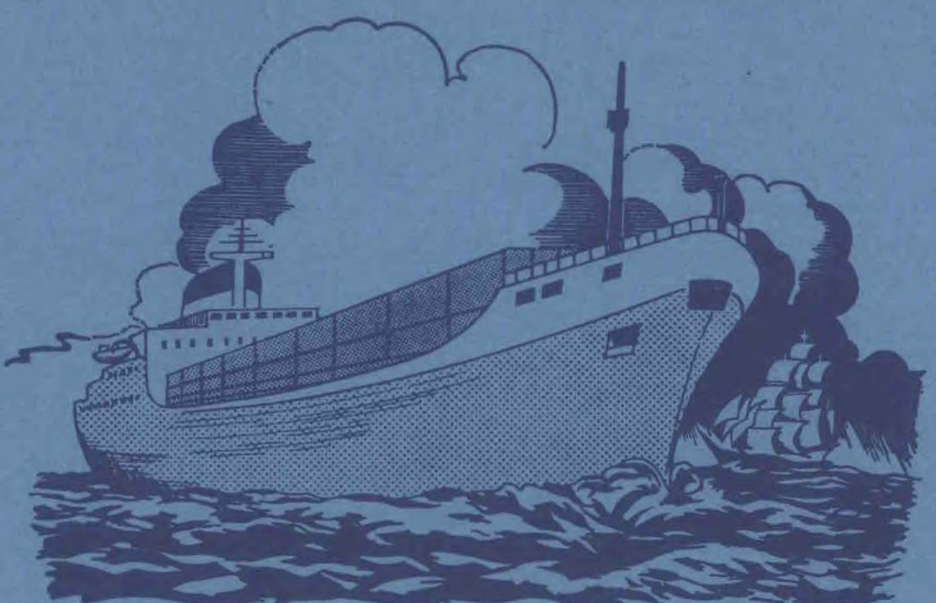
Met. O. 957

The Marine Observer

A quarterly journal of Maritime Meteorology



Volume LIII No. 280
April 1983

£2·20 net

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THE MARINE OBSERVER

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

Vol. LIII **No. 280** **APRIL 1983**

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Letters to the Editor, and books for review, should be sent to the Editor 'The Marine Observer', Meteorological Office, Eastern Road, Bracknell, Berkshire RG12 2UR

Published for the Meteorological Office by
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To be purchased direct from HMSO at any of the following addresses: 49 High Holborn, LONDON WC1V 6HB; 13a Castle Street, EDINBURGH EH2 3AR; Brazennose Street, MANCHESTER M60 8AS; Southey House, Wine Street, BRISTOL BS1 2BQ; 258 Broad Street, BIRMINGHAM B1 2HE; 80 Chichester Street, BELFAST BT1 4JY, or from booksellers.

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Report of Work for 1982

(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 composed as follows:

(*a*) 412 Selected Ships, including trawlers, which are supplied with a full set of meteorological instruments on loan and which make observations in code every 6 hours and transmit them to the appropriate coastal radio station wherever their voyages take them.

(*b*) 11 Supplementary Ships, including trawlers, which make less-detailed observations than Selected Ships and are supplied on loan with only a barometer, air thermometer and screen.

(*c*) 55 Coasting ('Marid') vessels which make sea-surface temperature observations in UK coastal waters and transmit them by W/T or R/T. When in the North Sea, the coasting ships include in their messages wind, weather and visibility observations.

(*d*) 12 Light-vessels and 1 light-tower which make observations of wind, waves, visibility and air- and sea-temperatures; all of these send coded reports by R/T. Reports from the *Royal Sovereign* and *Goeree* light-towers together with the *Channel, Dowsing* and *Varne* light-vessels are included in the BBC weather bulletins for shipping and all report barometric pressure, using the precision aneroid. They also report barometric tendency.

(*e*) 8 Auxiliary Ships which make and transmit visual observations of wind, weather and visibility with the addition of pressure and air temperature readings from the ships' own instruments. These ships do this work only when in areas where shipping is known to be sparse.

The importance of meteorological observations from ships at sea becomes apparent when it is appreciated that the oceans occupy nearly three-quarters of the earth's surface. Except for those made by HM Ships, Ocean Weather Ships and research vessels, these surface meteorological observations are voluntarily provided by the masters and officers of merchant ships. In the UK, the Marine Division has been responsible for obtaining these observations since 1855. These merchant ships are collectively known as the Voluntary Observing Fleet (VOF) and they vary from very large oil tankers and passenger vessels to coastal traders and trawlers.

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

Table 1. Average number of British Selected and Supplementary Ships on main trade routes to and from the UK

Europe	93	West Indies	10
Australasia	19	South America	8
Far East	28	Pacific coast of North America	4
Persian Gulf	16	Falkland Islands and Antarctic	2
South Africa	5	World-wide trading	180
West Africa	15	Near and distant-water fishing grounds	2
North Atlantic	41		

The continued recession in world trade in general and the depressed state of the shipping and fishing industries in particular continued to affect the size of the VOF. However, largely owing to the efforts of the seven Port Meteorological Officers who recruit merchant vessels into the VOF and who are established at the major ports of London, Liverpool, Southampton, Hull, Middlesbrough, Glasgow and Cardiff, the reduction in numbers was kept to a minimum. The result was that the percentage of British ships from which meteorological observations were received was greater than ever before. Nearly all the older, conventional vessels of the British merchant fleet have now been replaced by much larger and faster ships which spend considerably less time in port and thus are at sea for a greater proportion of the year. As a result the number of observations received continue to increase.

During a typical 5-day period in June, the average daily numbers of reports from ships and sea stations received at the Regional Telecommunication Hub (RTH) at Bracknell were as shown in Table 2.

Table 2. Average daily number of reports received at Bracknell from ships and sea stations and geographical breakdown of total daily number of reports received by Bracknell direct and via the Global Telecommunication System (GTS)

	1981	1982
Direct reception from:		
British ships	190	179
Foreign ships	112	74
Rigs, Platforms, Buoys	83	86
Total	385	339
Total daily number of reports received by Bracknell direct and via GTS from:		
	1981	1982
Eastern North Atlantic	880	756
Western North Atlantic	330	580
Mediterranean	80	98
North Sea	247	279
Arctic Ocean	65	69
North Pacific	777	776
All other waters	495	532
Total	2874	3090

Meteorological work on board British merchant ships has always been carried out on a voluntary basis and the Port Meteorological Officers, who are all Master Mariners with considerable experience of meteorological observing at sea, are able to contribute significantly to the maintenance of the high standard of the observations received from the VOF. With the co-operation of shipowners in the distribution of the revised publications to observing ships all over the world, the new surface observing code was successfully introduced at the beginning of the year.

The continued trend in the reduction of ship's complements together with efforts to reduce the workload on observing officers led to the installation of distant-reading meteorological equipment in a number of ships under construction. The Port Meteorological Officers received whole-hearted support and co-operation from shipowners in these and other matters to their mutual benefit. Trials continued with the automatic transmission of ship's weather messages.

Many foreign and Commonwealth Port Meteorological Officers continued to give valuable assistance in the replacement of defective instruments and the supply and replenishment of publications and stationery to ships of the British VOF which seldom return home. These officers were also of great assistance in the withdrawal of our equipment from those British ships which were sold abroad.

2. Ocean Weather Ship Activities

At the beginning of the year the two British Ocean Weather Ships, *Admiral Beaufort* and *Admiral FitzRoy* were decommissioned and sold, and the Ocean Weather Ship Base at Greenock was closed. To meet the UK obligations under the North Atlantic Ocean Station scheme the *Starella*, a trawler which had been converted for North Sea diving operations, was leased on a 4-year charter party during January. After further conversion, she sailed in early February as an Ocean Weather Ship to operate alternately with the Dutch weather ship *Cumulus* on ocean station 'Lima' situated at 57° 00'N, 20° 00'W. Concurrently with these new arrangements, the mode of transmission of data from all the Ocean Weather Ships in the scheme was changed to the telex over radio communications system. The *Starella* operated out of Fleetwood where a small Ocean Weather Ship office was established.

Station 'Lima' was manned continuously throughout the year with the exception of 36 hours in September when the *Starella* was delayed in her arrival on station owing to engine trouble.

The weather ship made hourly surface and 6-hourly upper-air observations. Sea and swell records using the Tucker ship-borne wave recorder now fitted on board the *Starella* were made throughout the year. Sea-water temperature and salinity readings to within 100 metres of the sea bed, collection of rain-water samples for analysis by the International Atomic Energy Agency and collection of sea-water samples on passage to and from station for monitoring radioactive content were undertaken at regular intervals. On behalf of the Institute for Marine Environmental Research, a plankton recorder was towed on about half the voyages to and from station during the year.

3. Ship Routeing

A ship-routeing service continued to be provided to advise on North Atlantic and North Pacific Ocean passages and also to offer advice in regard to the movement of tows and salvage operations. Advice was also given to vessels on passage in other parts of the world on request. In the first part of the year the number of routeings was maintained at a high level but during the summer months there was a fall-off in demand owing to the recession in world trade, the American embargo on steel imports from Europe and the South Atlantic conflict. However, there was an upward trend in the number of routeings towards the end of the year. Continued advertising in maritime publications has resulted in a number of new inquiries and two new large fleet contracts were secured. The weather watch and routeing by the service in conjunction with CFO for the movement of the Thames Barrier gates from Middlesbrough to the construction sites were successfully completed in the early part of the year. The voyage assessment service, in which an investigation is made concerning the performance of a ship in relation to the weather encountered during the voyage, continued to flourish as more shipowners and charterers became aware of the value of the service in assisting them to resolve claims for slow speeds and other delays in the time spent on voyage.

4. Services to Shipping

Services to shipping via BBC radio, British Telecom International Coast Radio Stations and our international radio-teleprinter and radio-facsimile broadcasts continued throughout the year.

During the year the British Telecom International Coast Radio Station at Oban was closed down. It was replaced in September by Hebrides Radio which, together with Lewis and Skye Radios, was remotely controlled from Stonehaven Radio. As these stations operated for 24 hours each day, the temporary arrangement whereby gale warnings for the sea areas Rockall and Bailey issued between the hours of 2200 and 0800 were transmitted by Portpatrick Radio was discontinued. Pendennis Radio, a new Coast Radio Station remotely controlled from Land's End Radio, was also established during the year. Cullercoats Radio continued to broadcast weather forecasts and gale warnings for all North Sea and adjacent sea forecast areas from Fair Isle to Plymouth in Radio Teletype as a temporary service.

Arrangements were made with British Telecom International for the transmission by radio-telephony of relevant sections of the Atlantic Weather Bulletin for Shipping—normally broadcast by radio-telegraphy—for the period when the yachts involved in the last leg of the Whitbread 'Round the World' Race were in the areas covered by the Bulletin.

5. Inquiries

During the year there was an increase in the number of marine inquiries received. These were principally from shipping interests, solicitors, universities and industrial firms and the subjects were extremely varied.

6. Awards to Voluntary Observers

As usual, the shipmasters, principal observing officers and radio officers who submitted the best meteorological logbooks during the year were presented with Excellent Awards in the form of books. Similar Awards were made to masters and officers serving on coastal traders for their work in making sea temperature observations. The books selected for this year's awards were the *University Atlas, Brewer's Dictionary of Phrase and Fable* and the *National Trust Atlas*. In recognition of their valuable voluntary meteorological work over many years during their careers at sea, four shipmasters were each presented with a long-service award in the form of an inscribed barograph.

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 UK will supply instructions on how to preserve and pack such samples on request.

PASSAGE OF TYPHOON 'PAT'

South China Sea

s.s. *British Respect*. Captain J. B. Wharrie. In Manila Bay, Philippine Islands. Observers, the Master, Mr M. T. Fisher, 2nd Officer and other members of the ship's company.

18–23 May 1982. At 0600 GMT on 18 May the ship *Fortune Star* weighed anchor and put to sea, having received a facsimile weather chart from Tokyo Radio. A few minutes later tropical warning 'Pat No. 03' was received on board by telex from Guam. The predicted track passed 80 n. mile south of Manila Bay. The pressure indicated by the barograph was $3\frac{1}{2}$ mb lower than that observed during the previous week of fine weather. By 0000 GMT on the 19th the pressure had dropped by a further $1\frac{1}{2}$ mb. At sunset the wind was perfectly calm (sea like a mirror) and the sky was 'murky'.

The second tropical warning received by telex from Guam on the 19th showed that the typhoon had taken a more northerly course than had been predicted and was expected to pass 100 n. mile to the north of the vessel. The typhoon had intensified and was proceeding at 12 knots. (The copy of this telex message was unfortunately mislaid.) At 1800 GMT on the 19th the vessel received warning 'Pat No. 10'. Gusts up to 80 knots were reported, and the typhoon was even further to the north than expected; it was anticipated that it would recurve and intensify at about 1200 GMT on the 20th. At this time Manila Bay was heavily overcast; the wind was WSW, force 4 (the local maximum), and the cloud base at 500 ft. There was drizzle turning to moderate intermittent rain and frequent flashes of lightning were accompanied by occasional dull rumbles of thunder. These conditions were typical for the periphery of a typhoon.

During the following 3 days the weather in the Bay returned to normal. Tropical warnings of Pat's progress continued to be received. It was proceeding NE'ly south of Japan and had reached its full fury at 0600 GMT on the 21st with wind speeds at 90 knots. By 1800 GMT on the 24th the speed had declined to 35 knots and thereafter the typhoon finally dissolved.

Position of ship: 14° 30'N, 120° 39'E.

DEEP DEPRESSION

South Pacific Ocean

s.s. *Act 6*. Captain J. Hart. Balboa to Auckland, N.Z. Observers, the Master, Mr. M. A. Clark, Chief Officer, Mr L. P. V. DesLandes, 2nd Officer and Mr P. R. Phibbs, 3rd Officer.

8–9 April 1982. A deep depression, formerly Typhoon Bernice, was experienced approximately 200 n. mile east of East Cape, North Island, New Zealand. The following extracts are taken from the ship's logbook and meteorological logbook.

8 April, 1930 GMT. Wind NE, force 5, barometric pressure 1004·8 mb. Moderate seas, low swell, overcast with light rain.

2130 GMT. Wind NE, force 8, pressure 1001·7 mb. Moderate to rough seas, moderate swell.

2330 GMT. Wind NE, force 9, pressure 994·3 mb. Rough seas, heavy, short swell. Vessel rolling easily.

9 April, 0040 GMT. Alteration of course to 180°(T). Depression appeared to be passing to north.

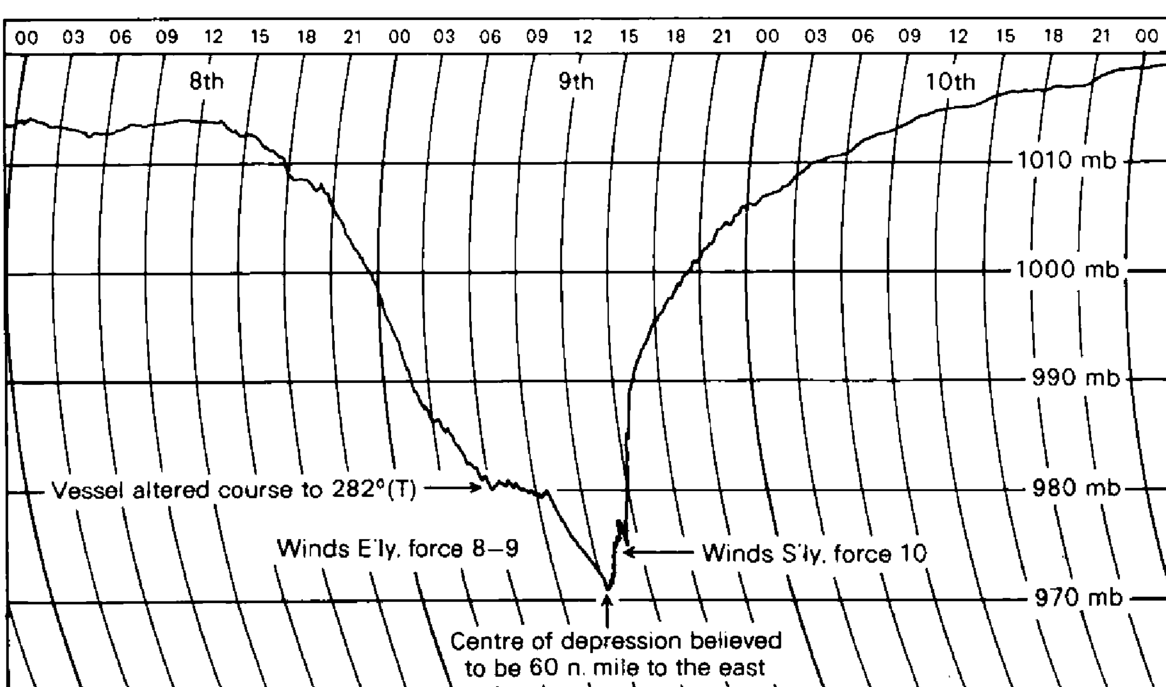
0330 GMT. Wind NE, force 8, barometric pressure 983·0 mb. Rough seas and heavy, short swell.

0430 GMT. Wind NE, force 9, pressure 981·2 mb. Sea surface obscured by spray.

0630 GMT. Wind ENE, force 8, pressure 980·3 mb. Wind veering.

0730 GMT. Wind E'N, force 8, pressure 979·9 mb. Rough seas and heavy swell. Vessel rolling and pitching.

0819 GMT. Alteration of course to 282°(T).



0830 GMT. Wind E, force 8, pressure 976·1 mb. Very rough seas and heavy swell. Sea surface obscured by spray.

1000 GMT. Wind S, force 9. Wind veering to S.

1030 GMT. Wind S, force 9, pressure 973·2 mb. Very rough seas and heavy swell. Overcast with heavy rain. Tops of waves being blown off. Vessel rolling heavily, violently at times. Taking heavy water over port side.

1130 GMT. Wind S, force 10, pressure 973·1 mb. Very rough seas and heavy swell. Vessel rolling heavily, taking moderate water overall.

1400 GMT. Wind SW'S, force 10, pressure 984·3 mb. Very rough seas and heavy swell. Overcast with drizzle.

1600 GMT. Wind SW, force 8, pressure 994·6 mb. Very rough seas and heavy swell.

1800 GMT. Wind SSW, force 8, pressure 998·1 mb. Rough seas and heavy swells from SSW and SE.

2000 GMT. Wind S'W, force 7, pressure 1002·5 mb. Rough seas and heavy swell. Overcast and clear.

At the height of the depression visibility was reduced to nil by spray and rain. On arrival in Auckland we were informed that the storm was most unusual for this time of the year. Extensive damage had occurred in the northern area of the North Island. Some minor damage had been caused to the ship. At 1000 GMT on the 9th, it was later discovered, the centre of the depression had been 60 n. mile to the east.

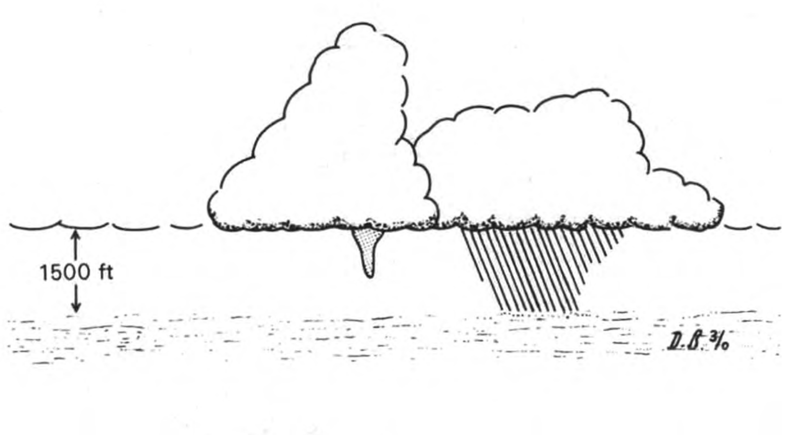
Position of ship at 1800 GMT on 8 April: 33° 54′S, 177° 06′W.

CLOUD FUNNEL

North Atlantic Ocean

m.v. *British Commerce*. Captain M. Dunning. Hamburg to Ras Lanuf. Observer, Mr D. Barker, 3rd Officer.

22 June 1982. A cloud funnel was sighted protruding vertically downwards from dense towering cumulus. There was speculation that this would lead to the formation of a waterspout but it only reached a point just over midway between the cloud base and sea level. The phenomenon was sighted at a distance of 8 n. mile and lasted for approximately 5 minutes before receding into the cloud. Dense precipitation was observed coming from an adjacent cumulus formation.



Weather conditions at time of observation: barometric pressure 1021·0 mb after a rise of 16 mb over the previous 24 hours, wind NW, force 3.

Position of ship: 39° 21′N, 13° 40′W.

ARCTIC SEA SMOKE

North Atlantic Ocean

m.v. *Aeneas*. Captain A. J. Dyne. Immingham to Montreal. Observers, the Master and ship's company.

15 May 1982, 2030 GMT. Wisps of fog were observed to form in troughs of the wind waves. The wind was NNE, 13 knots and the wave period 03 seconds, height 1 metre. At 2036 GMT the horizon became obscured and the visibility was 2 n. mile. Wisps of fog were now 'boiling off' the water in great quantities and travelling over the water in the same direction as the wind at the same speed as that of the waves, filling the troughs to a height of 1 metre. At 2055 GMT the visibility remained 2 n. mile but the wisps were now rising to 10 metres. At 2130 GMT the arctic sea smoke had reduced in height to 5 metres and the visibility had increased to 3 n. mile. At 2200 the visibility cleared to 7 n. mile, with traces of fog remaining in the wave troughs. At 2230 GMT all the fog cleared.

N.B. At 1310 GMT on this day the vessel had passed from the Labrador Current into the Gulf Stream in position 42° 26'N, 63° 03'W; the sea temperature then began to rise rapidly and the fog which had been observed on previous days cleared rapidly also.

Weather conditions at 2030 GMT: dry bulb 9·2 °C, wet bulb 8·8, sea temperature 18·0, barometric pressure 1010·9 mb.

Ship's course and speed 215°(T) at 13 knots.

Position of ship: 40° 56'N, 64° 29'W.

Note. The extract reproduced below is from p. 23 of the Fifth Edition of the *Meteorological Glossary:*

'**Arctic sea smoke:** If, when cold air moves over warm water, the vapour pressure at the water surface exceeds the saturation vapour pressure at the air temperature, then evaporation from the water surface proceeds at a higher rate than can be accommodated by the air. The excess water vapour over that required to saturate the air condenses and, in the unstable conditions present in the layer near the surface, the condensed water is carried continuously upwards to evaporate into the drier air above. "Steam" or "smoke" then appears to rise off the water surface. If an inversion exists near the water surface, fog may be confined below the inversion and become dense.

'The phenomenon occurs, for example, over inlets of the sea in high latitudes; over newly formed openings in pack ice; over lakes and streams on calm, clear nights; over damp ground heated by bright sunshine in cool conditions. Alternative names are "frost smoke", "sea smoke", "steam fog", "warm water fog", "water smoke" and "The Barber".'

RADAR DUCTING

North Atlantic Ocean

m.v. *Australian Venture*. Captain P. Grimanes. Liverpool to Melbourne. Observers, Mr R. S. Choppin, Chief Officer, Mr R. G. Macdonald, 3rd Officer and Mr C. A. Hinton, 4th Officer.

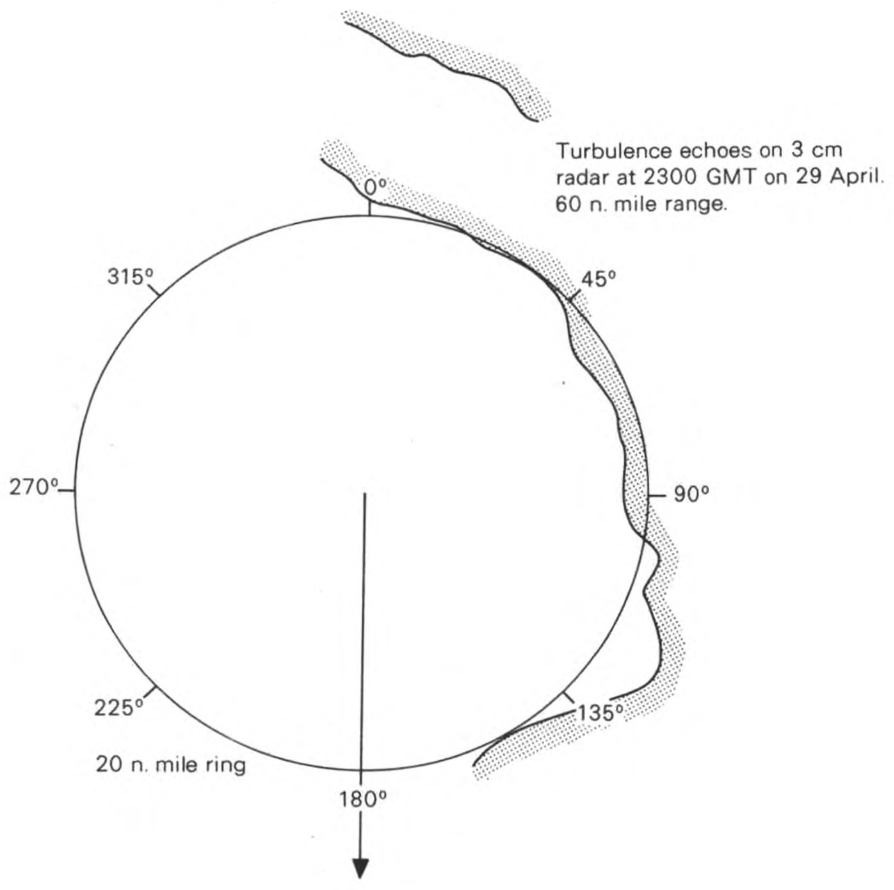
29–30 April 1982. Radar ducting was experienced in the Cap Blanc to Gambia River area. Long-range acquisition of ship targets began at 1500 GMT on the 29th and was fully developed on the 120 n. mile range of the 10 cm radar at 1800 GMT.

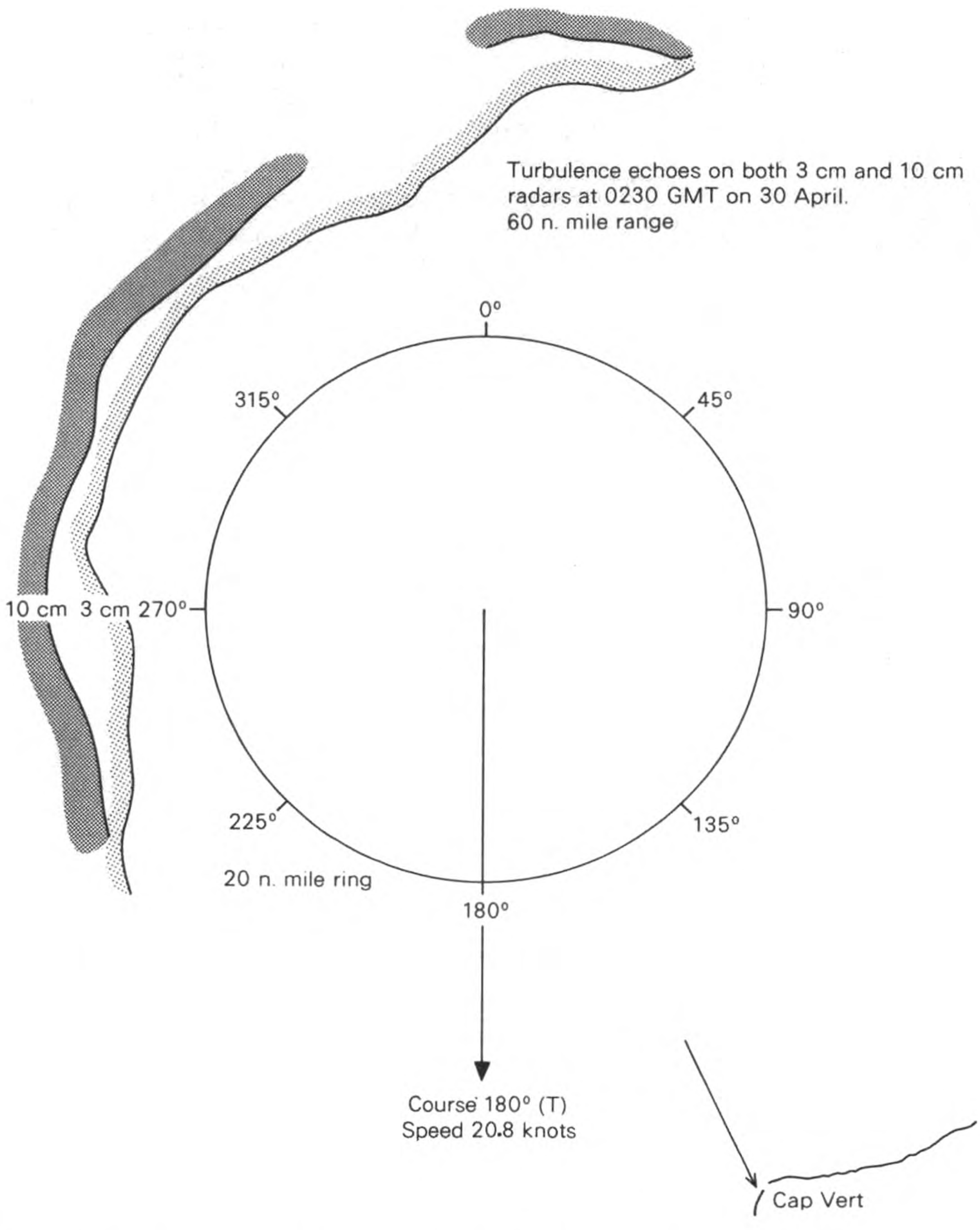
The first turbulence echoes were observed on the 3 cm radar at 1800 GMT on the 29th, when the pattern and azimuth were very similar to those observed later that day at 2300 GMT. Between this time and 0230 on the 30th the turbulence seemed to turn slowly anticlockwise until the pattern was as traced at 0230. At this time the turbulence was also seen on the 10 cm radar. The coastline at Cap Vert was clearly defined at 94 n. mile.

At 1800 GMT on the 29th second-trace echoes were observed on the 10 cm radar. These echoes were tracked to a distance of about 4 n. mile off, when a stationary target symbol was displayed for several minutes before fading. No visual target was observed, though the actual visibility was 8–9 n. mile.

Weather conditions at 1800 GMT on 29th: dry bulb 22·0 °C, wet bulb 19·5, sea temperature 16·2, barometric pressure 1013·0 mb, wind N'W, force 4.

Weather conditions at 0000 GMT on 30th: dry bulb 21·2 °C, wet bulb 19·5, sea temperature 18·2, barometric pressure 1012·5 mb. wind NNE, force 3.





Position of ship at 1800 GMT on 29th: 18° 23′N, 17° 50′W.
Position of ship at 0000 GMT on 30th: 16° 19′N, 17° 52′W.

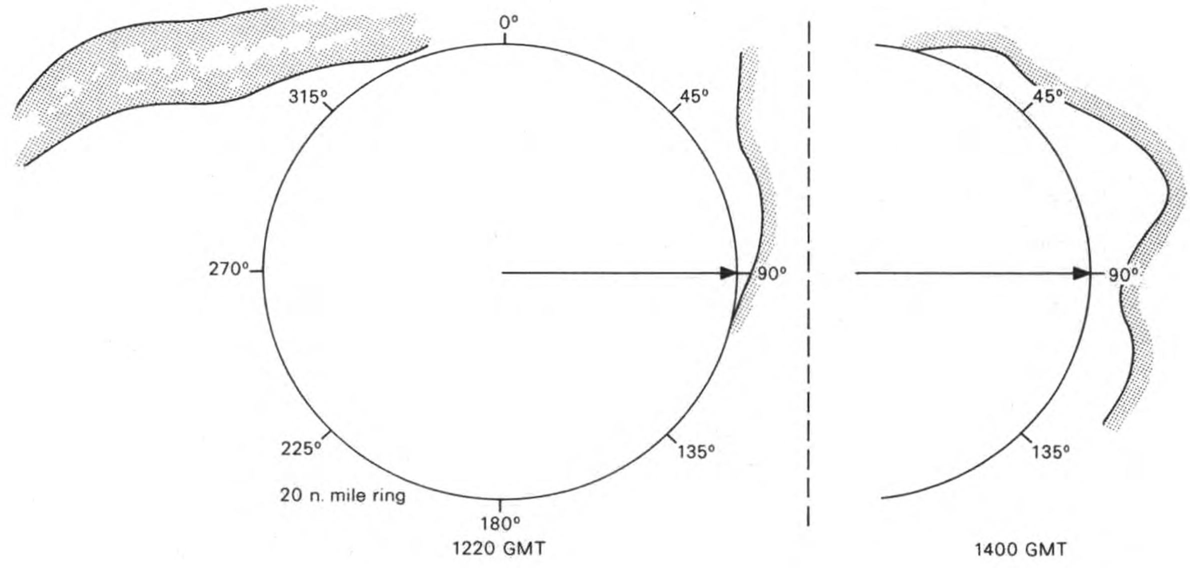
Note. The *Australian Venture* is an Australian Selected Ship.

Indian Ocean

m.v. *Australian Venture*. Captain P. Grimanes. Liverpool to Melbourne. Observer, Mr R. G. Macdonald, 3rd Officer.

7–8 May 1982. At 1000 GMT on the 7th radar ducting was observed on the 10 cm radar. Ships and Table Mountain were detected at a range of 120 n. mile. At 1108 GMT turbulence echoes were seen from SE to N. At this time the dry bulb temperature was 19·0 °C, wet bulb 15·5, sea temperature 13·1, barometric pressure 1015·2 mb and the wind N, force 3. At 1319 GMT temperature-inverted smoke was noted to the SW at a distance of approximately 10 n. mile. At 1330 GMT slight refraction was noted in ship targets near Table Bay and in shore buildings. At 1400 GMT the dry bulb was 21·7 °C, wet bulb 16·4, sea temperature 10·8, barometric pressure 1016·1 mb and wind NW, force 3.

On 8 May radar ducting was again observed after passing to southward of Cape Agulhas. Ship targets on the 10 cm radar showed up at 120 n. mile. At 1200 GMT slight turbulence-type echoes were noticed on the 10 cm radar. The 3 cm radar was switched on and definite turbulence echoes were observed as shown in the sketches; only very slight traces were seen, however, on the 10 cm radar despite the fact that the latter was acquiring ships at 100 n. mile and showing land near Cape Recife at 90 n.mile. The maximum ship target range



on the 3 cm radar was 80 n. mile. The vessel's course and speed were 090°(T) at 20·8 knots. The dry bulb was 23·0 °C, wet bulb 21·5, sea temperature 19·0, barometric pressure 1017·1 mb and wind NE, force 3. Visibility was very good with apparent smoke haze on the horizon all round.

Position of ship at 1200 GMT on 8th: 35° 33′S, 25° 43′E.

CETACEA

North Atlantic Ocean

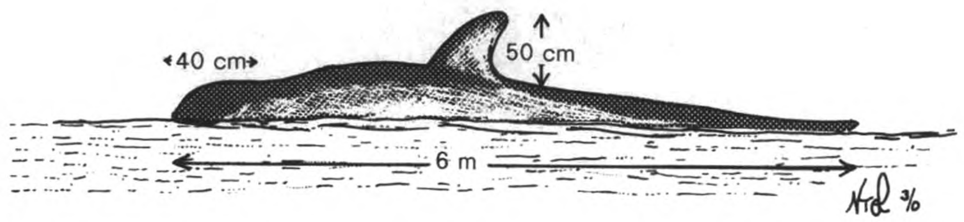
m.v. *British Poplar*. Captain P. Hillier. Nouadhibou (Mauritania) to Swansea. Observer, Mr N. T. Lee, 3rd Officer.

3 June 1982. At 1100 GMT the vessel was steaming on a course of 180°(T) at 14½ knots near to Cap Vert when a large number of what appeared at first to be large dolphins were sighted about 5 cables to port. They were travelling in a NW'ly direction and when counted numbered about 180–200, spread over a distance of 1 n. mile.

At 1120 GMT another school of about 30 creatures passed the vessel at a distance of about 10 metres travelling in a N'ly direction. On closer inspection, both sightings appear to have been Pilot Whales, both schools being rather docile and larger than dolphins, approximately 5–7 m in length. They were dark grey in colour and the dorsal fin was approximately 30–60 cm; their forehead was 'flat' with the blowhole visible 40 cm from the head.

They kept close to the surface at all times, breathing every 30 seconds. There were also several smaller species, about 3–5 m in length and of lighter pigmentation, amongst them. None of them seemed to be bothered by the close proximity of the vessel.

Near to both schools there were a number of dolphins (approximately 20 in number). They were light grey and about 2 m in length, distinguished by their 'bottle nose'. They were travelling in the same direction as the whales, whilst appearing far more active.



Position of ship: 14° 30′N, 17° 40′W.

Note. Mr D. A. McBrearty, of the Department of Anatomy, University of Cambridge, comments:

'The description and drawing do appear to indicate pilot whales. These would be the short-finned or tropical pilot whale *G. macrorhynchus*. Other dolphins in the group may have been bottlenose dolphins but it is also possible that they were humpback dolphins (*Sousa teuszii*). These animals are found in the coastal waters of West Africa and could, at first, be mistaken for bottlenose dolphins. They are greyish in colour, have a long beak, rather longer than the bottlenose in fact, and they have a hump faired into the curved dorsal fin. Both species may be found in company with pilot whales and with each other.'

South Atlantic Ocean

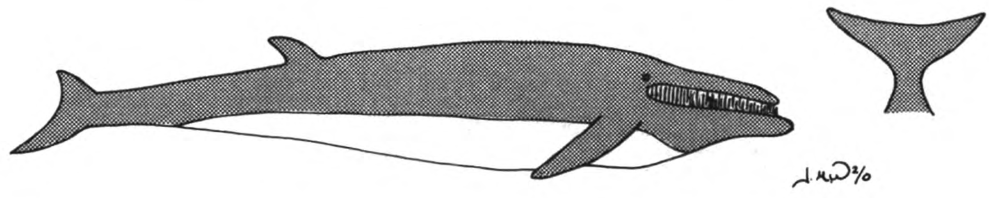
m.v. *British Tamar*. Captain D. O. W. Jones. Ascension Island to South Atlantic rendezvous. Observers, Mr J. M. White, 2nd Officer, Mr A. B. Spooner, Corporal M. N. Howard, RAF, Mr M. Rodulson, LRO(C), RN, and Mr B. Waters, Chief Officer, RFA.

20 June 1982. The vessel was drifting in the South Atlantic when three whales were spotted close to the bow. The time was about 1530 GMT. There were two large whales and a smaller one, giving the impression that they could be a family group. The two large whales were estimated to be about 25 metres in length and the smaller one about 15 metres. Their topsides were a dark slate grey and their undersides, from what we could see, were white or pale coloured. They were obviously baleen whales as we could clearly see their sieve plates. They had fairly pointed snouts, and looked as though they were permanently grinning. They had a small curved dorsal fin, fairly well back. The tail fin seemed fairly small in proportion to the body. They were identified as fin whales with the aid of the *Antarctic Pilot*.

The three whales were originally spotted just forward of the bow, floating on the surface, and frequently blowing spouts. They proceeded to circle the ship, down the starboard side, round the stern, and back up the port side, at a leisurely pace, always on or just below the surface. When they came up the port side the smaller one came in very close but, unfortunately, no-one had a camera to hand with which to photograph it.

They stayed close in to the ship, just forward of the port bow, until shortly after 1600 GMT. At this point they seemed to have disappeared. Shortly before 1700 GMT they reappeared for a short while, in the same area, and then moved slowly off across the bow, and away to starboard. The vessel was heading in a northerly direction at the time, and the whales disappeared in an east-north-easterly direction.

At the time of the observation there was a slight sea. The wind was NE, force 2. The sky was almost cloudless, with just a few small cumulus clouds around the horizon. The three whales appeared to be basking in the warm sunlight.



Position of ship: 24° 56′S, 19° 48′W.

Note. Mr McBrearty comments:

'This could well be, as the observers suggest, a fin whale (*Balaenoptera physalus*). A point about identification of the fin whale is that the colour pattern is asymmetrical. The white of the belly, chest and throat extends further up the right side than the left and includes the right front portion of baleen, which is a yellowish white. Occasionally, the right upper lip is also white.'

Mediterranean Sea

m.v. *Crestbank*. Captain T. D. Scott. Barcelona to Port Said. Observers, the Master, Mr G. A. Foster, 2nd Officer and Mr A. Stangroom, 3rd Officer.

8 June 1982. At 1225 GMT a solitary whale was sighted ahead and passed close down the ship's side, remaining very inactive. It provided the observers with ample opportunity to examine it in considerable detail. However, no conclusion could be drawn as to which species of cetacea it might have been. The whale was some 3½ or more metres in length and large around the girth, giving an impression of pregnancy. It was olive-green to brown in colour with white margins on the head and snout. These were assumed to be barnacles or scabs. The snout resembled that of a common dolphin, although not quite perfectly. There was no dorsal fin on the apex of the whale's back, but a small one was present midway between that position and the tail. The tail itself was broad and flat, and no blow was seen.

Position of ship: 34° 24′N, 21° 58′E.

Note. Mr McBrearty comments:

'Indications are that this is a ziphiid. A barrel-shaped girth, an obvious snout and a dorsal fin behind the mid-point, are all characteristic of this family.

'Only one member of the beaked whale family is known to be a regular inhabitant of the Mediterranean and that is Cuvier's whale, sometimes called the goosebeaked whale (*Ziphius cavirostris*). The colour of this small whale has been variously described as greyish to brownish with white scars and blotches. Males frequently have a distinctly cream-coloured head. Two prominent teeth may be seen at the point of the lower jaw in males, and very occasionally just the tips of these teeth may be seen in females. These whales, like all members of the ziphiid family, are seen offshore and usually in deep water. Food consists mainly of squid with some fish.'

Indian Ocean

m.v. *Anco Enterprise*. Captain B. Hoare. Durban to Port Louis. Observers, Mr S. Brace, 2nd Officer and Mr J. Gillis and Mr G. Bowles, 3rd Officers.

14 May 1982. At 1300 GMT a large whale was observed breaking the surface of the water in a fashion similar to that of dolphins, pushing about half its body clear of the water and landing heavily on its back. This performance was

observed for about 10 minutes. It was thought to be a sei whale although identification was difficult as it never came closer than about 1 n. mile. Its upper surface was dark grey to black and a very white underbody was apparent. One observer thought that he had seen white patches on the upper surface. A sharply recurved fin was observed and the mammal had no obvious beak or brow. A regular-shaped 'blow' was observed and the creature's size was estimated as 10 metres.

Position of ship: 21° 30'S, 61° 00'E.

Note. Mr. McBrearty comments:

'The behaviour pattern observed in this whale is common to the humpback (*Megaptera novaeangliae*) and minke whales (*Balaenoptera acutorostrata*) but less so to the finner (*Balaenoptera physalus*). I do not believe that the sei whale leaps in this fashion.

'A large curved dorsal fin was shown in the accompanying sketch. No mention is made of the forward flippers which, if this had been a humpback, would most certainly have been noticed as they occupy almost one third of the whale's length. The dorsal fin is proportionally too large and the "blow" the wrong shape for a finner, neither do I think this is a sei whale (*Balaenoptera borealis*) as is suggested. In my opinion, the description indicates that this was a minke whale.'

SHARKS

North-west Pacific

m.v. *Tacoma City*. Captain W. Wood. Panama to Xingang (China). Observers, the Master and ship's company.

21 April 1982. At 1800 GMT while the vessel was stopped undergoing engine repairs, a number of sharks, as many as 6 at a time, were observed alongside the vessel. They ranged in size from about 1·5 m to 3 m. The bodies had dark grey upper parts and white underbellies with a distinctive 'white-tips' coloration to the upper and outer parts of the fins. They were all accompanied by a number of sucker fish and also by another type which appeared to be an iridescent blue in colour, about 20 cm long, assumed to be pilot fish. Various 'tit-bits' were thrown into the water, and all were consumed. Attempts were made by the crew to catch one, but although several were hooked, the lack of a barb on the hook allowed them, in their violent movements, to detach themselves from the hook. After one very near but unsuccessful attempt, one shark was seen to swim away under the vessel trailing blood, but this had no effect on the other sharks, which continued to be drawn to the hook (with its bloodless piece of meat). After about 1½ hours most of the sharks had left, but at least one was still swimming around the baited hook, but making no attempt at a strike.

Position of ship: 13° 12'N, 101° 03'W.

Note. Dr F. Evans, of the Dove Marine Laboratory, University of Newcastle upon Tyne, comments:

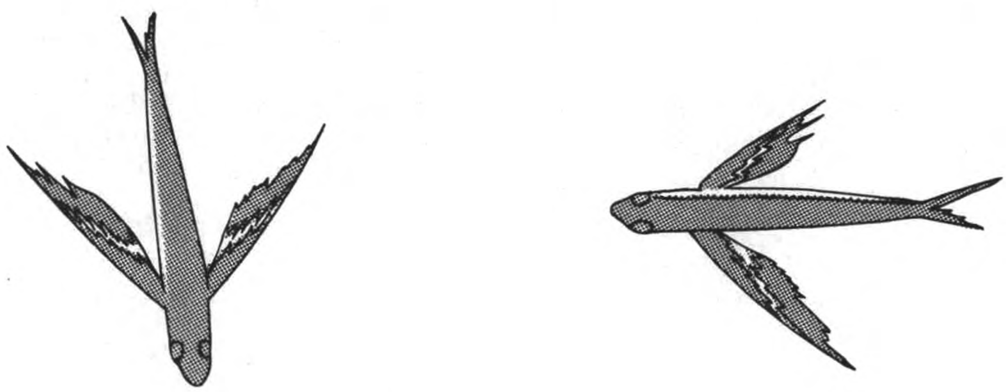
'From the description these sharks were the white-tipped shark, *Carcharhinus longimanus*, which is a near-surface high ocean dweller in all warm seas. In my own experience this shark is rather solitary but seamen have sent me a number of reports of small groups, such as this one, so I must revise my view. There are previous reports in *The Marine Observer* for April 1979 and January 1982. The blue fish were certainly pilot fish, *Naucrates ductor*, whose colour is indeed bluish, with 5–7 darker vertical bands on the side of the body. Pilot fish accompany sharks (and slow ships) in their wanderings, feeding on scraps and on the many parasites present on the bodies of the sharks. I presume the sucker fish were attached to the sharks; they are often found upside down behind the first dorsal fin, also waiting for a meal of scraps.'

FLYING FISH

USA coastal waters

m.v. *Andalucia Star*. Captain I. Mackintosh. Gulfport to Port Limon. Observers, Mr W. J. Barclay, Chief Officer and Mr D. Stratford, 3rd Officer.

18 April 1982. At 0900 GMT the Chief Officer noticed a flying fish on deck at one of the hatches on the port side. On closer examination the fish was found to be 30 cm long and 22½ cm broad. It was impossible, however, to ascertain its full wingspan as rigor mortis had set in. At the time of measurement its wings were at an angle of about 45°. It weighed in at approximately 225 grams. The fish's upper body was dark blue and scaly while the belly was a dull silver colour.



The sketches are based on colour photographs taken at the time of discovery.

Position of ship: 12° 55′N, 78° 35′W.

Note. In the October 1981 edition of *The Marine Observer* Dr F. Evans, of the Dove Marine Laboratory, University of Newcastle upon Tyne, commented as follows:

'The family of flying fish, about 50 species in all, may be coarsely divided into two, those with two wings and those with four. . . . The flight wings are, of course, highly developed fins. The two-wingers have large pectoral fins only, the pelvics being no bigger than herring fins while the four-wingers have their pelvic fins enlarged to aid gliding.'

MARINE LIFE

North Atlantic Ocean

m.v. *Singularity*. Captain L. A. Roe. Vigo to Rotterdam. Observers, the Master, Mr. N. Bennett, Chief Officer and Mr G. Bewley, 2nd Officer.

3 May 1982. Between 1515 and 1540 GMT the vessel steamed through large patches of suspended material in north to south streaks, which at times resembled thick orange/brown muddy water and in depth extended for at least two metres.

The depth of water was 1380 fathoms, which would seem to exclude seismic disturbance—hence it was concluded to be a 'Red Tide' phenomenon. It was by far the most dense example that had been seen by any of the observers.

Weather conditions: dry bulb 22·5 °C, dew-point 19·0, sea temperature 21·5, barometric pressure 1013·1 mb, wind N'ly, force 3–4.

Position of ship: 17° 14′N, 17° 40′W.

Note. Dr Evans comments as follows:

'The region referred to, where the Canaries Current turns west and sets off for the New World as the North Equatorial Current, is a region of strong upwelling as the migrating surface water is replaced from below. Dissolved plant nutrients are drawn up from the depths and in the spring a profuse phytoplankton bloom results. Stable early-summer conditions can then accentuate the bloom. The masses of microscopic plants seen from the *Singularity* were then blown into wind rows as happens to leaves on a lake. The thick, orange-brown, muddy water resulting from the bloom was correctly described as a red tide.'

BIRDS

East China Sea

s.s. *Act 2*. Captain L. J. Brown. Pusan (South Korea) to Keelung (Taiwan). Observers, Mr S. G. Millar and Mr K. Griffiths, Chief Officers, Mr D. M. Robinson, 2nd Officer, Mr S. M. Milner and Mr R. M. Walker, 3rd Officers, and Mr P. Lavery and Mr A. E. Burbridge, Radio Officers.

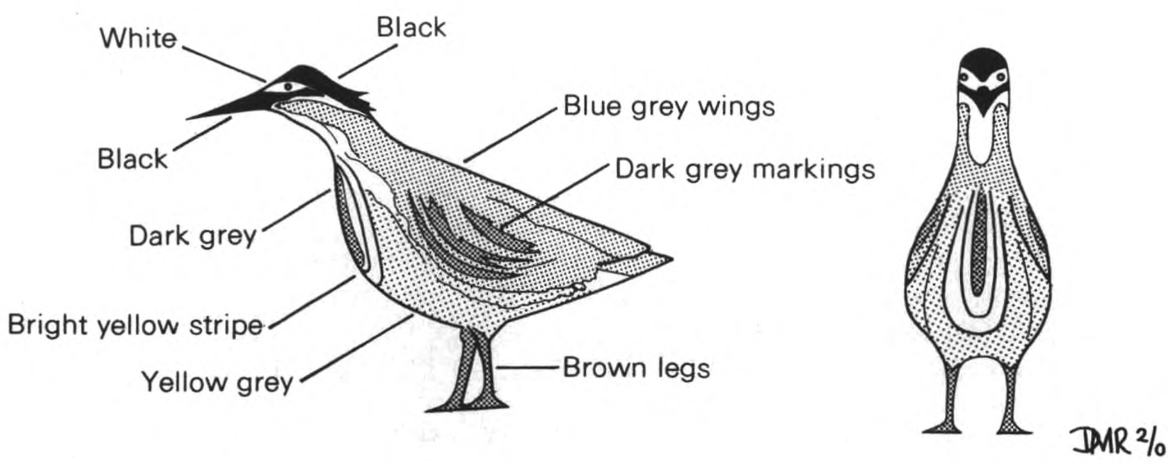
19–22 April 1982. Over this period of three days the vessel attracted a large selection of bird life, which seemed unusual as passages had been made across the East China Sea between 18 and 23 February and 6 and 10 April without the same selection being seen. The concentration between 19 and 22 April could have been due to the northerly migration ahead of the sun.

The vast majority of the species were landbirds and were therefore unidentifiable. The birds were attracted both by day and by night, though casualties arising from ship strikes were suffered predominantly during the night, especially the night of 21/22 April. Most of the birds which landed on the vessel stayed for between 6 and 10 hours, so they may have been recovering from exhaustion.

20 April, 0600 GMT. Position of ship: 29° 30′N, 125° 04′E.

This bird was about 30–35 cm long and had a wingspan of approximately 55–65 cm. Since the bird spent most of its time hiding, only the front view is accurate, but the colours at least are fairly accurate in the side view.

'NIGEL'



21 April, 0600 GMT. Position of ship: 23° 40′N, 118° 27′E.
This bird was about 22–25 cm long and had a wingspan of approximately 25 cm. It flew with a very rapid wing beat and a swooping line of flight. It spent the majority of its time hopping, with bursts of speed, presumably to catch insects.

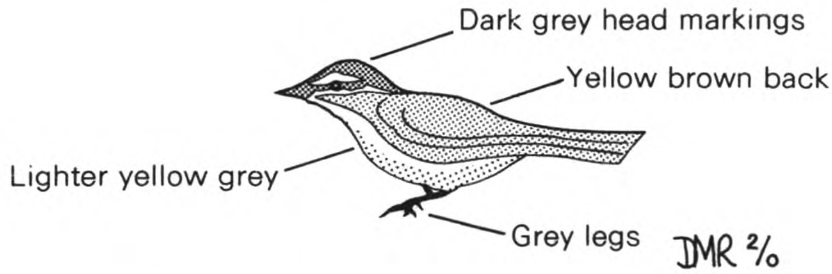
'SAM'

Black, grey and white

JMR 2/0

22 April, 1830 GMT. Position of ship: 22° 26′N, 115° 38′E.
This bird arrived on board possibly having been stunned or blinded by lightning, as it hit the bridge-front about 2 seconds after a bolt, giving the lookout a wing in the face and a fright to boot! It was about 18 cm long with a 20 cm wingspan.

'JUDY'



Numerous other birds were seen, some similar to grey canaries and some like the English sparrow, but with greater contrasts, but they were not willing models.

Southern Ocean

R.R.S. *Bransfield*. Captain S. J. Lawrence, Strait of Magellan to Southampton via Antarctic Peninsula. observer, Mr J. D. Shanklin.
3 April 1982. A Cattle Egret was seen flying around the vessel during the crossing of the Dale Passage. The bird did not attempt to land on the vessel.
Weather conditions: air temperture 4·0 °C, wind NW'ly, force 3–4.
12 April 1982. A Cattle Egret was again seen flying around the vessel which by now was on passage from Signy Island to Southampton via 200 n. mile south of the South Sandwich islands.
Weather conditions: air temperature −2·0 °C, wind NE'ly, force 4.
13 April 1982. A Cattle Egret, probably the same one as that observed on the previous day, was found on board. The bird was able to fly a short distance but

was very weak. It was unable to stand properly on its feet and its wing muscles felt deflated owing to obvious lack of protein and fresh water. the bird was caught and kept in a cage and it was initially necessary to resort to forcible feeding.

The Egret was force-fed with scraps of raw meat, chicken and raw egg during the first five to six days. Thereafter he (she?) accepted scraps of raw fish (usually 4–5 for periods of 1–2 hours) supplemented with vitamin capsules. He soon put on weight, 'perked up' and was fit for release on 1 May 1982 as the vessel passed through the Cape Verde Islands. He was released at 1400 GMT from the helicopter deck and flew straight to the after crane. He was still with the ship at nightfall but left during the night, in the direction, it was to be hoped, of the Cape Verde Islands or the African coast.

Weather conditions: air temperature 0·5 °C, wind NW'ly, force 4.

Position of ship on 3 April: 58° 33'S, 63° 50'W.

Position of ship on 12 April: 61° 30'S, 37° 00'W.

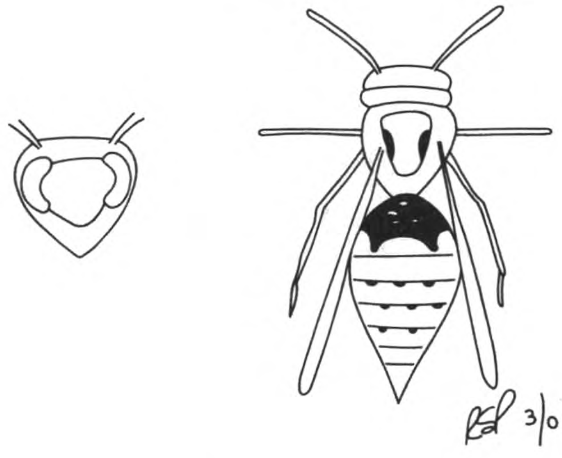
Position of ship on 13 April: 61° 30'S, 27° 52'W.

INSECT

Shetland waters

m.v. *Naticina*. Captain J. D. T. Price. At Sullom Voe, Shetlands. Observer, Mr R. S. Payne, 3rd Officer.

9 May 1982. While the observer and watchkeepers were attending to the after moorings, the insect described below and shown in the sketch droned in, bounced off the bulwark and landed audibly on the deck. It appeared to be drowsy, possibly because the weather was not very warm, and it stayed where it landed long enough for observations to be made, from a discreet distance, needless to say.



The overall appearance was that of a large wasp. It was approximately 2·5 cm in length, with short, club-like antennae and a short, dull-red head backed by an orange 'rollneck' collar. This collar had the same furry appearance as is found in bees. The thorax was a brick red in colour and had a prominent red-and-black marked 'shield'. Its forelegs appeared to be tucked under and its hind legs were long and trailing. Its wings were long and narrow and of the transparent black colour of a fly's wing. The abdomen was bulky, tapering off to a point.No sting was obvious but no chances were taken. This part of the body was a pale lemon-yellow in colour, with small black spots where the segments joined and a black 'waistcoat' with apparently random white spots.

At first the beast was thought to be blind, but closer inspection revealed two kidney-shaped dull-red eyes in the pattern of the face. The mouth-parts appeared to be of the chewing kind.

The weather was bright and sunny, though cool at about 15 °C.

Position of ship: 60° 30′N, 1° 20′W.

Note, Mr C. R. Vardy, of the British Museum (Natural History), comments as follows:

'The specimen appears to be a social wasp. Although the drawing and description are quite detailed, it is not possible to identify more exactly without seeing the actual insect.'

BIOLUMINESCENCE

North Pacific Ocean

m.v. *Barber Memnon*. Captain W. E. Bowden. Yokohama to Vancouver, B.C. Observers, Mr A. L. Crowe, Chief Officer, Mr J. M. Kernick, 3rd Officer, Mr D. Martin, Electrical Officer and Mr J. Igwe, Senior Cadet Officer.

16 May 1982. Sunset was at 0920 GMT and the moon was due to rise at approximately 1553 GMT. The vessel started passing through patches of bioluminescence which ranged from two to three metres in width to as much as 50 metres. They gave the appearance of small bubbles bursting on the surface, appearing fairly bright at first, but fading until they were virtually invisible by the time the vessel was abeam of them.

Weather conditions: dry bulb 16·0 °C, wet bulb 13·6, sea temperature 14·5, barometric pressure 1016·6 mb (steady), wind SE, force 2, a few clouds visible.

Ship's course 066°(T).

Position of ship at 1030 GMT: 36° 52′N, 145° 41′E.

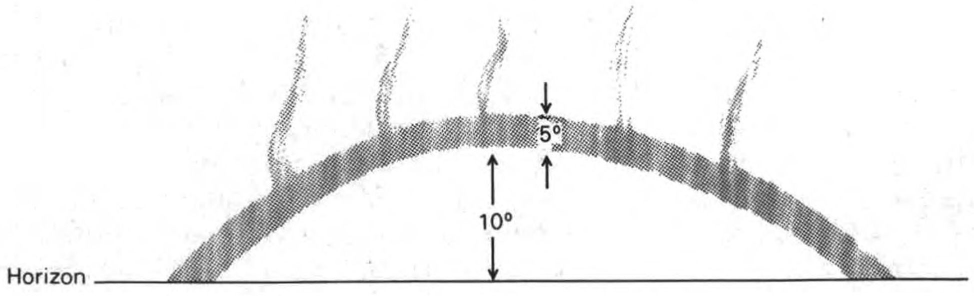
Note. The *Barber Memnon* is a Hong Kong Selected Ship.

AURORA BOREALIS

North Atlantic Ocean

m.v. *Aeneas*. Captain A. J. Dyne. Immingham to Montreal. Observers, Mr A. Lewis, 2nd Officer and Mr I. A. Sutton, 3rd Officer.

25 April 1982, 0450 GMT. A cloud-like crescent was seen on the starboard bow with a maximum elevation of 10° above the horizon. It extended from 12° on the port bow to the starboard beam, reaching the surface. The crescent was approximately 5° broad. Definite streaks appeared to shoot skywards and the crescent seemed to be getting closer as the elevation was rising. Stars were visible through and below it. After about 20 minutes it lost its definite crescent



shape and took on the form of a rayed arc; it was observed that frequent streaks continued to be emitted skywards. The aurora remained visible for 1 hour 10 minutes.

Two days previously considerable sunspot activity had been observed during morning sights.

Weather conditions: dry bulb −0·2°C, wet bulb −1·2, sea temperature −1·0, barometric pressure 1018·2 mb.

Course 298°(T).

Position of ship: 48° 05′N, 60° 55′W.

s.s. *Act 4*. Captain N. D. T. Johnson. Boston (USA) to St John (N.B.). Observers, the Master, Mr S. Scott, 2nd Officer and Cadet L. St J. Campbell.

28 May 1982. At 0430 GMT an auroral display was observed in the northern sky. It took the form of a quiet rayed arc of moderate brightness with no distinct colour. At 0450 the display became extremely active, increasing in relative brightness and showing colour. At 0455 GMT the aurora reached its most active state. The rays at either end of the arc became more distinct and aggressive, and a clear yellow-green colour could be seen across the sky, ranging from bright to brilliant in intensity.

At 0500 GMT the aurora went quiet, showing a definite change in brightness to moderate. The rays had disappeared, leaving a solitary homogeneous arc which was pale green in colour. At 0530, once again becoming active, the arc took on a banded form and appeared to be pulsating and the colour was a constant pale green.

At 0540 GMT, still continuing its pulsating cycle, but becoming darker in appearance, the band opposed its previous shape, giving an illusion of a higher elevation of its lower edge due north, and a lower elevation of its outer regions. At 0544 GMT the display quietened and once more became a homogeneous arc, although now weak and pale in colour. At 0553 GMT activity resumed and a ray appeared on the by now moderate homogeneous pale-green arc, bearing due north. Inclined at about 10° to the vertical, the slightly brighter ray extended well into the sky and slightly below the lower edge of the arc.

At 0603 GMT, resuming a quiet state, the aurora again took on the form of a weak homogeneous arc, pale in colour, similar to the display at 0544. At 0609 GMT the still quiet arc seemed to shift across the horizon and a weak curtained ray appeared bearing due north. At 0633 GMT, resuming a quiet state, the aurora again took on the form of a weak homogeneous arc, pale in colour and similar to the displays at 0544 and 0603 GMT.

At 0647 GMT the aurora became active and started to flame across the sky to the zenith in rapid bursts. The arc, which was still distinctive but more broken up, was of moderate brightness as were the successive flames emerging from it. Flaming activity continued until twilight; sunrise was at 0847 GMT.

Position of ship: 44° 30′N, 60° 23′W.

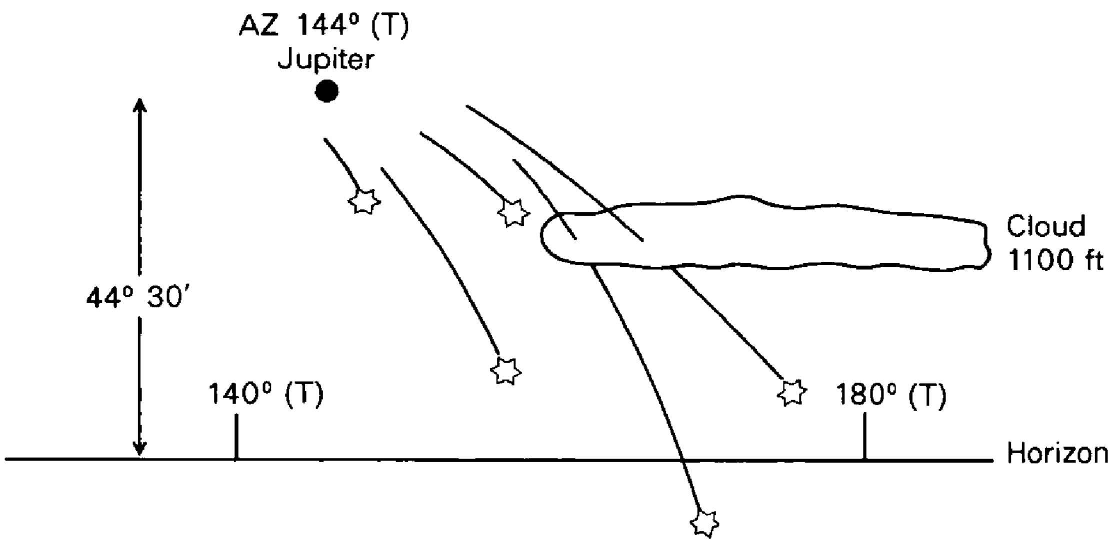
Note. The *Act 4* is a New Zealand Selected Ship.

METEOR SHOWER

North Atlantic Ocean

s.s. *Remuera Bay*. Captain J. S. Thorpe. Rotterdam to Auckland, N.Z. Observers, Mr M. Leech, 3rd Officer and Mr T. Brown.

25 May 1982, 2338–2340 GMT. Mr Brown thought he saw lightning out to port and went out on the port bridge-wing to investigate. Upon hearing his call the 3rd Officer dashed out to witness a most incredible meteor shower. His first impression was that the phenomenon was caused by naval vessels launching star-flares as the trails had the appearance of fireworks, being full of colour. The point of origin seemed to be just below and to the left of Jupiter (Alt. 44° 30′, Az. 144°(T)). All the bodies were considerably brighter than Jupiter and appeared to track from left to right but to be approaching the observers. Several passed through a bank of low cloud, lighting it up and emerging from the base.



It is hard to be precise but it is considered that at least one of them entered the sea, its track coming below the horizon. The apparent proximity caused both observers to duck into the wheelhouse and Mr Brown commented later he had considered hurrying deeper into the accommodation. Enough light was given off to illuminate the observers' faces and cast shadows, blocking out the stars, with only Jupiter bright enough to remain prominent, similar to bright moonlight. The particles appeared bright white in colour with residual sparks glowing in the trails. The average duration of flight was about 3 seconds and the phenomenon lasted for about 2 minutes.

Position of ship: 27° 33′N, 53° 06′W.

VOLCANIC ACTIVITY

Coral Sea

m.v. *Kweichow*. Captain H. J. Stagg. Hong Kong to Lautoka (Viti Levu Island, Fiji). Observers, the Master and Mr K. Ienraoi, 2nd Officer.

25 April 1982. At 1530 GMT a reddish-yellow glow was observed on a bearing of 106°(T); a simultaneous radar observation confirmed that the island of Tinakula in the Santa Cruz group was 40 n. mile distant on a bearing of 105°(T).

At 1630 GMT a clearer observation was made with the aid of binoculars; a 'good flow' of molten lava was seen to be spewing out of the crater and moving down the slopes of the volcano. At this time the island was shown by the radar to be 28 n. mile distant on a bearing of 090°(T).

During the observation the vessel was steering 135°(T) on smooth seas with a low, long SSE'ly swell. The wind was light airs and there were a few low cumulus clouds covering about 2/8 of the sky.

When the island was abeam to port at a distance of approximately 21 n. mile it became obvious that black smoke and ashes were also being thrown out high into the air.

Position of ship: 10° 22'S, 165° 10'E.

Note. The *Kweichow* is a Hong Kong Selected Ship.

RESCUE OF THE CREW OF THE *KYOTEN MARU*

South Pacific Ocean

m.v. *Arafura*. Captain R. M. Coates. Osaka to Sydney.

25 May 1982. At 1110 GMT the *Arafura* was directed by COMSURCEN, Canberra to proceed to the assistance of a vessel, m.v. *Kyoten Maru*, which was aground and in danger of capsizing on Lihou Reef (17° 10'S, 152° 09'E); this was some 150 n. mile SW of the *Arafura*'s position.

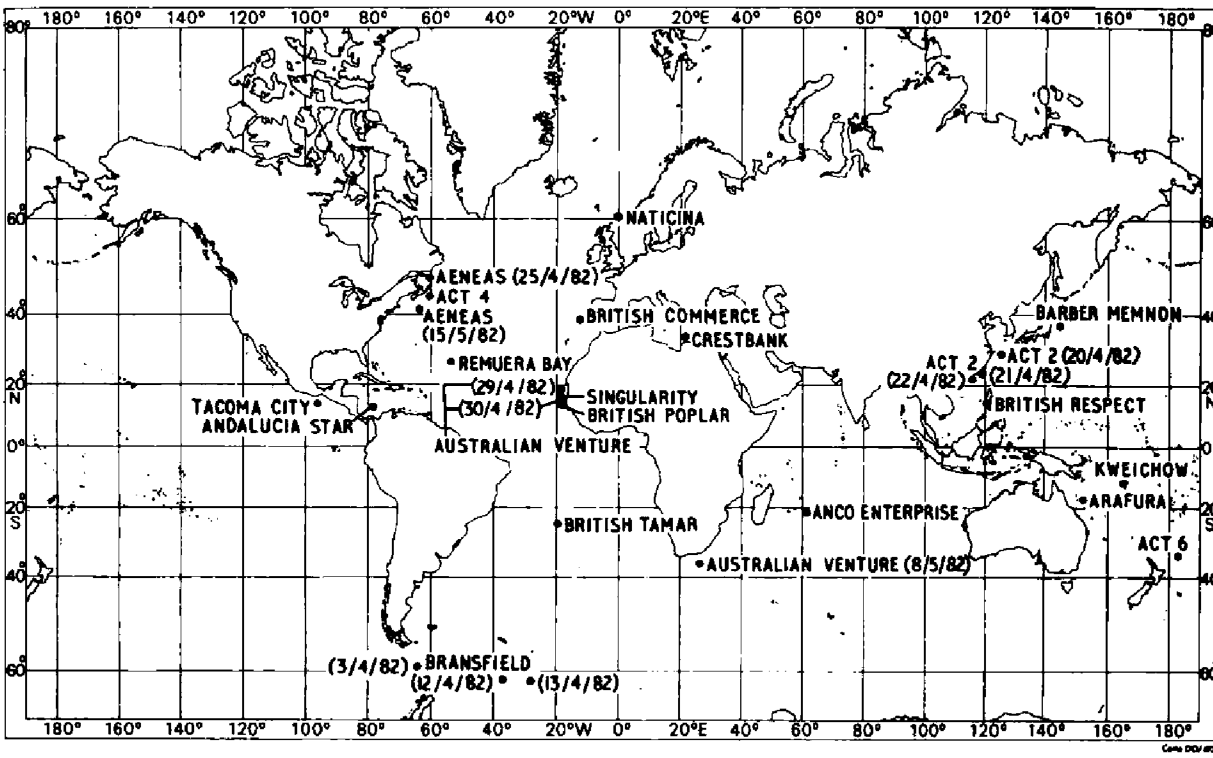
The vessel's course was altered to the SW and speed was increased to 22½ knots. The *Arafura* arrived in the vicinity of Lihou Reef at 1800 GMT on 25 May and was advised by the crew of the *Kyoten Maru* that they were unable to use their lifeboats. Instead they requested the use of the *Arafura*'s boat for their transfer from the stricken vessel. The Master agreed to this proposal and at first light, around 1950 GMT, *Arafura*'s motor-boat was lowered and set out for the *Kyoten Maru* to commence the transfer.

It took two trips to transfer the total of 24 crewmen and the operation was completed without any mishap in just over two hours. With the crew safely on board and her motor-boat and its crew safely recovered, the *Arafura* resumed her voyage to Sydney at 2200 GMT.

Throughout the rescue operation the weather was fair, with the wind ESE, force 3–4 and the air temperature 25 °C. There was a SE'ly swell of height 2 metres.

Position of ship: 17° 10'S, 152° 09'E.

Note. The *Arafura* is an Australian Selected Ship.



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

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The Distribution of Wind and Pressure in Cook Strait in strong Northerlies

By Mrs B. A. Stainer
(New Zealand Meteorological Service, Wellington, New Zealand)

It is well known that northerly wind flows are enhanced locally over the Cook Strait/Wellington area of New Zealand by the orography of the region, but the magnitude and distribution of this enhancement was not so well known owing to the small number of wind and pressure reporting stations in the area. Wind and pressure reports come from Paraparaumu, Kelburn and Wellington Airport with wind reports also from Brothers Island (during daylight hours), from Mt Kaukau and occasional reports from Beacon Hill. The Cook Strait ferries also provide reports from mid-Strait. This gives a concentration of reports over the immediate Wellington area but only two isolated reports from the Strait and one of these, Brothers Island, is at the far northern end of the Strait.

The receipt of some annotated barograms from the ferries therefore provided a unique opportunity for a more detailed study of the wind and pressure distribution of the region. Of particular interest on the barograms was the occurrence of large rapid pressure changes of approximately 4 mb or more during crossings of the Strait, these occurring simultaneously with very strong northerly winds. The reports from the standard reporting stations on these occasions gave strong winds but there was nothing to indicate the very high velocities noted by the ferries off the Wellington south coast.

To get an idea of the frequency of occurrence of rapid pressure changes on the ferry barograms a search was undertaken of the barograms for the period from 6.9.72 to 30.4.76. This indicated that rapid pressure changes were common, occurring on about 80 per cent of days. However, changes of 4 mb or more were much less common, occurring on about 12 per cent of days. This seemed sufficiently infrequent to indicate that winds of more than average strength were involved. As 92 per cent of rapid pressure changes occurred in northerly conditions and the examples of annotated charts all involved northerly wind conditions the study was confined to these situations and to large pressure changes (4 mb or more).

The comments written on the barograms, by relating actual wind speeds experienced to the time of the large pressure changes on the barograms, gave a very valuable basis for sorting out other situations where high wind speeds would be likely off the Wellington south coast. They were also helpful in making it possible to arrive at a reasonable overall picture of the wind distribution in the Strait.

Large-scale mean-sea-level isobaric maps of the Cook Strait area were produced using all available information including that from the barograms. The rapid fall and rise of pressure noted on the barograms gave evidence of a small-scale low off the south coast. Owing to the relationship between the pressure field and wind flow this served to highlight the likely areas of maximum and minimum wind speed. Although a complete circulation was drawn off the Wellington south coast it is not thought that an actual circulation exists. Because of the small size of the pressure minimum (2–3 km in diameter) the airflow would be ageostrophic and unable to have time to resolve into a circulation.

Attention was then turned towards finding ways in which occurrences of high winds could be predicted. Firstly, a broad-scale approach was considered and details of synoptic situations which favoured these conditions were sought.

Three main types of situation were found:

(*a*) a north-westerly flow ahead of a cold front approaching from the west;
(*b*) a disturbed westerly flow;
(*c*) a belt of high pressure across the north of the North Island with a westerly flow further south.

These are all common synoptic situations so further information was thought to be necessary.

The differences in pressure between pairs of stations were taken e.g. pressure at PP (Paraparaumu) − pressure at KL (Kelburn), pressure at KL − pressure at CC (Cape Campbell) etc., with the idea of getting an indication of the magnitude of the pressure gradient and hence the wind flow. However, this was not successful as strong winds occurred even when pressure differences were small. The reason for this seemed to be that the strong wind effect is on such a small scale that the pressure differences cover much too large an area to show it up.

The other main approach was to relate Mt Kaukau winds to the occasions on which rapid pressure changes occurred. It was found that during the 6-hour interval leading up to these occasions the Mt Kaukau wind was northerly (mostly in the range 350°–020°) and for at least 75 per cent of the time was 30 knots or more. It was also found that the location of the small-scale pressure minimum shifted from near Karori Rock when the Mt Kaukau wind was north-westerly to near Sinclair Head if the wind was northerly. Hence the location of the maximum winds would also shift although high winds would still be likely over the whole passage past the Wellington south coast.

An interesting result was obtained when relating the wind speed reported from the ferry at its mid-Strait reporting position and the occurrence within the next six hours of large rapid pressure changes. Speeds were mostly less than or equal to 30 knots (80 per cent of the time) and often less than or equal to 25 knots (63 per cent of the time). Thus the strongest winds did seem to be confined to the area off the Wellington south coast.

There follow two examples of case studies which made much use of the annotated barograms provided by the Cook Strait ferry officers. The locations of the reporting stations and geographical features referred to in the text are indicated in Figure 1.

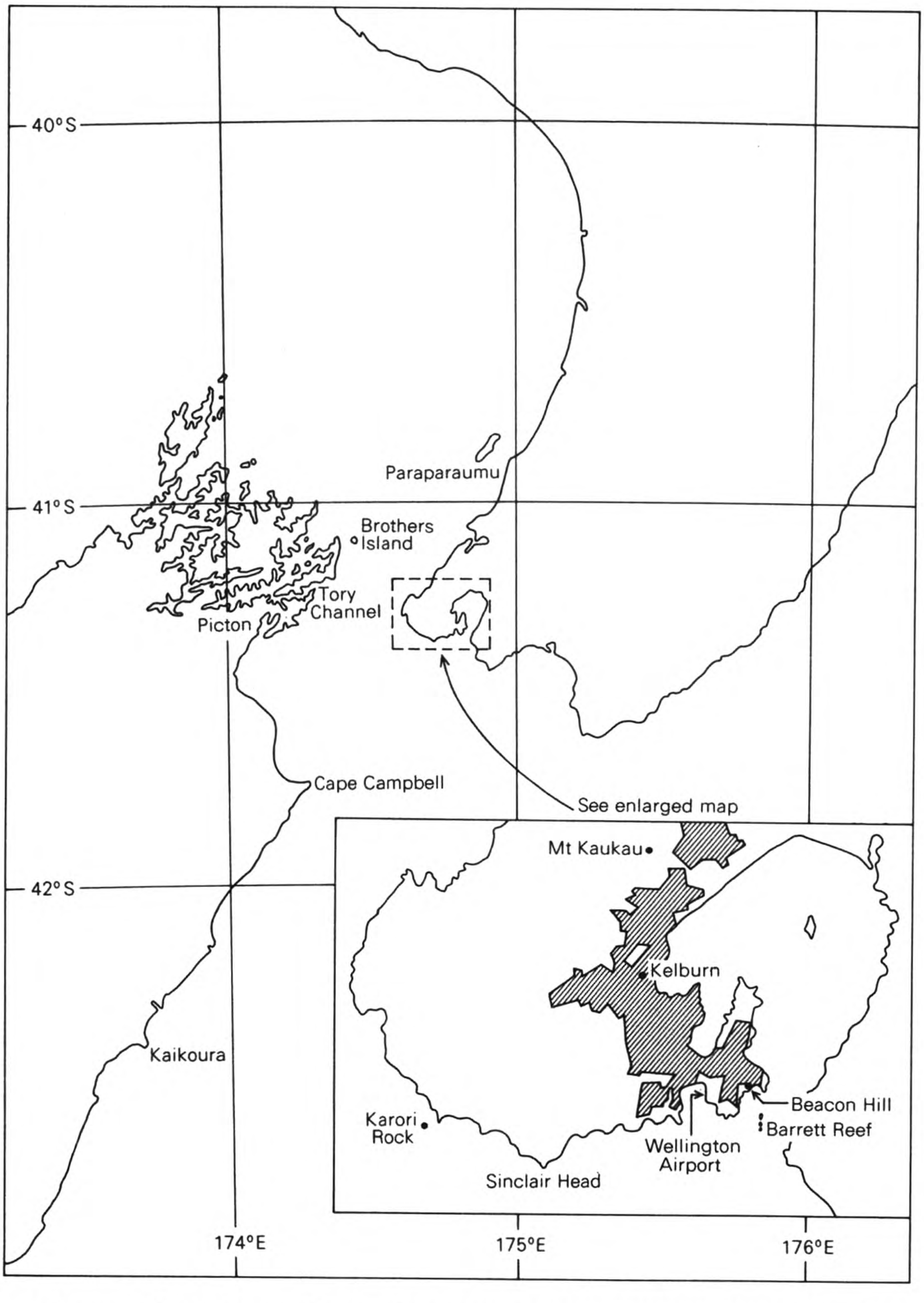


Figure 1. Reporting stations and geographic features in the Wellington area.

Case Studies

(1). 27 January 1976, 1800h.

A deep complex low-pressure system lies to the south of New Zealand and on its northern side an unstable westerly airflow covers the country.

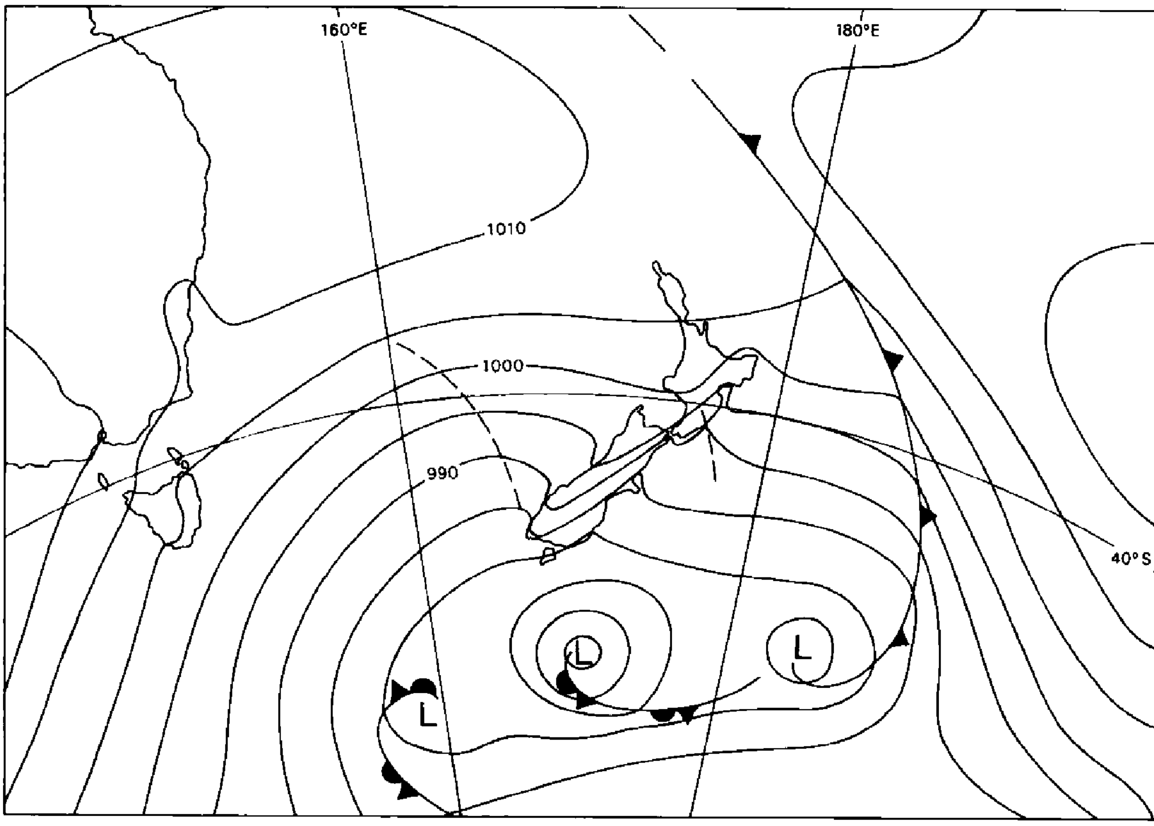


Figure 2. Synoptic situation at 1800h on 27 January 1976.

The barogram from the *Arahanga* is rather jerky with a rapid fall of about 3 mb at 1600h. The *Arahanga* later reported a north-westerly wind of 50 knots on the crossing from Tory Channel entrance to Karori Rock from 1700 to 1749h. The trace from the *Aranui* gives a drop of about 4 mb also at 1600h, on the voyage from Picton to Wellington—the drop commencing before Karori Rock then stopping at Sinclair Head before a steep pressure rise into Wellington Harbour. A small low was drawn off Sinclair Head to try to explain these facts.

This case provides an example where the broad-scale flow as indicated by the isobars (westerly) is at least 90° different from the Mt Kaukau wind (010°).

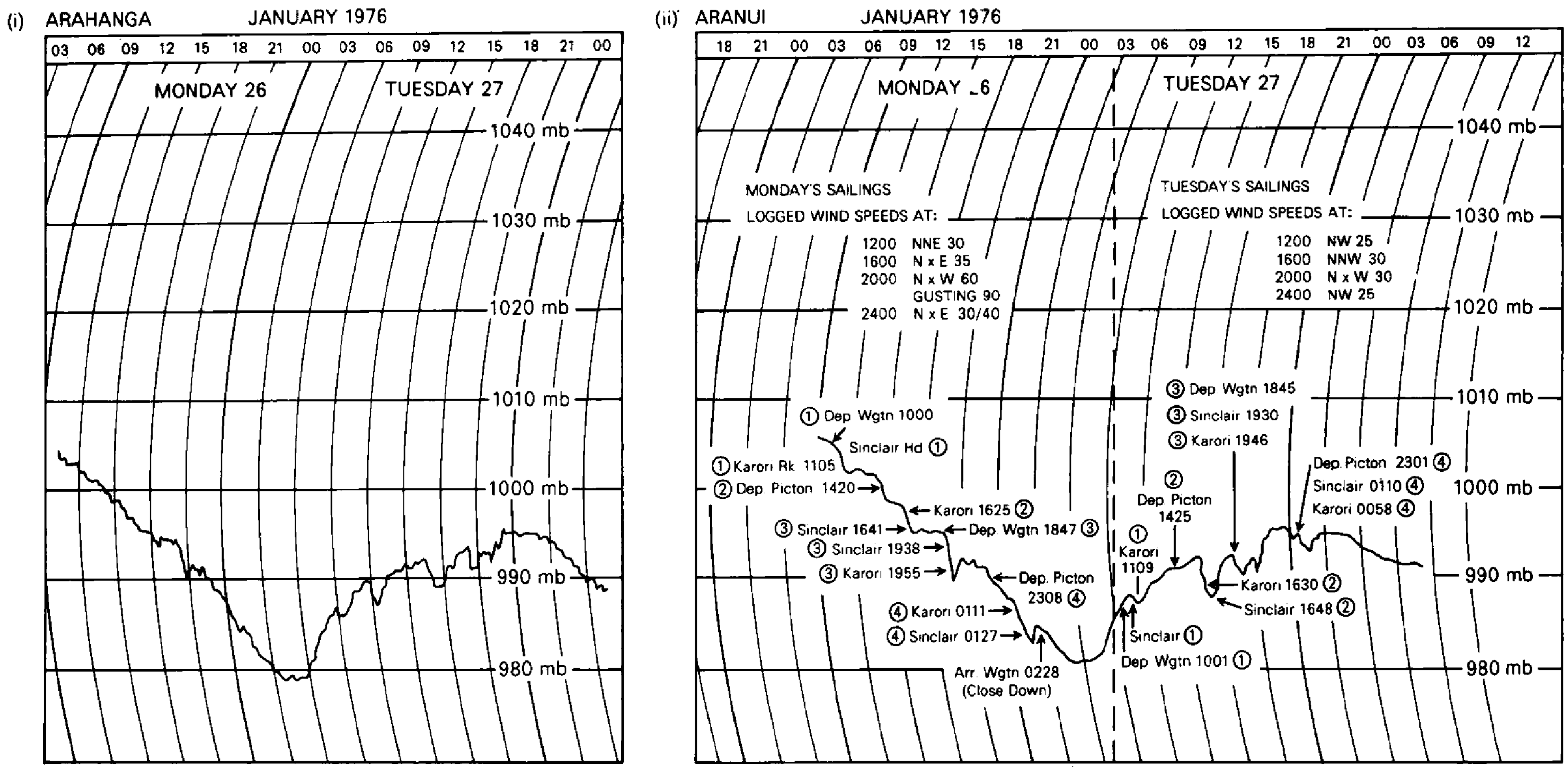


Figure 3. **Barograms from (i) the *Arahanga* and (ii) the *Aranui* for 26 and 27 January 1976.**

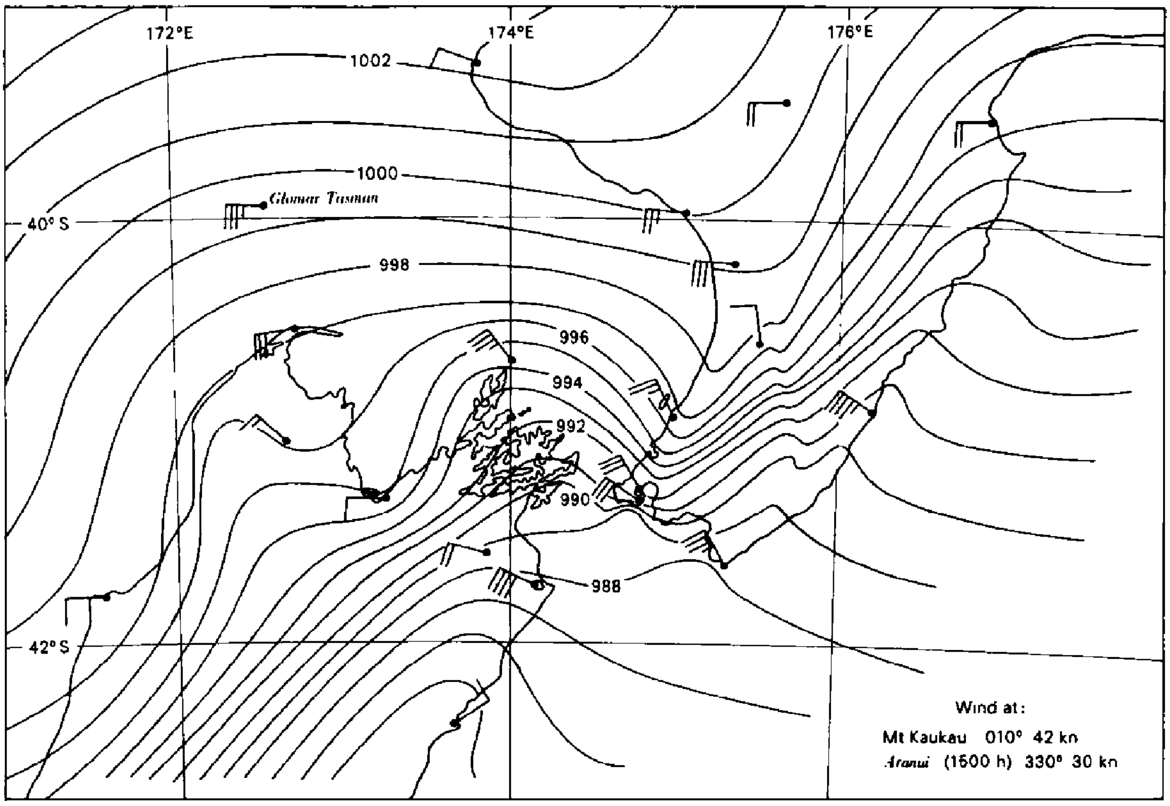


Figure 4. Large-scale analysis for 1800h on 27 January 1976.

(2). 15 July 1976, 1200h.
A strong north-westerly airflow covered the area ahead of a front over the north of the South Island. A small-scale low developed near Kaikoura where there was a north-westerly of 60 knots at midday. In the following three hours this low moved north and the wind at Kaikoura changed to south-westerly 20 knots. This had the effect of increasing the north-westerly gradient even more over the Cook Strait area.

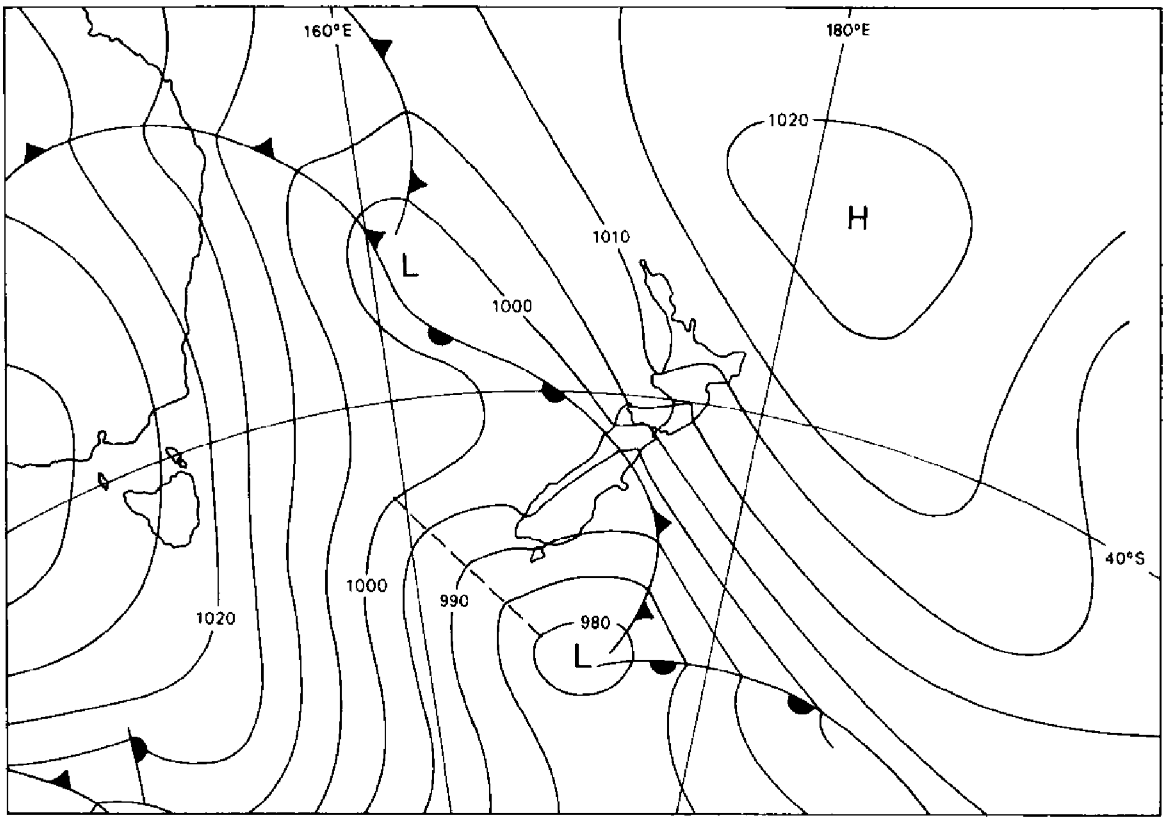


Figure 5. Synoptic situation at 1200h on 15 July 1976.

The barogram from the *Aramoana* showed that the ship was off Karori Rock at midday and the pressure fell sharply by about 5 mb from here to Sinclair Head and Barrett Reef Buoy and then rose sharply into Wellington. The ship returned to Picton about two hours later when another similar fall of pressure occurred.

Wind observations gave gusts of 90 knots on the inward voyage to Wellington and an average wind speed of 60–70 knots with gusts to 85 knots on the outgoing voyage 2–3 hours later.

Again the area of lowest pressure appeared to lie off Sinclair Head.

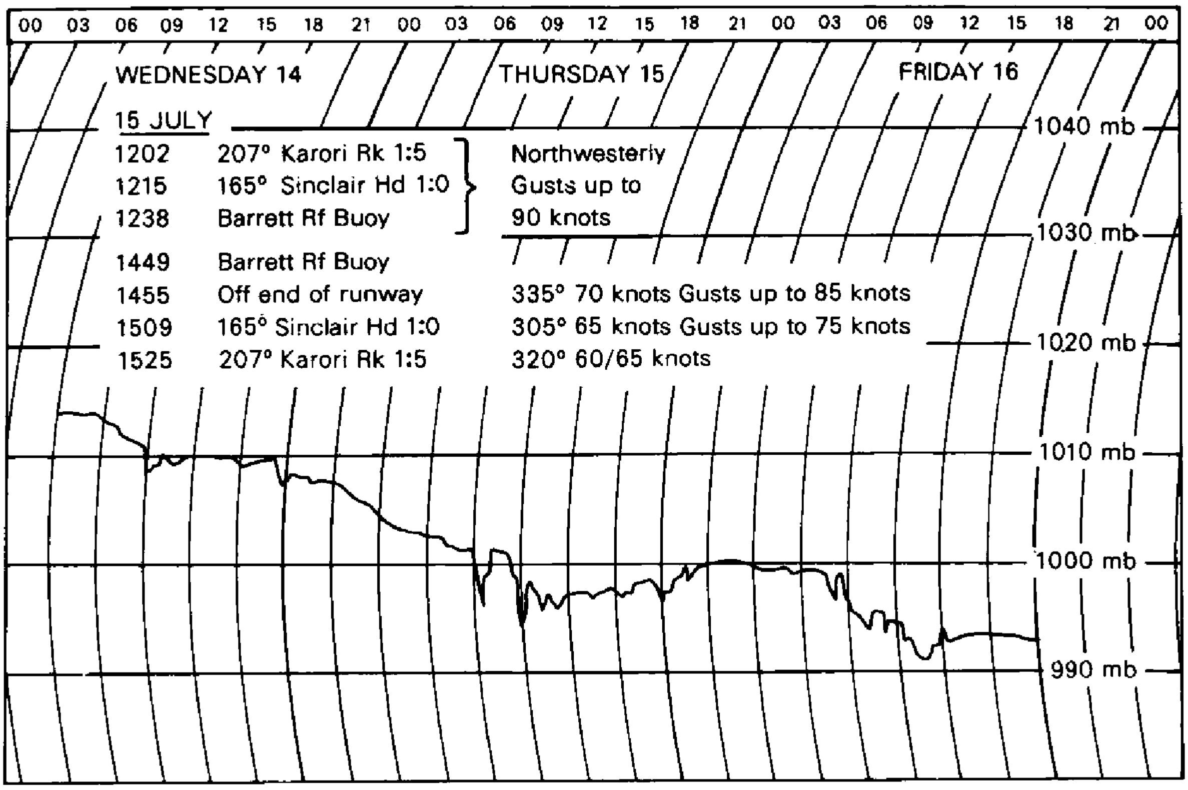


Figure 6. Barogram from the *Aramoana* for 15 July 1976.

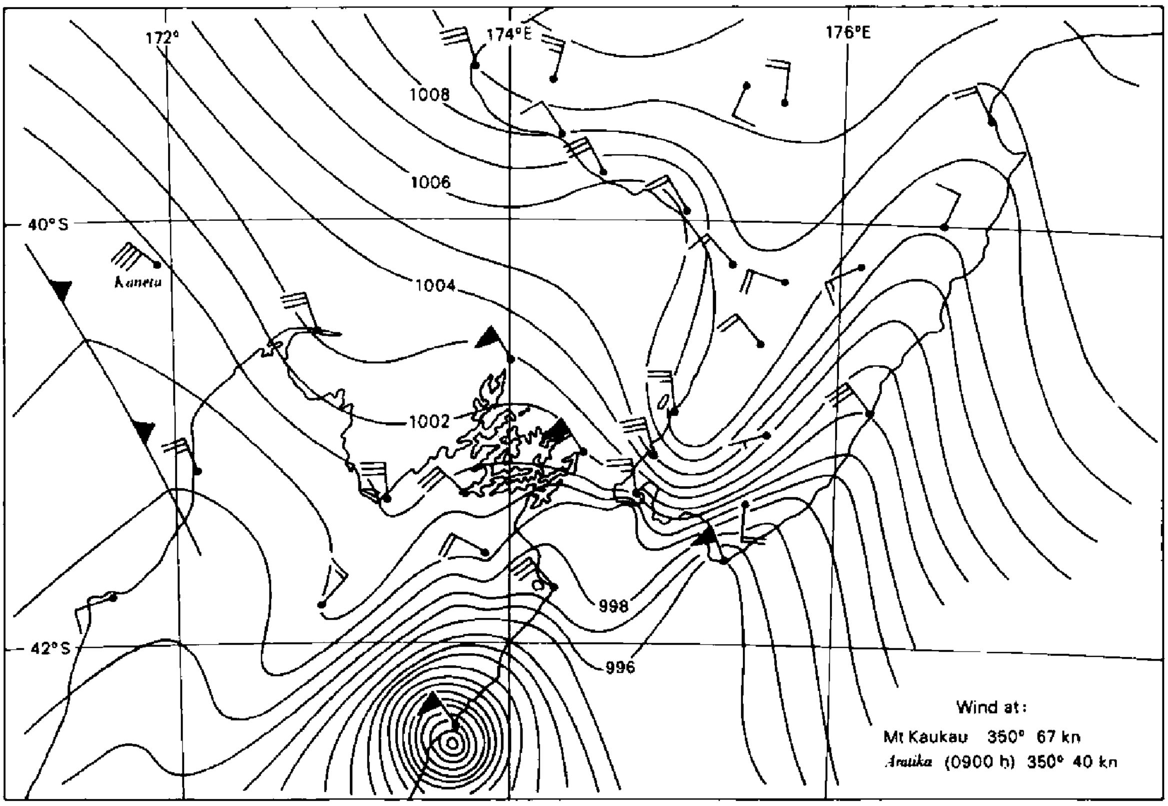


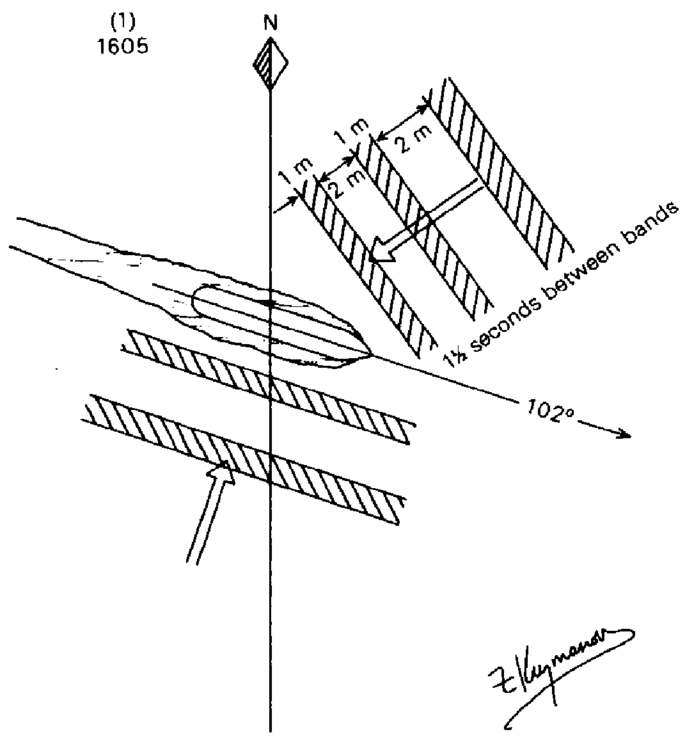
Figure 7. Large-scale analysis for 1200h on 15 July 1976.

Bioluminescent phenomena observed in the South China Sea

BY ZORAN KUZMANOV

The following highly detailed account of bioluminescent phenomena including phosphorescent wheels was received last year from Mr Zoran Kuzmanov, 2nd Officer aboard m.v. *Siam**, under command of Captain A. J. A. Potts. It is reproduced here *in extenso* together with comments by Dr Peter J. Herring of the Institute of Oceanographic Sciences and diagrams based on sketches made at the time of observation by Mr Kuzmanov.

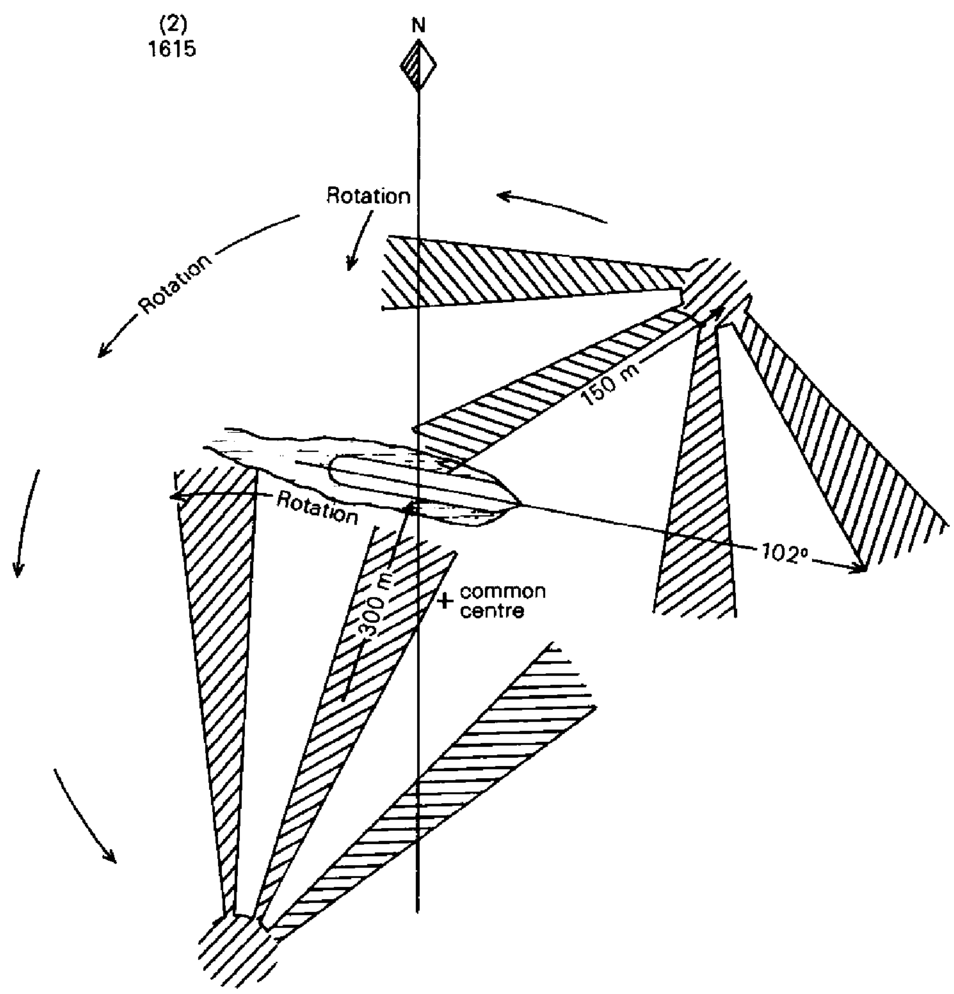
At 1605 GMT on 29 April 1982 parallel bands of diffuse bluish-grey light were observed travelling towards the ship from directions 200° and 055°(T) (Figure 1). The bands appeared like moonbeams, each being a metre wide with 2 metre



spacing and travelling 50 to 100 cm above sea level; the bands reached the ship at intervals of about 1½ seconds. No reflection of light off the ship's side was noticed. After some 10 minutes a hub of 2 m diameter with anticlockwise rotating spokes formed the original directions, the starboard hub being located some 600 m away and the port hub some 150 m away. The wheels travelled at a slightly lower speed than that of the ship and appeared to rotate about a common centre on the starboard side (Figure 2). The period of rotation was identical at around 3 seconds and each wheel contained some eight or so spokes, the light reaching the horizon.

At 1630 GMT a third hub formed astern on the port side, distance 300 m, bearing 340°(T). This also rotated anticlockwise at the same rate and had the

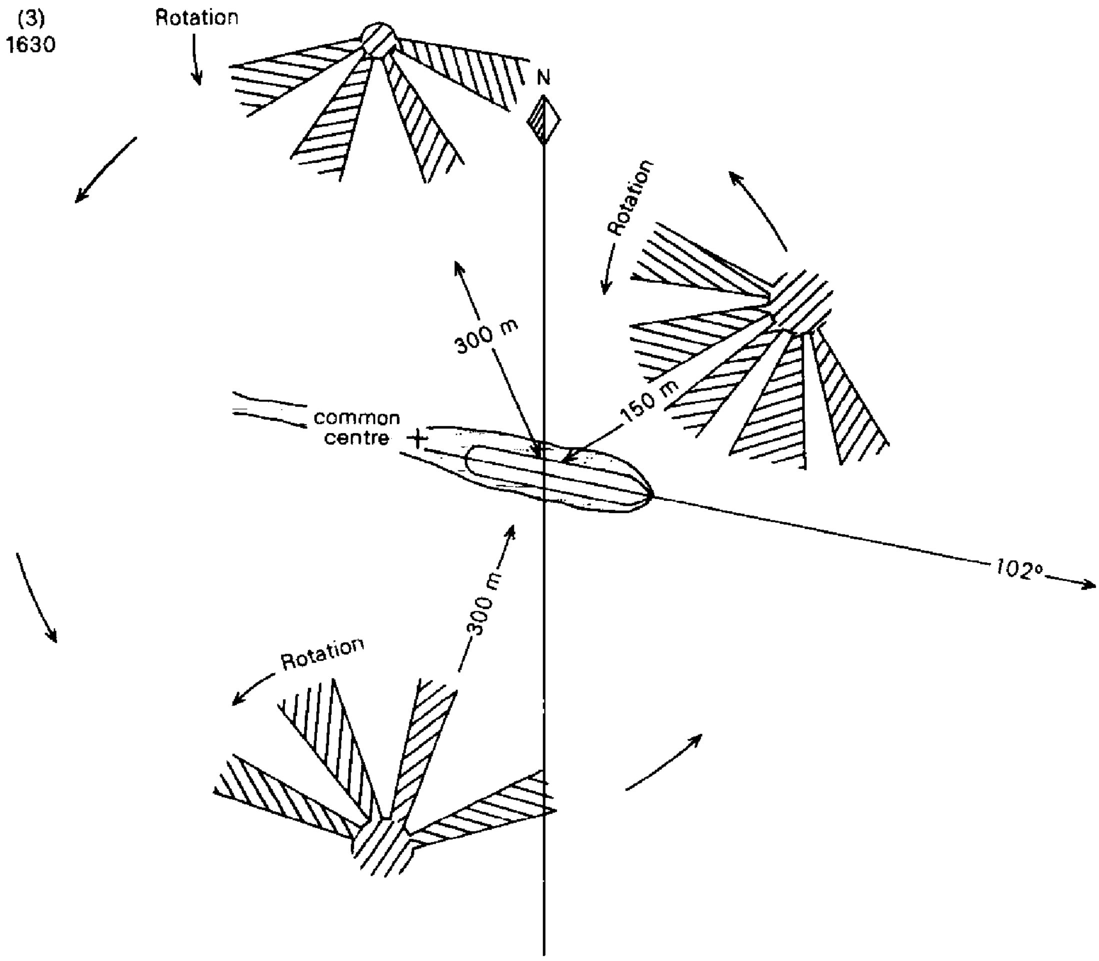
*Owners: Thai Ocean Transportation Co. Ltd, Bangkok.



same dimensions as the other two. All three appeared to rotate about a common centre and continued rotating anticlockwise about this point (Figure 3). At 1635 the 10 cm radar was switched off and back on again with no discernible effect. The echo sounder (which was unfortunately defective) was switched on and off, again with no results. The Aldis lamp was directed at the hubs and yet again there was no response. Activity fell off rapidly at 1645 and disappeared altogether shortly therafter.

At 1710 GMT parallel bands again formed, coming from four equidistant points 150 m away bearing 055°, 145°, 235° and 325°(T) respectively. The brightness of the diffuse light was higher than that previously observed but was comparable with the brightness which was to be expected from the proximity of the bands. These four bands did not affect each other and all appeared to have the same width, spacing and speed as before (Figure 4).

At 1720 four hubs formed 150 m away in the same directions and with the same luminosity and coloration. Each wheel rotated towards the ship, that is to say, starboard bow anticlockwise, starboard quarter clockwise, port quarter anticlockwise and port bow clockwise (Figure 5). The speed of rotation and dimensions were again similar to those previously observed. All four hubs travelled with the ship and after a few minutes they were joined by another phenomenon, this being extremely brilliant blue-white pulses of light from evenly distributed patches of diameter varying from 15 to 60 cm and circular in shape, all patches pulsing simultaneously at a timed rate of 114 flashes per minute. These patches extended some 150 m off the vessel all around. When the Aldis lamp was shone steadily at these patches no effect was observed, but


(3)
1630
Rotation
N
Rotation
300 m
150 m
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300 m
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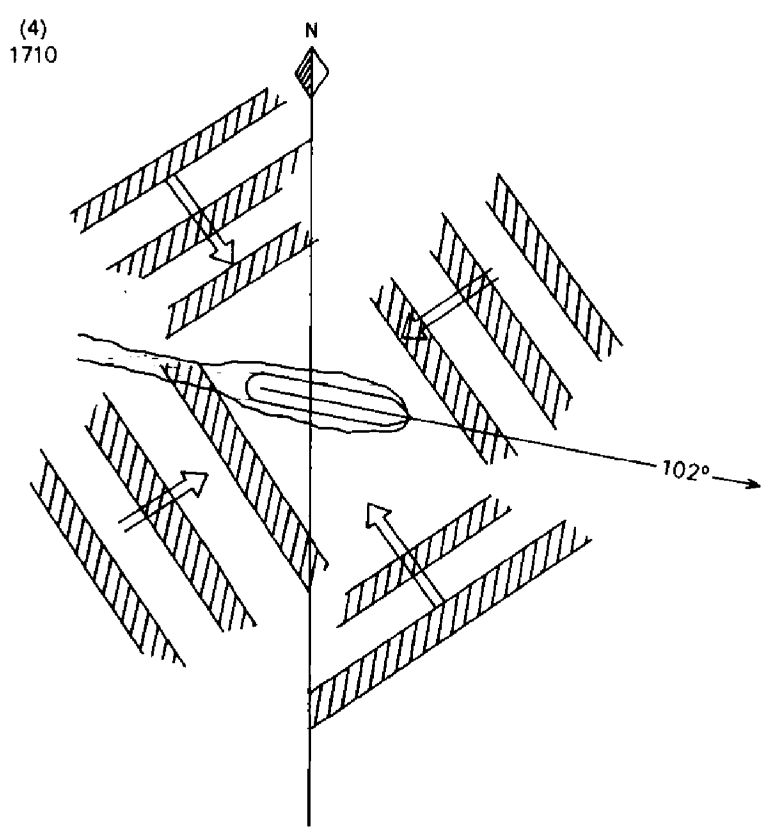
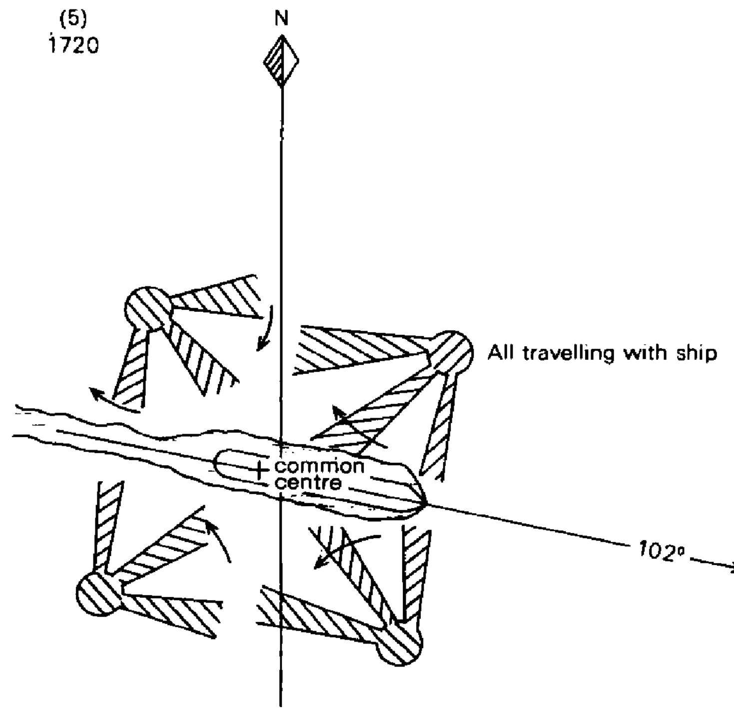
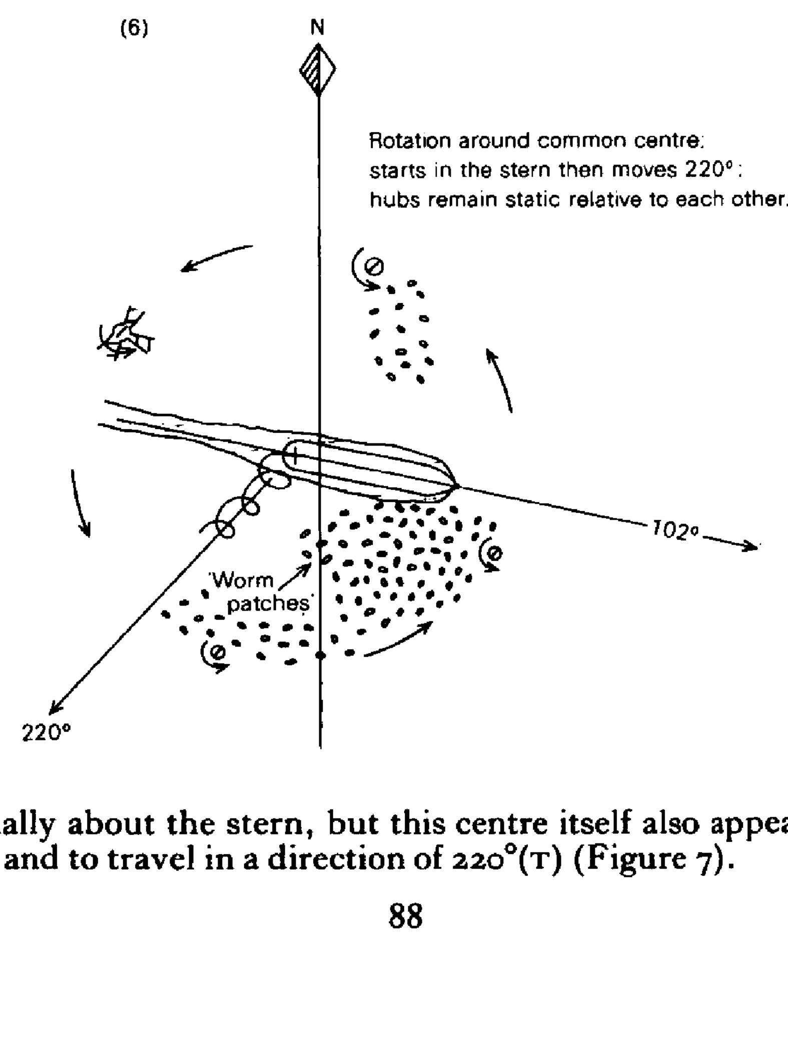

(4)
1710
N
102°



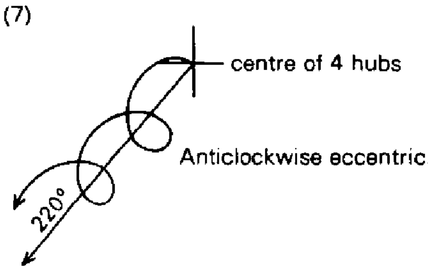
when it was flashed the phenomenon suddenly stopped. This was repeated twice more when they re-emerged after some 2 minutes, with the same results. The wheels continued uninterrupted throughout. Water was discharged on deck via the fire main but no luminescence occurred in this water. An alteration of course was effected to attempt to change the vibration in the water due to the ship; this too had no effect. Engine revolutions were not altered but some interactive reduction could be expected during the manœuvre. The four wheels then started a slow anticlockwise revolution about a common centre (Figure 6), this being



located originally about the stern, but this centre itself also appeared to revolve anticlockwise and to travel in a direction of 220°(T) (Figure 7).

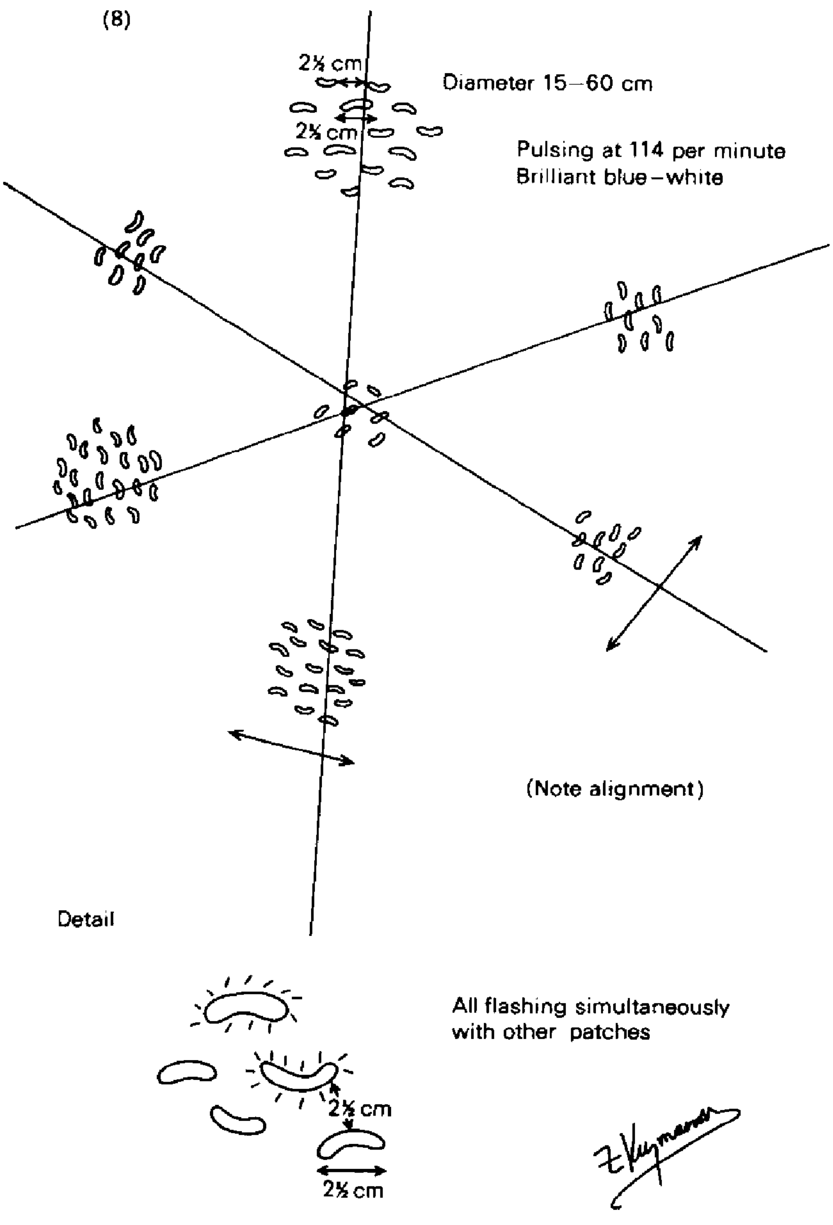
No interaction between the flashing patches and spokes was apparent. The patches were then observed through binoculars when distinct worm shapes were observed, each worm being around 2½ cm in length and equally spaced from

(7)



its neighbours 2½ cm away. Each patch of worms was aligned and the alignment between patches was offset by around 60° (Figure 8). The worms were not observed to 'wriggle' and either the same worms or immediately adjacent worms flashed on again, their alignment remaining unaltered. These worm patches appeared to be some 5 cm below the sea surface.

(8)



At about 1750 GMT upwelling diffuse patches of some quarter-worm-patch brilliance and four times the spoke luminosity were observed. These travelled straight up to a depth of around a metre and then moved astern at a greater speed than that of the ship. These large luminosities were yellowish-white in colour and some came very close to the ship, seemingly originating only in close proximity, say up to 15 m away.

Throughout these phenomena it was very noticeable that luminescence in the bow wave and wake was absent with only the large patches occasionally occurring in this area and the occasional flashed patch. The worm patches appeared at a uniform depth of about 5 cm below the sea surface, with spacing between patches about a metre.

A water sample was taken during peak activity when all three phenomena were occurring. This sample contained considerable amounts of light brown vegetable or animal matter contained in some seed-pod shaped receptacles. Additionally two animal forms were observable, one being translucent and worm-shaped, about 2 mm long and the other translucent carrot-shaped with frond at the blunt end which was used to swim rapidly through the water, this animal being about 6 mm in length. This sample was retained, with preservative, for subsequent expert investigation ashore.

At 1800 GMT the wheels faded away, disappearing by 1810. The large patches also vanished. The worm patches continued until 1835 but started to flash out of phase with each other and appeared to descend slowly, the coloration changing meanwhile to a dull orange colour. The flashing also slowed down from the previously noted 114 per minute to perhaps 30 per minute.

At 1920 GMT a vessel on the starboard bow was contacted by VHF and was asked whether the phenomena had been observed. The reply was in the negative, both for that day and for several years previously in the same locality. The vessel identified herself as the survey vessel *Tasman Sea* and on enquiry confirmed that the surveying equipment was not being used and that in particular the sonar had been switched off at 1835 GMT—coincident with the cessation of the phenomena. Was this mere coincidence? The vessel was able to oblige us with a satellite position from which precise positions for the various phenomena were calculated.

At 1605 GMT the *Siam* was in position 4° 52′N, 111° 35′E, steaming on a course of 102° (T) at a speed of 12·9 knots. At 1835 GMT she was in position 4° 48½′N, 112° 00½′E and the *Tasman Sea* was 17½ n. mile ahead of the *Siam*.

Throughout the period before, during and after the observations of bioluminescence, electrical activity was observed all round the ship, some 10 or more n. mile away. The air temperature was 30 °C and the sea temperature 32 °C. The sea was smooth and there was no swell. The visibility was excellent and the wind light airs or calm. There were 6 oktas of cumulonimbus and stratocumulus cloud. Rain was observed in small patches around the vessel. No magnetic anomalies were noticed at any time.

The charted depth was constant at 59 fathoms, but soundings were sparse. The *Siam* had a draught of 3 m forward and 6 m aft, with propeller tip immersed at 6·5 m. She is a motor ship, and the engine revolutions were 107 per minute.

The observers were Captain A. J. A. Potts (who only observed the worm patches owing to late call), Mr Zoran Kuzmanov, 2nd Officer, Cadet Guy Lockwood and Mr Domingo Angeles, Quartermaster.

Mr Angeles recalled that he had observed similar phenomena off Palawan in September a few years previously. The salient points of his account were as follows:

Ship of the same size, draught 9 m in 1000 fathoms of water. The Master stopped the ship, fearing that there might be submarines in the vicinity, and the several anticlockwise rotating wheels also stopped moving. The sky was clear, the sea was smooth and there was no lightning. The vessel was the

Tabangao, believed to have been subsequently renamed *Sulaiman*. The observers were the Master (Captain Lorce), the Chief Engineer, the 2nd Officer and himself.

In conclusion, it occurs to me that the cause was vibration induced by the *Siam*.

Dr Peter J. Herring, of the Institute of Oceanographic Sciences, comments:

'This is the most precisely documented account of phosphorescent wheels that I have ever seen and in view of the complexity of the phenomenon it is therefore particularly valuable. I congratulate its author on his effort. I know of no report describing such a complicated pattern of wheels and their movements and am quite at a loss to interpret them, except to agree with the observer that vibration from the vessel itself appears to have been at least partly responsible, contrary to most interpretations of such wheels. The involvement of the flashing patches is quite remarkable. Perhaps their initial frequency was related to that of the ship's engines. I regret that I can offer no suggestions as to the organisms involved; their alignment and immobility suggests that each "patch" was a single animal bearing many luminous organs but I know of no animal that would fit the description. Their response to the flashed Aldis lamp is fascinating but equally baffling.

'I have examined the sea-water sample (preserved with 50 per cent white rum!). After resisting the temptation to drink the sample I found that it contained a nematode worm or roundworm (this is the 2 mm animal noted by the observers) and a pteropod, a small swimming mollusc with a straight shell (the 6 mm carrot-shaped animal). Both were well preserved but neither is known to be luminous and I suspect their presence was coincidental to the phenomena.'

Marine Services Programme to the Year 2000

(From the Final Report of the Working Group on Marine Meteorological Services for the Commission for Marine Meteorology of the World Meteorological Organization held in Geneva, Switzerland, 20–24 September 1982)

I. Statement of the problem

International shipping has to respond increasingly to the concern of governments reflected in international treaties, and hence in national legislation, about improved safety of life at sea, the safe navigation on the seas and effective control of pollution of the seas and damage to its environment. There is, at the same time, pressure to operate ships more effectively and economically. Further, there is international concern to redistribute world maritime trade into fresh patterns to recognize the justified aspirations of developing countries. Thus, it is clear that traditional trading patterns will change. This change is occurring at a time when world recession already creates many changes in the need for ships as a consequence of the decrease of the consumption of materials and goods. Although sea-borne cargoes will be required to feed and clothe the growing world population the increase in ships may not be directly in step with this growth. Therefore, while the pressure increases on the one hand to sail with safety, on the other hand there is the need to maintain effective, competitive and economic ship operation.

Treaty requirements for the safety of life and the environment are specific and relate principally to the carriage by ships of equipment and the training of personnel who are to operate this equipment. Coincident with all such requirements is the need for a ship to be safe to meet the conditions it will encounter and therefore to have adequate knowledge of the predicted weather conditions for its passage. It is thought that the level of knowledge of the weather and sea state currently available in established meteorological services must be raised. This is of particular concern for ships on ocean passage. While the broadcast by facsimile transmission of ocean weather prognoses has made significant headway towards increasing the information base from which the master is able to make many of the decisions which concern the safety of his crew, their ship and the integrity of the environment, it is thought that even higher quality information will be required to enable effective decisions to be made on passage planning. It is foreseen that meteorological information requirements will, of necessity, be more closely related to the individual ship, its track, its capabilities and its needs. In particular, it is recognized that the considerably increased international obligations on ships to carry electronic navigational and position fixing aids introduce new considerations on traditional aspects of poor visibility while, on the other hand, the effects of wave height and direction on a successful passage are no less important.

The trend for large ships to sail with fewer crew members will continue. It is therefore necessary that the various types of information presented visually and automatically to the master and his officers are clear, unambiguous and in a form of presentation which, while recognizing his professional competence and training, does not require further interpretation or extrapolation.

It is required that the relevant information be rapidly updated to meet volatile situations. The processing of information from all sources should aim at eliminating source data while retaining only information which the mariner needs to know. It is thought that only a dedicated marine meteorological interface in contact with the user but also aware of the extent and relevance of source data, will be capable of processing and screening information for presentation to the user at sea.

II. Basic framework

As was stated previously, the role that the ocean regions play upon the world economy and the impact that severe marine environmental conditions have on man's work in the ocean regions is growing very rapidly. As the economic stakes rise even more rapidly because of the advent of extremely sophisticated, expensive ships and structures, the need to reshape our marine meteorological services programme becomes even more urgent than before.

While it was over a century ago that our primary efforts were directed to enhancing the safety of ships transiting the open oceans, it now appears that we must redirect our emphasis to the main ports and harbours and coastal environs. It is here that the super-ships, which are designed to cope with the high seas conditions successfully, are most vulnerable to small variations in meteorological and oceanographic conditions, and errors in the judgement of harbour pilots and shipmasters. A totally new approach to the provision of the essential forecasts and warnings of meteorological and oceanographic conditions is needed.

On the contrary, however, high seas services also require substantial improvement, but the character of the changes will be more in the nature of fine adjustments to present activities and a general heightening of the level of sophistication of forecasts, warnings and advisory information will be inevitable. Let us look briefly at how marine services in the year 2000 may be subdivided.

(A). Major ports and harbours

It is widely known that super-ships are now taxing all aspects of port and harbour developments around the world. Very high expenses are associated with ships waiting their turn to navigate narrow, shallow channels; when underway in close confines, the costs of small errors in judgement become enormous. The threat of major disasters also grows enormously, whether it be collision, fire, spills of toxic substances, flooding, etc. and the regulatory burden becomes even heavier. It is envisaged that modernly equipped ports someday will require the following environmental information and services:

(*a*) Precise mesoscale analyses and forecasts of weather and water conditions in channels and fairways, docking areas and anchorages.
(*b*) A real-time observing and reporting system that provides a continuous stream of meteorological and oceanographic parameters.
(*c*) A central facility in which the continuously acquired data are evaluated, processed and prepared for dissemination.
(*d*) A near-real-time forecast and warning data dissemination system that ensures continuous delivery to the users in minimum elapsed time.

These port services will necessarily have to deal primarily with presently observed conditions, but they will also provide outlooks to 12 and 24 hours routinely. Harbourmasters, pilots, dock superintendents, disaster control officials, shipping companies all will desire this steady stream of information which will be processed by a knowledgeable team of environmental experts, including oceanographers. In short a system will be developed, much like the aviation industry's air traffic control centres, where all aspects of the marine environment will be directed to the safe, efficient and rapid conduct of marine business in confined quarters.

(B). Coastal services

While the basic requirements and general shape of the services programme for main ports and harbours also may apply here, the geographic spread of marine activities is larger, less concentrated, and comprises a wider array of users. Both meteorological and oceanographic information will have to be acquired, compiled and prepared into forecast and warning packages for:

- General public/communities, beaches, yacht harbours.
- Fisheries/recreational and commercial.
- Coastal works/dikes, water pollution control facilities, power plants, piers, etc.
- Mining/sand, gravel, phosphate rock, etc.
- Oil and gas production platforms.
- Regional disaster control agencies.

Specific elements to be included in forecast and warnings to these users include:

- Waves, surf, shore erosion.
- Coastal currents, tidal anomalies.
- Storm surge and coastal flooding.
- Oceanographic parameters relevant to successful fishing operations.
- Mesoscale meteorological forecasts impacting operations on offshore oil, gas platforms.
- Small-scale; severe weather phenomena.
- Hazardous substance trajectory forecasts (e.g. oil spills from wellhead failures, ship disasters).

(C). Offshore services

As one moves farther from shore, the density and diversity of marine activities become lower and less numerous. Nevertheless, safety, economy and efficiency are primary objectives of this community also. Examples of users are:

- Recreational vessels.
- Commercial fishing fleets.
- Tug and barge operators.
- Coastal merchant ships.
- Oil and gas fields.
- Ocean floor mining.
- Salvage and towing operators.

The suite of services must be tailored to the general operating requirements of the community that generally does not return to port every night. Dissemination systems and forecast updating requirements are more critical than for the inshore users; an offshore operator must take into account the extended outlooks so that he may plan intelligently. A growing list of oceanographic parameter requirements is emerging from these users and it is logical that they also be integrated into the present meteorological forecast and warning system.

(D). High seas services

While modern merchant vessels generally do not have as many concerns about hazards to safety and seakeeping as in earlier times, daily operating and insurance costs have grown enormously. We envisage that in the foreseeable future, sailing plans will be required for all major ships engaged in transoceanic trade. More precise forecasts of open ocean winds and wave spectra will become essential, as will surface current, water temperature, current system boundaries and related oceanographic information. This information, when combined with a ship's known design characteristics, loading, engine performance and other data, will be employed by ship operators to effect major cost savings in:

- Fuel consumption.
- Hull and cargo damage.
- Wear and depreciation of propulsion plants.
- Transit time (via optimum track ship routeing).

These data will require collection, analysis, forecasting and dissemination in a manner permitting shipowners and operators to optimize their individual activities based on the 'best mix' of all relevant data. In particular, new modes of communication between ship and shore, such as line-of-sight satellite telemetry, may become routine elements of an improved high seas services programme.

III. Relationship to the World Weather Watch

The future marine environmental services programme will thus require substantial support from the World Weather Watch system. At the same time, the very user community which we serve also constitutes a vital part of the surface meteorological observation programme that is essential to the production of routine public forecasts and warnings on land, especially in maritime coastal regions. The marine services data acquisition and processing system necessary to support the improvements noted previously must therefore be an essential component of the total programme. It must become a fully shared enterprise in the areas of:

- Observations.
- Communications.
- National meteorological centres.
- Satellite support and other functions.

The Commission for Marine Meteorology should take full part in building the environmental services programme to meet the requirements for the Year 2000.

AURORA NOTES APRIL TO JUNE 1982

By R. J. Livesey

(Director of the Aurora section of the British Astronomical Association)

Marine observations of the aurora for the period are shown in the accompanying table.

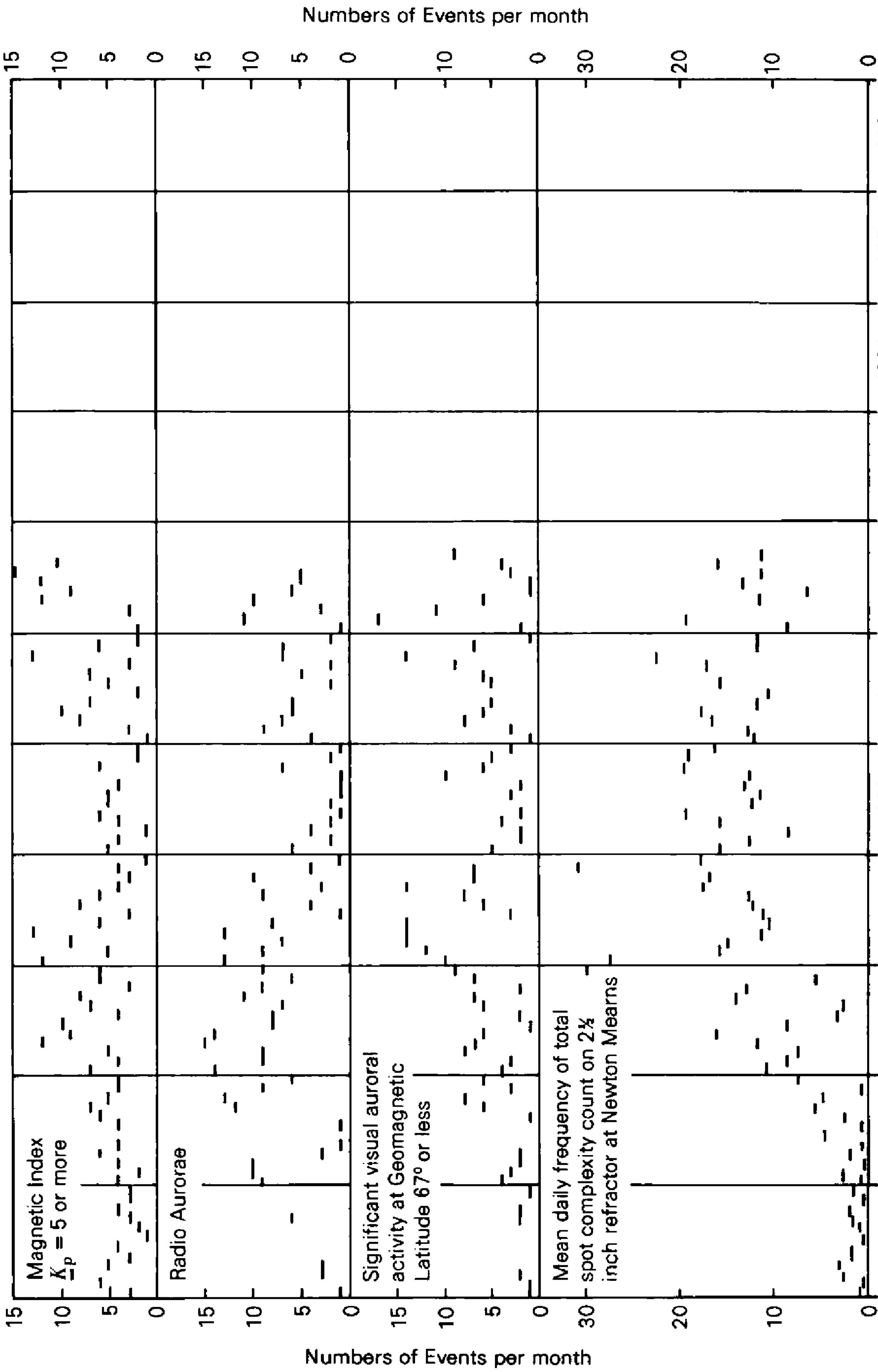
Marine Aurora Observations April to June 1982

Date 1982	Ship	Geographic Position		Time (GMT)	Forms in Sequence
25 April	*Almeria Star*	46° 38'S	168° 20'E	1100–1200	hA, hG, mRR, p_3RR
25	*Willowbank*	39° 05'S	162° 25'E	1045–1145	qhG, amRR, ahG, aRA, qhG, qhC
25	*Aeneas*	48° 05'N	60° 55'W	0450–0630	qhA, aRA, p_3RA
28	*Baltic Eagle*	59° 07'N	20° 05'E	2315–2345	qRR
30	*Mairangi Bay*	44° 58'S	100° 31'E	1635–1720	hG, R, hG
28 May	*Act 4*	44° 30'N	60° 23'W	0430–0847	qRA, RB, aRA, qhA, p_1hB, hP, aRR, qhA, hB, p_1RB

KEY: q=quiet, p_1=pulsating, a=active movement of form, h=homogeneous, m=multiple, p_3=flaming, RR=ray bundle, RA=rayed arc, hA=homogeneous arc, hB=homogeneous band, hC=homogeneous corona, hG=homogeneous glow, hP=homogeneous patch.

April began very quietly with isolated visual auroral activity in high magnetic latitudes on the nights of the 2nd/3rd and 4th/5th. There were accompanying radio auroral effects on HF wavebands on the 2nd and 3rd, with a magnetic storm commencing on the 1st. A massive and widespread auroral storm seen well down into England was observed on the night of the 10th/11th. Coronae were visible in central Scotland. Radio events took place on the 10th, 12th and 14th with associated magnetic storm conditions. Further reports of auroral sightings came in for the nights of 16/17, 20/21, 22/23, 28/29, 29/30 and 30/31 April. Aurora Australis was reported by observers in Western Australia and from shipping on the 24th/25th and 30th/31st. Further radio effects were noted on the 27th and 29th while magnetic storm activity was noted on the 16th, 17th, 20th, 22nd, 24th, 25th, 27th and 29th.

There was only one report of visual aurora in May on the night of the 27th/28th when s.s. *Act 4* encountered a display in the vicinity of Nova Scotia. Because of the eccentricity of the magnetic pole the magnetic latitude lines dip equatorwards in the region of Canada so that the aurora comes further south and away from the summer twilight zone which tends to cut off observing in north European waters. Radio aurora effects were noted on the 1st, 2nd and



Numbers of Events per month
Magnetic Index K_p = 5 or more
Radio Aurorae
Significant visual auroral activity at Geomagnetic Latitude 67° or less
Mean daily frequency of total spot complexity count on 2½ inch refractor at Newton Mearns
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
15
10
5
0
30
20
Numbers of Events per month

3rd associated with magnetic disturbances on the 2nd, 3rd and 4th. Further radio events manifested themselves on the 27th, 28th and 30th with magnetic disturbance between the 26th and 30th of the month.

In June a solitary visual aurora report came from m.v. *Lackenby* on the night of the 13th/14th in the St Lawrence Estuary. Radio events took place on the 1st, 3rd, 10th and 12th. The magnetic field was generally disturbed with storm sudden commencements on the 6th, 8th, 12th and 22nd, when the earth's magnetic field became momentarily compressed by the impact of clouds of electrified particles emanating from active regions on the sun.

It is clear from perusal of the records that we are passing through a period of auroral activity forming a secondary maximum during the declining years of the current sunspot cycle. The first maximum took place with the development of the sunspots to their peak intensity. As the sunspots decline in number they also reduce in latitude on the sun and progressively appear closer to the solar equator. Thus they tend to align themselves more closely with the plane of the ecliptic, and material shot out by reason of solar flare activity is more likely to reach the earth. At the same time as the spots vacate higher solar latitudes, active regions in the sun's outer atmosphere, or corona as it is called, extend equatorwards while the shape of the sun's magnetic field alters. The result is that the active areas, called coronal holes, contribute sprays of electrified particles which sweep the earth as the sun rotates.

The aurorae generated by flare and allied activity related to sunspots tend to be violent and widespread, with a tendency to recur only if the sunspot group itself is long lived and active after the 27 day solar rotation period. Aurorae generated by the coronal holes tend to be quiet events situated at higher terrestrial geomagnetic latitudes, may last for several nights in a row and may repeat after the 27 day rotation intervals. Both types of aurora are currently being observed, the coronal hole aurora having the additional distinguishing mark that it is not usually associated with any compression of the earth's magnetic field at the commencement of a magnetic storm, called the storm sudden commencement because of the suddenness with which it shows on a magnetometer.

During intense auroral storms the activity may penetrate on occasion to the tropics although it may not be observed as such because watchers are not expecting aurora in these latitudes. As typical examples, Honolulu saw an aurora in 1859 (1 September), Bombay in 1872 (4 February), Singapore in 1909 (25 September) and Samoa in 1921 (13 May). All these storms manifested themselves world-wide with related massive magnetic field disturbances. In recent years the writer has received reports of aurora from the Bahamas. In the normal course of events the particles causing the aurora spiral along magnetic lines of force which in the auroral regions are quasi-vertical but in the tropics are quasi-horizontal. Thus the earth's magnetic field requires to be very disturbed in order to provide magnetic pathways that can lead electrified particles into the tropical regions in a near-vertical direction, a condition which under quiet field conditions is technically impossible. The severity of recent auroral storms suggests that mariners on tropical voyages might consider the possibility that they may encounter aurora. They should, however, distinguish aurora from the zodiacal light which the writer has seen to advantage from the east coast of Sri Lanka, unhampered by urban lightning. The zodiacal light is due to the reflection of sunlight by particles in space between the earth and the sun and is not due to electromagnetic phenomena.

Note. The entry for 'zodiacal light' in the 5th edition of the *Meteorological Glossary* is as follows:

zodiacal light: A cone of faint white light in the night sky, extending along the ZODIAC from the western horizon after evening TWILIGHT and from the eastern horizon before morning twilight.

The phenomenon is caused by the scattering of sunlight from a cloud of particles lying in the ecliptic. The composition and origin of these particles—whether of dust or molecules or electrons, solar or terrestrial—is not yet certain. Molecular emission may also play a part.

ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM SEPTEMBER TO NOVEMBER 1982

The charts on pages 99 to 101 display the actual and normal ice edges (4/10 cover), sea-surface and air temperatures and surface-pressure anomalies (departires 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). Southern and eastern iceberg limits will be displayed during the iceberg season (roughly February to July). 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 : 1966–75 (Meteorological Office). Surface pressure: 1951–70 (Meteorological Office). Air temperature: 1951–60 (US Department of Commerce, 1965). Sea-surface temperature: area north of 68°N, 1854–1914 and 1920–50 (Meteorological Office, 1966), area south of 68°N, 1854–1958 (US Navy, 1967).

September

Pressure anomalies were rather weak. There was, however, some anomaly for northerly winds over north-eastern Canada. New ice formed earlier than usual in Lancaster Sound and around Somerset Island. East of Greenland the previous pattern of ice anomaly (with near normal conditions in the Greenland Sea and ice persisting south of normal in the Barents Sea) continued.

October

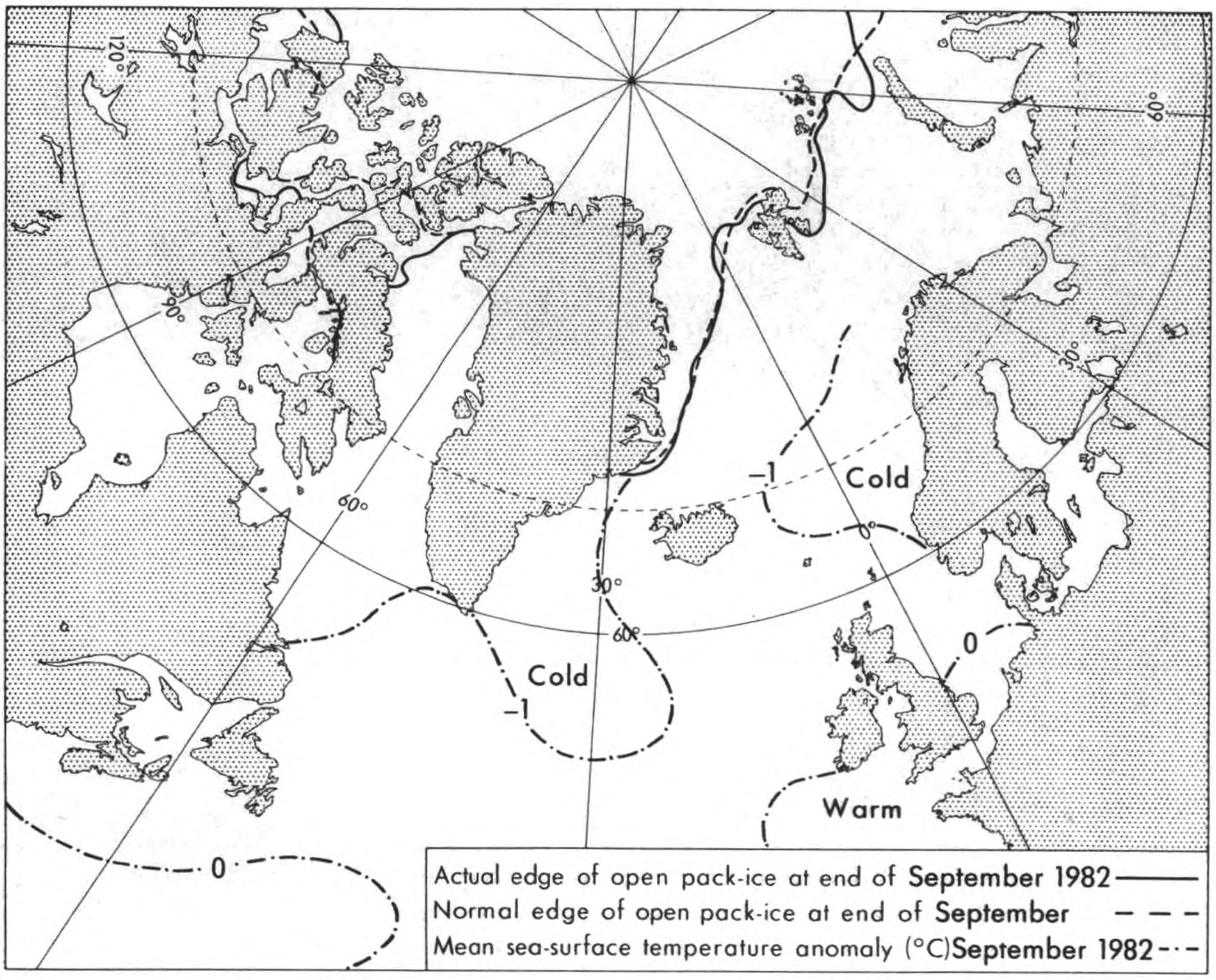
Pressure anomalies were stronger than during recent months. There was a weak anomaly for northerly winds over eastern Canada and new ice formed much earlier than usual in Foxe Basin and over Baffin Bay. An anomaly for south-easterly winds gave some recession over the Greenland Sea although there was southward drift and excess of ice in Denmark Strait. Over the Barents and Kara seas the anomaly for colder anticyclonic weather resulted in ice forming much further south than usual.

November

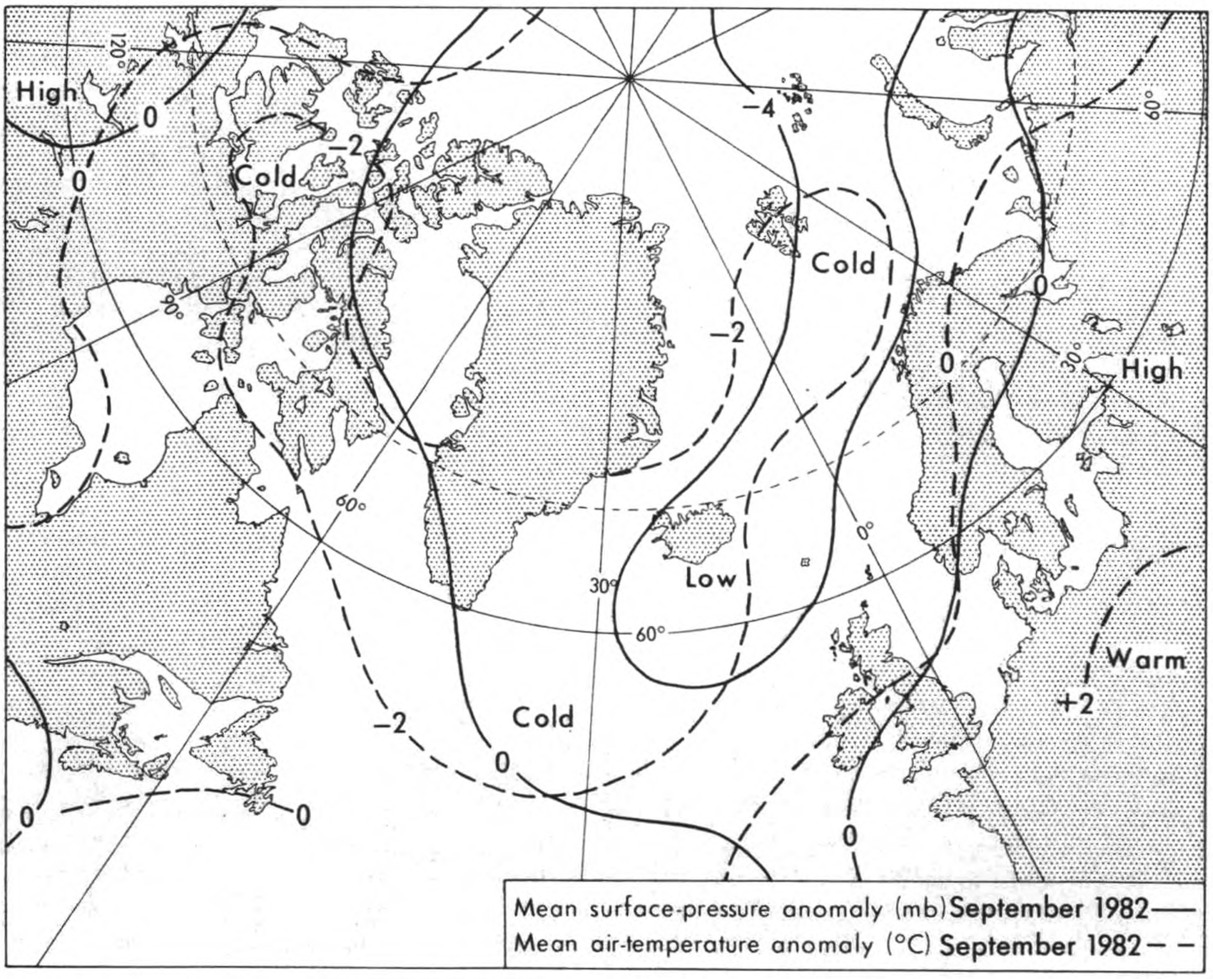
A strong feature was the anomaly for low pressure centred near Iceland. Temperatures were generally lower than usual. Over south-eastern Canada there was an anomaly for cold west or north-westerly winds and the previous tendency for ice to form earlier than usual continued. By the end of the month there was a small excess of ice in Hudson Bay. In Hudson Strait and approaches the ice edge was much further east than usual. East of Greenland some anomaly for easterly winds resulted in the ice edge remaining near to or west of its usual position. Over the Barents Sea the previous excess of ice was reduced so that by the end of the month ice conditions had reverted to near normal.

REFERENCES

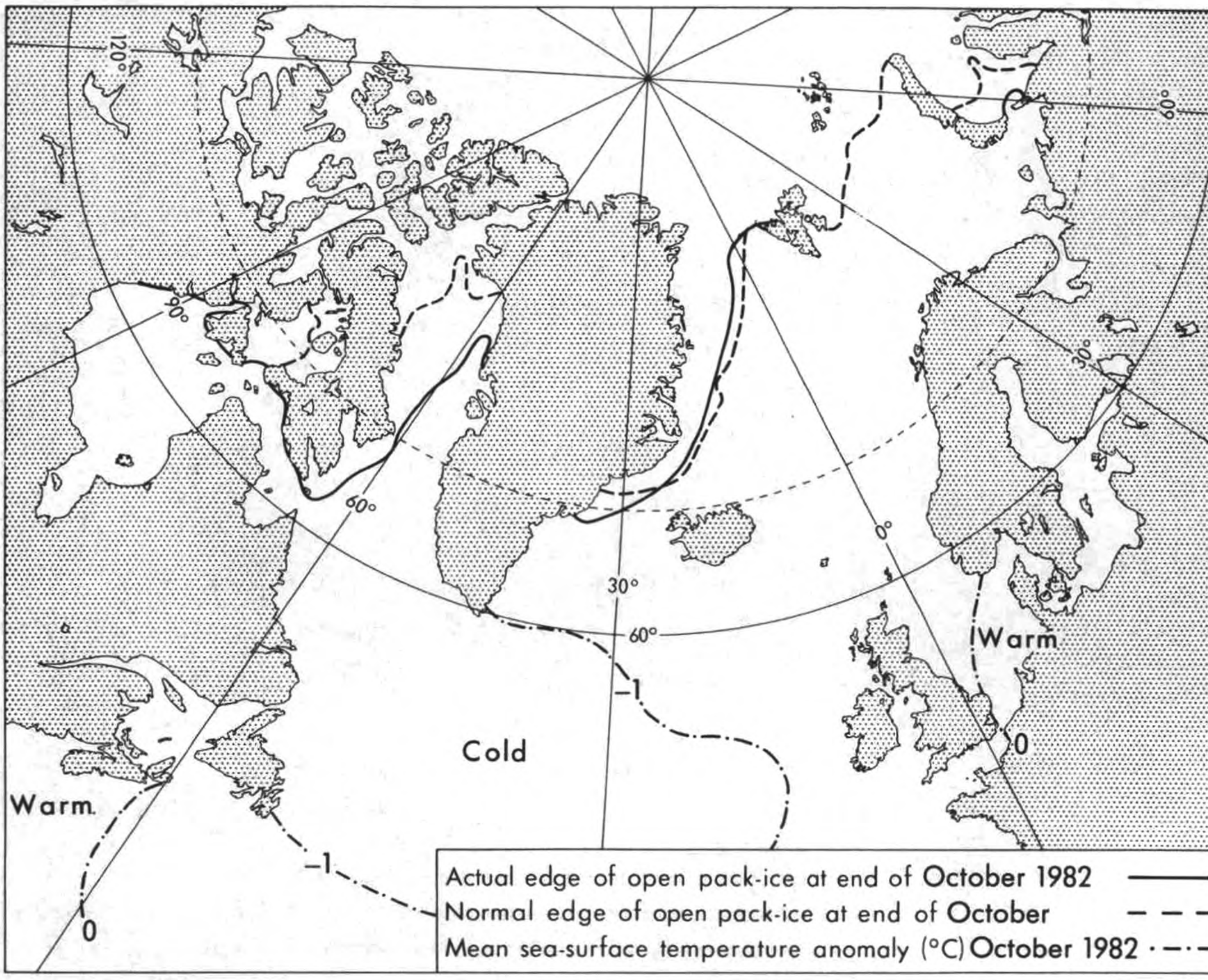
Meteorological Office, London	1966	Monthly meteorological charts and sea surface current charts of the Greenland and Barents Seas.
	—	Sea ice normals (unpublished) and various publications.
US Department of Commerce Weather Bureau, Washington, D.C.	1965	World weather records, 1951–60. North America.
US Naval Oceanographic Office, Washington, D.C.	1967	Oceanographic atlas of the North Atlantic Ocean, Section II: Physical properties.

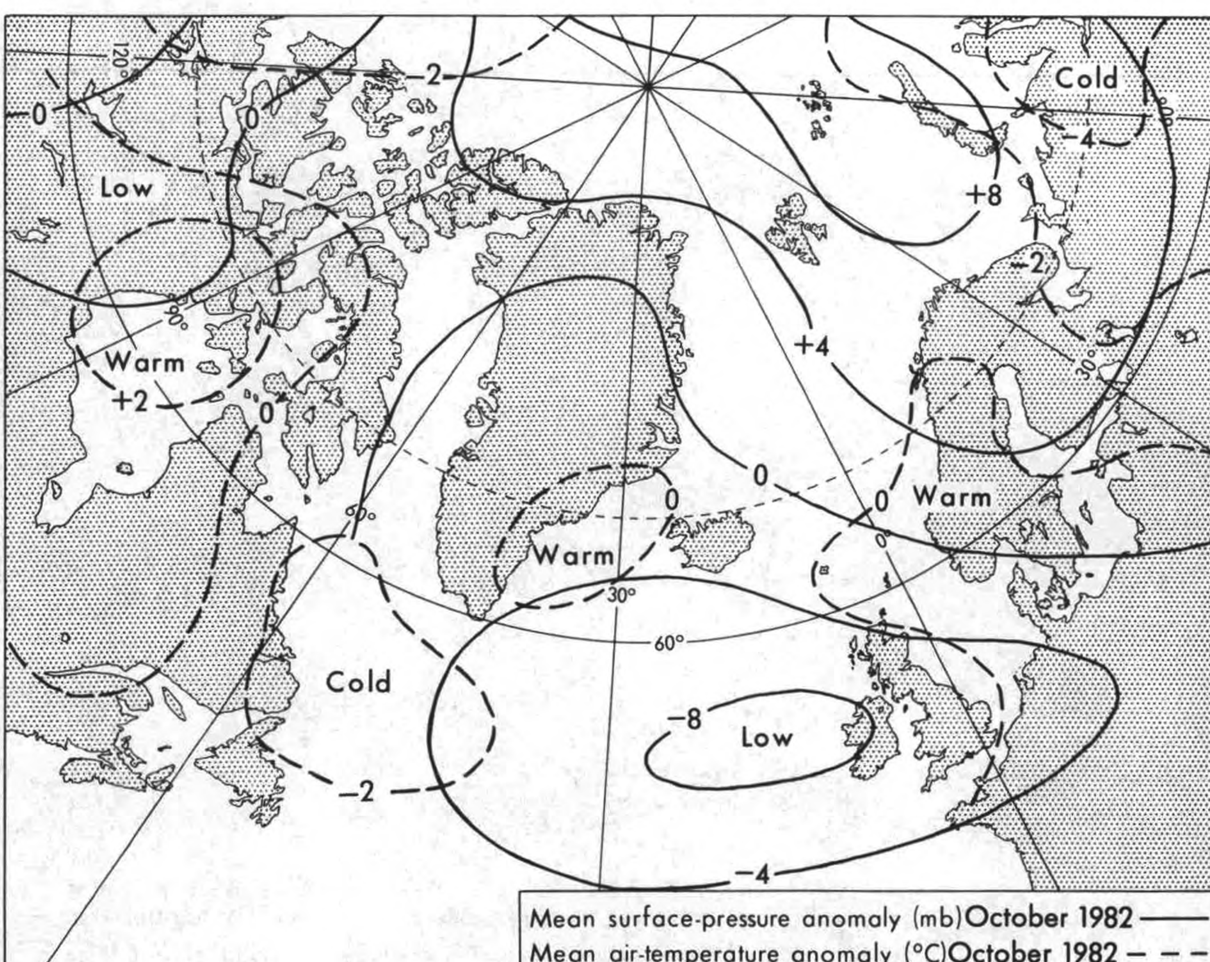


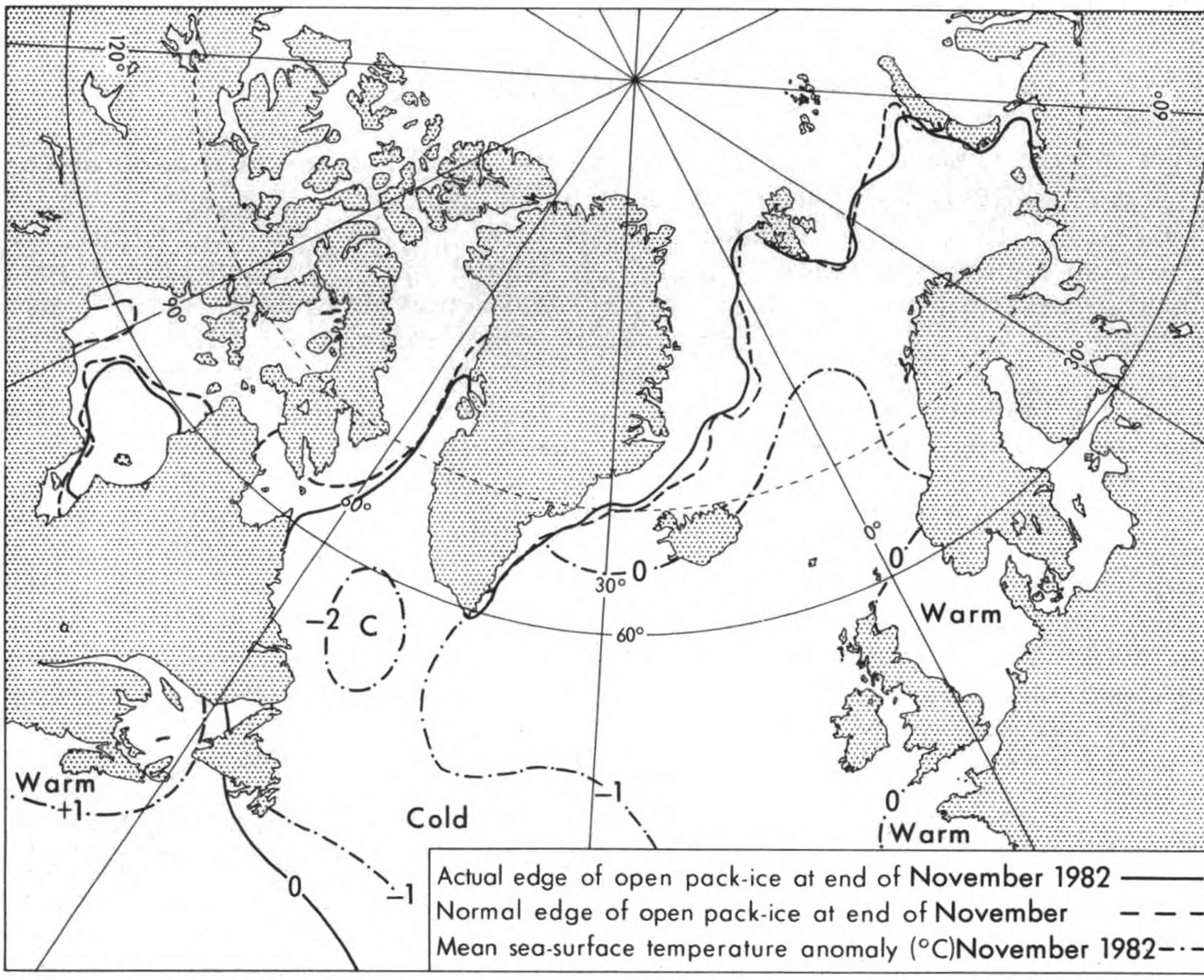
120°
60°
90°
30°
60°
30°
60°
Cold
-1
0
Cold
-1
0
Warm
0
Actual edge of open pack-ice at end of September 1982
Normal edge of open pack-ice at end of September
Mean sea-surface temperature anomaly (°C) September 1982

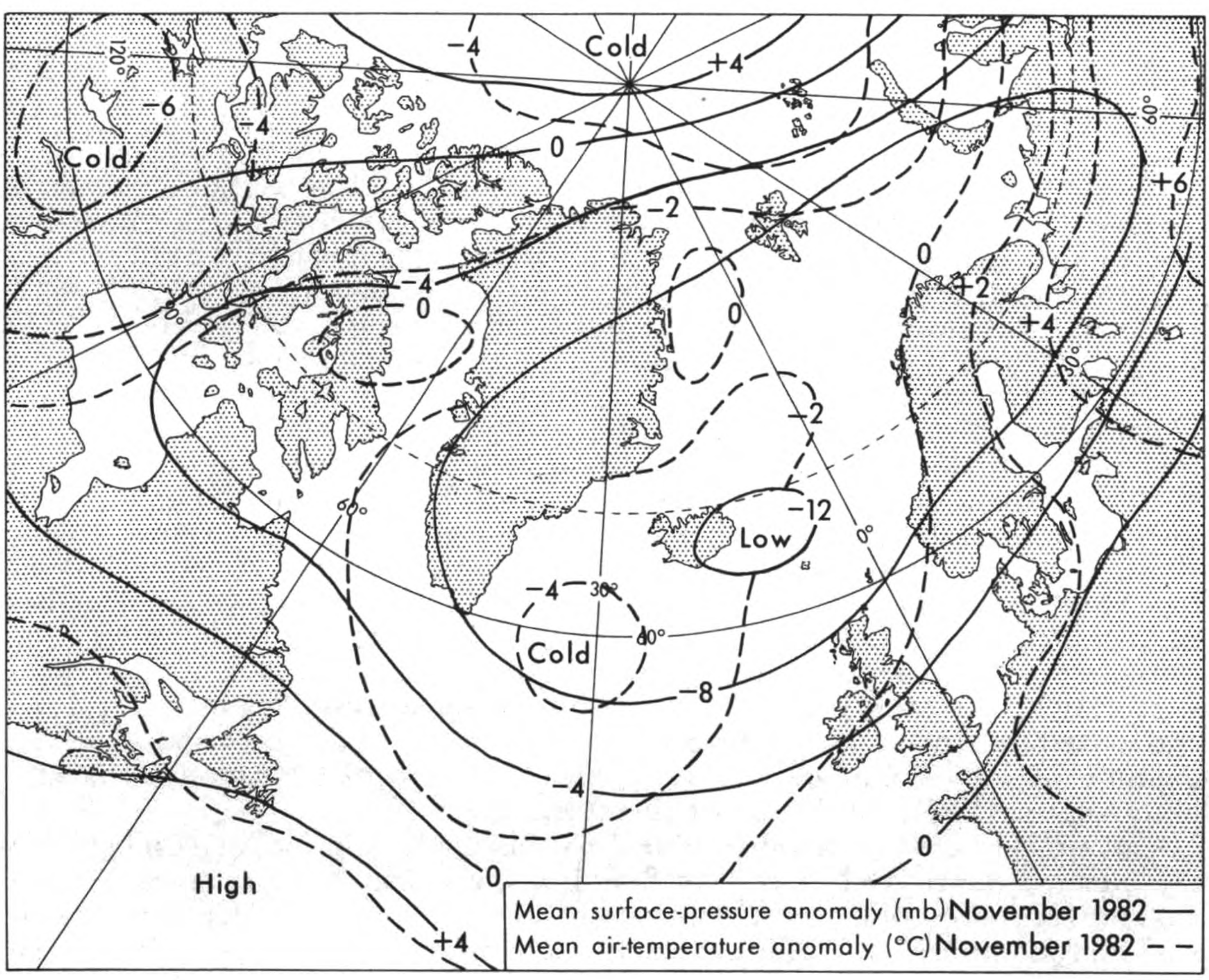


120°
60°
High
0
0
Cold
-2
-4
Cold
-2
0
0
High
90°
30°
60°
30°
60°
0°
Low
Warm
+2
-2
Cold
0
0
0
0
Mean surface-pressure anomaly (mb) September 1982
Mean air-temperature anomaly (°C) September 1982


120°
90°
60°
30°
60°
0°
30°
60°
Warm
Cold
Warm
−1
−1
0
0
Actual edge of open pack-ice at end of October 1982
Normal edge of open pack-ice at end of October
Mean sea-surface temperature anomaly (°C) October 1982


120°
90°
30°
60°
−2
0
0
Low
Warm
+2
0
Cold
+8
−4
−2
+4
0
0
Warm
Warm
Cold
−2
−8
Low
−4
Mean surface-pressure anomaly (mb) October 1982
Mean air-temperature anomaly (°C) October 1982


120°
90°
60°
30°
0°
60°
Warm
+1
-2 C
0
30°
-1
Cold
0
Warm
0
-1
Actual edge of open pack-ice at end of November 1982
Normal edge of open pack-ice at end of November
Mean sea-surface temperature anomaly (°C) November 1982


120°
-4
Cold
+4
-6
-4
Cold
0
-2
-4
0
0
+6
+2
+4
-2
-12
Low
-4
Cold
-8
-4
0
High
0
+4
Mean surface-pressure anomaly (mb) November 1982
Mean air-temperature anomaly (°C) November 1982

Personalities

RETIREMENT.—CAPTAIN G. A. WHITE, Marine Superintendent of the Meteorological Office, retired on 31 December 1982.

Gerald Arthur White commenced his career at sea as a Cadet with the Canadian Pacific Steamship Company in August 1941. The following August his ship was sunk by enemy action whilst homeward bound across the North Atlantic. During the following voyage he again experienced a heavy convoy attack and when outward bound on the next voyage his ship was torpedoed and sunk. He was later in the first convoy to sail from Gibraltar to Port Said after the Mediterranean had been closed to allied shipping for many months. After surviving further convoy attacks he was promoted to 5th Officer in June 1944 and later that year obtained his 2nd Mate's Certificate. Less than a year later he was in Java and again came under fire when fighting broke out with the Indonesians.

After obtaining his 2nd Mate's Certificate, he served with several companies including Strick Line, County Ship Management, Anglo Saxon Petroleum Company and the Royal Fleet Auxiliary. He obtained his Master's Certificate in 1949 and passed for Extra Master a year later. In 1950 he was promoted to Chief Officer in the Royal Fleet Auxiliary and spent the following 18 months with the British forces involved in the Korean campaign.

During 1954 and 1955 he was a lecturer at the King Edward VII Nautical College in London but, preferring a more active life, returned to sea in command of a geophysical survey vessel. In 1958, now having family commitments, he finally 'swallowed the anchor' and joined the Marine Survey Service of the Department of Trade as a Nautical Surveyor and Examiner of Masters and Mates. His first appointment was to the Central Board of Examiners in London, but after 3½ years he was transferred to Liverpool where he carried out surveying duties. In January 1965 he was promoted to Senior Surveyor and was transferred to Newcastle upon Tyne.

In 1968 Captain White was elected a Younger Brother of Trinity House.

On 1 November 1969 Captain White joined the Meteorological Office as Marine Superintendent after the retirement of Commander C. E. N. Frankcom, O.B.E., R.D., R.N.R. Realizing the condition of the British Ocean Weather Ships, his first major task was the drawing up of specifications for replacement ships. However, this project was cancelled and he then devoted much of his time to the refurbishment of the existing ships. This task was completed in 1977 when the *Admiral FitzRoy* (ex *Weather Adviser*) and the *Admiral Beaufort* (ex *Weather Monitor*) took over duties on the North Atlantic Ocean Station 'Lima'. During this time he took part in the protracted negotiations leading to the termination of the International Civil Aviation Organization North Atlantic Station Agreement and the establishment of a new Agreement under the auspices of the World Meteorological Organization. More recently, he arranged for the sale of the *Admiral FitzRoy* and *Admiral Beaufort,* the closure of the Ocean Weather Ship Base at Greenock and the chartering, modifying and equipping of the *Starella* for her present role as an Ocean Weather Ship.

During his period in office, Captain White encouraged and maintained cordial and close relationships with the Shipping Industry and this contributed to the maintenance of a Voluntary Observing Fleet of approximately 500 ships in spite of the serious decline of the British merchant fleet.

Captain White was a member of the Commission for Marine Meteorology and the North Atlantic Ocean Station Board of the World Meteorological Organization. He represented that Organization at the International Maritime Organization Assemblies and Marine Safety Committee meetings and also at the meetings of the sub-committee on the Safety of Navigation held under the auspices of the Department of Trade.

We wish him a long and happy retirement.

RETIREMENT.—CAPTAIN J. F. MILNER retired on medical grounds from P. & O. Deep Sea Cargo Division last April after serving 38 years at sea.

John Francis Milner was born in December 1927 and received his pre-sea training at Pangbourne Nautical College. In 1944 he was apprenticed to the New Zealand Shipping Company and sailed on his first voyage in the *Cornwall*. He obtained his Master's Certificate in October 1954 and, for a short period, served in ships of the B.P. Tanker Company. He returned to the New Zealand Shipping Company and was promoted to Master in March 1961 in command of the *Norfolk*. Thereafter he commanded a number of ships including the *Papanui, Surrey, Hurunui* and *Turakina*. When the New Zealand Shipping Company was absorbed into the P. & O. group, he commanded *Strathnevis, Strathaslak* and, recently, the *Strathdirk*.

Captain Milner sent us his first meteorological logbook from the *Rakaia* in 1948. Thereafter we received a further 35 logbooks bearing his name of which 22 were classed as Excellent. He received Excellent Awards in 1971, 1972, 1973, 1975 and 1979.

We wish him a long and happy retirement.

RETIREMENT.—MR W. CUMMING, Radio Officer, retired on 6 September 1982 after more than 39 years with the Marconi International Marine Company.

William Cumming was born on 14 January 1925 and joined the sea staff of Marconi in June 1943. He survived the war unscathed and served as Radio Officer in several ships.

In April 1958 he was appointed to the *Port Nelson* and remained with Port Line until February 1972. Thereafter he served for 6 years in ships of the Ben Line. More recently he served as Radio Officer on board the *Reynolds*, managed by Bolton Maritime Management Company.

We received the first meteorological logbook bearing Mr Cumming's name from the *Port Nelson* in 1964. Thereafter he sent us a further 22 meteorological logbooks and he gained Excellent Awards in 1969 and 1974.

We wish him a long and healthy retirement.

RETIREMENT.—MR A. J. GORDON, Radio Officer, retired on 6 September 1982 after serving nearly 40 years with the Marconi International Marine Company.

Alexander James Gordon was born on 11 May 1924 in Kirkcudbright. He was appointed to the sea staff of Marconi on 11 December 1942 'for the period of hostilities only' and served on the *British Gratitude*. He resigned in August 1949 in order to study for a 2nd class P.M.G. Certificate and, having obtained this qualification, was reappointed to Marconi the following December.

In July 1955 Mr Gordon was serving on board the *Geologist* which sank after being in collision with the *Sun Princess*. During the Suez Crisis in 1956 he was serving aboard the *Barbatia*, owned by Shell, which was sunk, and the crew, including Mr Gordon, were interned in Egypt.

Since September 1961 Mr Gordon has served mainly on Ben Line vessels including the *Benvorlich, Benloyal, Benavon* and *Benalder*. His last appointment was to the *City of Edinburgh*, also owned by Ben Line.

Mr Gordon's name first appeared in a meteorological logbook received from the *Cortona* in 1960. Since then we have been sent a further 35 logbooks bearing his name. He received an Excellent Award in 1981.

We wish him a happy and healthy retirement.

RETIREMENT.—MR R. SMITH, Radio Officer, retired on 19 September after serving over 39 years at sea with the Marconi International Marine Company.

Ronald Smith was born in South Shields in May 1925 and joined the sea staff of Marconi as Radio Officer in July 1943. After completing 3 voyages, one of almost 2 years duration, aboard the *Gerusalemme,* he temporarily left Marconi to obtain his 2nd Class P.M.G. Certificate. He rejoined the Company in November 1947. After serving as Radio Officer in various ships he transferred to the Company's shore staff in Newcastle upon Tyne in February 1954 but reverted to the sea staff in March 1958. He again served in various ships until December 1962 when he was appointed to a vessel owned by the Esso Petroleum Company. He remained with that Company for 38 consecutive voyages, serving principally on board the *Esso Lancashire.* More recently he served aboard the *Birchbank* and *Glenpark.*

We received the first meteorological logbook bearing Mr Smith's name from the *Esso Hampshire* in 1964. Thereafter he sent us a further 27 books and he gained an Excellent Award in 1977.

We wish him a long and healthy retirement.

Notices to Marine Observers

APPOINTMENT TO THE NAUTICAL STAFF OF THE MARINE DIVISION AT BRACKNELL

Captain J. F. T. Houghton, M.N.I., M.C.I.T., has been appointed to the Marine Division of the Meteorological Office and posted to Headquarters in Bracknell in succession to the late Mr J. D. W. Brown.

On leaving H.M.S. *Worcester* in 1948, John Houghton was apprenticed to the P. & O. S. N. Company and served with them until 1970, attaining the rank of Chief Officer. He then transferred to Denholm Ship Management with whom he remained until shortly before joining the Meteorological Office. He was promoted to Master in 1974 and for the past 8 years has commanded a number of ships managed by Denholms.

WEATHER BULLETINS FOR SHIPPING BROADCAST ON BBC RADIO 4

It is proposed to put back the present 0015 broadcast to 0033 and bring forward the present 0625 broadcast to 0555 (all 'clock' times) in the near future.

Confirmation and the date of implementation of these changes will be promulgated as soon as possible.

NOCTILUCENT CLOUDS

The Aurora Section of the British Astronomical Association is interested in reports of Noctilucent Cloud as described on pages 85 and 86 of the *Marine Observer's Handbook.* Observations of this phenomenon should be recorded in the Additional Remarks pages of your Meteorological Logbook in the usual manner.

Printed by HMSO, Edinburgh Press
Dd 0717702 C20 3/83 (206770)

ISBN 0 11 726927 1
ISSN 0025-3251