living matter (mainly trees) on an average land surface, we find that, in addition to the oxygen, carbon and hydrogen involved in photosynthesis, living matter also contains large amounts of nitrogen and smaller quantities of sulphur and phosphorus, all of which are among the elements in nature which are being influenced by man's activities (see Fig. 1).



The intensive cycling of phosphorous, nitrogen and sulphur begins (1) with the use of phosphorous as a fertilizer, which returns (2) to the lithosphere and is then taken up (3) by aquatic and terrestrial organisms and returned (4) to the lithosphere and hydrosphere by decay. Carbon dioxide, nitrate and sulphate, rising (5) into the atmosphere from industrial activity and falling (6) in rain may be re-absorbed by vegetation. Soluble and volatile elements are transferred by the evaporation- (7) precipitation (8) cycle.

Fig. 1. Eutrophication of the biosphere. (From 'Mineral Cycles' by Edward S. Deevey, Jr. Copyright © September 1970 by Scientific American, Inc. All rights reserved.)

Starting with hydrogen and oxygen, water is by far the most abundant single substance in the biosphere and a number of problems of the biosphere are linked with the well-known water cycle—from the ocean through evaporation, condensation in the atmosphere, precipitation and then through lakes, glaciers and rivers back to the ocean. One of the interesting features of this cycle is the relatively small amount of water existing in the form of water vapour in the atmosphere, namely, an equivalent depth of only 0.03 metre if equally distributed over the Earth's

surface. On the other hand, the equivalent depth of all ice and snow is estimated at between 50 and 120 metres, so it is readily understood that relatively small climatic changes influencing the glaciers of the world may have catastrophic consequences. The use of water for industrial and domestic purposes is enormous and is increasing rapidly and at the same time the water pollution is alarming. Many alternatives are being studied to meet this situation, among them increasing use of ground water, desalting of sea-water and artificial weather and climate modification, including partial diversion of the flow of major rivers.

The oxygen now in the atmosphere is believed to be mainly of biological origin. The oxygen content has fluctuated considerably in the past and many of man's activities, such as burning of fossil fuels, paving of green land, etc., may influence the oxygen content. Scientists believe, however, that a reduction of oxygen in the atmosphere by several per cent will not have any adverse effect. Part of the atmospheric oxygen is converted into ozone (O_3) which filters out certain harmful ultraviolet wavelengths of the solar radiation. The possible effects of supersonic transport aircraft (SST), cruising at the level of maximum concentration of ozone (18–20 km), have caused much speculation and some scientists are of the opinion that a large number of SST aircraft may reduce the protecting power of the ozone layer and, in the long run, have adverse health effects. Other scientists have shown that the effects of regular operation of such aircraft will probably be so small (of the order of 1/30 of the daily variations in the total amount of ozone) that it would be difficult to measure with the normal ozone spectrophotometers.

Turning now to the nitrogen cycle, although man and animals are living in an ocean of air that is 79 per cent nitrogen, we are not able to utilize it directly. Nitrogen has to be 'fixed', i.e. incorporated into a chemical compound that can be utilized by plants and animals. The industrial fixation of nitrogen exceeds in magnitude all other interventions in the cycles of nature and by the year 2000 this fixation may reach an amount of 100 million metric tons per year. At the present time nine million tons of nitrogen are accumulating every year in the soil, in the groundwater reservoirs, in rivers, lakes and in the ocean.

The increasing use of chemical fertilizers by the world's farmers (more than 60 million tons per year) has great benefits for world food production but has two important hazards. In special cases it may cause local pollution of drinking water, and it may contribute to the well-known phenomenon of eutrophication, which gives rise to massive growth of algae which in turn deplete the water and may kill off fish. An additional problem is the increasing release of sulphur into the atmosphere by combustion of fuels. It is believed that only 20 per cent of the sulphur products in the atmosphere are of volcanic origin, while 80 per cent are man-made. When these sulphur products are brought to the ground by precipitation they may increase the acidity of lakes and rivers and even endanger the lives of certain species of fish such as salmon.

Finally, we come to the carbon cycle in the biosphere. As already mentioned, the burning of fossil fuels has been rapidly increasing, in particular since the beginning of this century, and currently some 5,000 to 6,000 million tons of fossil carbon per year are being consumed and the waste products released into the atmosphere. The carbon dioxide content in the atmosphere, measured at the Mauna Loa Observatory in Hawaii, has increased from 314 ppm (parts per million) in 1960 to 321 ppm in 1970, and some increase has even been measured in the Antarctic. The estimated value of the carbon dioxide content in the atmosphere in the year 2000 is around 390 ppm, assuming that about two-thirds of it is quickly removed from the atmosphere either by exchange with the ocean or is used to increase the total vegetation on land. It should be borne in mind that carbon dioxide is a natural component of the atmosphere and that the mixing processes in the atmosphere are relatively rapid; the atmospheric constituents will in fact be well mixed after a period of a few years, whereas the turnover time for the deep oceans may be as much as 1,000 years.

Effects on climate

A number of speculative remarks have been made with regard to the possible climatic effects of the increasing amount of carbon dioxide in the atmosphere. Considered alone, it would reduce the loss of heat to space and it has been calculated that a 100 per cent increase in carbon dioxide may raise the mean temperature by 2-3 degc. On the other hand, such higher temperatures would produce more clouds which might tend to lower the temperature at the Earth's surface. More dust or particles in the atmosphere would also tend to reduce the mean temperature. In this connexion it is interesting to note the recent use of mathematical-physical models to calculate future climatic conditions by means of powerful computers. The results of such computations must obviously be treated with great caution, due to the uncertainties of the assumptions made, but it may well be an important tool for future calculations of the impact of possible climatic changes, whether man-made or natural.

Conclusions

What can we conclude from this brief review?

The rapidly increasing world population creates a number of problems with regard to safeguarding the balances in the biosphere.

The waste produced by man's activities is increasing at an alarming rate and creates problems of disposal and of pollution of fresh water, land and ocean.

The total energy production may, in 50 years' time, reach a proportion which is not negligible compared with natural energy transformation in the atmosphere.

The use of water is increasing rapidly and ways and means of meeting the requirements need serious attention.

The oxygen cycle in the biosphere is being disturbed with unknown consequences.

The increasing amount of nitrogen, sulphur products and other substances introduced into the biosphere creates a number of hazards.

The carbon dioxide in the atmosphere is steadily increasing, thus disturbing the normal balance in the biosphere which may change the climate.

Although man has the power to explore the moon and has demonstrated in many other ways the tremendous potential of science and technology, he has not hitherto put sufficient effort into solving the complex problems of the biosphere. It must be admitted that we do not know enough about many of the processes changing the biosphere and that therefore considerable research efforts will be needed, but many of the problems are urgent and we must take measures now with the know-how available.

The meteorologists have a vital role to play in this situation, and WMO is taking an active part in preparing for the United Nations Conference on the Human Environment to be held in Stockholm in 1972. We must all assume our part of the responsibilities in order that the governments of the world can make the best decisions and make them in time. We are 3,000 million people on this planet, but we have only one biosphere.



The presentation of a barograph to Captain H. D. T. Lockyer; left to right: Captain G. S. Cochrane, Mr. J. K. Bannon, Captain Lockyer and Captain J. Paterson (*see page 81*).



The presentation of a barograph to Captain F. D. Glover (*see page 81*).

(Opposite page 69)



The presentation of a barograph to Captain J. Illingworth (*see* page 81).



The presentation of a barograph to Captain I. Y. Batley (*see* page 81).

Ice Conditions through the North-west Passage

BY R. M. SANDERSON AND G. P. DAVIS
(Meteorological Office)

For more than 500 years traders from Europe have dreamed of a sea route around North America to the Orient: a North-west Passage (see Fig. 1). The first recorded attempt was made by John and Sebastian Cabot towards the end of the fifteenth century and since then numerous expeditions have set out to find this route. The passage remained unconquered, however, until 1906 when Roald Amundsen in the *Gjoa*, having set out in 1903, successfully completed the navigation of the route from east to west, though the existence of the route was established about sixty years earlier by the ill-fated Franklin expedition.¹

Because conditions were so hostile to the operation of ships, commercial interest in this route waned and navigation in the area was generally confined to schooner-trading in the southern regions when ice conditions permitted. Nevertheless, since 1906, several successful passages have been made, the most notable being those of Larsen in the *St. Roch*.²

Almost sixty years after Amundsen's voyage, commercial interest in the North-west Passage was suddenly re-awakened by the discovery of vast mineral resources in the more remote regions of North America, especially oil in Alaska. This interest stimulated the *Manhattan Project*³ which has demonstrated that purpose-built commercial surface vessels can operate in all but the most severe ice conditions within the Canadian Arctic. Adventure has also motivated interest in the route and an attempt to sail a small yacht, single-handed, through the passage was begun in 1971. At the time of writing this yachtsman is wintering in an Eskimo settlement at Cambridge Bay.

The purpose of this article is to describe the general ice conditions through the North-west Passage, particularly the pattern of break-up in the summer months. (Summer is here defined as the period from mid-June to early September when the mean daily 0°C air-temperature isotherm lies to the north of the area—see Fig. 2.) The ice charts discussed are based to a large extent on data derived from special aircraft reconnaissance carried out by the Canadian Atmospheric Environment Service during the ten-year period 1961–1970. The ice terms used conform to the WMO Sea Ice Nomenclature (1968) which is printed in the *Marine Observer's Handbook*, 9th Edition, 1969 (Met.O.522) and *The Mariners' Handbook*, 3rd Edition, 1971 (N.P.100).

General ice conditions

The experiences of those navigators who have attempted to force this route account for the widespread belief that ice conditions through the Canadian Arctic Archipelago are always severe. Though they undoubtedly are for most of the year, this is far from the case in the late summer when the ice usually melts over the greater part of the route so that, in most recent years, there has been an almost ice-free route in early September. Ice conditions, however, show considerable variability from one year to another. Not only does the precise location of the open-water routes vary within the individual straits, but in a few severe years the ice does not break up to the same extent in some central regions and navigation is then restricted to vessels with an ice-breaking capability. The progress of earlier expeditions, at least since the early nineteenth century, suggests that this pattern of break-up (determined from 1961–70 data) may not have varied greatly since about 1800. It would appear that the failure of the earlier navigators to complete the passage was largely due to the fact that they did not and could not know where the open-water channels existed.

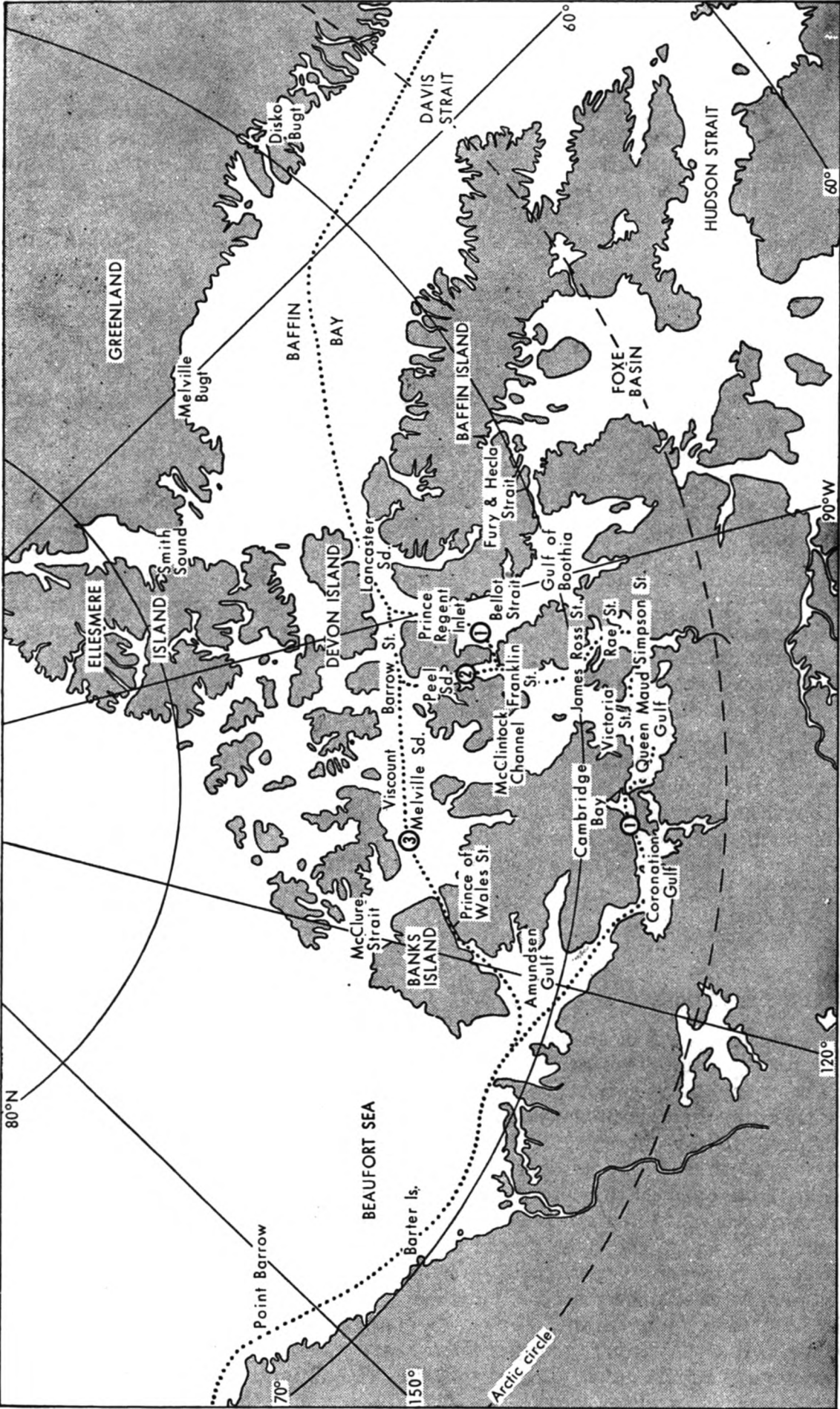


Fig. 1. The North-west Passage: key chart and recommended routes.

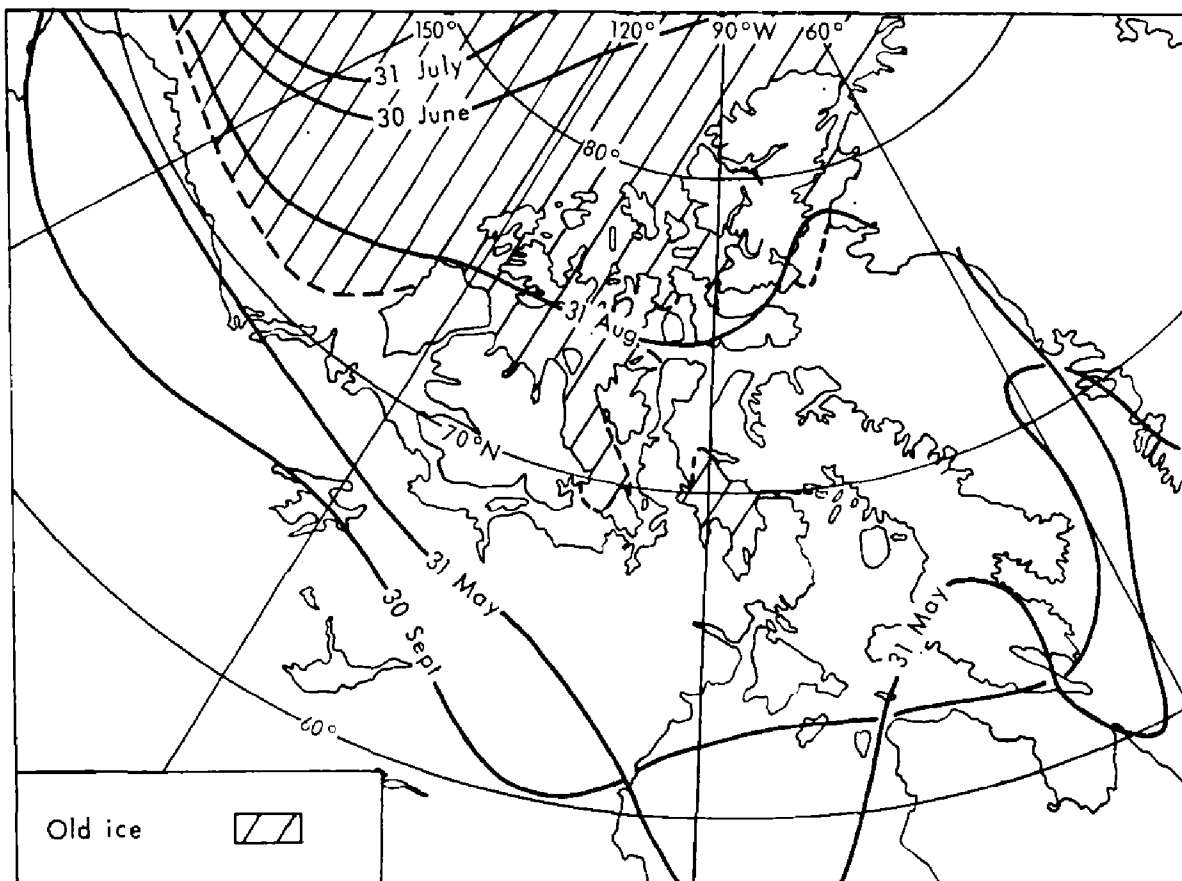


Fig. 2. Distribution of old ice. Normal positions of 0°C mean air-temperature isotherm.

Modern technology has overcome this difficulty and reasonably accurate forecasts of ice conditions are broadcast daily,⁴ based on actual ice information determined by special air reconnaissance and from the analysis of pictures obtained from meteorological satellites on polar orbit.

Distribution of old and first-year ice

The *Manhattan* Project has shown that it is possible to operate large ice-breaking transport ships in the Canadian Arctic throughout the year but the operation of small, unprotected vessels must be confined to the navigation season (late July to early October). That there is a navigation season is due to the fact that the heavily-ridged old ice of the Arctic region (ice which has survived through at least one summer) is confined to the north and north-west of the archipelago and to some relatively small areas within. The greater part of this area, including the western and eastern entrances along the north coast of Alaska and over Baffin Bay, is generally affected by first-year ice (ice which forms in one winter and melts before the next)—see Fig. 2. This distribution of first-year and old ice determines the possible routes through the Canadian Arctic.

Routes

Due to potentially adverse ice conditions throughout the summer in Foxe Basin, Fury and Hecla Strait and the Gulf of Boothia, the entrance via Hudson Strait is not recommended. The only practical point of entry from the east is around the northern end of Baffin Island and into Lancaster Sound. Once in this Sound there are three recommended routes through the archipelago to the Beaufort Sea (see

Fig. 1), the choice of route being not only dependent on the actual ice conditions but also on the size of the vessel. The first route, suitable for small vessels only because of the shallow depths in some regions, lies through Prince Regent Inlet, Bellot Strait, Franklin, James Ross, Rae and Simpson Straits to Queen Maud Gulf, thence westward along the mainland coast. (Victoria Strait is not recommended due to adverse ice conditions.) The second route differs from the first only in that it attains Franklin Strait by way of Barrow Strait and Peel Sound. (McClintock Channel is normally covered by close pack-ice, consisting of old floes, throughout the year.) The third route, suitable for larger vessels (and that navigated by the 62,435 G.R.T. *Manhattan*), lies through Barrow Strait, Viscount Melville Sound and Prince of Wales Strait into Amundsen Gulf. (A possible fourth route through McClure Strait and along the west coast of Banks Island is usually affected by severe ice conditions throughout the year.)

Ice thickness, ridging

At the time of maximum extent (March) sea-ice covers the whole of the area from the approaches to Davis Strait in the east to the Bering Sea in the west. In general, over the first-year ice areas, the ice, where level, will have attained a total thickness of about 7 feet at this time. Where the ice is deformed, ridges 30 feet high, with associated ice keels 100 feet deep, may occur. Old ice, where level, will normally be about 10 to 12 feet thick by late March and will attain similar heights and depths to first-year ice where deformed. (In summer, level old ice may well reduce to 6 feet or less in total thickness.)

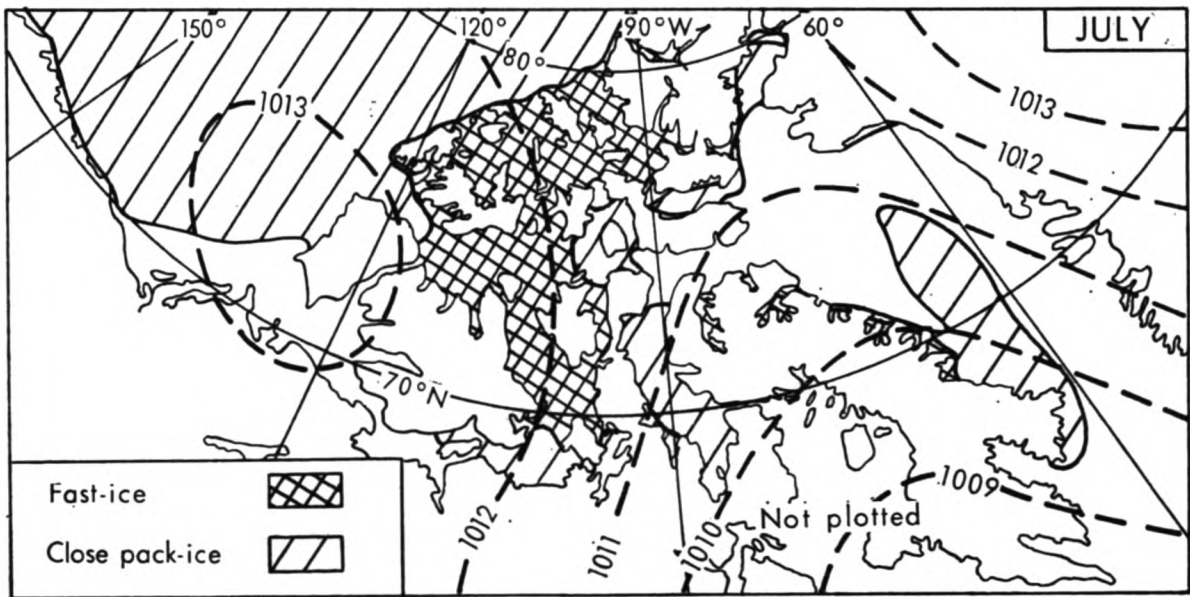
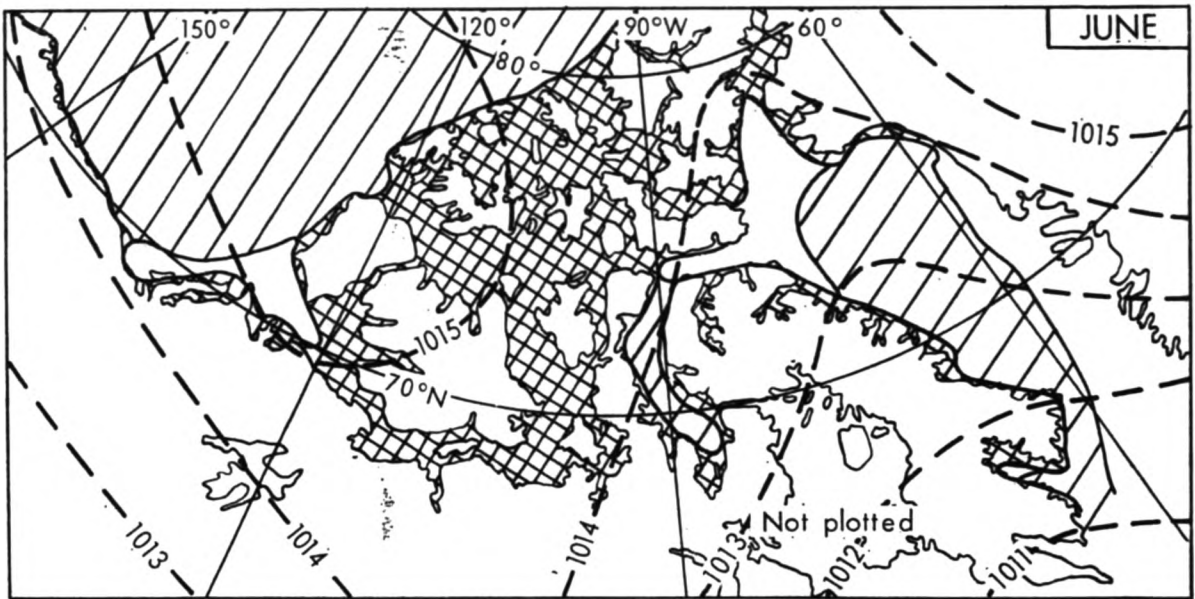
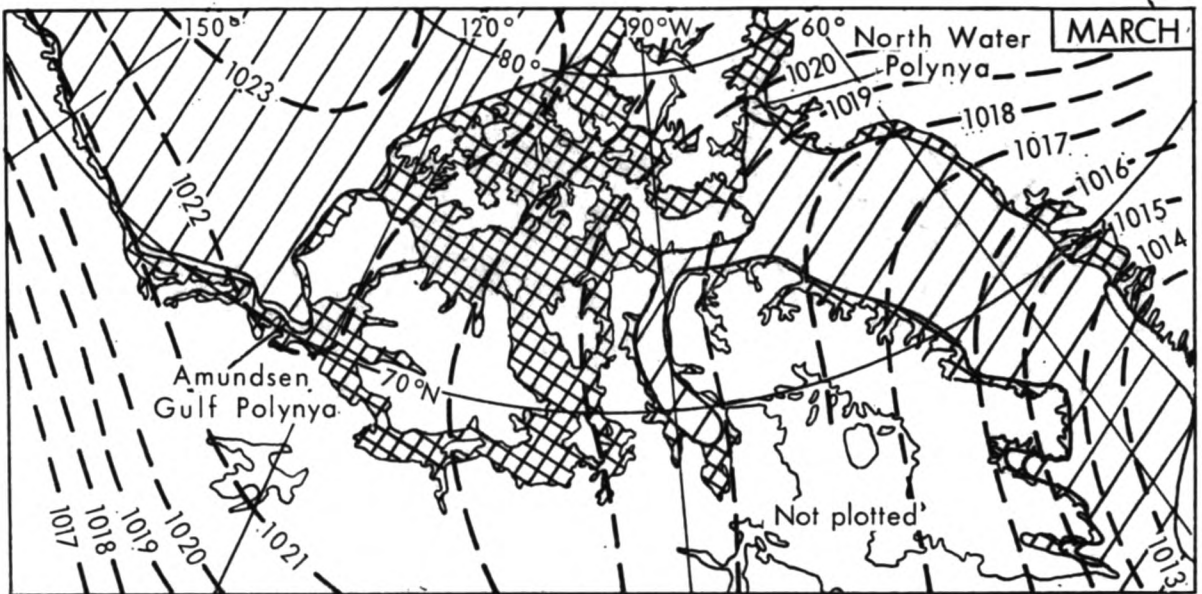
Since the area is covered by ice each winter the only variability that is possible from one winter to another is in the thickness of the ice. The first few feet of ice are formed early in the winter and after this, due to the insulating effect of the ice in reducing the flow of heat from the water below to the very cold air above the ice, the rate of new freezing at the ice/sea water interface is greatly reduced, so that the total thickness of the ice varies a few inches only from a mild to a severe winter.

There is little information on ridge frequency over the archipelago. In general, pack-ice will be more frequently ridged than fast-ice but ridging within the latter will depend on the stage at which it became fast. Ice which has become fast early in its formation is generally fairly level, whereas fast-ice which results from the consolidation of pack-ice will normally be heavily ridged.

Type of ice

The ice-cover over the area takes two significantly different forms. One is pack-ice—ice which consists of discrete floes of varying sizes which move, albeit slowly and erratically, under the influence of wind, current and internal stresses within the pack. This type of ice is found off shore in Davis Strait, Baffin Bay, Lancaster Sound, Prince Regent Inlet and the Gulf of Boothia in the east, and over the Beaufort Sea in the west. The remainder of the area is covered by fast-ice—a complete cover of ice which is fixed to coasts and is generally immovable. Fig. 3 (a) shows the usual position of the boundary, or 'flaw' as it is known, between these two types of ice.

The location of the flaw at the head of Baffin Bay and in Amundsen Gulf is of great importance to the pattern of break-up, since it is the development of the recurring polynyas in these areas which heralds the arrival of spring. In some years, however, there are major differences from this picture in that occasionally the fast-ice may extend eastwards to cover most of Lancaster Sound and sometimes Amundsen Gulf may be covered by pack-ice rather than fast-ice. The importance of these variations in the position of this boundary will be revealed in the following description of the pattern of break-up in summer.



Figs. 3 (a), (b), (c). Average ice conditions at the end of March, June and July and average surface pressure (1951-1966) during those three months.

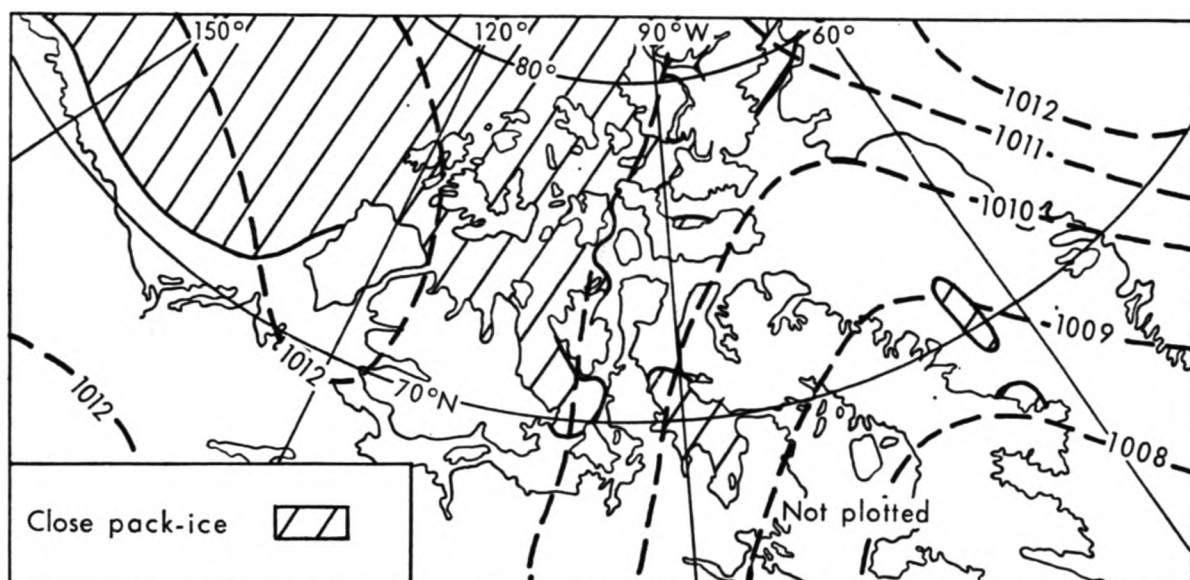


Fig. 3 (d). Average ice conditions at the end of August and average surface pressure during that month.

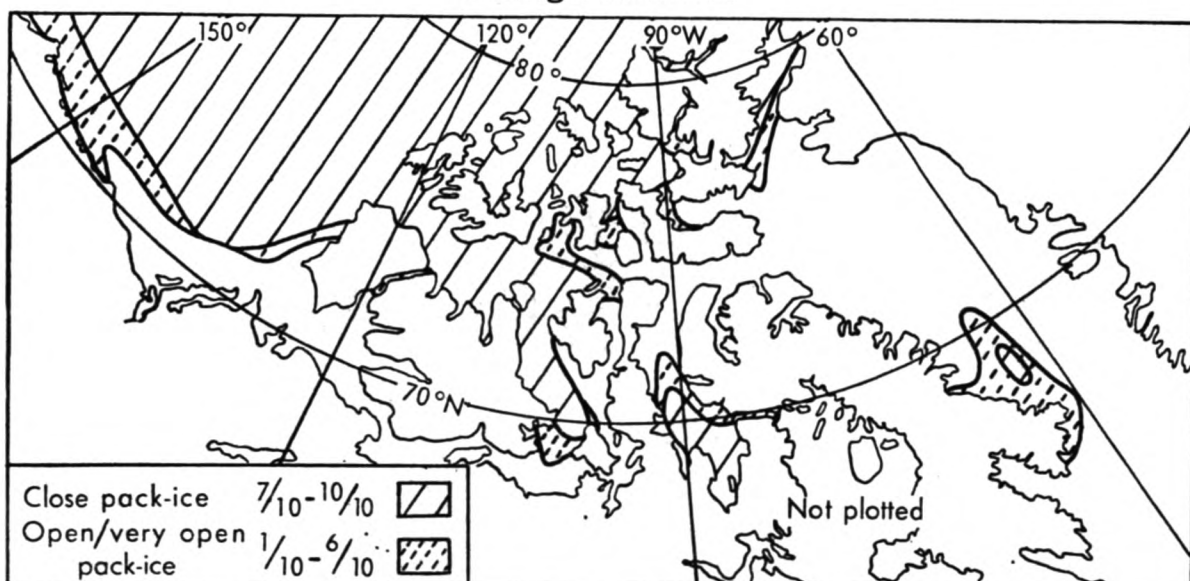


Fig. 3 (e). Average ice conditions on 10th September (usual date of minimum ice extent).

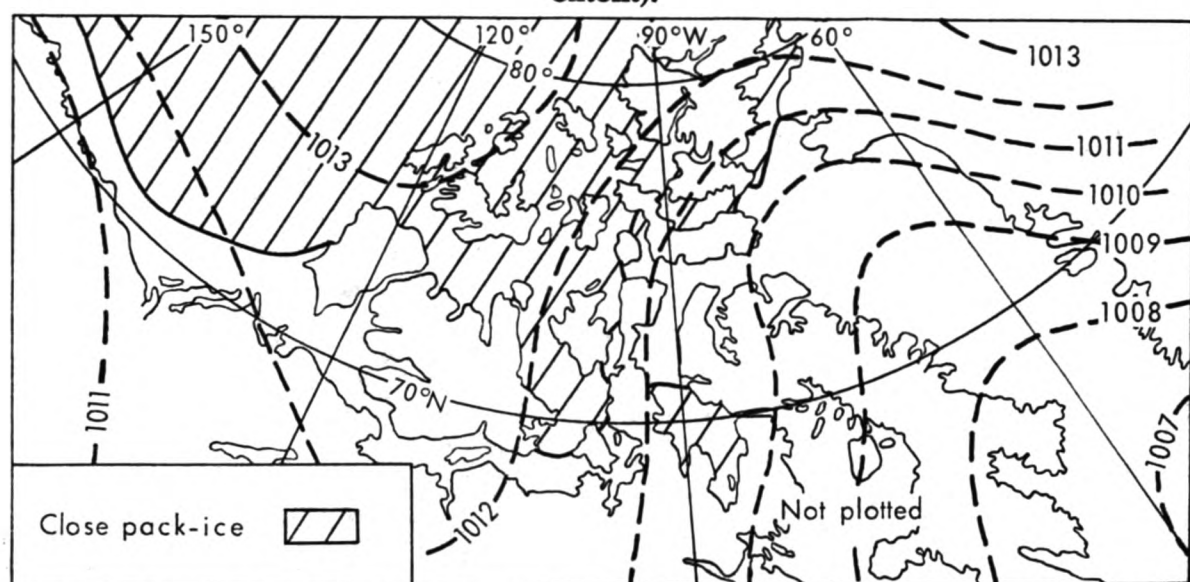


Fig. 3 (f). Average ice conditions at the end of September and average surface pressure during that month.

Development of break-up

It can be seen from Fig. 3 (a) that at the end of March there are already a number of polynyas in existence. These recur in most years at the flaw between the fast-ice and the pack-ice. The pack-ice, being free to move under the action of the wind, drifts away from the static fast-ice leaving a lane of open water. As air temperatures at this time of year are still well below freezing, new ice will form very rapidly and the polynyas will remain fairly small.

North Water polynya

The most well-known of these polynyas is that which forms in northern Baffin Bay to the south of Smith Sound. The North Water, as it is named, occurs throughout the winter and is an important factor in the break-up of Baffin Bay ice during late winter and summer. The winds over Smith Sound during the winter, typified by the isobar pattern displayed in Fig. 3 (a), prevail from the east-north-east and move the pack-ice away from the Greenland coast towards the east coast of Ellesmere Island. (Ice moving under the influence of wind alone moves along the direction of the isobars at a rate of about 1/100 of the geostrophic wind producing the movement. The reason for this is that the surface winds over the region are backed by about 30° from the geostrophic wind but the ice moves at about the same angle to the right of the force causing it to move.) Off the coast of Ellesmere Island the pack-ice is pushed southwards by the action of both wind and current. Since Smith Sound is covered by immovable fast-ice the only means of replacing pack-ice in this area is by the continual re-freezing of the North Water. It follows from this, therefore, that the ice in the north-west of Baffin Bay is thinner than that further south and will melt more readily in summer. As the temperatures rise in late winter the re-freezing of the North Water proceeds more slowly and consequently its area begins to increase. By the end of May, although air temperatures are still below 0°C (see Fig. 2), this polynya has extended southwards to Lancaster Sound and has linked with a second polynya which has been formed there by wind and current in much the same way.

In this case winds from the northern quarter are required to move the pack-ice southwards from Devon Island into the east-going current in the south of the Sound (see Fig. 4) which carries the ice into Baffin Bay. It can be seen that if there is an absence of winds from the required direction during late winter, or if Lancaster Sound is covered by immobile fast-ice rather than pack-ice, then break-up in the Sound will be delayed. An example of the latter effect occurred in 1970 when the break-up in Lancaster Sound was delayed by about two months.

Amundsen Gulf polynya

The other polynya worth noting is that which forms to the west of Amundsen Gulf. This begins to form in late March as the south-easterly winds required for its formation replace the north-westerlies of the preceding winter months. If the Gulf is not covered with fast-ice the polynya extends further east than usual and, given favourable winds to drive the pack-ice westwards, the whole Gulf may be almost ice-free by late May even though air temperatures have yet to rise above 0°C.

Break-up of fast-ice

At the end of June, due to the action of wind and waves, the North Water and Amundsen Gulf polynyas have become vast areas of open water. By then, under the influence of wind and current, the Baffin Bay ice edge has retreated westwards to open up a wide lead off the west coast of Greenland (see Fig. 3 (b)). Despite these large changes in the pack-ice zone, the fast-ice at the end of June remains intact.

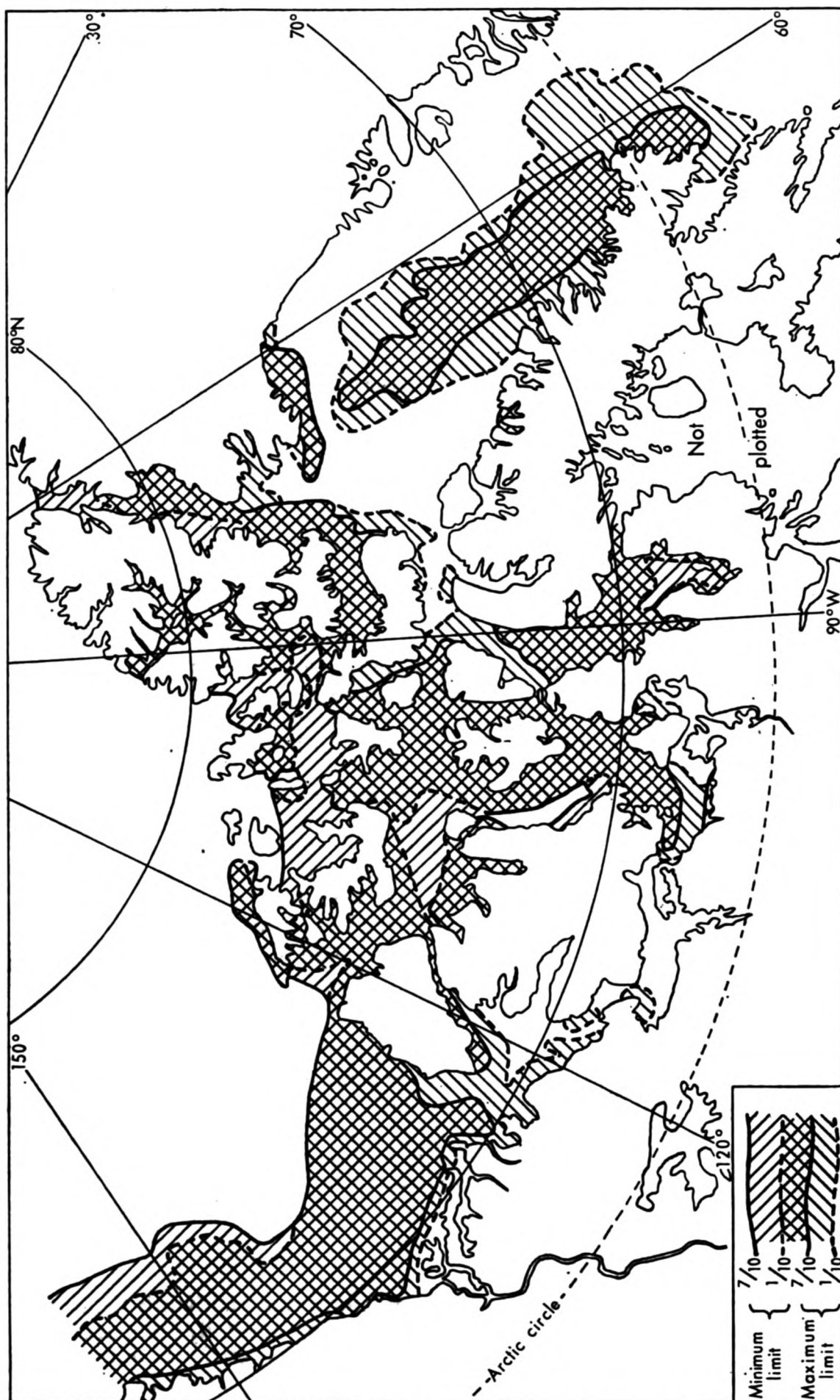


Fig. 3 (g). Variability of ice conditions on 10th September (usual date of minimum ice extent).

The break-up of the fast-ice is almost entirely dependent on the process of puddling. As the air temperatures rise above 0°C in early June the snow cover on the ice melts, forming puddles. These, in turn, absorb insolation at a much greater rate than the highly-reflective snow-cover, leading to a rapid increase in the rate of melting of the underlying ice. However, it is not until late July that the fast-ice has broken into pack-ice and is then free to move under the action of wind and current. At this time there is usually open water in the west from Coronation Gulf to Barter Island, with a lead extending westwards to Point Barrow and, in the east, there is an open-water route around the Baffin Bay ice into Lancaster Sound and Barrow Strait (see Fig. 3 (c)).

Mean minimum conditions

At the end of August these two open-water areas have almost connected with each other (see Fig. 3 (d)). By now conditions are almost at their best as temperatures to the north of the area are falling to near 0°C . A further slight improvement is maintained in early September until about the 10th when ice conditions normally reach their minimum extent (see Fig. 3 (e)). This shows Route 1 to be just clear of ice and Route 2 to be clear apart from an area of open, or very open pack-ice at the northern entrance to Peel Sound. Route 3, however, has about 180 n. miles of close pack-ice in Viscount Melville Sound to be negotiated before reaching the much easier conditions of Prince of Wales Strait.

Variability of mean minimum conditions

Fig. 3 (f), showing the extreme limits of close and very open pack-ice for 10th September, demonstrates how much ice conditions vary from season to season. The major factor in determining the amount of ice affecting the passages through the archipelago is the wind during the month of August; it has little effect earlier (except, as mentioned before, in the case of Lancaster Sound and Amundsen Gulf) because of the solidity of the ice cover. In August, on average, the winds over this region prevail from some point between north and east resulting in the distribution of ice shown in Fig. 3 (d). A bad summer is caused by winds from between north and west producing severe ice conditions in the important central channels from northern Peel Sound to James Ross and Victoria Straits. Winds from between south and east are associated with light sea-ice conditions in most channels in summer.

The importance of the August winds is emphasized by the development of the season during 1963 when mild south-east winds during June and July were replaced in August by winds from the west. By early September the ice within the archipelago had been forced eastward with the result that the northern approach to Peel Sound was blocked with close pack-ice, as was James Ross Strait. In fact in this particular year, alone of the ten studied, the route through Viscount Melville Sound and Prince of Wales Strait would have given slightly less ice than the other two routes.

An important exception to the general rule that winds from between south and east cause light ice conditions in summer is that these winds drive pack-ice from the Gulf of Boothia north-westwards to block the eastern approaches to Bellot Strait. In these circumstances Route 2 would probably provide an ice-free alternative.

In the west the width of the shore lead in the south of the Beaufort Sea is chiefly determined by the wind from July onwards. The best conditions usually occur with winds from between south-east and south-west, whereas bad conditions are

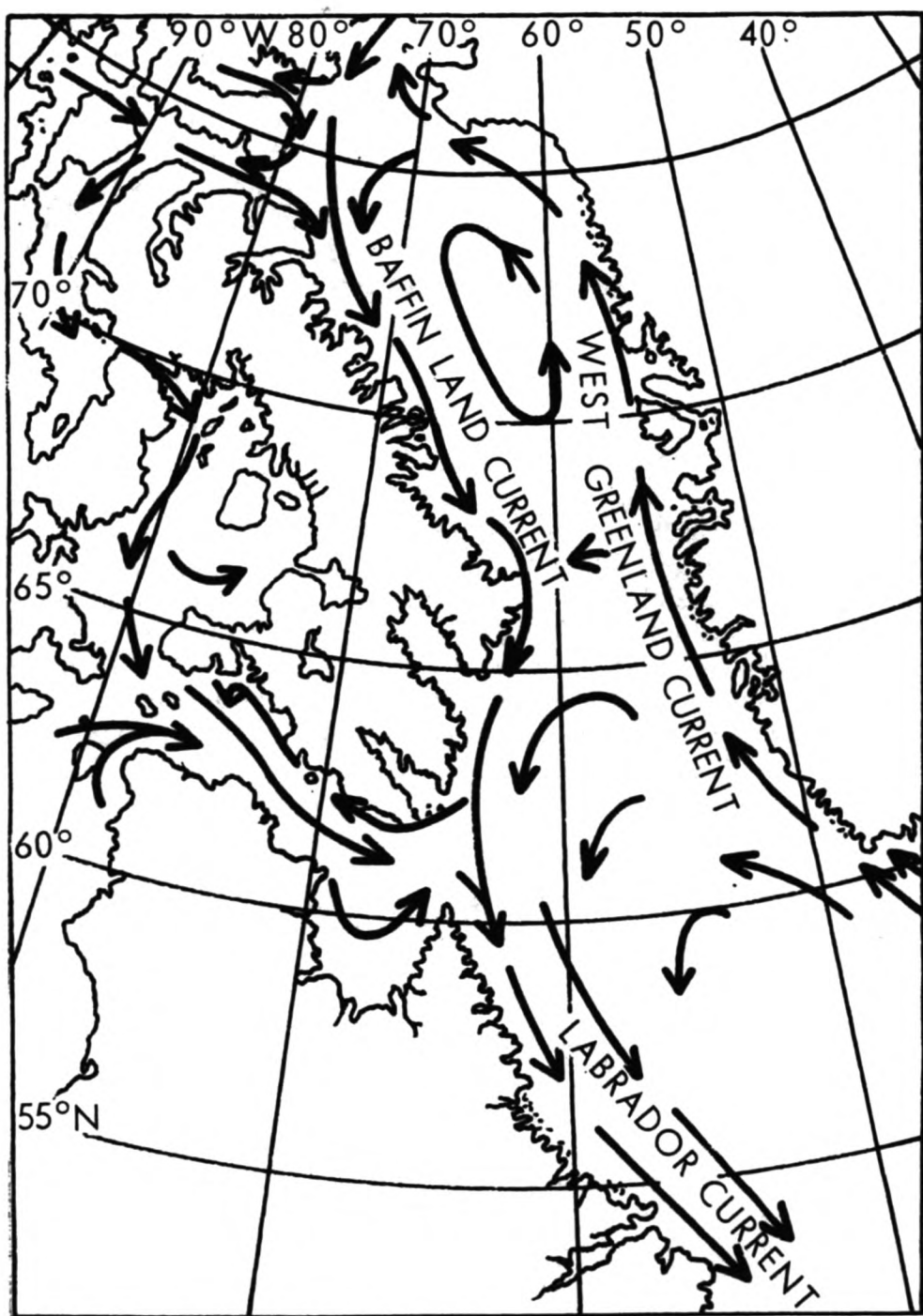


Fig. 4. General surface-current circulation.

normally caused by north-west winds, when close pack-ice, which may consist of old ice floes, is pushed near to, and occasionally on to the coast.

In the east an area of ice may persist through the summer off the east coast of Baffin Island until freeze-up begins in October, but in the last ten years there has always been an open-water route affording reasonably easy access to Lancaster Sound by late August.

Owing to the vast extent of the North-west Passage, the necessary wind conditions for a light (or bad) summer may not prevail over the whole route in any one season.

Onset of freezing

During the latter part of September the air temperature falls below 0°C throughout the area, resulting in the widespread formation of new ice. Fig. 3 (f) shows the

normal pack-ice edge at the end of September but there is generally some new ice extending beyond this edge. By the end of October the archipelago, Beaufort Sea and north-west Baffin Bay have usually become covered with pack-ice.

Icebergs

The foregoing description has referred exclusively to sea-ice. Another type of ice, not formed on the sea, which presents a severe hazard to the mariner in the eastern part of the route, is the iceberg. This hazard is chiefly confined to Baffin Bay and sea areas southward to the Grand Banks of Newfoundland, and the eastern section of Lancaster Sound, though isolated icebergs or ice islands (large slabs of land-ice which originate from an ice shelf, e.g. north Ellesmere Island ice shelf) may affect almost any part of the route.

It has been estimated that more than 40,000 icebergs may be present in Baffin Bay at any one time, by far the greater number being located close in to the Greenland coast between Disko Bugt and Melville Bugt where most of the major parent glaciers are situated. Some of this vast number of icebergs become grounded in the vicinity of their birthplace and never leave their source region; others drift out into the open waters (in summer) of Baffin Bay and steadily decay, but a significant proportion each year is carried by the predominant current pattern of the region (see Fig. 4) in an anticlockwise direction around the head of Baffin Bay. Of these, some ground in Melville Bugt and along the eastern shores of Baffin Island and there slowly decay. A few may enter Lancaster Sound but they are driven southwards by northerly winds until their track is eventually reversed by the east-going current on the southern side of the Sound. The remainder slowly drift southward with the Baffin Land, and later Labrador, Current, their numbers constantly decreasing by grounding or, in summer, melting in the open sea so that, on average, only a little over 200 icebergs pass southwards of the 48th parallel on the Grand Banks of Newfoundland each year.⁵

Though no data are available on the average number of icebergs at certain locations in Baffin Bay an indication of frequency of icebergs can be seen from Fig. 5 which shows iceberg density on a specific occasion. It is probable that a vessel, in shaping a course from the southward for Lancaster Sound, may expect to sight several hundred icebergs. (This course, shown in Fig. 1, would probably lie on the eastern side of Baffin Bay as far as about latitude 71°N, then would run north-westward towards Lancaster Sound in order to avoid the sometimes persistent ice-field off the east coast of Baffin Island.)

Icebergs show considerable variability in size. The largest may be up to 600 feet above sea-level and have horizontal dimensions measured in large fractions of a mile. The draught of such an iceberg may be expected to be about 400 fathoms. On extremely rare occasions ice islands may be found in the area. Their horizontal dimensions may be measured in miles, their height will be up to 120 feet, of which 15-20 feet will be above water-level.

Conclusion

We have seen that ice conditions through the North-west Passage are usually far from impossible in late summer, even for small unprotected vessels. In most years there is an almost ice-free route in early September, throughout its entire length, though the precise location of this route may vary from year to year. Navigation is therefore possible for small boats, but only in average or better years, and then only if the vessel is equipped to intercept broadcasts of ice conditions so that she may be routed through the most favourable channels.

However, due to the fact that some central areas usually remain ice-covered until late August, the navigation season for small vessels is so short that these vessels will

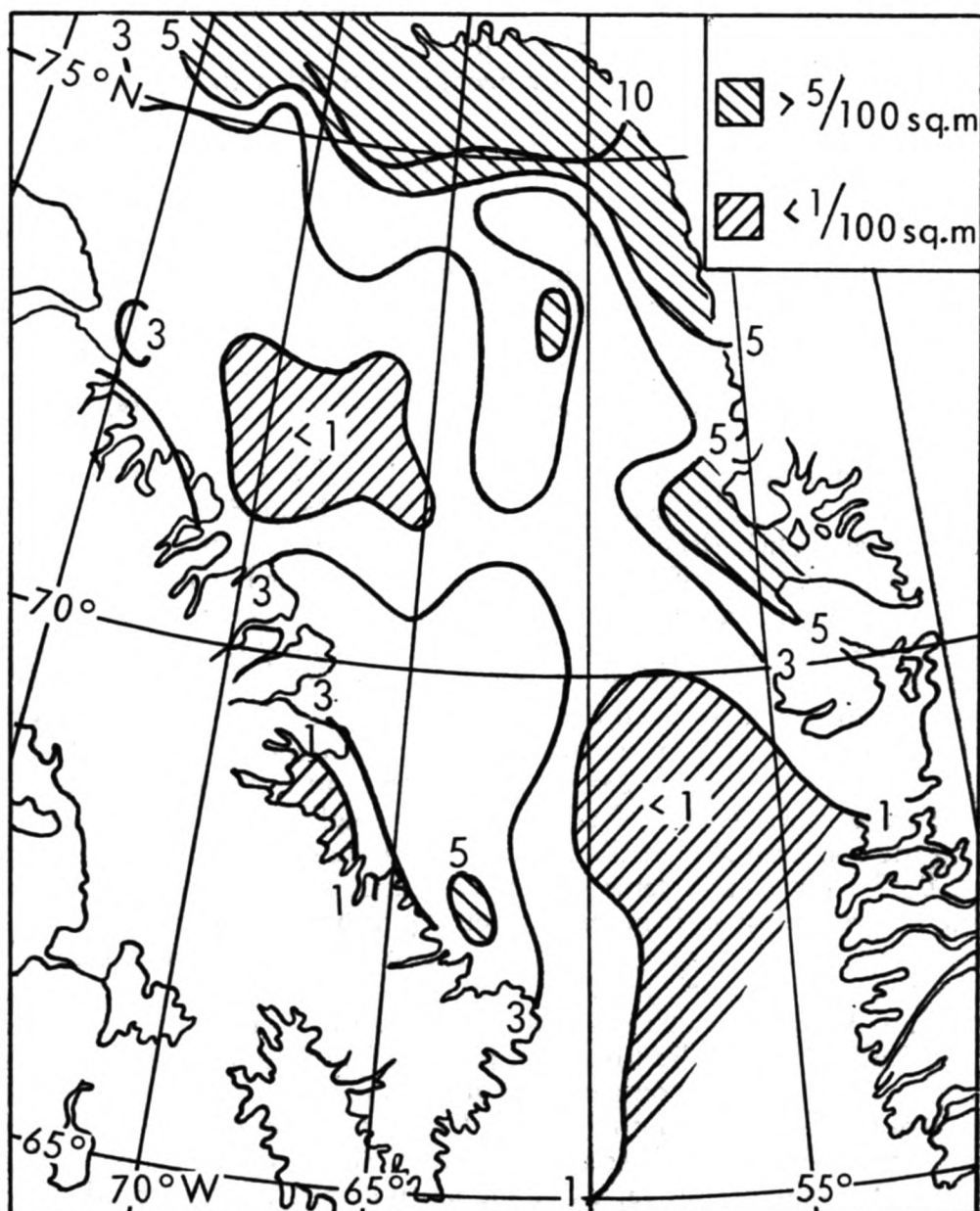


Fig. 5. Iceberg population per 100 square miles (27th September–5th October 1970).

probably have to winter in the archipelago before attempting to complete the passage in the following summer. Preparations for such an expedition should allow for the possibility of spending several winters in the Canadian Arctic.

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A CENTURY OF VOLUNTARY OBSERVING— THE PACIFIC STEAM NAVIGATION CO.

Our annual pictorial series of ships of one ownership covering a century of voluntary observing for us is continued opposite page 61 with pictures of three observing ships belonging to the Pacific Steam Navigation Company of Liverpool.

A century ago we had five of this company's ships on our Voluntary Observing List, the senior of which was the *Patagonia* aboard which we had put our instruments on 11th September 1869. We have been unable to find a picture of this ship and this period is therefore represented by a picture of their *Lusitania*. She was a single-screw barque-rigged steamer of 3,832 gross tons built by Laird Bros. of Birkenhead in 1871. She was recruited to the voluntary observing fleet on 27th September 1871 in Liverpool for a voyage to Valparaiso. Her last mention in our registers was in 1880 when she was on the fortnightly service between London and Australia which was jointly operated by the Orient S.N. Co. and the Pacific S.N. Co.

Our second picture, representing the 'middle period' is of their *Orcoma*. She was a twin-screw steamer of 11,571 gross tons built by W. Beardmore & Sons of Glasgow in 1908. She came to be known as the Electric Ship, for it is said that every known electrical device adaptable to ship use was incorporated in her construction. Incidentally, it was another ship of the Pacific S.N. Co., the *Mendoza*, which in 1879 became the first British merchant ship to use electricity. The *Orcoma* was on our registers until 1933.

Our third picture is of the *Pizarro*, representing the company's present-day observing ships. Of 8,564 gross tons, she was built at Greenock in 1955 by the Greenock Dockyard Co. Ltd. and joined the Voluntary Observing Fleet on 7th October 1955 in Liverpool.

We take this opportunity of expressing our appreciation of the voluntary service which the masters and officers of the Pacific Steam Navigation Company's ships have given us during the past century. We have seldom, if ever, been without at least one of their ships on our Voluntary Observing List and today six are observing for us.

L.B.P.

PRESENTATION OF BAROGRAPHS

As announced in the October 1971 number of *The Marine Observer*, Captain J. Illingworth of Manchester Liners, Captain I. Y. Batley of the New Zealand Shipping Company, Captain H. D. T. Lockyer of the British and Commonwealth Line and Captain W. J. Law, R.D. of the Cunard Line had been selected for the annual barograph presentations.

As always, we indulged our perennial hope that we would be able to get all four shipmasters in the one place at the one time so that we could have the one ceremony but, once again, this was found to be impossible.

On 6th December 1971, at the kind invitation of the British and Commonwealth Line, Mr. J. K. Bannon, a Deputy Director of the Meteorological Office, Captain G. A. White, Marine Superintendent and Lt. Cdr. L. B. Philpott, Nautical Officer in the Marine Division, repaired on board m.v. *Argyllshire* at Birkenhead to present the barograph to Captain H. D. T. Lockyer. Captain Lockyer, whose last command before retiring a year ago had been the *Argyllshire*, was accompanied by Mrs. Lockyer. Also present at the informal ceremony were Captain G. S. Cochrane, Master of the *Argyllshire* and Captain J. Paterson, Liverpool Marine Superintendent of the British and Commonwealth Line.

After the presentation by Mr. Bannon, who stressed the fact that in spite of

meteorological rockets, satellites and computers it was still the surface observation which was the keystone of all meteorological knowledge and forecasting, the party were very hospitably entertained to luncheon aboard the ship.

The Meteorological Office Headquarters at Bracknell was the scene, on 5th January 1972, of a very pleasant nautical occasion when Captain J. Illingworth and Captain I. Y. Batley came down to receive their awards. Captain Illingworth was accompanied by Mrs. Illingworth and supported by Captain A. G. Rowlands, Marine Superintendent of Manchester Liners Ltd. and Mr. Shaw from the Management. Captain Batley brought Mrs. Batley and from the London headquarters came Captain A. G. Davies, Assistant Marine Manager of the P. & O. General Cargo Division (better known as the New Zealand Shipping Co.) and Mr. R. F. A. Hosking from the Management.

Dr. B. J. Mason, Director-General of the Meteorological Office, made the presentations, again stressing the great value which ships' observations had always been and would continue to be, certainly within the foreseeable future.

A fifth barograph was also presented by Dr. Mason on this occasion but this time to a Shipping Company rather than to an individual. During the last few years the Sugar Line have made a somewhat unique contribution to world meteorology; they are not alone in having all their ships in the Voluntary Observing Fleet but in addition they have helped us to pioneer a new venture, obtaining upper-air observations from over the oceans. This has involved two of their ships in certain construction work such as the provision of deck stowage for helium, stowage for the balloons and graw-sonde instruments, the virtual gutting of a cabin to accommodate special receiving apparatus and finally the provision of accommodation for a meteorologist from this Office during the voyage. Captain F. D. Glover, their Administration Superintendent, has given us considerable help and encouragement in this work and we took the opportunity provided by this ceremony of inviting him down to Bracknell to receive the fifth award on behalf of his Company. Unfortunately the Annual General Meeting of the Sugar Line Ltd. was also held on this day and Captain Glover had to come down alone.

After the presentations, the party took luncheon with the Director-General and senior officers of the Meteorological Office and subsequently saw the work of the various branches which deal with and use ships' observations.

In the meantime, Captain W. J. Law, the recipient-designate of the fourth long-service award, remains obstinately at sea in command of the new cruise liner *Cunard Adventurer* but as soon as he does return the first opportunity will be taken of presenting him with his barograph.

Photographs taken at these two ceremonies are shown opposite pages 68 and 69.

L.B.P.

Presentation ceremony in Canada

On 9th November 1971 the Atmospheric Environment Service (formerly the Canadian Meteorological Service) of the Department of the Environment made its first long-service award for marine weather observing to Captain C. A. Bradshaw in honour of his retirement from Shell Canadian Tankers Ltd. and of his 21 years as an observing Officer and Master (*see* photograph opposite page 60).

Captain Bradshaw's career in weather reporting began in 1950 when he joined the Shell tanker *Pinnacles* as 2nd Officer. He acted as an Observing Officer, and later as Principal Observing Officer aboard the *Pinnacles* and *Rincon Hills* from 1950 to 1961. In 1961 he became Captain of the new Shell tanker *Emerillon*. Although his actual participation in weather observing was necessarily curtailed he continued to give support and encouragement to his officers in the ship's weather programme.

Since 1953, when detailed records were first compiled, the three ships on which Captain Bradshaw served have produced 20,562 weather observations. He has

won the annual Canadian Excellent Awards for marine observing on eight occasions as a Principal Observing Officer, and for eight years as Captain. This record is all the more remarkable as the work was carried out with little personal supervision from the Canadian Service. The Shell tankers operated normally between Portland, Maine and South America; hence Canadian Port Meteorological Officers had few opportunities to visit them.

Captain Bradshaw, who was accompanied by Captain S. J. Armitage, Marine Superintendent of Shell Canada Ltd., received a gift of a barograph from Mr. J. R. H. Noble, Assistant Deputy Minister of the Atmospheric Environment Service. Mr. Noble also presented Captain Bradshaw with one of the 100 centennial plaques which the Canadian Meteorological Service awarded to individuals, organizations and ships in celebration of its centennial in 1971. The plaque was awarded to Captain Bradshaw's last ship, the *Emerillon*, whose officers have produced over 8,000 weather reports since she began service in 1961.

The presentation ceremony took place at the new headquarters building of the Atmospheric Environment Service in suburban Toronto, which was officially opened on 29th October 1971. Following the presentation the visitors were shown the many facilities of the new building.

ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM OCTOBER TO DECEMBER 1971

The charts on pages 84 to 86 display the actual and normal ice edges (4/10 cover), sea-surface and air temperatures and surface-pressure anomalies (departures from the mean) so that the abnormality of any month may be readily observed. (The wind anomaly bears the same relationship to lines of equal pressure anomaly as wind does to isobars. Buys-Ballot's law can therefore be applied to determine the direction of the wind anomaly.) The summary of iceberg sightings has been discontinued and is replaced during the iceberg season (roughly February to July) by southern and eastern iceberg limits. In any month when sightings have been abnormally frequent (or infrequent) this will be discussed briefly in the text.

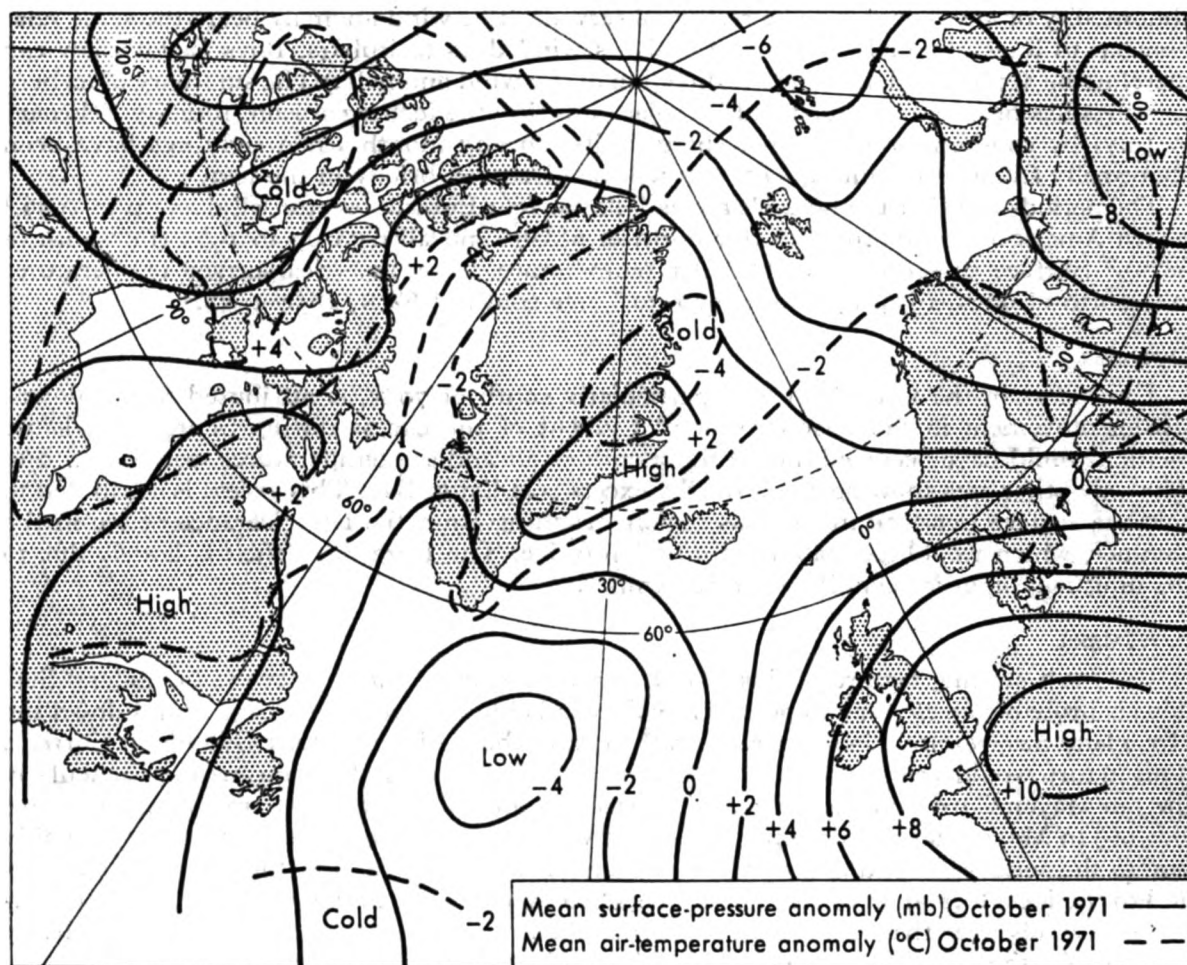
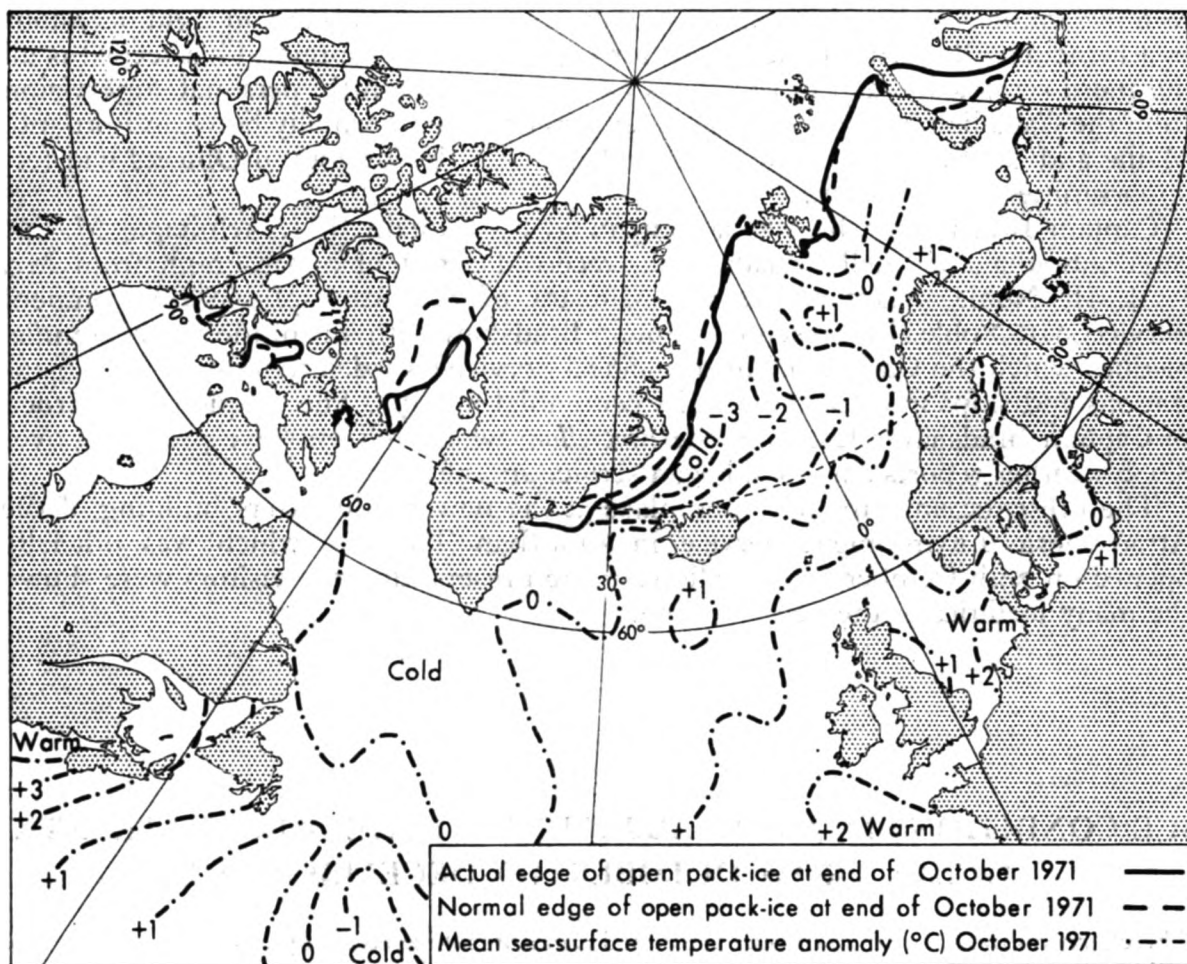
The periods used for the normals are as follows. Ice: Eurasian sector, all data up to 1956,¹ North American sector, 1952-56 (for north of 68°N)¹ and all data up to 1963 (for south of 68°N).² Surface pressure: 1951-66.³ Air temperature, 1951-60.⁴ Sea-surface temperature: area north of 68°N, 1854-1914 and 1920-50,⁵ area south of 68°N, 1854-1958.²

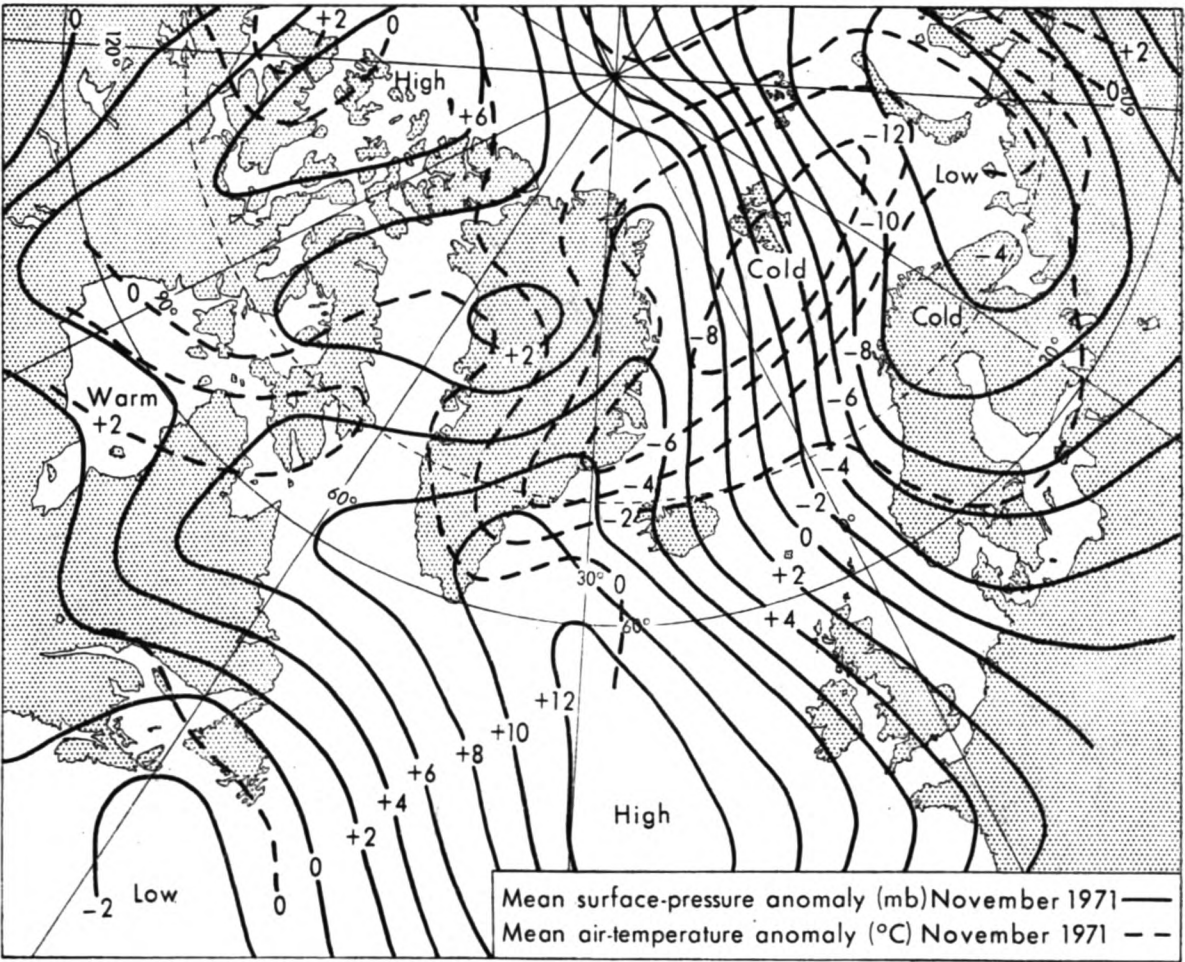
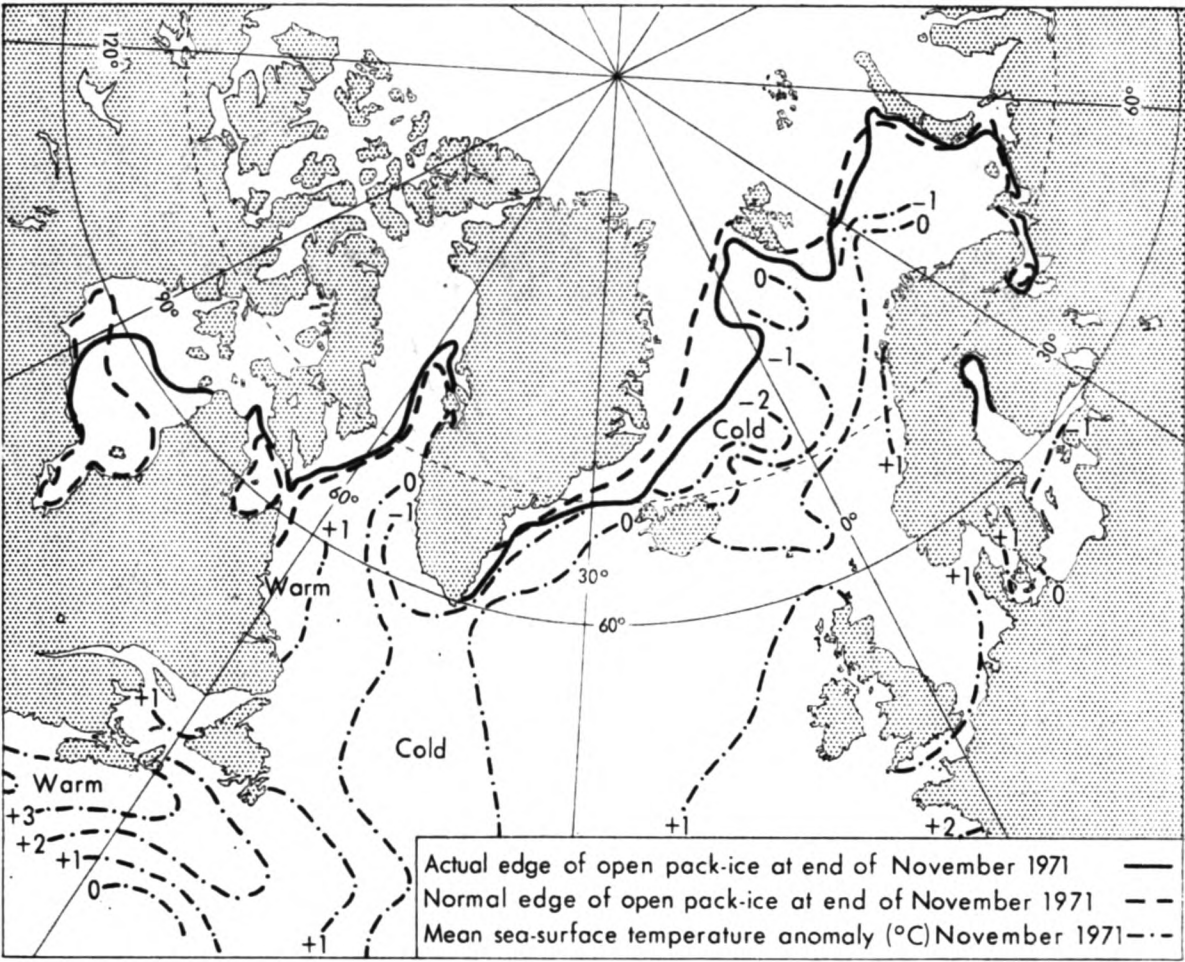
OCTOBER

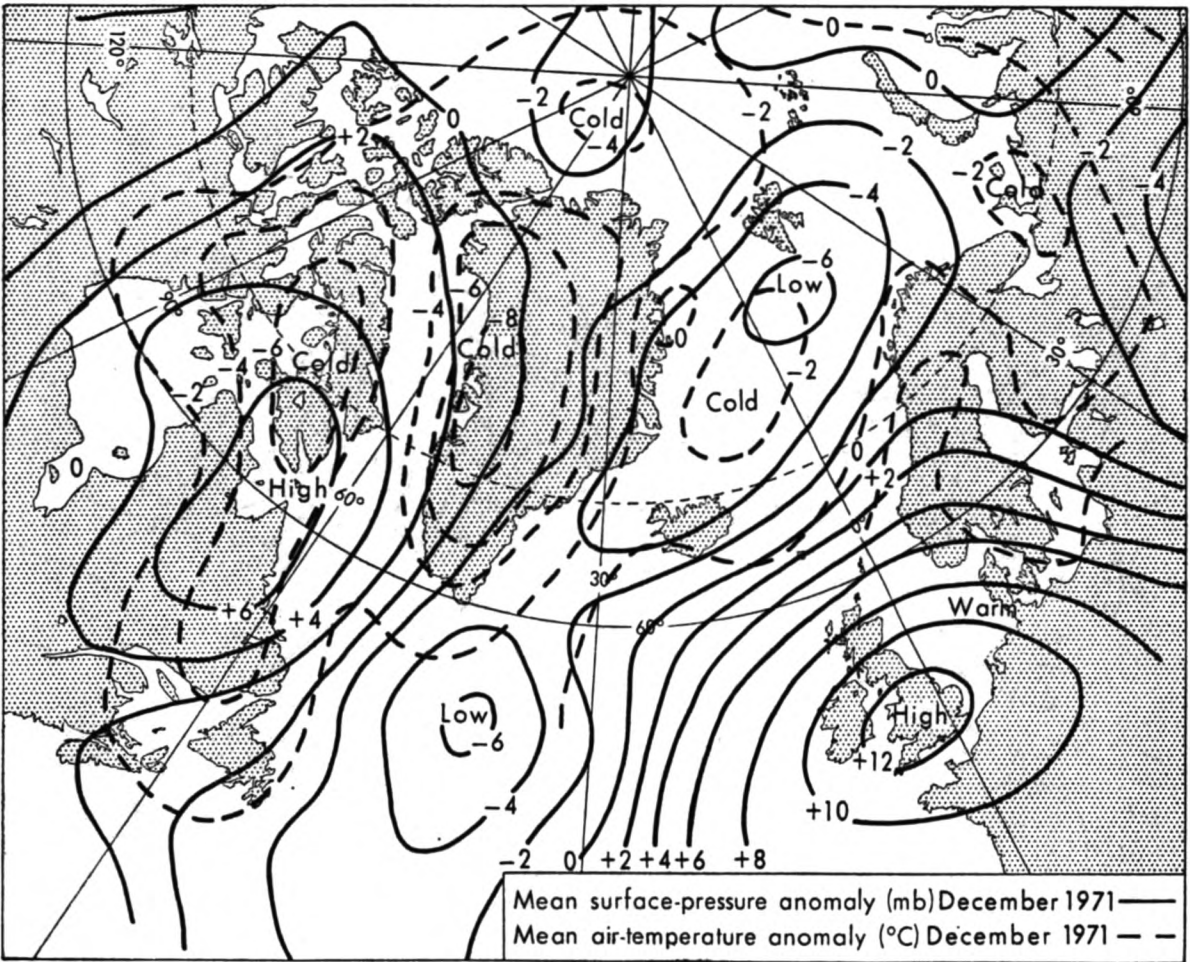
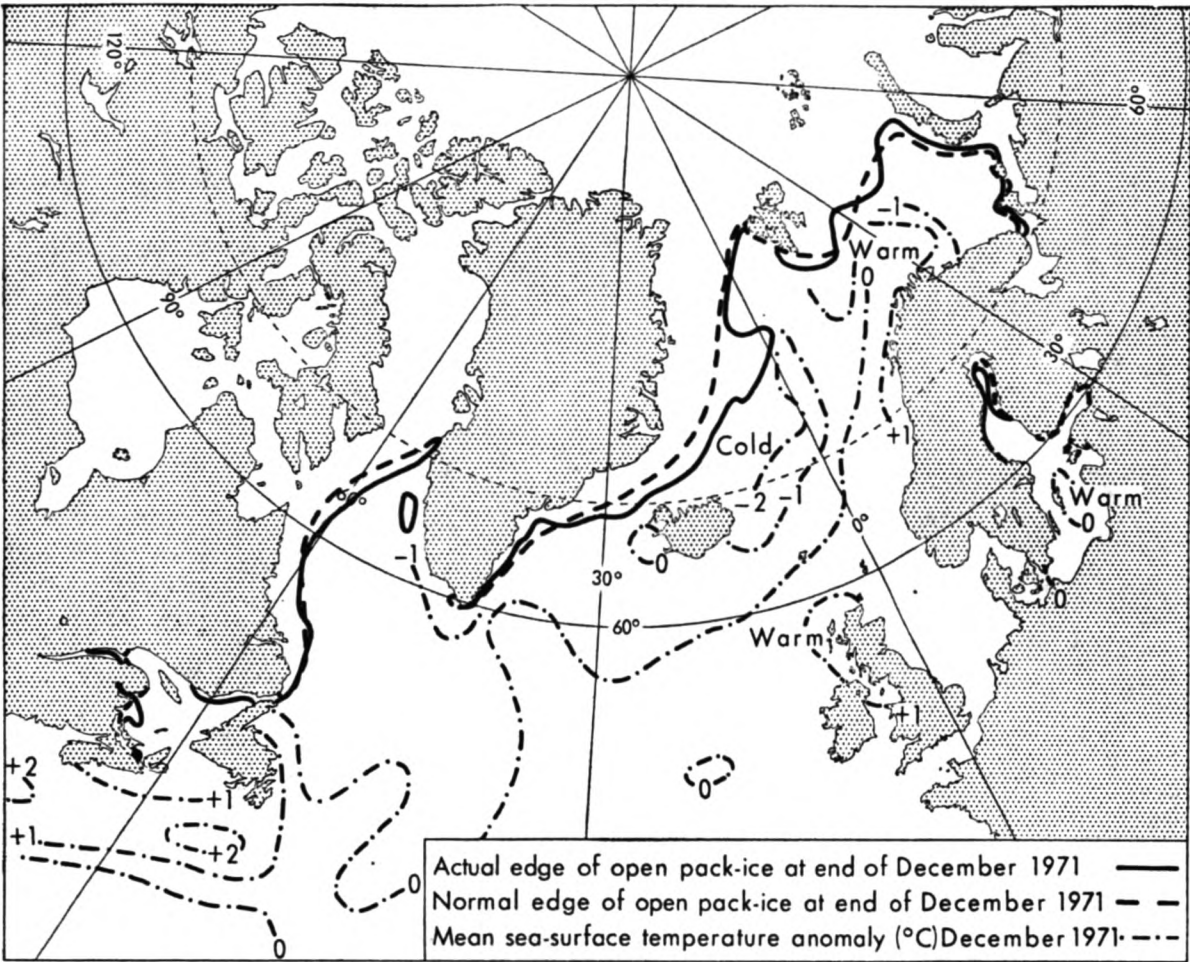
The excess in the Greenland Sea, particularly south of 70°N, is attributed to the downstream movement in the East Greenland Current of the excess during September. Little melting would have occurred during the month as air and sea temperatures were below 0°C. The only other area showing a noteworthy excess was Baffin Bay. This excess is attributed to cold sea-surface temperatures in this region, resulting from the late clearance of ice in the summer, which would facilitate the formation of ice. The Kara Sea deficit is largely due to the unusually light ice conditions of September.

NOVEMBER

The most striking feature of this month is the substantial excess over the Greenland Sea. This is probably chiefly due to persistent cold winds blowing across the Arctic and down the Greenland Sea, resulting in an increase in the rate of the ice-bearing East Greenland Current. This in turn would lead to a boosting of the branch currents from the main stream, particularly the Jan Mayen Current which would bring pack-ice and cold water eastwards on the northern side of Jan Mayen. Since air temperatures here were well below normal the excess is probably due to the south-eastward and eastward movement of old ice floes in those branch currents and to the local formation of ice. The Barents Sea excess is due to the unusually strong north-easterly winds over that region, while an incursion of mild south-westerly winds probably accounts for the return to near-normal conditions in Baffin Bay and Davis Strait.







Baltic Ice Summary: October-December 1971

No ice was reported at the following stations during the period: Riga, Ventspils, Tallin, Mariehamn, Turku, Sundsvall, Kalmar, Göteborg, Visby, Emden, Lubeck, Hamburg, Bremerhaven, Kiel, Flensburg, Stettin, Gdansk, Stralsund, Rostock, Aarhus, Copenhagen, Oslo, Kristiansandfjord.
 No ice was reported at any of the stations during October.

STATION	NOVEMBER								DECEMBER									
	LENGTH OF SEASON		ICE DAYS			NAVIGATION CONDITIONS			ACCUMULATED DEGREE DAYS	LENGTH OF SEASON		ICE DAYS			NAVIGATION CONDITIONS			ACCUMULATED DEGREE DAYS
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Leningrad ..	21	30	10	10	0	10	0	0	96	1	31	31	18	2	26	5	0	230
Pyarnu ..	22	30	9	7	0	7	2	0	53	1	31	30	16	14	30	0	0	81
Viborg ..	21	30	10	10	0	10	0	0	—	1	31	31	31	0	27	4	0	—
Klaipeda ..	22	30	5	0	0	2	0	0	44	0	0	0	0	0	0	0	0	3
Helsinki ..	25	25	1	0	0	0	0	0	74	10	31	5	0	0	1	0	0	151
Mantyluoto	0	0	0	0	0	0	0	0	—	13	24	7	0	0	0	0	0	—
Vaasa ..	20	31	11	9	0	11	0	0	131	1	31	31	31	0	20	11	0	230
Oulu ..	17	30	14	14	0	0	14	0	205	1	31	31	31	0	0	31	0	383
Roytaa ..	21	30	10	3	7	3	7	0	—	1	31	31	0	27	2	29	0	—
Lulea ..	15	30	16	16	0	16	0	0	241	1	31	31	31	0	7	24	0	414
Bredskar ..	21	25	2	0	0	1	0	0	—	9	31	18	0	0	17	0	0	—
Stockholm	0	0	0	0	0	0	0	0	25	31	31	1	0	0	0	0	0	10
Skellefteå ..	19	30	12	9	0	10	0	0	—	1	30	13	8	0	12	0	0	—

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

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

DECEMBER

Last month's excess over the Greenland Sea was maintained. This can be largely attributed to the lack of any wind effect to reduce it; since air and sea temperatures remained below 0°C the excess would not be reduced by melting. In the far north a fresh north-easterly wind anomaly accounted for a retreat of the ice edge in the region north of about 74½°N. Conditions in the north Barents Sea were restored to near normal by south-easterly winds.

R.M.S.

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Book Reviews

In Mischief's Wake, by H. W. Tilman. 8½ in × 5½ in, pp. 167, *illus.* Hollis & Carter Ltd., 9 Bow Street, London, WC2E 7AL, 1971. Price: £2.10.

In the January 1969 number of *The Marine Observer* we reviewed Major Tilman's fifth book about his travels in *Mischief* and mentioned that whilst we were writing the review news had come in that she had foundered off Jan Mayen Island.

The present volume, *In Mischief's Wake*, opens with the story of that last ill-starred voyage. Twice before this intrepid sailor-mountaineer had taken *Mischief* to Angmagssalik and fjords to the south but on this voyage he had hoped to enter Scoresby Sound and land on the two mountainous, unexplored islands therein, Milneland and Redland, calling at and exploring Jan Mayen on the way; "A voyage full of interest," he writes, "aimed at two major targets, so that if one were missed we could always say we had been aiming at the other." Alas for hope!

Sailing from Lymington on the last day of May 1968, nine days later she had got no further than the Maidens, just north of Belfast, but on 18th June she arrived safely in Thorshavn where she met the Danish survey vessel *Ole Roemer* whose Captain was able to provide useful information about Scoresby Sound.

In Akureyri, Iceland, where a few days were spent on a little light mountaineering, the Hull trawler *Portia* was met and her Skipper gave Major Tilman scant hope of ever reaching Jan Mayen, let alone Scoresby Sound. And he came very near to being right, for not only was Jan Mayen virtually ice-bound but the 300-mile passage was made in almost continuous fog. The subsequent landing, followed a few days later by a stranding whilst shifting to a 'safer' berth and the ultimate foundering of the ship, are exploits which read rather strangely in these days of more sophisticated adventure. Those of us who have loved a ship in our time will understand Major Tilman's thoughts at this dark moment: "I felt like one who had first betrayed and then deserted a stricken friend . . . I could not but think that more might have been done to save her. I shall never forget her."

But it was not long before Major Tilman fell in with *Sea Breeze* and all the old urge came back. Like *Mischief* she was a one-time Bristol Channel Pilot cutter built at Porthleven, though some seven years older. He bought her and, having had her fitted out at Lymington, he prepared for another voyage northwards. There were two false starts, involving firstly a return to Lymington for re-caulking of a number of seams and secondly a week in Appledore following the loss of a top mast and the bowsprit. This put Tilman well behind schedule for catching Scoresby Sound open and he therefore decided to cut out the Faeroes and sailed direct for east Iceland. After leaving Iceland on 3rd August *Sea Breeze* had five days of more or less continuous fog before she briefly sighted the Greenland coast about 25 miles south of Scoresby Sound. But the combination of cold, fog and loose pack-ice proved too much for the crew; Major Tilman calls this 'a Polite Mutiny off the Greenland Coast' and he therefore set course for home. Thus *Sea Breeze's* first cruise for him was not wholly a success although he calls it a useful shakedown cruise.

On 5th June 1970 she once again put to sea from Lymington; fain would Tilman have had another tilt at Scoresby Sound but, not wishing to disappoint two young men who had come all the way from the Antipodes with the express idea of climbing, he settled for a voyage to south-west Greenland, Julianehaab and fjords to the south. But once again it was a bad ice year and at one stage *Sea Breeze* spent five days imprisoned in the ice when 100 miles or so short of her destination. Though undoubtedly an annoyance to Major Tilman and his crew, for us the *Sea Breeze's* drift during the period confirmed the existence of a $\frac{1}{2}$ -knot northerly set in this area, the sort of information which hardly ever reaches us.

Ultimately he made Julianehaab and from there everyone seemed to have all the walking and climbing that they wanted. *Sea Breeze* arrived back in Lymington on 27th September 1970.

As this review is being prepared, Major Tilman has completed his third voyage in *Sea Breeze*, yet another attempt at Scoresby Sound, and we hope that this will be incorporated in another book in due course. For his style and descriptive powers are inimitable, he has a large fund of anecdote and quotation to cover every situation, his adventurous spirit has not a little of the original Elizabethan in it and, above all, he has the priceless gift of being able to communicate much of this to the reader.

L.B.P.

Underwater Handbook: Western Approaches to the British Isles: Oceanographic and Meteorological Data. 9 in × 12 in, pp. ix + 124, *illus.* The Hydrographic Department, Ministry of Defence, London. N.P. 625. 1971. Price: £3.50.

This volume is the second of a new series of Underwater Handbooks prepared by a retired naval officer in the Hydrographic Department of the Navy from the latest available oceanographic, meteorological and other data pertaining to a selected area. It contains a wealth of information, much of which can be found in other books and publications, but it is most useful to find it so well set out in one volume.

The book contains six chapters and describes first the general nature of the area, including geographical features, shipping routes and monthly fishing activities before giving climatic conditions in sufficient detail to be interesting and helpful to the navigator. After reading the first two chapters one may be in some doubt about the choice of title of the series as there is so little mention of 'underwater' conditions. However, in Chapter 3 the reader starts to become immersed when surface currents, sub-surface currents, tidal streams and sub-tidal streams are dealt with. Sea-water characteristics and sea-bed characteristics are adequately described in the next two chapters and include temperature and salinity distribution, sound velocity, transparency and colour of the sea-water also the thermocline for each month of the year. A knowledge of the contours of the sea-bed and possibly the nature of the bottom are as important to us now as they were in the past and receive adequate coverage. Mention is made of magnetic anomalies although only limited information is available on this subject. The last chapter describes the marine life in the area and includes amongst other things plankton, fish, mammals and venomous creatures; this cannot fail to hold the interest of the mariner.

There are numerous excellent figures and several well-laid-out tables contained within the text with a further 15 plates provided at the back of the book. The Beaufort wind scale appears as Appendix I and a lengthy Appendix II contains a list of all known wrecks, both charted and uncharted, also the underwater obstructions in the area. The sum total of these amount to 1,334.

The first volume of the Underwater series was published in 1968 and the use of units may possibly have been discussed and decided some years prior to that, as fathoms, feet and degrees Fahrenheit are in common use, with metres and degrees Celsius given in parentheses. When writing on surface currents, kilometres per day, the less common and somewhat unpopular method of describing the rate of flow, is also given in parentheses but such points do not in any way reduce the value of such a book.

This publication will undoubtedly be a useful contribution to the navigator's technical library. It is well set out for ease of reference and is another example of the very high standard of work produced by the Hydrographic Department of the Navy which is so frequently taken for granted by those who navigate over the oceans of the world.

G.A.W.

Personalities

OBITUARY—We regret to record the death on 17th February of CAPTAIN R. REID, Port Meteorological Officer in Glasgow since 1950. He had been ill for some time.

Robert Reid was born in Victoria, British Columbia in 1911. He came of seafaring stock and decided early in life that he too would go to sea and in 1927 joined Sir Walter Runciman's Moor Line as an apprentice. His first ship was the *Tullochmoor*. Passing for 2nd Mate in 1931 he continued to serve with the Moor Line until he passed for Master in 1936. After serving for a year or two with J. & C. Harrison and the British Tanker Company he joined the Bulk Oil Shipping Company where he gained quick promotion to Master.

In 1942 Robert Reid was mentioned in dispatches for outstanding seamanship when his ship was sunk by enemy action in Cardigan Bay.

A keen voluntary observer for this Office for much of his sea career, he gained an 'Excellent' award in 1948.

In 1949 he left the sea to join the Marine Branch of this Office as a Nautical Officer. After a short period as Port Meteorological Officer at Cardiff, followed by a few months in the Marine Branch of the Office, then at Harrow, he went to Glasgow as Port Meteorological Officer.

We extend sincere sympathy to his wife and two children.

A.D.W.

RETIREMENT—CAPTAIN F. G. C. JONES, Port Meteorological Officer in Cardiff since November 1955, retired in January.

Frederick Jones commenced his sea career in December 1924 when he was apprenticed to the British Steamship Company of London. His first ship was the *Woolburn*.

After obtaining his 2nd Mate's certificate in 1929 he joined the Scindia Steam Navigation Company as 3rd Officer and continued in their service until he obtained his Extra Master's Certificate in 1934 when he joined the Blue Funnel Line as 3rd Officer. His first command was the *Neleus* in 1951.

Injuries received in an aircraft attack on his ship in the Formosa Strait in July 1950 led to a deterioration in his health and in 1953 he was obliged to give up active service at sea.

Throughout his sea career Captain Jones was interested in meteorology and for many years he was a voluntary observer. This interest led him to apply for a post as Nautical Officer in the Meteorological Office and in 1955 he joined the Office and was appointed Port Meteorological Officer at Cardiff.

We wish him a long and happy retirement.

A.D.W.

Notice to Mariners

FORMATION OF THE NAUTICAL INSTITUTE

With the support of a large number of members of the nautical profession, an Institute has at last been formed which will be able to represent authoritatively the professional interests of qualified mariners.

Principal object of The Nautical Institute will be to bring together in a single body all qualified members of the nautical vocation who have common professional interests but who up to now have had no common ground on which to meet.

Hitherto, shipmasters and navigating officers in the Merchant Navy, pilots, nautical college lecturers, marine superintendents, nautical surveyors, harbour masters, Naval officers and other qualified mariners have had no opportunity to maintain contact with one another and have been unable to keep abreast of modern developments and ideas concerning their particular interests and responsibilities.

As well as providing a means of communication within the nautical profession, The Nautical Institute will in due course be able to offer an authoritative opinion in nautical affairs which should help the promotion of a national maritime policy. Up to now, members of the nautical profession have had no medium through which their views might be made known.

“We are confident”, say the Council in a report to foundation members, “that The Nautical Institute can now move ahead, and hope it will quickly establish a national reputation that will provide dignity and respect for our profession in future years.”

Further information can be obtained from Captain C. W. Malins, Hon. Secretary, The Nautical Institute, Hanway House, Clark's Place, London EC2N 4BH. (Telephone 01-283 3687.)

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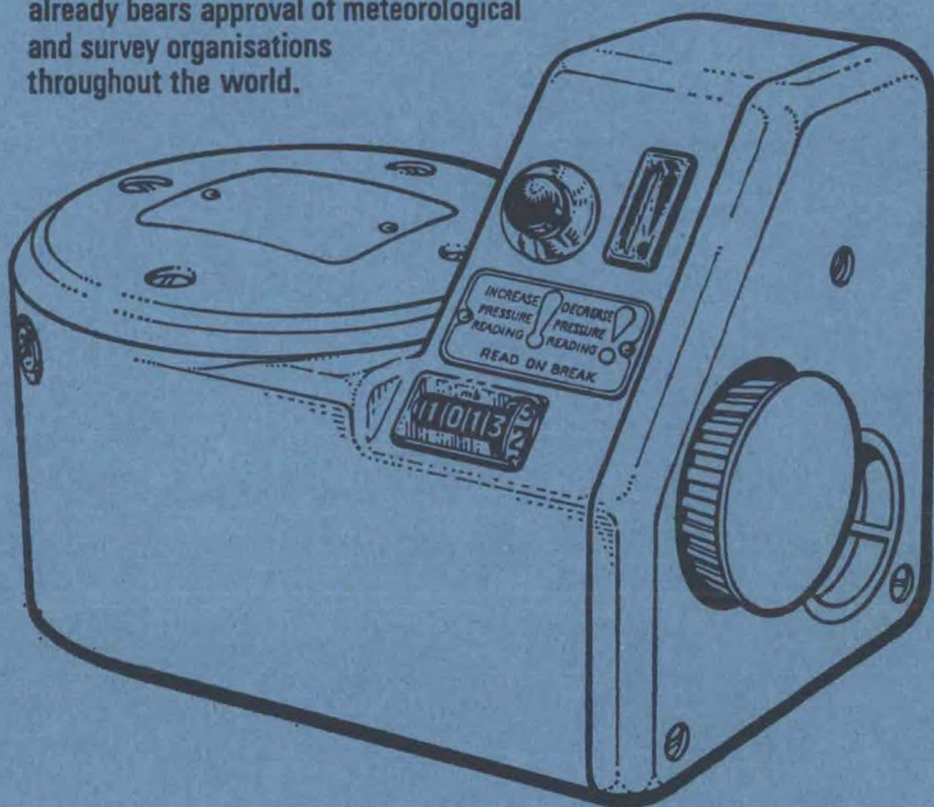


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