

Met. O. 923

# The Marine Observer

*A quarterly journal of Maritime  
Meteorology*



Volume XLIX No. 263  
January 1979

£1.50 net





# THE MARINE OBSERVER

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

Vol. XLIX

1979





# THE MARINE OBSERVER

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

VOL. XLIX

No. 263

JANUARY 1979

## CONTENTS

	<i>Page</i>
Editorial .. .. .	4
The Marine Observers' Log—January, February, March .. ..	7
Current Uses of Satellite Data in a Meteorological Forecast Office BY RALPH K. ANDERSON .. .. .	26
Portishead Radio. BY D. MULHOLLAND .. .. .	36
Special Long-service Awards .. .. .	38
Aurora Notes, January to March 1978. BY R. J. LIVESEY .. ..	39
Ice Conditions in Areas adjacent to the North Atlantic Ocean—July to September 1978 .. .. .	41
Royal Visit to the Meteorological Office.. .. .	46
Personalities.. .. .	46
Notices to Marine Observers .. .. .	48
Fleet Lists .. .. .	49

*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*  
HER MAJESTY'S STATIONERY OFFICE

© Crown copyright 1979

To be purchased direct from HMSO at any of the following addresses: 49 High Holborn,  
LONDON WC1V 6HB; 13a Castle Street, EDINBURGH EH2 3AR; 41 The Hayes, CARDIFF CF1 1JW; 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.

PRICE £1.50 NET or £6.48 per annum (including postage)

## Editorial

'If you have a ship confided to your care, note the precursory signs of the winter wind and tempestuous sea'  
Aratus c 300 BC

These words are as true today as when they were written over 2000 years ago for, despite the modern powerful ship equipped with sophisticated electronic devices, the modern seafarer is still dependent on the weather for his comfort and safety. Over the years the mariner almost unconsciously develops an acute awareness of his surrounding weather conditions and no ship's officer would consider himself efficient if he were not 'weather wise'.

Prior to the advent of radio, the mariner used his awareness and skill to interpret his surrounding weather conditions in order to form a reasonable speculation on what was in store for him.

Nowadays, of course, the mariner does not have to rely only upon his own skill to interpret the weather signs. The International Convention for the Safety of Life at Sea (SOLAS) requires its signatories to provide a meteorological service for shipping '... to warn ships of gales ... to issue daily, by radio, weather bulletins suitable for shipping ...'.

The introduction of weather forecasts and gale warnings for shipping in the UK was instigated by Vice-Admiral Robert FitzRoy, the first Superintendent of the Meteorological Office, at that time a department of the Board of Trade. In fact it was FitzRoy who coined the word 'forecast' when he began to issue weather bulletins which were published in the daily newspapers for the information of those interested in the operations of ships and the general public. In 1863 FitzRoy published *The Weather Book* in which he defined the word 'forecasts' as follows: 'Prophesies or predictions they are not; the term forecast is strictly applicable to such an opinion as is the result of a scientific combination and calculation ...' and goes on 'certain it is that although our conclusions may be incorrect, our judgement erroneous, the laws of nature and the signs afforded to man are invariably true. Accurate interpretation is the real deficiency'.

The first direct weather forecasts to mariners took the form of visual gale warning signals introduced at ports in the British Isles in 1861 and was undoubtedly a great step forward in the utilization of meteorological knowledge. These visual signals consisted of the familiar North and South Cones hoisted in conjunction with a Drum—the latter being dispensed with sometime between 1871 and 1887. In his book, FitzRoy describes how the forecasts were arrived at: 'Having collated and duly considered the Irish telegrams, the first forecast for that district is drawn and then successively the west-central, north-west France, south-west, south-east and east coasts are taken. These comparisons being made and the first forecast altered as requisite, short expressive extracts are written, copied and forthwith sent out for immediate publication. Should the indications be such as to require cautionary signals to be shown along any or all the coasts, a printed list of places is sent with merely a word or two in addition to the Telegraph Office close at hand. These words are simply "North Cone" or "South Cone", "Drum" or "Drum and North (or South) Cone" as the case may require.'

It is interesting to note that the telegraphed weather reports referred to in the book were in a five-figure code based on the same principle as that used in the present meteorological codes. These warnings must have saved many ships and lives for Admiral FitzRoy was described at the time as 'one of the greatest living benefactors of our age'. A North Cone over a Drum is inscribed on FitzRoy's gravestone.

For over half a century, with the exception of the years 1866–68 when they were discontinued due to an inter-departmental dispute, the visual gale warning signals were the only meteorological aid to the mariner. In 1909 the introduction of radio in a few trans-Atlantic liners enabled these ships to send weather reports to the shore by wireless telegraphy when within range. By the end of World War I wireless

telegraphy had so much improved in reliability and range that the introduction of weather bulletins for shipping in coastal waters became a possibility. In February 1919 it was decided that radio weather reports from ships in the North Atlantic—which had been suspended during the war—should be resumed. In addition to transmitting their messages in code to the shore, the ships were encouraged to exchange their observations. However, the latter idea did not become much used, although some vessels often exchanged weather information in plain language.

In June 1921 a forecast weather message in plain language broadcast from Poldhu in Cornwall was introduced. This covered the western coastal waters of the British Isles and also included reports in code of the actual weather at five shore stations, these being Stornoway, Blacksod (Eire), Holyhead, Scilly and Dungeness. In some ships attempts were made to plot simple weather charts based on this scant information together with a few intercepted ship's reports.

On 1 January 1924, in appreciation of the valuable assistance given to the Meteorological Office by ships sending in weather reports by radio, a weather bulletin called 'Weather Shipping' was broadcast twice a day from the powerful Air Ministry transmitter in London capable of being received over 2000 nautical miles out into the North Atlantic. For forecasting purposes the coastal waters of the British Isles were divided into three areas—the Eastern Area extending from Cape Wrath to Dungeness, the Southern Area from Dungeness to the Scilly Isles and the Western Area from the Scilly Isles to Cape Wrath including the coasts of Ireland. These large areas were sub-divided into smaller areas named after their location and many of these—Forties, Dogger, Humber, Thames, Wight etc., are familiar to mariners today.

By the end of 1924 weather bulletins for shipping were being transmitted from coastal radio stations at Valentia and Seaforth for the Western Area, Niton for the Southern Area and Cullercoats for the Eastern Area. 'Weather Shipping' was in six parts; Part I gave the general inference, Part II gave the actual observations, in code, for 10 shore stations at Wick, Tynemouth, Yarmouth, Dungeness, Guernsey, Scilly, Holyhead, Valentia, Malin Head and Stornoway. Parts III, IV and V gave forecasts of wind and visibility for 12 hours for each of the Areas and Part VI gave the outlook.

From October 1925 'Weather Shipping', with the exception of Part II, was broadcast by radio-telephony from the BBC transmitter at Daventry on a ~~frequency~~ <sup>wavelength</sup> of 1600 metres at 1030 daily. In addition forecasts for the Western Area, Southern Area and Eastern Area were broadcast from the BBC transmitters at Liverpool, Bournemouth and Newcastle respectively at approximately 2230. However, in 1926 the evening broadcasts were re-arranged and, in place of the forecasts transmitted from Liverpool, Bournemouth and Newcastle, a forecast for all areas similar to that transmitted in the morning was broadcast from Daventry at 2200 on week-days and 2100 on Sundays.

In 1932 a Northern Area extending northwards from a line drawn through Cape Wrath to 63° North and including the sub-areas Orkney, Faeroes and Shetland was added to the 'Weather Shipping' bulletin.

Radio weather bulletins for shipping ceased during World War II and were resumed in 1945 in much the same form as before the war. By 1948 most shipping services had returned to normal and, as a result of the recommendations of the International Meteorological Organization—now the World Meteorological Organization—the forecasts were extended into the eastern North Atlantic and thus was born the North Atlantic Weather Bulletin. At the same time the coastal areas were given a new format very similar to that of today's which resulted in the omission of the Northern, Eastern, Western and Southern Areas.

Apart from the change of name Heligoland to German Bight and the ceasing to issue separate forecasts for the northern and southern parts of the Irish Sea there were no changes until last year. In 1976 the Marine Division of the Meteorological Office carried out a survey throughout the shipping and fishing industries on the



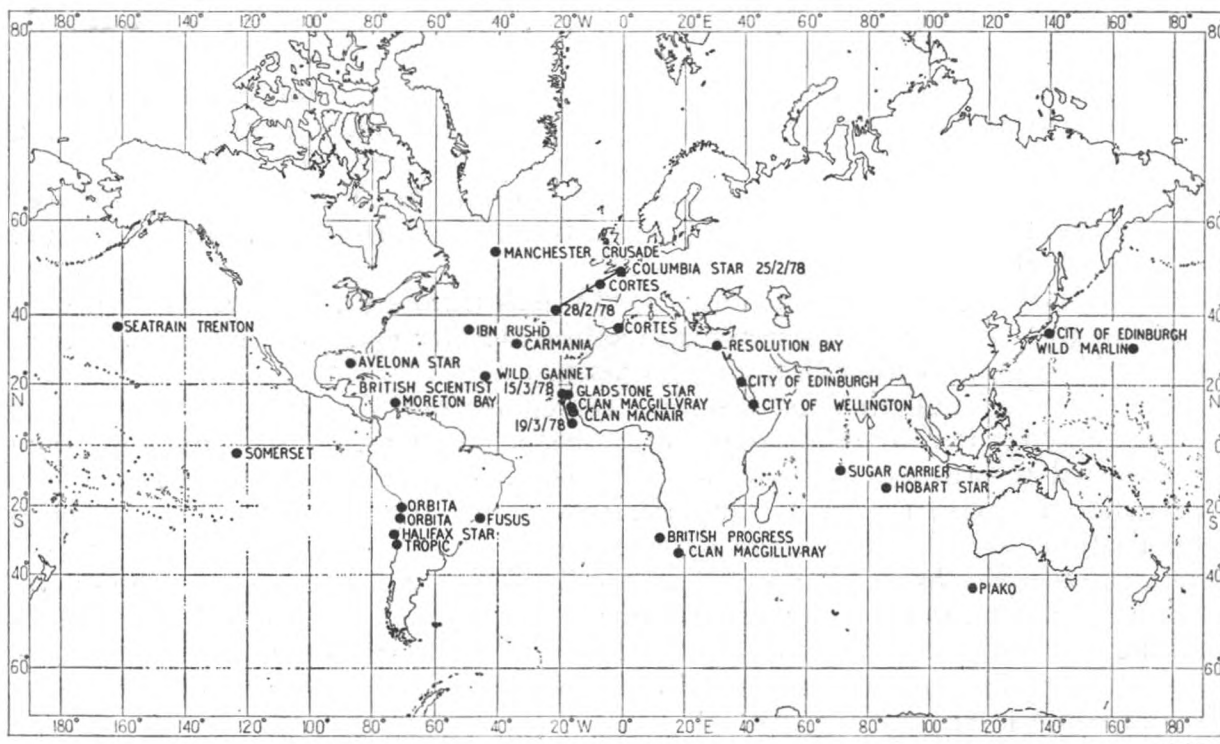
meteorological services rendered by the Meteorological Office. From this survey it was apparent that there was a desire in the shipping industry for the forecasts issued by the British Meteorological Office to cover the whole of the route between the UK and the approaches to the Straits of Gibraltar and as a result the new area, Trafalgar, was added to the North Atlantic Weather Bulletin in January 1978.

More recently, in November of last year, the BBC made certain changes in frequencies with the result that the Shipping Forecast now forms part of Radio 4 transmissions. The opportunity was taken to standardize the times of the Shipping Forecasts broadcast by the BBC so that they are uniform throughout the week and also to have a forecast for the area Trafalgar included in the 0015 broadcast.

As a signatory to the SOLAS Convention the United Kingdom is obliged to issue weather bulletins for shipping. However, the Meteorological Office has not lost sight of the valuable contribution made by the Voluntary Observing Fleet towards the data required not only for forecasting but also for climatological and research purposes and will continue to seek to improve the meteorological services to the shipping and fishing industries as a token of our acknowledgement of the services rendered by voluntary marine observers.

May 1979 bring prosperity, health and 'fair weather sailing' to all our readers, whether ashore or afloat.

C. R. D.



Position of ships whose reports appear in 'The Marine Observer's Log'



## January, February, March

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

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

### TROPICAL DEPRESSION 'WINNIE'

#### Indian Ocean

m.v. *Hobart Star*. Captain J. F. Rowe. Melbourne to Suez. Observers, the Master, Mr J. M. Jarratt, Chief Officer, Mr R. O. James, 2nd Officer and Mr A. D. Smith, 3rd Officer.

17 March 1978. At 1200 GMT a warning was received from the Australian Radio Station VIX that tropical depression Winnie was centred in position  $14.3^{\circ}\text{S}$ ,  $84.5^{\circ}\text{E}$ , almost due west of the vessel's position, see below.

From 1030 onwards a considerable increase in the swell, from a NW'ly direction, had been observed, this was not the dominant swell at the time, but became so by 1300. At 1300 the barometric pressure began to rise very slowly and at 1305 light rain commenced which turned to almost continuous drizzle.

Between 1500 and 1730 frequent light rain showers were observed, the wind remained steady at NE'ly force 3-4 and the pressure began to fall slowly.

By 1900 the wind had veered to SE'ly and increased to force 7 and the pressure was falling rapidly. At 2100 the wind veered further to become S'E and the pressure reached its lowest value of 993.6 mb; at this time also the rain had become heavy and continuous. The wind continued to veer slowly until by 0000 it had become SW'ly, force 6-7. The visibility was considerably reduced by heavy rain between 2200 and 2330, but thereafter improved gradually as the rain moderated. By 0000 the pressure had begun to rise rapidly.

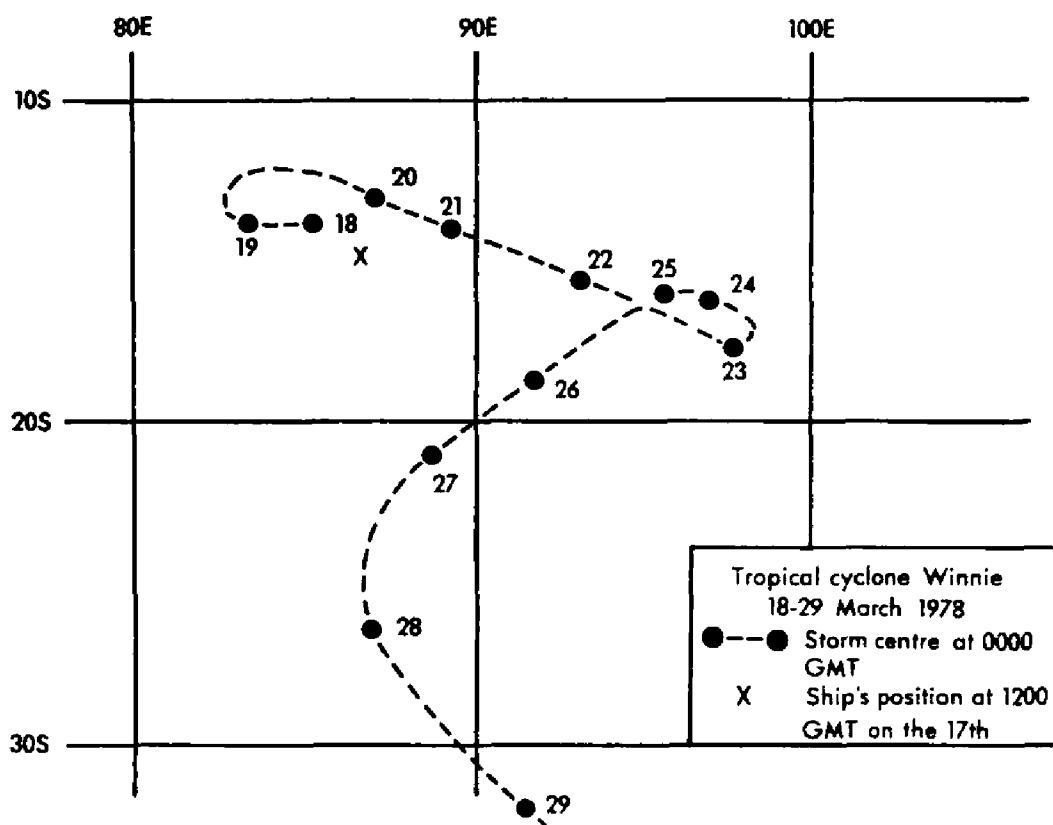
At 0045 on the 18th the continuous rain gave way to showers and the wind decreased slightly to force 5-6.

By 0200 the wind had increased to force 7 and thereafter, until 20 March, strong NW'ly winds and belts of heavy rain were experienced. During the rain the wind veered slightly and increased to force 8.

It was believed that the depression had not reached its maximum intensity when the vessel encountered it.

Position of ship at 1200 GMT on the 17th:  $14^{\circ} 42'S$ ,  $86^{\circ} 42'E$ .

*Note.* The diagram shows the track of Winnie as followed by NOAA satellite. The depression was in the development stage when the *Hobart Star* passed very close to the centre late on the 17th.



Winnie continued to develop and attained hurricane strength by the 21st which it maintained until the 24th. It then moved SW for several days before recurving and becoming extra-tropical.

## PROLONGED HEAVY WEATHER

### Eastern North Atlantic

m.v. *Columbia Star*. Captain R. M. Burns. Tilbury to Cristobal. Observers, the Master, Mr J. Bottwood, Chief Officer, Mr N. Meek, 2nd Officer and Cadet A. Hillier.

25-28 February 1978. The following is the sequence of weather experienced on passage from Tilbury to the approximate position  $40^{\circ} 24'N$ ,  $21^{\circ} 48'W$ .

GMT

25th 0717: Wind s'w, force 3, barometer reading 988.4 mb, sea slight, low swell.

1200: Wind SE, force 4-5, barometer reading 981.6 mb.

1600: Wind SE's, force 3-4, barometer reading 976.8 mb.

2000: Wind ssw, force 5, barometer reading 971.4 mb, overcast with



- occasional light rain showers, sea moderate to rough with a very short moderate to heavy head swell.
- 2200: Vessel reduced speed to minimize pounding.
- 2215: Further reduction in speed.
- 2250: Further reduction in speed to 50 revolutions.
- 26th 0000: Wind sw's, force 5-6, barometer reading 977.6 mb, sea rough, moderate swell estimated to be 4 metres.
- 0210: Wind s'e, force 4-5, barometer reading 973.8 mb, vessel increased speed as conditioned moderated.
- 0700: Wind ssw, force 9, barometer reading 978.0 mb, overcast with occasional rain showers, sea very rough, very heavy head swell estimated to be 7 metres, speed again reduced as conditions deteriorated, visibility reduced by flying spray.
- 1100: Wind sw'w, force 8-9, barometer reading 982.1 mb, sea rough, swell heavy.
- 1500: Wind w's, force 7-8, barometer reading 983.6 mb.
- 1545: Vessel increased speed as conditions once again moderated. During the remainder of the day the wind moderated and veered slightly, the barometric pressure continued to rise, weather overcast and clear, sea rough, swell heavy.
- 27th 0000: Wind wsw, force 6, barometer reading 990.3 mb and was now steady, long heavy swell estimated to be 7-8 metres. Vessel's speed increased to 120 revolutions.  
During the next 8 hours conditions remained much the same and the vessel's speed was maintained.
- 1600: Wind wsw, force 6-7, barometer reading remained steady at 990.0 mb, swell estimated to be 9 metres.
- 1800: Wind showed a marked increase to force 9-10, barometer reading 988.8 mb, vessel's speed reduced to minimize violent pitching and pounding.
- 1830: Wind wsw, force 9, barometer reading 987.7 mb.
- 1915: Vessel's speed further reduced to 75 revolutions.
- 28th 0000: Wind wsw, force 8, barometer reading 989.0 mb.
- 0200: Wind w'n, force 7-8, barometer reading 987.8 mb.
- 0500: Wind w'n, force 10, barometer reading 990.7 mb.
- 0600: Wind w'n, force 9, barometer reading 1003.0 mb.
- 1000: Wind NW'w, force 9, barometer reading 1008.8 mb. Full speed resumed as swell lengthened.  
During the remainder of the day the pressure continued to rise and the wind decreased to become force 5-6 by late evening.

Position of ship at 1200 on the 25th: 50° 12'N, 01° 06'W.

Position of ship at 1200 on the 28th: 42° 00'N, 21° 42'W.

*Note.* During the latter half of February and into early March a large complex area of low pressure persisted over the eastern half of the North Atlantic. The main centres of the system remained north of about 45°N and to the west of the British Isles.

A strong w to sw surface airflow was maintained between latitudes 35° and 45°N and particularly so between 40° and 45°N. There were troughs and secondary depressions in the airstream from time to time and these features produced variations in both the direction and speed of the wind.

With the persistence, strength and almost unlimited fetch of the winds during this period, some very rough seas were to be expected and were, in fact, reported.

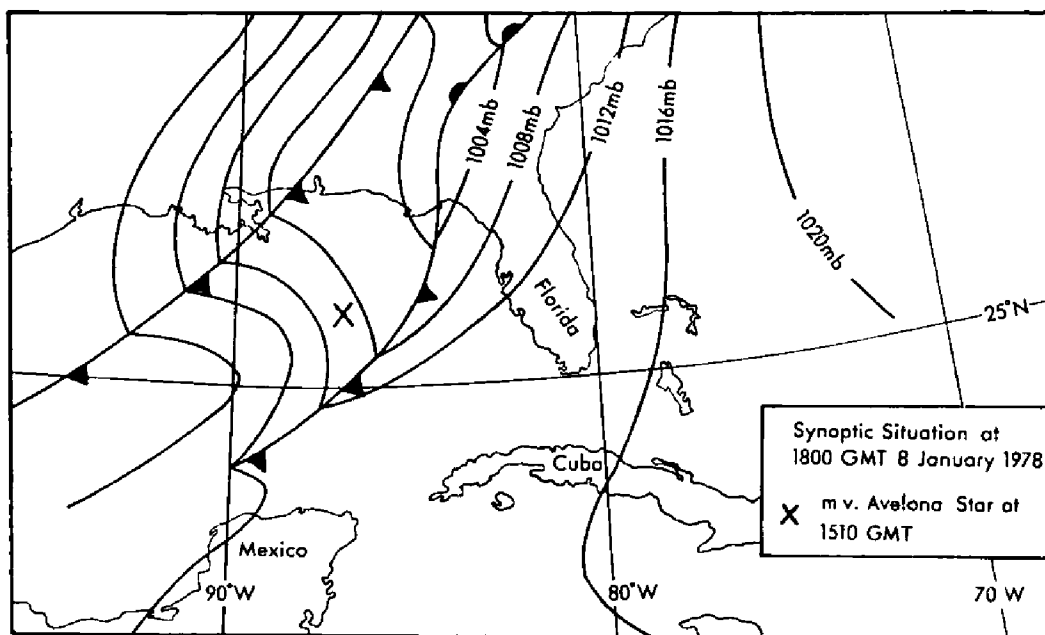
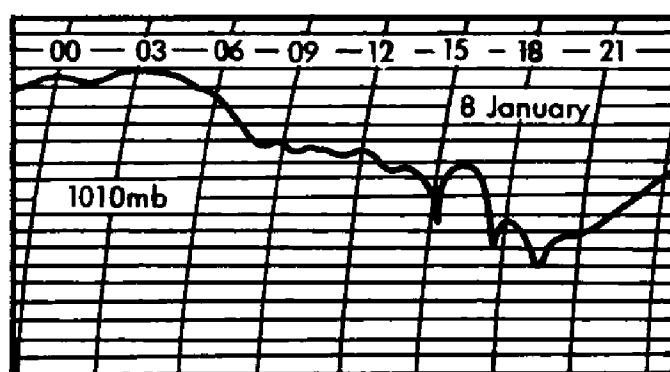
## SEVERE LINE-SQUALL

### Gulf of Mexico

m.v. *Avelona Star*. Captain R. Brownbill. Panama Canal to Gulfport, Mississippi. Observers, the Master, Mr G. Sayle, Chief Officer, Mr R. Tucker, 3rd Officer and Cadet A. Reader.

8 January 1978. At 1510 GMT a belt of rain was observed on the radar screen at a distance of 25 n. mile from the vessel and lying in a NNE-SSW'ly direction, the wind at the time was light sw'ly.

At 1536 the rain had reached the vessel. The wind veered to NW and increased to force 11 and visibility was reduced by driving spray. The barometric pressure fell two millibars then rose steeply again, see trace. At the height of the storm the wind probably reached hurricane force and was accompanied by torrential rain; the rain finally ceased at 1730. An urgent message was sent to the US Coastguard at Puerto Rico, local stations being unobtainable at the time.



During the next few hours rises and falls of pressure were observed on the barograph trace. The wind decreased gradually and by 1800 had become NW'ly, force 4. A further increase to force 7-8 was observed for a time before it finally settled at force 4 on the following morning.

Position of ship: 26° 39'N, 87° 15'W.

*Note.* The *Avelona Star* was on the southern edge of a depression which started to deepen rapidly in the vicinity of the Great Lakes on the 8th. Over the next few days it was to become one of the worst storms to have affected the eastern United States during that winter. The low eventually moved away NNE and had filled by the 13th over the north of Baffin Bay.

Cold air was swept well to the south behind the cold fronts with temperatures falling below freezing even in Florida. Very strong southerly winds developed over the eastern seaboard and widespread damage was caused both overland and to ships at sea.

Cold air was extending into the Gulf of Mexico and the severity of the line-squall at the first cold front was probably due to the marked contrast between the warm air of the southerlies and the cold air that was replacing it.

The passage of the fronts produced two well-marked dips in the barograph trace. It would appear that there must have been another trough which has not been picked out in the analysis but which gave rise to the third dip between 1700 and 1800.

## LINE-SQUALL AND WATERSPOUT

### North Atlantic Ocean

m.v. *Ibn Rushd*. Captain P. W. Roberts. Gibraltar to New York. Observers, Mr B. D. McIntyre, 2nd Officer, and Mr D. Kellas, Radio Officer.

1 February 1978. At 1700 GMT a line-squall was observed to be approaching the vessel from a south-westerly direction at an estimated speed of 40 knots; as the vessel passed through the squall, the sea indicated a wind force 11-12.

When the white-water caused by the squall was about half a nautical mile astern of the vessel, it commenced to rotate in an anti-clockwise direction and within a very short time a waterspout formed from the base of the cloud; it was moving in a north-easterly direction and began to dissipate after only three minutes. The base of the waterspout was estimated to be 50 metres in diameter.

Later inspection of the barograph trace revealed a vertical fall and rise in pressure of 1.2 mb during the passage of the squall.

Other weather details were: overcast with heavy showers, wind, other than during the passage of the squall, sw'ly, force 8, barometric pressure falling at a rate of 7 mb in 3 hours.

Position of ship: 36° 00'N, 49° 50'W.

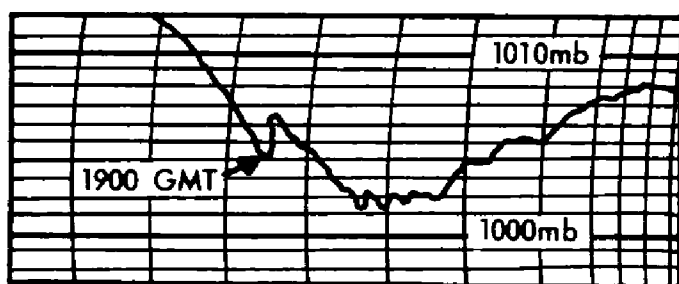
## LINE-SQUALL

### North Pacific Ocean

m.v. *Seatrain Trenton*. Captain J. B. Turnbull. Oakland (California) to Kobe (Japan). Observers, the Master, Mr T. Mather, Chief Officer and Mr N. Glendinning, 3rd Officer.

29 January 1978. At 1900 GMT a line-squall, extending at least 20 n. mile in a NNE to ssw'ly direction, was observed on the radar screen to be about 5 n. mile ahead of the vessel; the squall produced a very solid echo, especially along its leading edge, on the screen.

As the vessel passed through the squall the wind increased to about 50 knots, torrential rain commenced and the barograph trace showed a sharp rise in pressure,





see chart. After about five minutes, however, the rainfall decreased in intensity, the wind speed decreased to about 10 knots and barometric pressure began to fall again.

The wind remained steady from a south-westerly direction before, during and after the squall, the dry bulb was unchanged at 13.5°C but there was a fall in the wet-bulb temperature after the passage of the squall from 12.6 to 10.9.

Position of ship: 36° 02'N, 161° 50'W.

## FREAK WAVES

### North Atlantic Ocean

m.v. *Carmania*. Captain D. M. Swetnam. Bremen to Panama. Observer, the Master.

1 March 1978. The vessel experienced unpredictable and severe pounding on three occasions, at 0630, 1000 and 1250 GMT. This was considered to be unusual since weather conditions had been steadily improving. The wind, blowing from a west-south-westerly direction, had decreased from force 6 at 0200 to force 4 at 1300. A moderate south-westerly swell had also decreased and was in the order of 5 metres at 1300. The vessel's speed and course was 20.5 knots and 240°T.

It was thought that this sudden pounding may have been connected with the confluence of currents as may be experienced in the vicinity of the Cape of Good Hope when the Agulhas current meets the westerly drift causing 'Potholing' on the ocean floor. The sea-water temperatures for the preceding day indicated that an increase had taken place from 15°C at 1200 to 17.2 at 1800. A further increase to 19 was observed the next day. A normal increase of about one degree per 12 hours was observed after this time until arrival in Martinique to which place the vessel was diverted.

Position of ship at 1250: 33° 09'N, 34° 56'W.

Note 1. Captain Swetnam adds:

'I have experienced this phenomenon before off the Cape of Good Hope, which, I think, is well documented. But searching my memory and my journal I have come up with four other occasions and a careful study of the routing charts reveals the one common factor that in all the positions where it has been encountered a confluence of currents—usually a warm current meeting a cold one—exists. The four positions were:

Off Pusan in position 35N 131E.

Off Honshu in position 35N 142E.

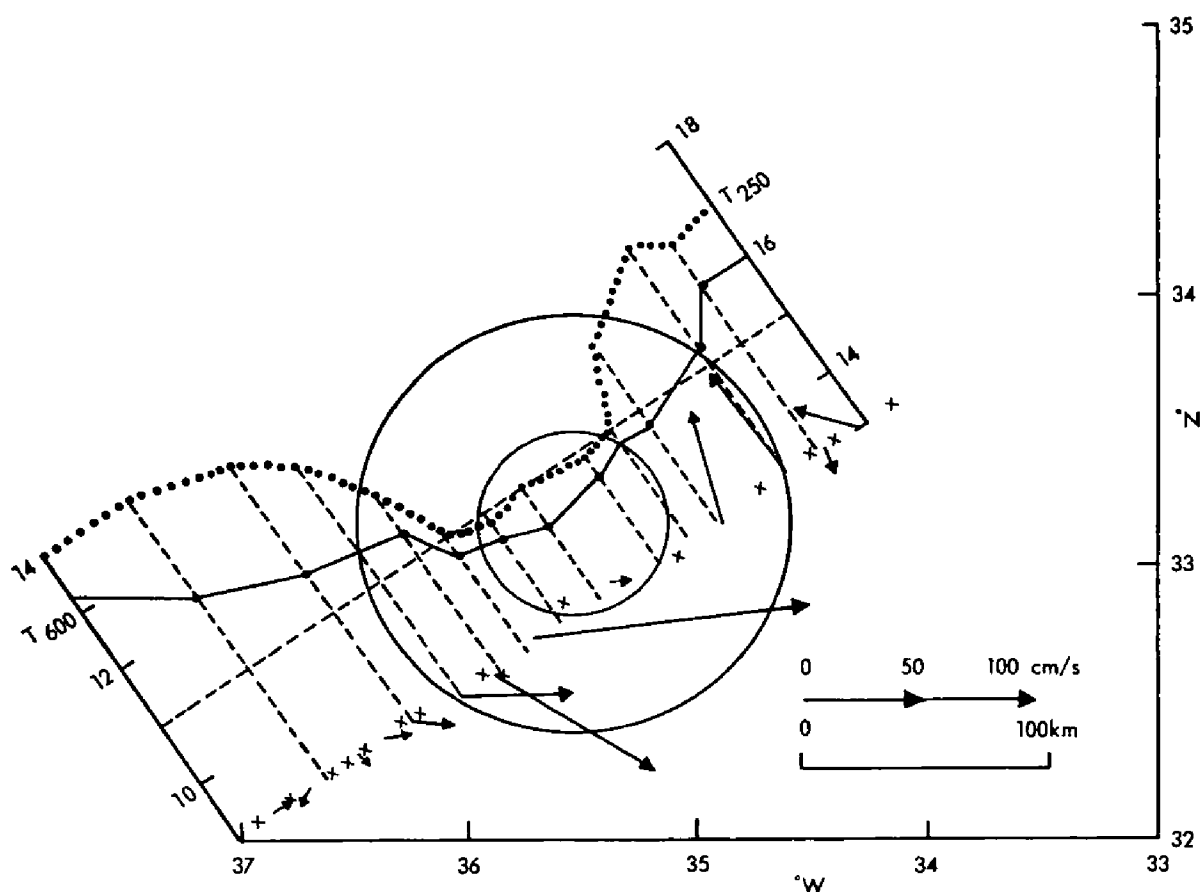
Off the Gulf of California in position 20N 109W.

In the Iceland/Faeroe Gap in position 63N 10W.

Note 2. Mr L. Draper of the Marine Information and Advisory Service of the Institute of Oceanographic Sciences, comments:

'It seems to us unlikely that this effect was produced by a confluence of currents, it is more nearly analogous to the phenomenon referred to by Captain Swetnam which results in large and sometimes disastrous waves off South Africa. This occurs there when waves suddenly cross the boundary between still water and the opposing Agulhas current, which achieves speeds of five knots at times. When waves meet an opposing current they are slowed down and refracted, concentrating the wave energy into a reduced area. This has the effect of shortening the wave-length and, to accommodate the same energy within a smaller area, increasing the wave height.

'There is no major current similar to the Agulhas in the area where the *Carmania* experienced trouble, but it is an area where oceanographic fronts (similar to meteorological fronts) exist. Along the line of such a front there can be strong currents around local eddies, and just such is illustrated in the diagram produced by Dr J. Gould of this Institute for an occasion in June 1976 in almost exactly the area where the *Carmania* experienced trouble. It will be seen that the current reached a speed of 2.5 knots (50 cm/sec. is close to one knot). In this



**Surface current vectors across mesoscale features east of the Mid-Atlantic Ridge. A possible eddy location has been drawn north of the ship's track (indicated by plus signs). The 250-m and 600-m temperatures are also shown**

instance the currents measured by Dr Gould would not have opposed waves coming from the south-west, but presumably they would have done so on the northern flank of the eddy, see diagram.

'Captain Swetnam did not report the wave periods, but from the Meteorological Office report of winds of force 6 or over it seems likely that they were of perhaps 7 to 9 seconds. If these waves were to run into a 2.5-knot current the wave height would be enhanced by around 25 per cent, but if the current speed were to be about 6 knots it would stop transmission of the energy of such waves entirely, a modest further increase in current speed would, therefore, have a noticeable effect.

'It seems that the *Carmania* must have experienced three zones of currents opposing waves within 12 hours. If this hypothesis is correct, there is no need to invoke the supernatural or even local meteorological effects. It is something which can happen with very little warning but with possibly damaging results.'

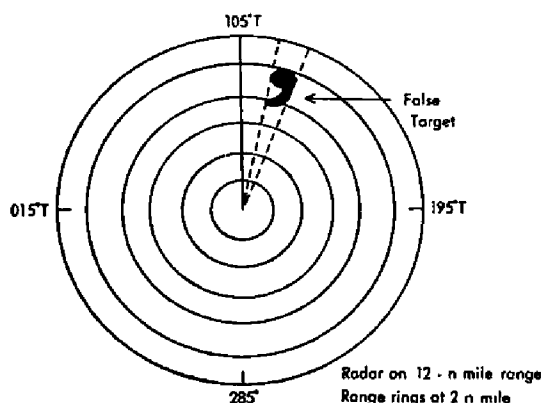
## **RADAR DUCTING**

### **Mediterranean Sea**

m.v. *Resolution Bay*. Captain P. J. Clark. Rotterdam to Port Said. Observer, Cadet P. J. Jenner.

5 February 1978. A false target was observed on the radar screen, using the 10 cm wave guide system, on the 12-n. mile range. The target was first observed bearing between 117 and 126°T at 9 n. mile and disappeared on a bearing of 130°T at a distance of 3 n. mile, see sketch. Nothing was observed on the sea surface and the possibility of a rain shower in the area was ruled out.

Abnormal radio reception was also experienced, it was, therefore, concluded that the false target was a radar ducting echo.



Weather conditions at the time were as follows: dry bulb 17.0°C, wet bulb 14.6, sea temp. 15.0, barometric pressure 1009.4 mb, wind E'ly, force 2, sea slight, no swell.

Position of ship: 32° 04'N, 30° 29'E.

*Note.* Mr A. M. Shaw of the Royal Signals and Radar Establishment, comments:

'The warm air over a cold sea seems consistent with ducting over this area and the direction of the signal is consistent with the position of land. It is not possible to check whether the range is also in agreement since the radar pulse repetition frequency is not known.

'The Nile Delta coast is very flat so one would not expect much except from buildings in the Dumyat area—the Master probably knows the area sufficiently well to say whether there are any modern buildings in this region.'

## WHALES

### Eastern North Atlantic

m.v. *Gladstone Star*. Captain E. G. Bee. Liverpool to Cape Town. Observer, Mr N. Wright, 3rd Officer.

29 March 1978. At 1200 GMT a disturbance was observed about 200 metres from the vessel. After a few seconds a whale broke the surface and submerged. Then, four or five times in quick succession, it leaped completely clear of the water re-entering in a dive like a dolphin rather than just falling backwards. After these leaps and dives it then raised the fore-part of its body clear of the water three times, each time dropping back with a splash.

The animal was 5–6 metres in length and dark grey in colour, the dorsal fin was quite large and the over-all impression was that of a 'scaled-up' dolphin although the creature was heavier and less sleek. Unfortunately no reference book could be found, it was, therefore, not possible to make a positive identification, it was, however, thought to have been a pilot whale.

The most striking feature was the manner in which the body was curved during the leap which was very smooth. The whale entered the water making very little splash considering its bulk and that it was descending from a height of about three metres.

No other whales were observed on this occasion but on the following day a small number were observed about 150 metres off the bow, these also were thought to be pilot whales.

Position of the ship at 1200 on the 29th: 16° 48'N, 18° 12'W.



## PORTUGUESE MEN-O'-WAR

### Eastern North Atlantic

m.v. *Clan Macnair*. Captain R. E. Todd. Walvis Bay (S. Africa) to Dublin. Observers, the Master and Officers of the watch.

14 March 1978. At 0700 GMT a mass of jelly-like creatures were observed and thought to be small Portuguese men-o'-war.

At about 1100 we came upon thousands of these creatures clustered together, forming lines of pink masses, running in a NE-SW direction at right-angles to the wind; these large masses were observed for about two hours.

Specimens in the large masses were seen to have tendrils about 30 cm in length and blue in colour.

Position of ship at 1200: 10° 30'N, 17° 12'W.

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

'These were Portuguese men-o'-war (*Physalia*). They develop with the fishing tendrils or tentacles off-centre, either to right or left. The gas gland which inflates the float into a sail is also set asymmetrically. As a result sail and wetted surface are off-set and the animal does not run before the wind but reaches across it. The tentacles, which sting and kill fish, can be hauled up and down like a centre-board. Yet the Portuguese man-o'-war is a primitive creature being only a jelly-fish.'

### Eastern North Atlantic

s.s. *British Scientist*. Captain R. Taylor. Europoort to Singapore. Observer, Mr S. W. Thomson, 2nd Officer.

15-19 March 1978. During this period objects, thought at first to be water-melon skins, were observed; upon close inspection they were found to be jelly-fish.

The jelly-fish varied in size up to 25 centimetres. From above they seemed to have the shape of a hedgehog, including the snout, and a pink ridge was seen to protrude above the water and act like a sail. The bodies were opaque, a few of the larger specimens had tentacles under which small fish were visible. The fish were a dark green colour with circular black bands on the body.

During the first three days large numbers of these creatures were observed, thereafter the number decreased to only a few small ones on the fifth day in the most southerly position.

Position of ship at 1800 GMT on the 15th: 16° 00'N, 19° 06'W.

Position of ship at 1200 GMT on the 19th: 6° 54'N, 15° 06'W.

*Note.* Dr F. Evans comments:

'These were *Physalia*, see the observation from the *Clan MacNair* above. The small fish were pilot-fish *Naucrastes*, which are able to associate with Portuguese men-o'-war without being captured.'

## FISH

### Bay of Biscay

m.v. *Cortes*. Captain J. Collins. Gibraltar to Liverpool. Observers, the Master and Mr A. J. Bairstow, 3rd Officer.

29 March 1978. At 0830 GMT the vessel passed through an area the surface of which was littered with thousands of small fish ranging in length from 5 to 12 centimetres. Some of the fish appeared to be dead and the majority were very sluggish

in their movements, many swimming slowly around in tight circles. It was not possible to obtain a specimen and owing to rough seas, not much detail was observed, it was thought, however, that the fish resembled sprats. A number of sea-birds were present and although they were taking some of the fish, their interest appeared to be less than expected—they may, however, have already gorged themselves.

No pollution of the sea was evident and regular observations of sea temperature during the following hour showed no significant change.

The fish were observed over an area which exceeded one square nautical mile.

Position of ship:  $47^{\circ} 48'N$ ,  $7^{\circ} 33'W$ .

*Note.* Dr Evans comments:

'I suggest the possibility that this may have been the lost catch of a fishing boat (a burst purse-seine etc.).'

### South Atlantic Ocean

s.s. *British Progress*. Captain S. F. Bryce. Cape Town to Europoort. Observer, Mr T. D. Maxted, 2nd Officer.

4 March 1978. At 0750 GMT a fish, see sketch, was found on board the vessel.



The whole of the back and sides was black and the underside white with yellow streaks. The body was generously covered with small spines, also, set above between the eyes were 9 large spines 0.45 cm in length. The other dimensions were: body length 3.30 cm, width 1.65 cm, depth 1.00 cm, tail length 0.95 cm (tapered) and the mouth, of solid bone similar to the parrot fish, was 0.45 cm wide.

Position of ship:  $30^{\circ} 00'S$ ,  $12^{\circ} 18'E$ .

*Note.* Dr F. Evans comments:

'This is a porcupine fish or spiny puffer of the family Diodontidae. Adult porcupines inhabit warm inshore waters. The young, which I suppose this to be, are more oceanic.'

### JELLY-FISH

#### Caribbean Sea

s.s. *Moreton Bay*. Captain R. J. Bland. Rotterdam to Panama. Observers, Mr J. C. Wise, Chief Officer and Mr R. A. Kenchington, 2nd Officer.

19 March 1978. At 1910 GMT a jelly-fish two metres in diameter was observed passing close to the side of the vessel. It was pure white in colour and the tentacles seemed to extend at least two metres below the surface.

A closer examination of the jelly-fish was not possible owing to the speed of the vessel.

Position of ship:  $14^{\circ} 29'N$ ,  $73^{\circ} 09'W$ .

*Opposite page 16*



H M. The Queen signing the Visitor's Book at the Meteorological Office accompanied by the Director-General, Dr B. J. Mason

*See page 46*

*Opposite page 17*



Captain A. Phillips, Nautical Officer attached to the Ship Routeing Service of the Marine Division, being introduced to H.M. The Queen. Dr B. J. Mason, Director-General of the Meteorological Office and Mr D. E. Jones, Assistant Director (Central Forecasting) are in attendance

*See page 46*

*Note.* Dr F. Evans comments:

'This huge jelly-fish was most probably a specimen of the genus *Cyanea*. The largest specimen so far exactly measured was 2·3 metres across with tentacles extending 37 metres; it came from Massachusetts Bay.'

## TORTOISE

### South Pacific Ocean

m.v. *Somerset*. Captain B. Austen-Smith. Balboa to Apia (W. Samoa). Observer, the Master.

16 February 1978. At 0300 GMT a giant tortoise was observed. The sighting was too brief to describe accurately the creature but it was at least 60 centimetres across and was swimming with head well up.

The main interest in the event was the creature's distance from land being some 1900 n. mile west of the Archipelago de Colon (Galapagos Is) and 1000 n. mile ENE of Îles Marquises. Since leaving Panama the vessel had experienced westerly sets of 20–50 n. mile per day which might account for the tortoise's apparent predicament.

The creature was heading east but this might have been in order to avoid the vessel rather than for navigation purposes. Were it really intent upon regaining the Archipelago de Colon, it might have done better to reverse course and travel south-about, but then it was not for us to interfere.

Position of ship:  $3^{\circ} 17'S$ ,  $123^{\circ} 50W$ .

*Note.* Mr E. N. Arnold of the Department of Zoology, British Museum (Natural History), comments:

'It would be surprising to encounter a giant tortoise so far from land, especially as the nearest locality for them is the Galapagos.'

Mr Arnold suggests that the creature observed may have been a turtle.

## BIRDS

### North Atlantic Ocean

m.v. *Manchester Crusade*. Captain D. S. Millard. Montreal to Manchester. Observers, Mr J. L. Mitchell, Chief Officer, Mrs Mitchell and family and Officers of the watch.

1 January 1978. During the evening of New-Year's Day the 3rd Officer was presented with a bird for identification purposes; the Chief Officer had found the bird waddling and flapping on the fore-deck.

After some discussion and reference made to a book on sea-birds, it was thought to be an immature Razorbill. However, when the bird was taken down to the bar yet more names were suggested. Since there were no artists on board a photograph was taken for identification purposes, and, having convinced the Chief Officer's two young sons that the bird did not want to sleep with them, it was taken to the vessel's office and given food and water.

Although it was thought at first to have a damaged leg because of its ungainly walk, the following morning it was found to be in high spirits. When it was placed on the gunwale capping it promptly jumped off into the water and was last seen frolicking in its natural habitat.

The bird was partly dark coloured and the head was a grey 'sooty' colour.

It was decided by members of the vessel's company that they had been 'first-footed' in a very nice manner.

Position of ship at 1200 GMT:  $53^{\circ} 54'N$ ,  $40^{\circ} 42'W$ .

*Note.* Captain G. S. Tuck, Chairman of the Royal Naval Bird Watching Society, comments:

'After this entertaining narrative, perhaps the Chief Officer and his family might like to know that the stumpy little sea-bird was a Little Auk, *Plautus alle*, in winter plumage. This

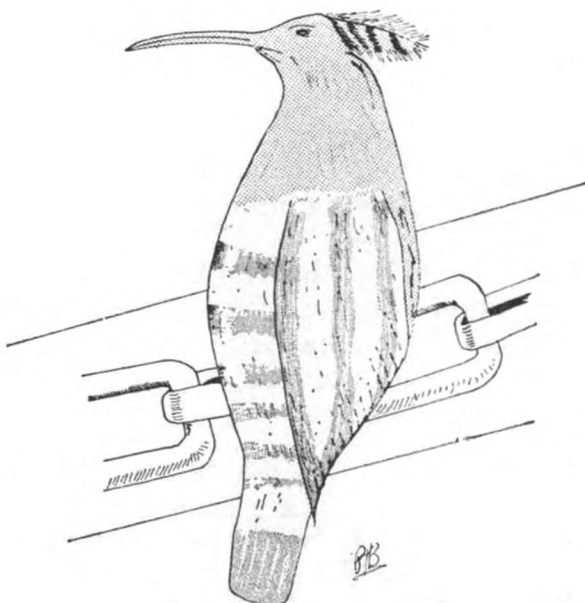


species breeds in the far North Atlantic islands but moves southwards somewhat in winter months.'

### Red Sea

m.v. *City of Wellington*. Captain A. J. Evans. Mombasa to Jidda (Saudi Arabia). Observer, Mr P. M. Bailey, 3rd Officer.

19 February 1978. Whilst passing Perim Island the bird shown in the sketch was observed to land on No. 3 hatch.



It was about 30 centimetres long and its markings were quite striking. The upper part of the body was a sandy colour and the lower part was marked by distinct bands of black and white. The crested head also had black bands. The beak was long and curved and yellow in colour.

At anchor off Jidda two similar birds were observed flying near the vessel, they appeared to have a fan-like tail, the end of which was black.

Position of ship at 1200 GMT: 14° 00'N, 42° 48'E.

*Note.* Captain Tuck comments:

'This is a very good sketch of the Hoopoe, *Upupa epops*. During its migratory passage it is often seen, and frequently found on board vessels in this region.'

### HAWKMOTH

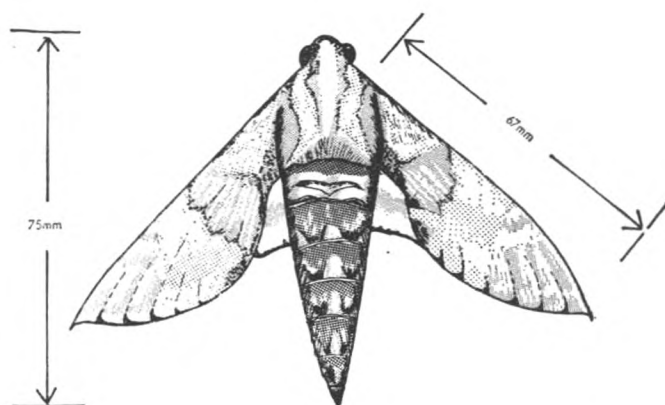
#### Western South Atlantic

m.v. *Fusus*. Captain M. H. Hardy. Lagos to Curaçao. Observer, Mr M. R. Etherington, 2nd Officer.

4 February 1978. Whilst the vessel was at anchor in Santos, a large moth, see sketch, was caught.

Most of the body carried varying shades of brown ranging from light fawn to chocolate brown on the top. The underside was a fawny-pink colour. The most interesting feature appeared to be a total lack of any form of antennae.

Position of ship: 24° 00'S, 46° 20'W.



**Note.** Mr A. H. Hayes of the Department of Entomology, British Museum (Natural History), comments:

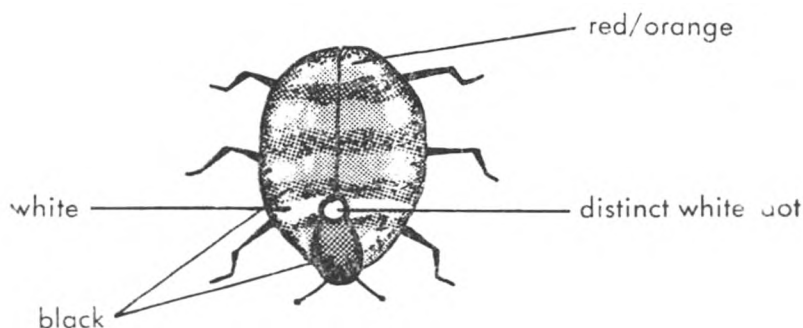
‘This is the hawkmoth *Eumorpha anchemolus* Cramer which is to be found in Mexico and Argentina. The antennae were probably lost during capture.’

## INSECTS

### South Pacific Ocean

m.v. *Tropic*. Captain S. Gibson. Valparaiso to Callao. Observer, Mr P. Smith, 3rd Officer.

11 January 1978. At 0200 GMT the insect as shown in the sketch was found on board the vessel. The vessel at the time was 17 n. mile off the Chilean coast and it was thought the insect had come on board since the vessel’s departure from Valparaiso at 2200.



A magnifying glass was employed in order to obtain the dimensions and colouring of the insect; the insect was found to be 5 mm long and 3 mm wide.

On the following day another insect of the same type was found by the Chief Officer.

Position of ship: 31° 42’S, 71° 58’W.

**Note.** Mr M. J. D. Brendell of the Department of Entomology, British Museum (Natural History), comments:

‘This appears to be an adult beetle, probably *Anthrenus* (family Dermestidae). It is very close in pattern to the common cosmopolitan Varied Carpet Beetle *Anthrenus verbasci* Linnaeus.

‘An infestation on board ship would not be beyond consideration and may well explain the presence of more than one of these beetles.’

## GRASSHOPPER

### North Pacific Ocean

m.v. *Wild Marlin*. Captain R. Lowther. Yokohama to Guayaquil (Ecuador). Observers, the Master and ship's company.

1 March 1978. When the vessel was three days out of Japan, an insect, see sketch, was found on deck. During the previous three days the wind had been blowing from a W-NW'ly direction, it was thought, therefore, that the insect may have been blown on board, or more probably, had come on board whilst the vessel was in Japan. The insect died two days after being found.

Position of ship:  $31^{\circ} 00'N$ ,  $167^{\circ} 00'E$ .



*Note.* Dr D. R. Ragge of the Department of Entomology, British Museum (Natural History), comments:

'The sketch is that of *Cyrtacanthacris tatarica*, a common grasshopper, widely distributed in the Old World Tropics.'

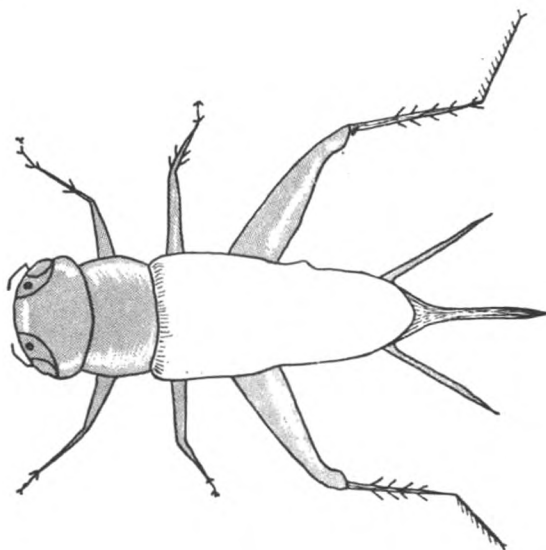
## CRICKETS

### Red Sea

s.s. *City of Edinburgh*. Captain S. Murray. Hong Kong to Hamburg. Observers, Mr M. H. Burbidge, Chief Officer and Cadet K. McKenzie.

26 March 1978. Three insects, each approximately four centimetres long, were found during the morning on board the vessel. They were thought at first to be members of the locust family, but, upon closer inspection, the bodies appeared to be similar to that of the wasp.

Abdomen and head were black in colour and the legs, which were also black close to the body, became a brownish-red after the first joint. A woody-brown shell-type covering was observed on the backs of the insects. All the legs were barbed as illustrated in the sketch.



Position of ship at 0600 GMT:  $21^{\circ} 00'N$ ,  $38^{\circ} 24'E$ .

*Note.* Mr B. C. Townsend of the Department of Entomology, British Museum (Natural History), comments:

'These are female Black Field Crickets, *Gryllus bimaculatus* De Geer. These insects, members of the true crickets and related to locusts, are common throughout Africa, tropical Asia and the Mediterranean.

'The long pointed organ protruding from the end of the abdomen, which may have been equated with a wasp's sting by the observers, is in fact the ovipositor, used for depositing the eggs in the ground.

'Crickets have two pairs of wings. The hind-wings are used in flight and the fore-wings form the "shell-type" covering on the back. In the males, the fore-wings form the singing apparatus also.'

## BIOLUMINESCENCE

### Eastern North Atlantic

m.v. *Clan Macgillivray*. Captain R. A. G. Simmons. Marseille to Cape Town. Observer, Mr P. J. M. Hickmott, 3rd Officer.

24 February 1978. At 2047 GMT a bright bioluminescent glow was observed in the vessel's bow wave and alongside the hull. The glow had a clean lime colour to it. No affect was observed when the Aldis lamp, echo-sounder and radar were switched on.

Position of ship:  $12^{\circ} 18'N$ ,  $17^{\circ} 33'W$ .

*Note.* Dr P. J. Herring of the Institute of Oceanographic Sciences, comments:

'This is possibly copepod luminescence which is conspicuously green.'

### South African Waters

m.v. *Clan Macgillivray*. Captain R. A. G. Simmons. Cape Town to Port Elizabeth. Observers, Mr A. J. Blackler, Chief Officer and Cadet E. J. R. Williams.

7 March 1978. At 0230 GMT milky white streaks lying in an east to west direction, each about half a nautical mile long and 20 metres wide, were observed. The sea was like a mirror, even reflecting the red sidelight of another vessel. The bow wave edges were brilliant white. The milky-white appearance gradually took on a greenish hue.

A sample of the sea-water was taken and, when observed under a magnifying glass, white organisms were seen to be making quick jerky movements. When the sample was taken into the dark wheel-house and agitated, a green sparkle was observed.

Position of ship at 0000:  $34^{\circ} 24'S$ ,  $18^{\circ} 24'E$ .

*Note.* Dr Herring comments:

'As the first observation from the *Clan Macgillivray* above, this may also have been an example of copepod luminescence. The description of jerky movements fits these small planktonic animals (crustaceans) and they are known to be abundant in South African and North West African waters at certain times of the year.'

### North Atlantic Ocean

m.v. *Wild Gannet*. Captain I. Y. Batley. Augusta (Italy) to Cartagena (Columbia). Observers, Mr D. S. MacDonald, Chief Officer and Mr K. C. Riddick, 3rd Officer.

9 January 1978. Between 2200 and 0030 GMT on the 10th patches of bioluminescence, stimulated by the lights from the starboard side portholes, were observed along the side of the vessel.

The patches were roughly circular in shape and about half to one metre in diameter, they appeared to be two metres below the surface of the water. They

emitted a very clear bright white light which, on occasions, took on a harsh blue quality when the surface of the water was illuminated by the accommodation lights. At about 2300 a maximum of 50 patches per minute were observed on the starboard side.

The patches were further stimulated when the light from the Aldis lamp was directed onto the water but no effect was observed when the radar or echo-sounder were switched on.

Position of ship at 2300:  $22^{\circ} 17'N$ ,  $44^{\circ} 33'W$ .

*Note.* Dr Herring comments:

'I expect that each patch was a single animal a little way below the surface, but I am at a loss to account for the brightness of the effects. Pyrosomas and comb-jellies which sometimes respond to light and are of the right size range, might have been involved.'

### Eastern South Pacific

m.v. *Orbita*. Captain R. K. C. Thomas. Arica to San Antonio (Chile). Observers, Mr P. M. Gregson, 2nd Officer and Cadet J. Tyson.

6 February 1978. At 0600 GMT moving patches of bioluminescence were observed about half a nautical mile ahead on the port bow; the patches were later identified as luminous trails of large fish. The trails appeared in groups of two or three or singly and kept up a course parallel to that of the vessel for two or three minutes.

It was possible to hear the splash as the fish broke surface, for this reason and also the behaviour of the fish around the vessel, it was thought by the observers that the vessel had encountered a school of porpoises or dolphins.

Position of ship:  $21^{\circ} 30'S$ ,  $70^{\circ} 48'W$ .

### Eastern South Pacific

m.v. *Orbita*. Captain R. K. C. Thomas. Valparaiso to Antofagasta (Chile). Observer, Mr P. M. Gregson, 2nd Officer.

13 February 1978. At 0600 GMT unusually bright bioluminescence was observed. A very large number of small fish were visible by their trails in the water swimming away from the side of the vessel. On several occasions it was possible to see the trails of much larger fish apparently chasing the smaller ones. The shoals of small fish would scatter upon the approach of the larger.

It was an amazing sight to see the very bright trails of larger and small fish in such heavy concentrations.

Position of ship:  $24^{\circ} 30'S$ ,  $70^{\circ} 45'W$ .

*Note.* Dr Herring, commenting on the above two observations, writes:

'Two interesting accounts of fish or dolphins made visible by their luminescent trails.'

### Eastern South Pacific

m.v. *Halifax Star*. Captain R. A. Young. Balboa to Valparaiso. Observers, Mr N. J. Brierley, 3rd Officer and Mr C. Booth, Radio Officer.

31 March 1978. At 0200 GMT extensive patches of bioluminescence were observed, some were circular, varying in diameter from  $1\frac{1}{2}$  to 5 metres, others were 60 centimetres to 5 metres in length. All of the patches were only dull in intensity. As the vessel approached the patches they appeared to be made up of small organisms which moved away from us.

When the Aldis lamp was switched on hundreds of small fish were observed jumping out of the water, a red-brown light was also reflected from pin-head sized objects in the water, thought to be plankton.

Position of ship:  $29^{\circ} 06'S$ ,  $73^{\circ} 19'W$ .



*Note.* Dr Herring comments:

'As the observer surmised, fish were almost certainly the cause. The red-brown reflection was probably from the eyes of the fish, many lantern-fish eyes give such a reflection.'

## ABNORMAL REFRACTION

### Mediterranean Sea

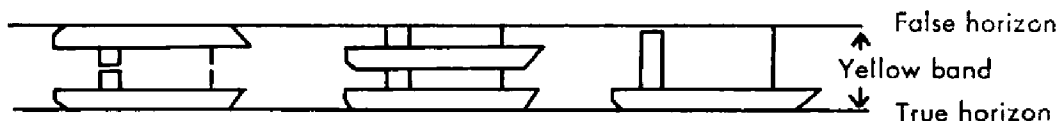
m.v. *Cortes*. Captain J. Collins. Carthagen a to Liverpool. Observers, the Master and Mr A. J. Bairstow, 3rd Officer.

18 February 1978. Between 1715 and 1800 GMT abnormal refraction in various forms was observed.

At 1715 a low yellow-coloured band with an apparent depth of about 50 metres was observed to extend all around the seaward horizon, nothing unusual was seen landwards and the band was thought to be dust or haze. The yellow colour was very distinct and it may have been significant that the sun was setting over mountains around the coast at the time. It was also noted that funnel fumes were forming into a yellow cloud about one nautical mile astern.

At 1720 an object was sighted seawards, this was shown on the radar screen to be a ship at a range of 12 n. mile.

The effects of abnormal refraction are shown in the sketch. All the images were very sharp and there was no shimmering effect, the effects persisted until each observed target came within seven nautical miles of the vessel. On two occasions the inverted image was observed before the true object.



Another interesting phenomenon was the observation of a distinct band of sea at the upper extremity of the yellow band, this, when examined through binoculars, showed wave detail and true colour. For a short time also a band of water was observed against a back-drop of land.

Weather conditions at the time were: dry bulb 17.1°C, wet bulb 14.8, sea temp. 15.2, barometric pressure 1010.1 mb, visibility 12 n. mile, wind SSW'ly, force 2. Altocumulus cloud was observed over the coastal mountains.

Position of ship: 36° 52'N, 1° 50'W.

## LUNAR ECLIPSE

### Indian Ocean

m.v. *Sugar Carrier*. Captain J. E. Leaver. Melbourne to Suez. Observers, the Master and ship's company.

24 March 1978. At 1520 GMT it was observed that three-quarters of the moon was in shadow whilst the whole was still visible; reference to the *Nautical Almanac* confirmed that a total eclipse was in progress. By 1535 the moon was in total shadow and appeared to be copper-coloured. Gradually the colour darkened to become a dull brownish red. Darker patches, thought to be shadows of the seas, were also observed. During the whole period of the eclipse the stars were very bright and the Milky Way was more clearly visible than usual.

Towards the end of the eclipse the moon regained its copper colour and, just before the lower limb came out of shadow, the colour brightened and seemed to take on a bluish tinge. The moon had finally passed through the earth's shadow by 1710.

Weather conditions at the time were as follows: dry bulb  $27.1^{\circ}\text{C}$ , wet bulb  $24.5$ , small amounts of cumulus and altocumulus, slight haze.

Position of ship:  $8^{\circ} 10'S$ ,  $70^{\circ} 22'E$ .

*Note.* The colouring of the moon when the eclipse is total is caused by the refraction of the sun's rays into the shadow by the earth's atmosphere. The rays most strongly refracted have passed through a large mass of air and so have lost their blue light.

## EARTHQUAKE

### Japanese waters

s.s. *City of Edinburgh*. Captain S. Murray. At anchor, Tokyo Container Terminal. Observers, the Master and ship's company.

7 March 1978. At 0256 GMT the vessel was rocked from side to side for a period of 10 to 15 seconds; the motion was gradual at first but increased in intensity before finally dying away.

On the following morning the local newspaper reported that an earthquake of fairly strong intensity had shaken wide areas in the districts of Kanto, Chubu and Tokuhu.

The focus of the earthquake was located at a point 300 kilometres below the sea in the Pacific. It was reported to have been a rare type of tremor which has its epicentre deep underground and occurs only once in several years.

Position of ship:  $35^{\circ} 45'N$ ,  $139^{\circ} 45'E$ .

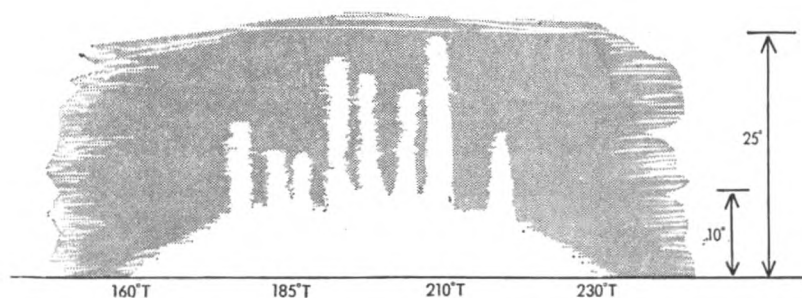
## AURORA AUSTRALIS

### Indian Ocean

m.v. *Piako*. Captain D. Foreman. Lyttelton (NZ) to Suez. Observers, the Master and ship's company.

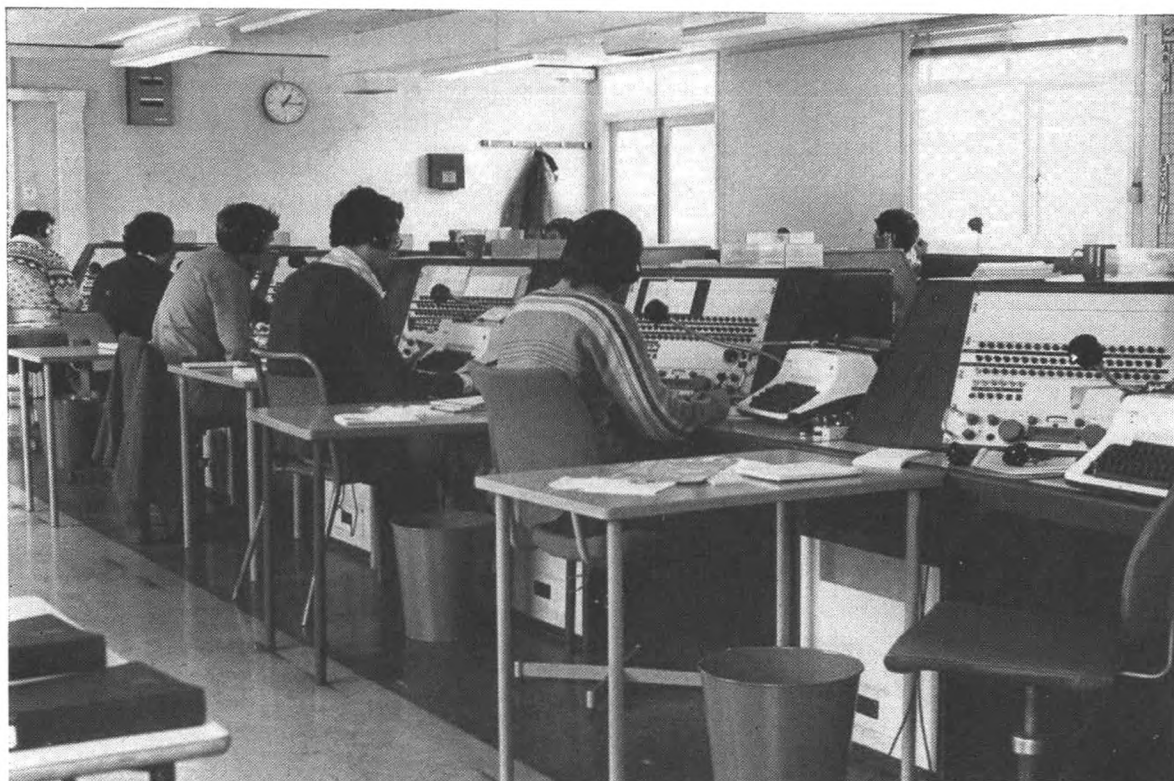
29 January 1978. At 1220 GMT Aurora Australis, weak to moderate in intensity, was observed for a period of about 10 minutes; the display occurred between  $160^{\circ}$  and  $230^{\circ}$  (T) with maximum activity between  $185^{\circ}$  and  $210^{\circ}$  (T).

The form was that of a rayed arc, see sketch, the rays extending to an elevation of  $25^{\circ}$ . The auroral glow emerged from the horizon with apex extending to an elevation of about  $10^{\circ}$ .



At 1230 the brightness quickly decreased in intensity leaving the glow which was observed until twilight the following morning.

Position of ship:  $43^{\circ} 23'S$ ,  $114^{\circ} 11'E$ .



Morse consoles at Portishead Radio



Radio-telephone consoles at Portishead Radio

*See page 27*

*Note.* The *Marine Observer's Handbook* states:

'Reports from ships are used in conjunction with reports from observers on land and in aircraft to compile full descriptions of all displays. These are required in connection with the study of many problems connected with long-distance radio communication and other practical matters. While auroral reports are required from all latitudes, observers who are familiar with auroral features can make a unique contribution to auroral studies by keeping watch for aurora in tropical regions.'

*Editor's Note.* The observation from the *City of Montreal* on page 66 of the April 1978 issue of *The Marine Observer* (Volume XLVIII, No. 260) was wrongly accredited to Captain A. J. Palmer, it should have read Captain A. A. Ramsden. The error is regretted.

# Current Uses of Satellite Data in a Meteorological Forecast Office

By RALPH K. ANDERSON

(Member of the Application Group, National Environmental Satellite Service USA)

Reproduced by kind permission of the Editor, WMO Bulletin

## Introduction

Over the past 15 years, the benefits of satellite technology have become available to meteorologists throughout the world. Today more than 800 receiving stations in over 74 countries take advantage of the Automatic Picture Transmission (APT) service provided by the polar-orbiting National Oceanic and Atmospheric Administration (NOAA) satellite of the USA and the METEOR satellites of the USSR. Additional information is available through weather facsimile (WEFAX) broadcasts from equator-orbiting geostationary satellites. Many forecasters can now view the evolution of storms directly at time intervals ranging from once every 12 hours to once every 15 minutes, depending on the satellite data available to them. In addition satellite winds, based on measurements of cloud motions and satellite vertical temperature profile measurements, are available on a routine basis for certain areas of the world. These data are derived at national and regional centres and exchanged on a world-wide basis.

Initially, satellite data improved synoptic-scale weather analysis in areas where reports were lacking. More recently, the frequent interval imagery from geostationary satellites is providing new data from which meteorologists can develop operational methods for forecasting short-term weather events in the mesoscale. Applications of geostationary imagery have thus far been restricted mainly to the USA where photographic quality half-hourly imagery is distributed to all weather service forecast offices via a national facsimile network. This type of data will soon be more universally available as other geostationary satellites become operational.

This article discusses current applications of satellite data relevant to some of the specific forecast problems faced in a forecast office. The degree of application is different depending on the type or combination of data available either through direct APT readout, WEFAX, landline facsimile or teleprinter messages. The following discussion deals primarily with the data and products of satellites currently operated by the USA.

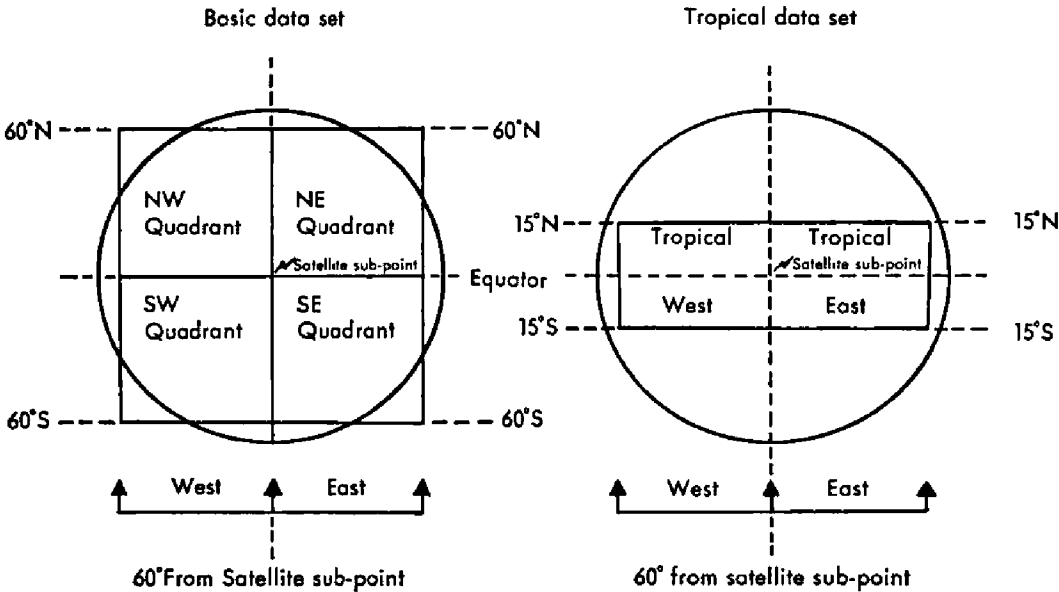
## Satellite data and derived products

Satellite imagery from the NOAA polar-orbiting satellites is broadcast continuously and can be received directly by the user. These images are available twice a day when the satellite is within range—in the morning around 0900 local sun time and again in the evening near 2100 local time. The imagery has a resolution of 4 km in the visible (0.52–0.73  $\mu\text{m}$ ) and 8 km in the infra-red (10.5–12.5  $\mu\text{m}$ ). WEFAX transmissions provide a second source of polar-orbiting data. Selected mosaics made from several passes of stored data give coverage of areas beyond the range of direct readout stations. The satellite data comprising these images are mapped by computer to polar stereographic or mercator projections. High Resolution Picture Transmissions (HRPT) can also be received from NOAA satellites. These data have a one-km resolution in both the visible and the infra-red spectral ranges.

Data from polar-orbiters are best suited to synoptic-scale analysis. Although the spatial resolution of the data is capable of defining mesoscale cloud systems, the 12-hour interval between pictures is much too large to follow the growth and decay of small circulations. Mesoscale weather systems which can evolve rapidly in a few hours are best observed and tracked with geostationary satellites.



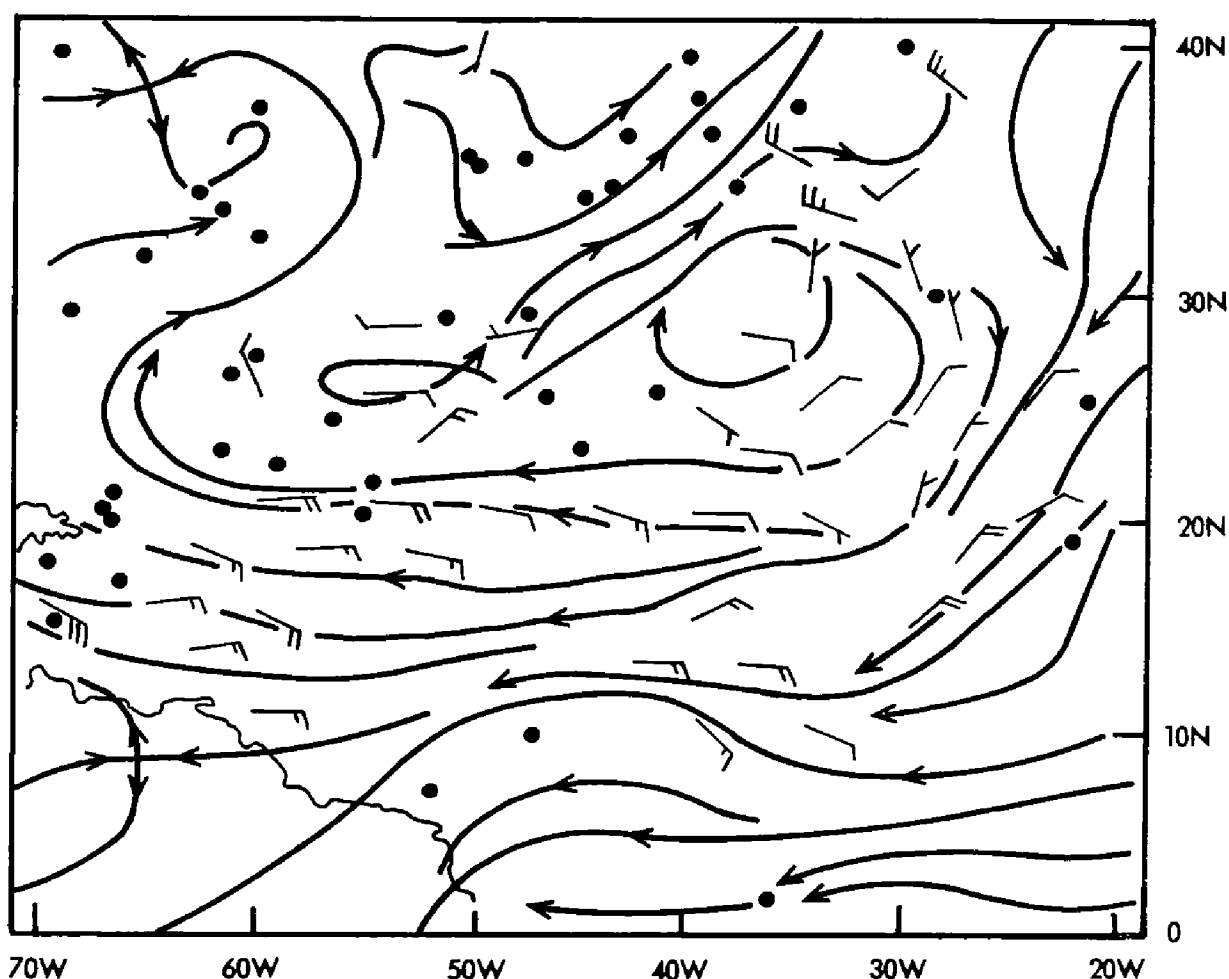
The Geostationary Operational Environmental Satellites (GOES) of the USA provide continuous half-hourly imagery on a 24-hour basis. The resolution of the data ranges from one km in the visible to 8 km in the infra-red. GOES satellites orbit the earth at an altitude of 35 000 km. Located at  $75^{\circ}\text{W}$  and  $135^{\circ}\text{W}$ , they view the same portion of the earth continuously to a distance of some  $70^{\circ}$  latitude in all directions from the subpoints of the satellite. Due to expense, direct readout of geostationary satellite data is limited to a few processing centres with large computer resources. In the USA, small sectors of the imagery are extracted and re-transmitted to forecast offices via landline photofacsimile. Sectors of the imagery are also broadcast on a three-hourly basis via WEFAX for reception through APT ground stations. Figure 1 illustrates the sectors of geostationary satellite imagery available by WEFAX transmission from GOES-east ( $75^{\circ}\text{W}$ ) and GOES-west ( $135^{\circ}\text{W}$ ). Infra-red quadrants are available for the most part at three-hour intervals on a 24-hour basis. Quadrants of corresponding visible data are also available during the day time. The tropical sectors are transmitted less frequently. The photograph opposite page 25 illustrates an example of a GOES-east, north-east quadrant WEFAX sector. This infra-red imagery for 1800 GMT 16 March 1977 depicts synoptic-scale cloud formations over the North Atlantic.



**Figure 1. Sectors of geostationary satellite imagery available by WEFAX transmission from GOES-east ( $75^{\circ}\text{W}$ ) and GOES-west ( $135^{\circ}\text{W}$ )**

Satellite measurements of the atmospheric vertical temperatures structure are made by the NOAA polar-orbiting satellites. These data can be received by direct sounder broadcast (DSB) and require sophisticated ground equipment for processing. Temperature profile data received and processed in the USA are disseminated by teleprinter message to the regional weather data distribution centres for re-transmission to the local users. The data are sent in two forms—clear radiances (SARAD) and thickness values (SATEM). These data are used primarily by those weather centres having computer analysis and forecasting facilities. The coverage of the data is world-wide over the ice-free portions of the oceans.

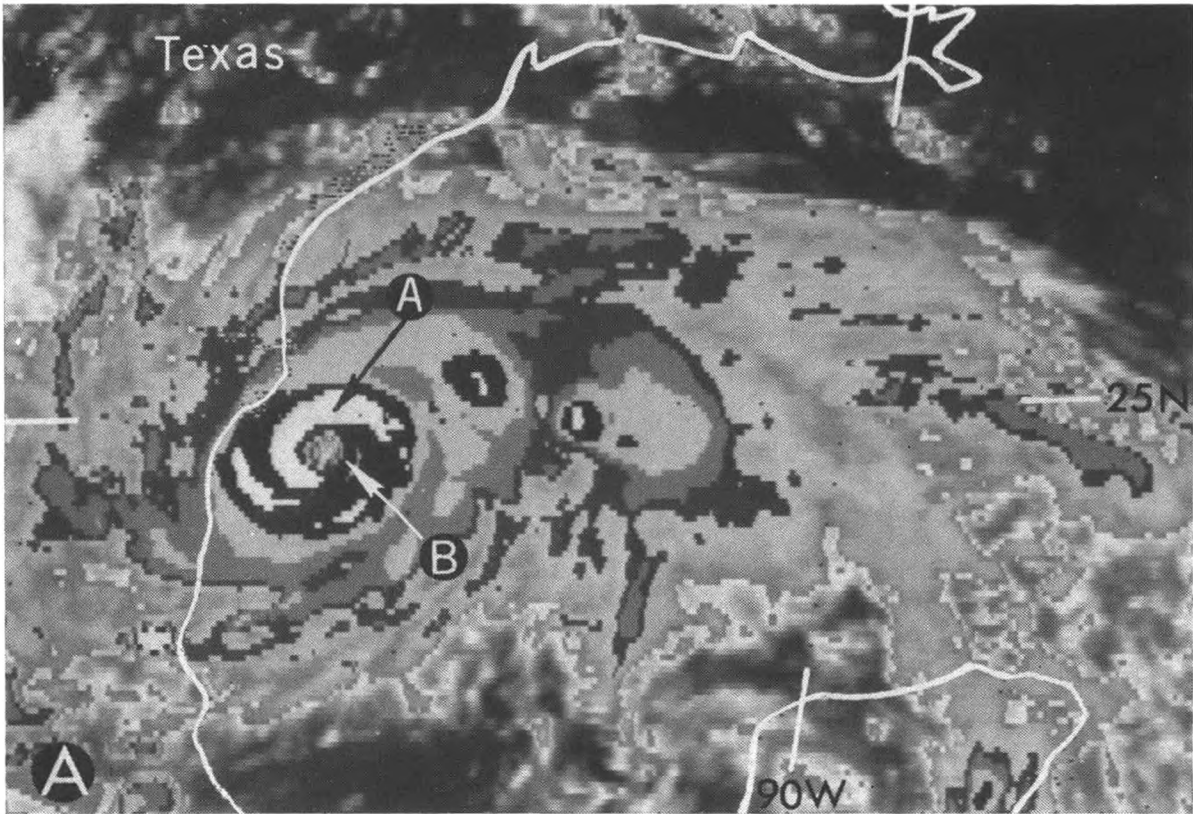
Satellite wind measurements, see Figures 2 and 3, are also available from the USA. The temperature of the cloud element used to compute an upper-level wind in Figure 3, and the height of the cloud element in millibars, based on the cloud temperature, are part of the SATWND message; these values are also shown in Figure 3. Some of the upper-level satellite winds obtained on this are for levels significantly above or below 250 mb. They have been plotted to show a complete sample but were not used in the analysis.



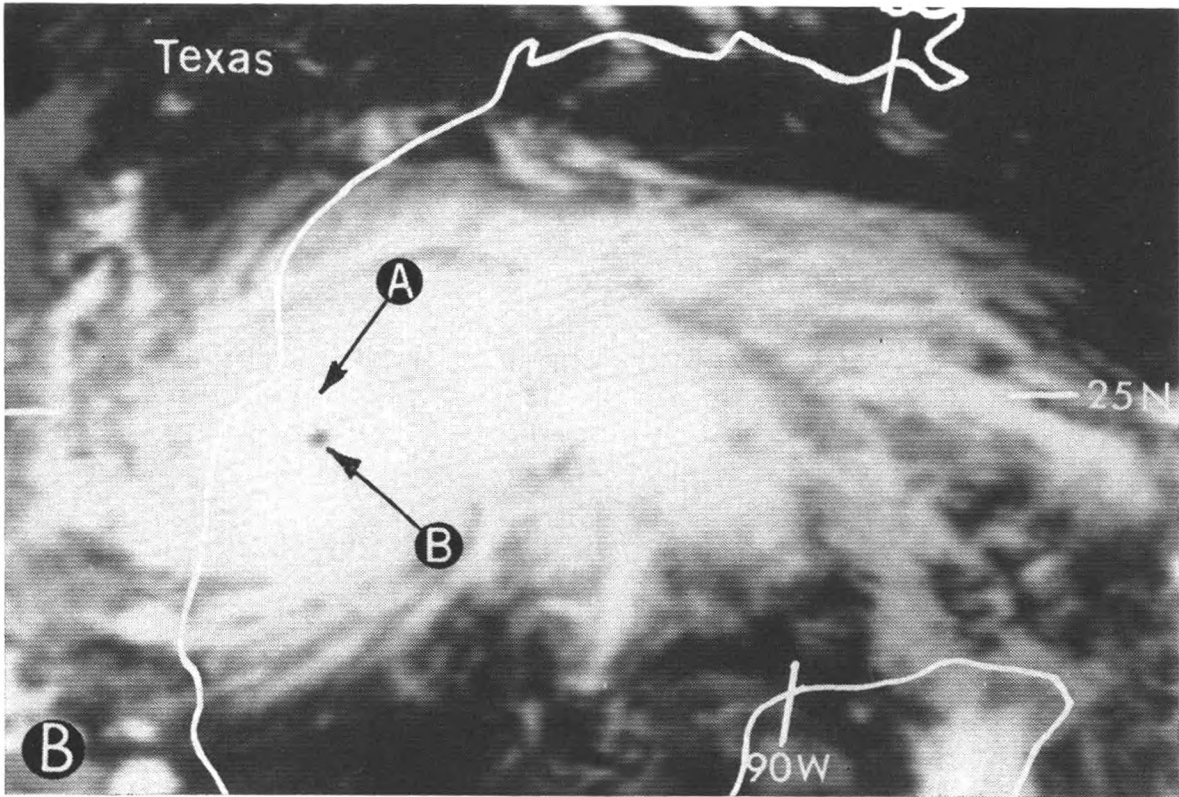
**Figure 2. Satellite winds for 1000 GMT 1 June 1977. An operational low-level streamline analysis made using satellite winds (plotted) and surface reports (not plotted but located by solid dots)**

Satellite wind measurements are based on cloud motions measured three times each day by using geostationary satellite images. The measurements are made between 30°W and 180°W and 45°S to 45°N using the infra-red data. Low-level satellite winds represent air motions near the 900-mb level. Upper-level satellite winds have an altitude assigned to them based on the equivalent black-body temperature of the cloud element being tracked.

Visible and infra-red imagery, radiances for temperature profiles and cloud motions are the basic satellite data now available to forecasters. We next review how this data is being used to solve day-to-day forecast problems.



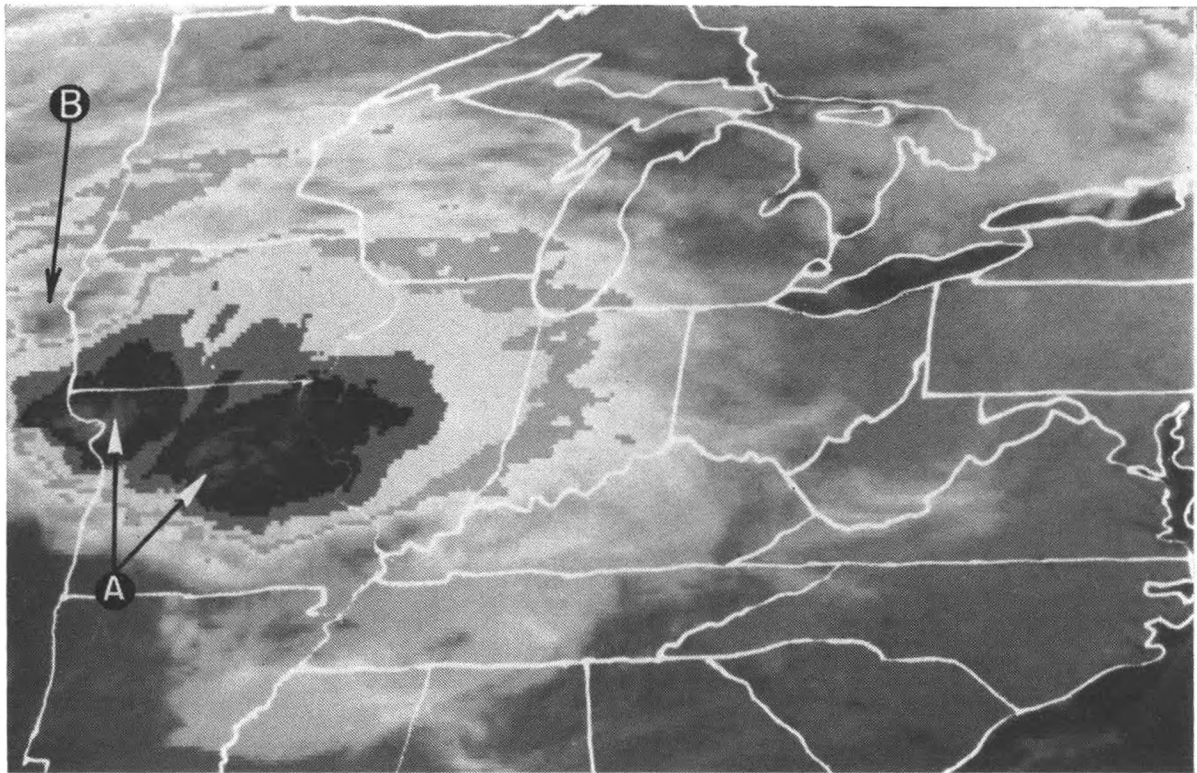
Hurricane Anita. GOES enhanced infra-red image for 0000 GMT 2 September 1977



Hurricane Anita. GOES unenhanced infra-red image for 0000 GMT 2 September 1977

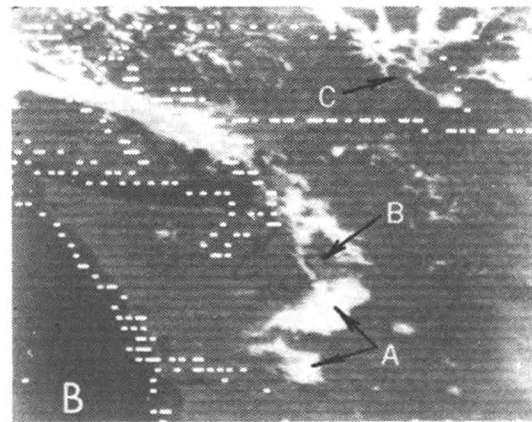
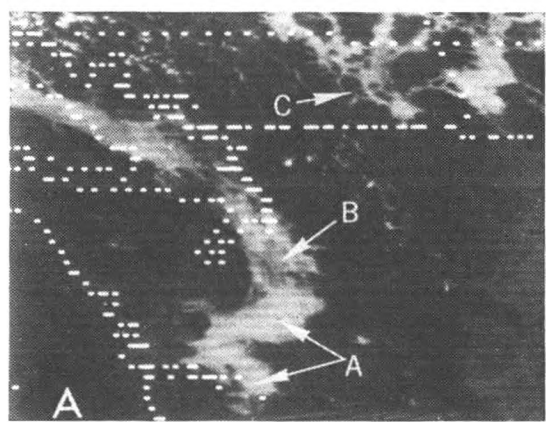
C\*

See page 30



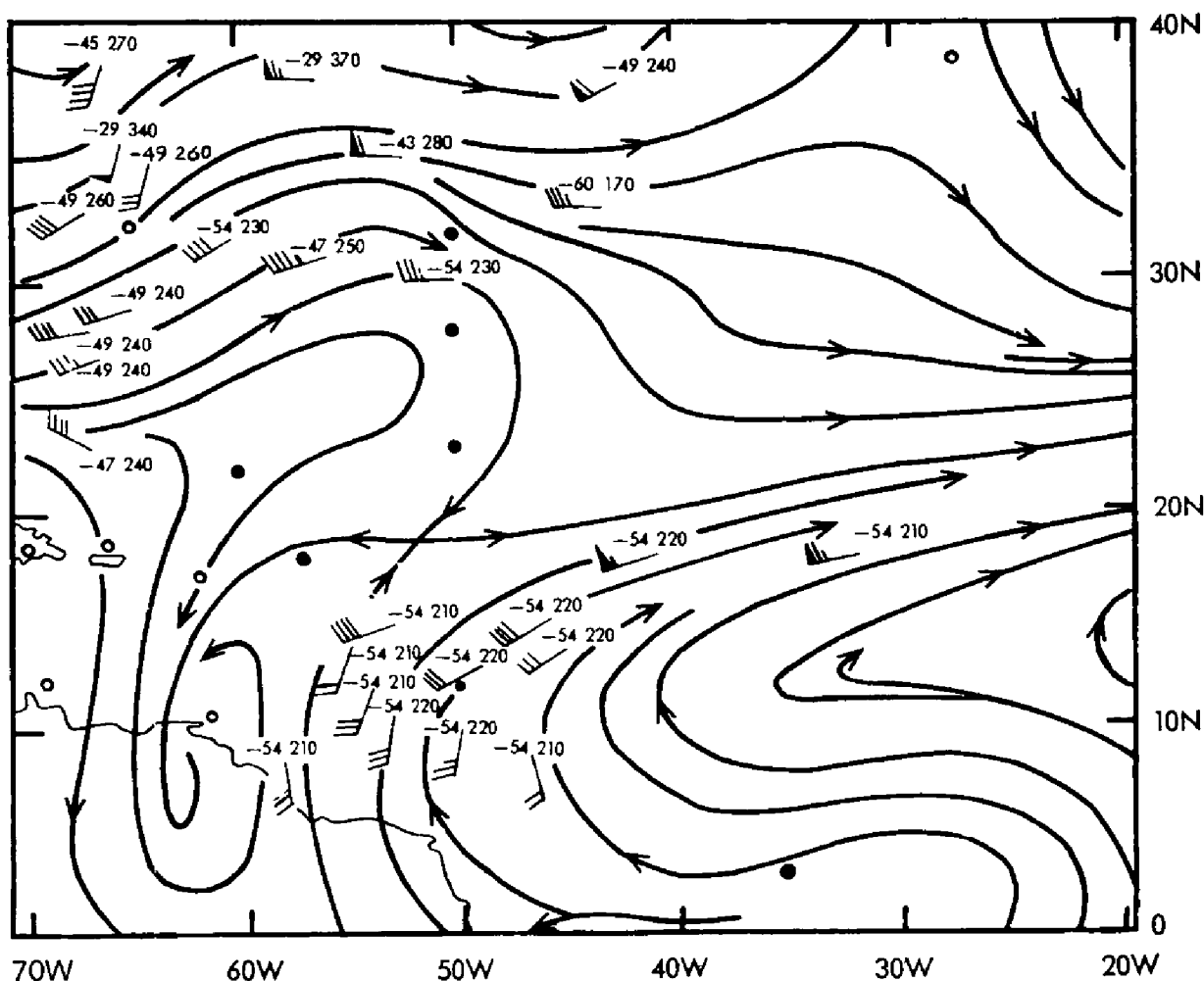
Clouds over the USA. GOES enhanced infra-red image for 1030 GMT 12 September 1977

See page 30



Stratus and fog over the north-western parts of the USA. GOES visible imagery for 7 October 1976. (A) Visible image for 0815 local time, (B) Visible image for 0945 local time

See page 31



**Figure 3. An operational 250-mb streamline analysis made using satellite winds (plotted), RAWIND data (not plotted but located by open circles) and aircraft reports (not plotted but located by solid dots)**

### Use of satellite data by forecasters

*Synoptic analysis*—satellite data can be applied to synoptic analysis indirectly through the analysis of clouds and cloud systems, or directly by using the quantitative height measurements derived from the sounder and the winds obtained from cloud motion.

Cloud imagery obtained from polar-orbiting satellites is used as routine to locate and track storms, both in the westerlies of the temperate zones and in the tropics. Assessments of frontal strength, storm intensity, surface wind direction, surface low positions, upper-air troughs and ridges, mid-tropospheric vorticity centres and relative atmospheric stability can all be made from cloud analysis. For example, in the photograph opposite page 25, the synoptic-scale features which can be identified include the subtropical jet (J-J<sup>1</sup>), an oceanic squall line (S-S<sup>1</sup>), a low-pressure centre (L), an active front (L-A) which becomes inactive (A-B) and the axes of two upper-level troughs (T) and (T<sup>1</sup>).

Continuous infra-red imagery from geostationary satellites makes it easier to identify and track rapidly moving vorticity maxima near the jet stream. These maxima in the upper atmosphere often produce weather changes but are difficult to identify and track with upper-air observations which are only made every 12 hours. Often they have associated clouds whose growth, dissipation, and deformation reveal ongoing changes in the upper-tropospheric vorticity field which can be used in diagnosis.

In the tropics, satellite observations are often the only ones available for analysis of storms. Classification techniques, developed for polar-orbiter visible data, allow daily estimates of a storm's maximum wind speed and an assessment as to its probable development. In the last several years a new classification system has been developed which uses enhanced infra-red imagery from geostationary satellites. Imagery of this type is contoured with different shades of grey in order to identify significant temperature ranges in the display. The photographs opposite page 28 show an enhanced and unenhanced infra-red view of hurricane Anita. The grey shade temperature assignments from coldest (convection indicated by (A)) to the warmest (periphery of picture) are as follows: white  $-75^{\circ}$  to  $-70^{\circ}\text{C}$ , black  $-69$  to  $-64$ , light grey  $-63$  to  $-54$ , medium grey  $-53$  to  $-42$ , dark grey  $-41$  to  $-30$ , first band of continuous grey shade  $-29$  to  $+3$ , second band of continuous grey shade  $+4$  to  $+23$ .

In the enhanced version the white band of cold cloud (A), which partially surrounds the warm eye (B), signifies a storm with winds of up to 130 knots. The evolution of the cold-cloud infra-red pattern near the storm centre is used to classify the storm's intensity. This new infra-red classification technique allows continuous 24-hour monitoring of tropical storm development by geostationary satellites.

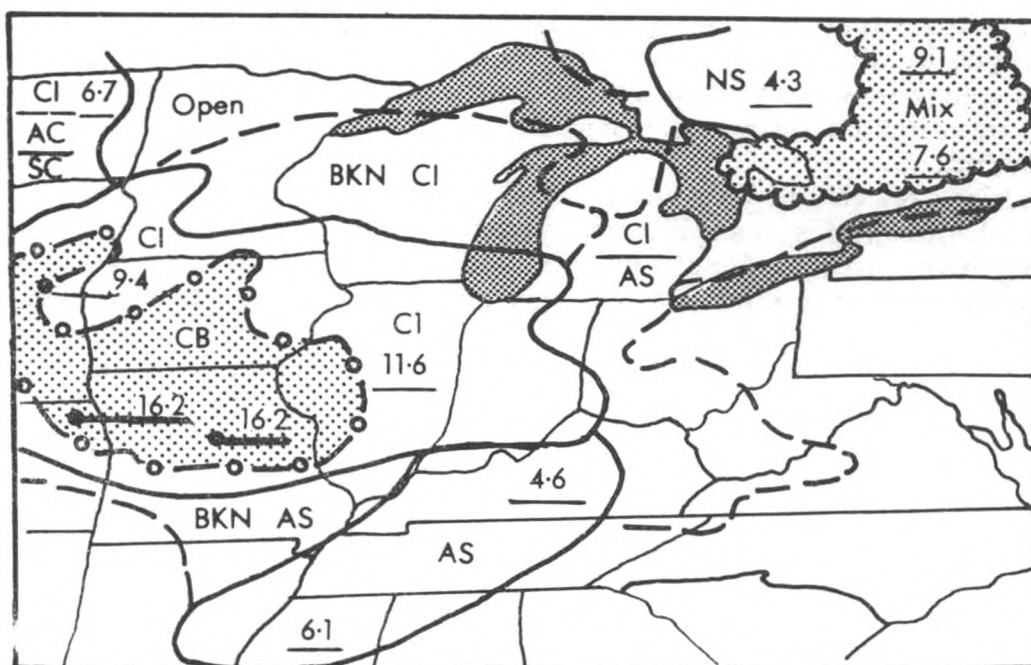
Quantitative satellite data help to define the large-scale tropospheric flow patterns for use in numerical weather analysis. Upper-level thermal gradients, revealed by sounder data, enable the polar jet streams, in both the northern and southern hemispheres, to be located more precisely. Satellite wind measurements provide data over the tropics and subtropics. Thus quantitative satellite data contribute to the improvement of the numerical forecasts using both hemispheric and global forecast models.

*Aviation services*—geostationary satellite data are best suited for applications to aviation meteorology since they show the growth and decay of mesoscale weather systems. Half-hourly interval data have proved to be an important new tool for updating terminal forecasts and preparing inflight weather advisories concerning clouds, thunderstorms, fog and stratus. Polar-orbiter imagery has been used for some time by forecasters dealing with oceanic flights to identify and forecast areas of significant weather and strong winds aloft.

Cloud heights can readily be obtained from infra-red cloud imagery. For accurate determination, the data must be calibrated and dealt with in digital form. Infra-red data give the equivalent black-body temperature of cloud-top surfaces. This information, plus knowledge of the atmosphere's temperature structure where the clouds are observed, allows one to compute the actual cloud-top height. The temperature structure is obtained from plotted radiosondes, upper-air analyses or forecasts. When dealing with cirrus clouds, it is necessary to use estimates of cirrus cloud transmissivity in order to obtain the proper cloud-top heights. Cloud-top computations can be made using infra-red data from either geostationary or polar-orbiting satellites. Figure 4 shows a nephanalysis plus cloud-top heights obtained from infra-red imagery. Maximum cloud-top values as well as average top values are shown. This is an example of an operational facsimile chart developed for aviation applications. In the Figure the cloud-tops are in kilometres. Values for maximum cloud-top are underlined and a solid dot locates the positions of the maximum tops. Other height values are average tops relating to the area where they appear. A dash-dot line surrounds cumulonimbus areas, a dashed boundary surrounds areas of broken clouds of mixed layers, a solid line surrounds a continuously overcast area and a scalloped line delineates overcast areas of mixed cloud type.

Enhanced infra-red imagery also gives quantitative cloud-top information. The upper photograph opposite page 29 is an enhanced infra-red image for the same time as the nephanalysis in Figure 4. In this photograph the grey shade temperature assignments from the coldest (centre of convection (A)) to the warmest areas are





**Figure 4. Nephanalysis and cloud-top chart over the USA and Canada for 1030 GMT 12 September 1977**

as follows: continuous grey tones (A) surrounded by black, less than  $-62^{\circ}\text{C}$ , black  $-62$  to  $-59$ , dark grey  $-58$  to  $-53$ , light grey  $-52$  to  $-42$ , medium grey  $-41$  to  $-32$ , continuous grey tones  $-31$  to  $+28$ . The photograph has a cold-cloud contouring similar to that used for hurricane analysis which was discussed previously. In this example, the lighter grey tones surrounded by black are the coldest tops. Points indicated by A and B correspond to the maximum top values given in Figure 4. Enhanced infra-red pictures help to identify areas of active thunderstorms. Such pictures are relatively easily produced and allow the forecaster to see important cloud topography at a glance.

Satellite imagery is currently being used to help make short-range (0-6 hours) forecasts of fog and stratus dissipation and formation. Early morning visible satellite pictures clearly reveal the extent and boundaries of the fog and stratus common to high-pressure régimes. Variations in brightness in the top of a fog or stratus layer give an indication of the relative thickness of the layer; the thickest portions appear the brightest. Studies of satellite pictures show that the darker areas dissipate first with the brightest lasting the longest. Usually fog areas shrink during day-time towards the centre or where the clouds are brightest and thickest.

An example of fog and stratus appears in the two lower photographs opposite page 29. Note that the brighter areas (A) on the earlier picture persist, but that the fog in the greyer area (B) has dissipated in an hour and a half. Note also that valley fog (C) in British Columbia can be easily identified. Fog and stratus analysis can be aided by enhancing the visible data with contoured shades of brightness. Such analysis is possible using visible imagery from either the polar-orbiting or geostationary satellites.

Careful analysis of infra-red geostationary satellite imagery during the evening can give some indication where advection fog or stratus will form later in the night. Moist oceanic air moving inland in the early evening will cause the land beneath it to appear darker than land under dryer air. This is because the land under the moist air cools at a slower rate. Later in the night, fog or stratus is most likely to form in the darker, moister areas which were detected by satellite earlier in the

evening. Thus, areas with a high probability of fog formation can be identified several hours before the event. The detection of such moist areas requires that the infra-red image be greatly enhanced in the temperature range of interest. Viewing the data in animated form makes it easier to detect a boundary of moist air as it moves inland.

Restrictions on visibility caused by dust and haze are also important to aviation interests. Blowing dust can be readily detected in visible imagery. Such dust originates in arid areas under strong wind conditions. It can produce restrictions on visibility both at the ground and aloft depending on the strength of the winds and the stability. Satellites reveal the boundaries of areas where low visibilities exist. Once the condition producing the dust has been diagnosed, forecasts of the persistence and trajectory of the dust can be made. Atmospheric haze and pollution also play a role in reducing inflight visibilities for aircraft. Haze and pollution are best detected by satellite visible sensors when the sun angle is low. Geostationary satellite views of areas near dawn or dusk are best suited for this purpose. Once identified, haze and pollution boundaries can be forecast using the expected changes in circulation and changes in stability.

Considerable information concerning thunderstorm gust fronts is available from both visible and infra-red geostationary satellite imagery. Visible pictures show cloud arcs which move away from thunderstorms. These arcs represent wind shift lines, regions of vertical wind shear near the ground and gust front lines. They can be identified and followed with half-hourly pictures. Knowledge of their presence and movement can provide valuable input to terminal forecasts in the 0 to 3-hour range.

*Severe weather warnings*—forecasters who have access to geostationary satellite imagery find it extremely useful in monitoring severe thunderstorms. The strong winds, tornadoes and flash floods which often accompany severe thunderstorms are produced by mesoscale circulations too small to be adequately defined by conventional surface reports. These circulations can be detected by means of satellite cloud analysis and then followed as their weather systems evolve. This allows forecasters to be more specific as to where a severe weather event is expected and, in many cases, an early warning can be issued. Even large-scale storms, such as hurricanes, can be better forecast using frequent-interval satellite surveillance. Rapid deepening of these storms, or changes in their course, can have a big effect on coastal weather, both as to wind strength and location.

When tornadoes are expected in the USA, the GOES-east satellite is operated so as to provide 15-minute interval pictures for the National Severe Storm Centre. These pictures are electronically animated and used to pin-point the locations where tornadoes are most likely to occur. One-km visible data are used to follow cloud lines as they grow and merge to produce severe weather. Enhanced infra-red imagery, such as shown in the photograph opposite page 29, is also animated in real-time for use in the forecast process.

Potential flash-flood situations are evaluated by analysing imagery for slow-moving persistent thunderstorms. Once such a storm is identified, it is possible to compute half-hourly quantitative rainfall estimates on a point-by-point basis. This can be done by using a recently developed technique which relies on empirical relationships between rainfall amount, infra-red cloud-top temperature, cloud growth and cloud mergers. (The photograph opposite page 29 shows the type of infra-red imagery used for this analysis). This application is still being developed and tested. It promises to be a valuable tool where surface reports are sparse, non-existent or slow to be received. Although the technique was developed for summer convective rainfall over the USA, it should be adaptable to other areas.

*Applications to agriculture*—current satellite applications to agriculture include rainfall estimates and ground-temperature measurements for frost warnings. New applications are also being developed in areas such as forest management.

A number of rainfall-estimating procedures are available which empirically relate satellite-viewed clouds to quantitative rainfall amounts. The most successful schemes deal with convective rainfall in the tropics and subtropics. Rough estimates for periods of 24 hour or longer are possible from twice daily polar-orbiter imagery. More-accurate estimates are possible by using continuous geostationary imagery and applying the enhanced infra-red technique previously discussed in connexion with flash-flood warnings. Satellite rainfall estimates are important in areas where few raingauge measurements are available and information is needed for crop predictions and water-resource planning.

Geostationary satellites make it possible to monitor ground-temperature changes in agricultural areas. Satellites show the areas affected by freezing temperature and the duration of freezing conditions. Specially enhanced infra-red imagery or computer analysis of digital data is used for this application.

Satellites can also play a role in forest management. Forest fires of significant size can be detected in remote areas by their smoke plumes. Smoke is best detected in visible data. Analysis of cloud conditions near fires is often helpful to the weather forecasters involved with forecasting conditions in the vicinity of fires. Knowledge of convective cloud conditions in the vicinity of the fire can be applied to short-range forecasts of local wind conditions.

Agricultural applications of satellite data are all relatively new within the last few years. As time goes on, there should be more development and impact in this area.

*Marine forecasts*—satellite inputs to marine weather forecasts include the location and intensity of major ocean storms, sea-surface temperatures and some information on the state of the sea. All types of satellite data are applicable to marine problems. Marine storms can be located and tracked adequately with polar-orbiter imagery. Geostationary imagery is useful to monitor rapidly deepening storms and to obtain mesoscale wind and weather information to use in making short-range coastal zone forecasts. Such forecasts have become increasingly important for off-shore drilling activities.

Sea-surface temperatures change slowly and can be adequately monitored with polar-orbiting satellite infra-red imagery. Knowledge of ocean-surface temperatures can be used in preparing forecasts of sea fog or convective cloud distribution, depending on the expected wind flow. Satellites show the precise location of strong sea-surface gradients which define the edges of ocean currents. Knowledge of current boundaries combined with wind forecasts can be applied to ship routing programs.

The photograph opposite page 36 shows the eddy pattern caused by the interaction of the Falkland current and the Brazil current east of Argentina. The sharp eastern boundary of the northward-moving cold Falkland current is clearly depicted in this Very High Resolution Radiometer (VHRR) image. The effect of sea temperatures on local cloud formation is seen at U where cold air is moving across a warm portion of the Brazil current to produce cumulus clouds. Other small-scale sea-surface temperature variations in this picture, which could affect local cloudiness, are the warm waters of the Rio de la Plata (R) and the warm and cold eddies at the current interface.

*Snow and ice mapping*—snow and ice boundaries often affect temperature and cloud forecasts. Snow and ice analysis is best done with VHRR data. The upper photograph opposite page 37 shows an ice boundary in the Davis Strait west of Greenland. Arrows indicate the ice edge. In this case, lines of cumulus clouds are observed to form downwind from the boundary as cold air moves over warmer water. Similar cloud effects are observed over land downwind from snow boundaries. Knowledge of snow cover also helps in local temperature and fog forecasting.

## **The use of satellite imagery for training**

Satellite imagery is an invaluable aid for training forecast personnel. This is especially true of geostationary satellite pictures when they are viewed in motion. Such films show the evolution of the cloud systems produced by synoptic-scale circulations as they move through their life cycle. Forecasters can directly compare cloud evolution to corresponding changes in circulation as they are depicted on the surface and upper-level analyses. For many years, meteorologists have applied the frontal models developed by the Norwegian School to analyse the cloud and weather in temperate latitudes and to produce forecasts. These models were deduced from surface observations and limited numbers of upper-air reports. The Norwegian frontal model is highly idealized and, more often than not, provides an inadequate description of the clouds and weather in a given storm situation. Satellite imagery provides the basis for new models based, not on static observations, but on observing cloud systems in continuous motion. Forecasters who study satellite film of storm evolution soon become adept at combining their knowledge of cloud pattern evolution with forecast flow patterns and are able to produce better forecasts of clouds and weather.

Mesoscale weather systems are responsible for much of the weather which forecasters must predict. The current networks of surface and upper-air observations do not resolve mesoscale weather systems. Because stations are too far apart and observations are taken too infrequently, mesoscale weather systems are presently only imperfectly understood. Satellites provide direct observations for developing better models of mesoscale weather events. These, in turn, will provide the basis for better short-range forecasts. The importance of convective lines and their interaction was little understood in the production of severe weather before these were studied by means of satellite imagery.

Satellites also show how land- and sea-breeze régimes along oceans and lakes play a key role in local weather.

The lower photograph opposite page 37 shows a land-to-sea-breeze régime along the African coast. In this morning view, the line of convection (R) and (S) marks the convergence zone of the night-time land breeze and offshore low-level south-westerly flow. A marked clear zone (T) results from subsidence along the coastline. Films of the diurnal behaviour of convective lines such as this one enable forecasters to understand more fully the effects of local circulations and to account for these effects in their forecasts of local weather. Animated satellite data can prove extremely effective in meteorological training.

## **Conclusion**

In this article we have summarized the various types of satellite data that are available to forecasters around the world. The most common data available is that from the APT direct readout system of polar-orbiting satellites. Countries with a larger investment in ground receiving equipment are able to copy the VHRR data from the High Resolution Picture Transmission system as well as some of the direct readout sounding data from the NOAA satellites. At present, only a small number of countries are able to receive data directly from the geostationary satellites and distribute these data to their forecasting services at frequent intervals. WEFAX transmissions, however, do provide access to geostationary imagery on a limited basis. The main advances in forecasting application in the last five years have come through study of the geostationary frequent-interval satellite data. These have led to useful applications in the United States to synoptic analysis, aviation, marine, severe weather and other types of forecasting activity. In the near future, these types of applications will be possible from the geostationary satellites of Japan and Europe. It is hoped that, as technology improves, the benefits and applications of the geostationary satellite observing systems can be made available to more and more

countries in the world. Until this is possible, the data from these satellites can be used for training meteorologists of many countries so that they can gain a better insight and have more understanding of the weather systems that are peculiar to their parts of the world.

## Portishead Radio

By D. MULHOLLAND  
(Officer in charge)

Readers of this journal are probably familiar with the Atlantic Weather Bulletins put out by the Post Office's long-range station, Portishead Radio, and if they have worked on one of the Voluntary Observing Ships, they may have forwarded weather messages to this station. But meteorology is only one of the concerns of Portishead Radio, the busiest maritime radio station in the world, communicating with ships in every part of the globe.

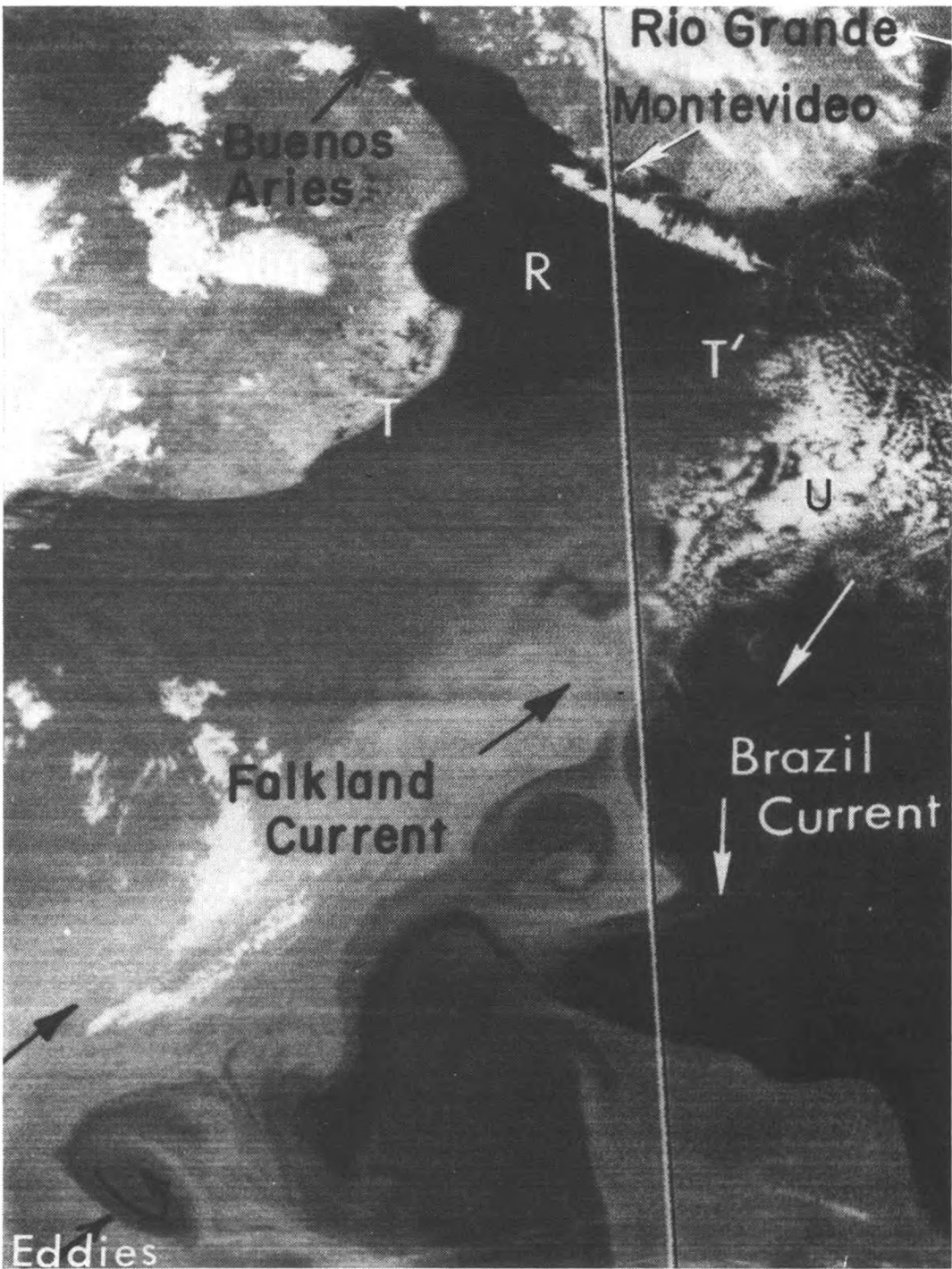
The complex known as Portishead Radio takes its name from the town—near Bristol—where the original transmitters were situated. There are now 50 transmitters spread across the country at Dorchester in Dorset, Leafield in Oxfordshire, Ongar in Essex and Rugby in Warwickshire. The transmitters are controlled and operated from the centre near Burnham-on-Sea in Somerset. Reception, on directional aerial systems, uses 82 receivers at Somerton and Burnham-on-Sea.

Some idea of the traffic passing through the station can be gauged from the traffic totals for the last year: there were 22 450 739 paid words in the radio-telegram service, 729 461 paid minutes of radio-telephone calls and 204 248 paid minutes of radio-telex calls; in addition 116 free medical cases were handled. This level of activity required a team of 220 radio officers who, with management and support staff, bring the complement to 250.

The story of Portishead Radio goes back 58 years to the period when wavelengths measured in thousands of metres were the rule for long-distance communications, and to when Marconi and Franklin were experimenting with radio-telephone links to Australia. In 1920, only five years after the first radio-telephone message had bridged the Atlantic, the Post Office established a long-wave station at Devizes in Wiltshire designed to provide two-way communication in the 110–160 kilohertz band at ranges up to 2000 miles. Another station using longer wavelengths and higher masts was built at Rugby to provide one-way communication with ships. Devizes proved to be inadequate and was closed after five years and its functions were taken over by a new complex with receivers and control near Burnham-on-Sea and transmitters at Portishead; this system concentrated chiefly on the passenger-liner trade in the Atlantic. Meanwhile, in 1926, taking note of the Marconi and Franklin short-wave experiments, the Post Office inaugurated a successful trial involving the Burnham/Portishead stations communicating with the liners *Carinthia* and *Olympic* through one transmitter and receiver in the short-wave bands. This was the start of maritime short-wave two-way communications world-wide. Marconi and Franklin went on to pioneer the 'beam system'—a short-wave communication system between Empire Governments, using directional aerials, so that a point-to-point service on short waves was developed at the same time as the maritime short-wave service.

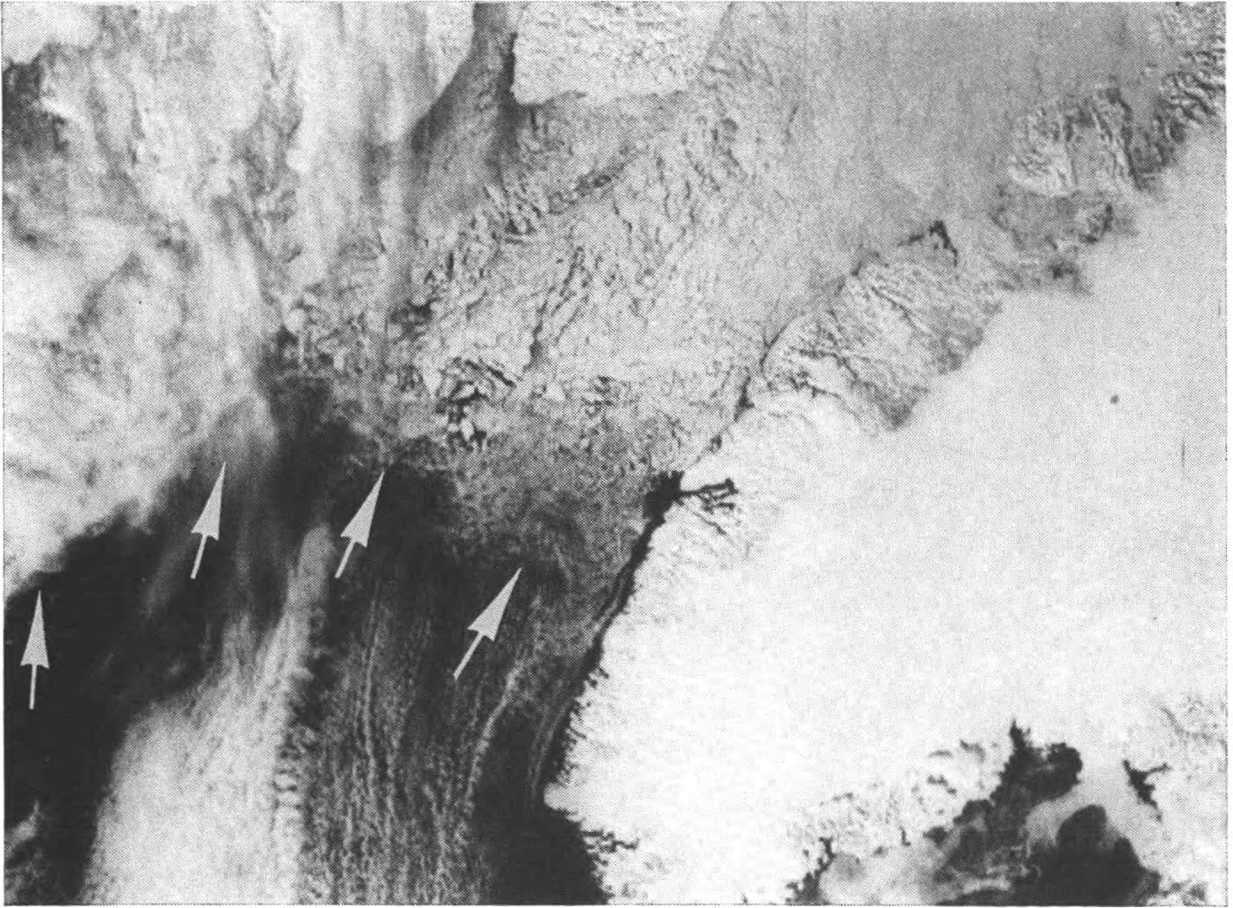
By 1939 Portishead Radio had 15 receivers and 6 transmitters in use and handled 3½ million paid words of radio-telegrams. With the outbreak of war, commercial working ceased. News such as the North Africa landings and the sinking of the *Scharnhorst*, distress calls and enemy reports kept the station busy until the post-war period brought with it an increased demand for world-wide commercial radio communication—with particular emphasis on morse. Radio stations in the British Commonwealth agreed to participate in a world-wide link-up with each station responsible for working with ships in its own area and with the Royal Navy providing a link between land stations. This system, which catered for British ships only, avoided the need for extremely long-distance communications between ship and shore; ships were able to receive messages from Britain—and transmit to Britain—through their own local Commonwealth stations. Portishead Radio acted





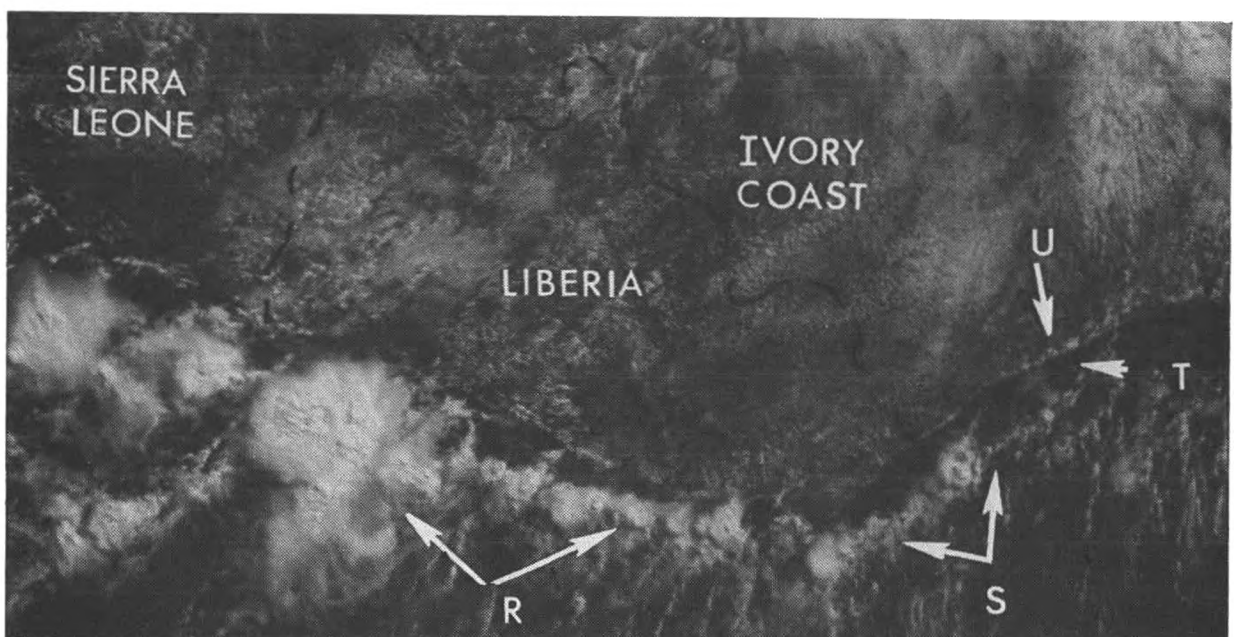
Sea-surface temperature pattern in western South Atlantic NOAA VHRR infra-red image for 31 October 1975

See page 33



Ice in the Davis Strait. NOAA VHRR visible image for 30 March 1976

*See page 33*



Land breeze convection along the African coast. NOAA VHRR visible image for 13 July 1973

*See page 34*

as co-ordinator, maintaining a vast file index on the movements of all British ships, so that messages for them could be routed to the appropriate station. At this time (1948) Portishead Radio had 38 positions for operating world-wide in the 4 to 22 megahertz bands (short-wave) and 4 positions for operating in the long-wave band (110 to 160 kilohertz). But, by 1957 the demand for long-wave working had ceased; the equipment was replaced by short-wave apparatus and all communications with ships was by morse.

At this point changes in land-line communications were taking place and these had considerable influence on the development of maritime systems; previously, messages to ships had passed by way of local Post Offices to the coastal stations, while other countries were accessible through the London Central Telegraph Office. The introduction at Portishead of teleprinters working directly into this Central Telegraph Office (through which all messages were routed) made it possible to speed up communications between the ship at sea and the sender/receiver on shore. Development of the telex system through which private subscribers were able to dial and deliver their own messages also affected traffic to Portishead Radio. Today the system deals directly with the individual subscribers and maintains private circuits for those who are prepared to pay extra. One such customer is the Meteorological Office which uses it for the exchange of meteorological observations, weather routing messages and weather bulletins.

The 1970s saw other changes in the role of Portishead Radio. The transfer of long-range maritime radio-telephone services in 1970 to the station was well received, so much so that additional receivers and transmitters had to be provided. In 1971 the abandonment of the Commonwealth morse link-up had a further impact. Installing more-powerful equipment, ships reverted to direct communication with Portishead Radio, whilst, for communication with the North Pacific, a special system using high-power equipment and directional aerials was introduced. The latter was so successful that the method was later extended to other parts of the world.

In the 1960s communication by radio-telex had been confined mainly to contract rather than to public service, but Dutch equipment, accepted as the world standard specification, enabled Portishead Radio to introduce any telex subscriber and now the station's role may be compared to a telephone exchange operator who connects one subscriber with another. The service has been developed on a semi-automatic basis and its success indicates that it may be possible to introduce automatic subscriber through dialling in the future. At present, however, it is possible to set up a circuit between the ship and Portishead Radio by automatic means and then to connect in the landline subscriber on his telex machine. A similar system of machine telegraphy can produce automatically a daily newspaper on board ship. Eventually radio-telex may replace morse because it is faster and more accurate.

Portishead Radio offers a variety of services. The cheapest of these services is the Ship Letter Telegram in which messages are transmitted to the coast station from the ship and then delivered by post; it is particularly popular for agency services such as Interflora, Kays Mail Order and Vernons Football Pools. A radio-telegram is the most commonly used form of written communication and operates with speed in both directions. Radio-telex also provides written communication by connecting two parties by teleprinter. An alternative to these systems is the radio-telephone which enables shore subscribers to be connected with ships.

In addition to these basic services there are broadcasts to ships—weather bulletins, navigational warnings and distress messages are examples of such broadcasts. A free medical service using radio-telegram or radio-telephone allows ships to obtain advice from the Royal Naval Hospital in Plymouth, whilst assistance cases may require the involvement of the Coastguard or Air-Sea Rescue Service or a broadcast to other ships with doctors on board. A facsimile service makes possible the transmission of pictures and documents—pictures taken at sea during the 'Cod War' were passed to the news media by this means.

The method of alerting ships to the presence of traffic at the coast station depends to some extent upon the equipment available on board a ship. The main system is a traffic list, sent by morse or radio-telephone, which includes the call signs of ships for whom there are messages or radio-telephone calls. 'Selective calling' can alert a suitably equipped ship by automatic means and permits the visual display of the calling coast station on board. Ships fitted with radio-telex can be contacted automatically and a two-way circuit is established at the time.

Plans are envisaged for considerable expansion over the next few years and the new station, already in the course of construction near Burnham-on-Sea, is evidence of confidence in the growth of the high-frequency service. This paper has traced Portishead Radio's development over 50 years of communication, today the station finds itself at the beginning of a new era—one dominated by maritime satellite communication—which, in the course of time will, no doubt, cause the popularity of the high-frequency medium to decline. The next 50 years may see changes as great as, if not greater than, those seen by the early pioneers who extended our awareness of the possibilities of radio communication.

### SPECIAL LONG-SERVICE AWARDS

Following the practice commenced in 1948 the Director-General of the Meteorological Office has made four Special Long-service Awards each year to officers whose services to the Meteorological Office have been particularly outstanding over a prolonged period.

All officers who have provided us with meteorological records in 15 or more years and who have contributed at least one meteorological logbook in the current award year are considered for the selection of the Special Awards. Personal cards are scrutinized and length of service combined with the number and quality of the records determines the order of placings. The period considered for the following awards is taken up to the end of the year 1977 and from our records the Director-General is pleased to select the following shipmasters:

1. Captain J. D. Hellings, ex-P. & O. Lines, whose first meteorological logbook was received here in 1949 from s.s. *Devon* (Federal Steam Navigation Company), has provided us with a total of 41 meteorological logbooks during his 23 years of voluntary observing.

2. Captain N. W. Cockshoot of Manchester Liners Limited sent us his first meteorological logbook in 1949 from s.s. *Manchester Trader* and has provided us with 71 meteorological logbooks during his 28 years of voluntary observing.

3. Captain J. H. Hutson of Container Fleets Limited sent us his first meteorological logbook in 1957 from m.v. *Middlesex* (Federal Steam Navigation Company). During his 18 years of voluntary observing Captain Hutson has provided us with 34 meteorological logbooks.

4. Captain V. A. Hunt, Port Line Limited, sent his first meteorological logbook in 1948 from m.v. *Port Macquarie*. During his 20 years of voluntary observing Captain Hunt has provided us with 37 meteorological logbooks.

As usual, the awards will be in the form of appropriately inscribed barographs and we congratulate these four shipmasters on this recognition of many years of outstanding voluntary observing at sea.

The masters will be notified of the awards and of the arrangements to be made for their presentation.

J. D. B.

# AURORA NOTES JANUARY TO MARCH 1978

By R. J. LIVESEY

(Co-ordinator of Auroral Observing, the Solar Section of the British Astronomical Association)

There has been a marked drop in the number of ships reporting auroral activity as the following table shows:

Period, January to March	..	1976	1977	1978
No. of ships reporting	..	11	5	5
No. of marine aurora nights	..	24	13	9
Total aurora nights, all sources	..	36	29	22(1)

(1) Aurora reported from all land and marine sources. Data for 1978 as yet incomplete.

Details of the marine aurora observed in the period under review are given in the table at the end of these notes.

The event of 10 January appeared as a quiet visual display in Scotland accompanied by radio echoes from the activated ionosphere. Lerwick Observatory reported magnetic storms on 3 and 8 January and 9 February. The auroral event of 9 March was also seen as a quiet event widely reported throughout Great Britain and accompanied by a magnetic storm at Lerwick. Similar conditions occurred on 13 March. The event of 9 March was preceded by a solar flare on the 6th reported by members of the British Astronomical Association. This is the time for electrically charged particles to travel from the sun to the earth to generate the aurora.

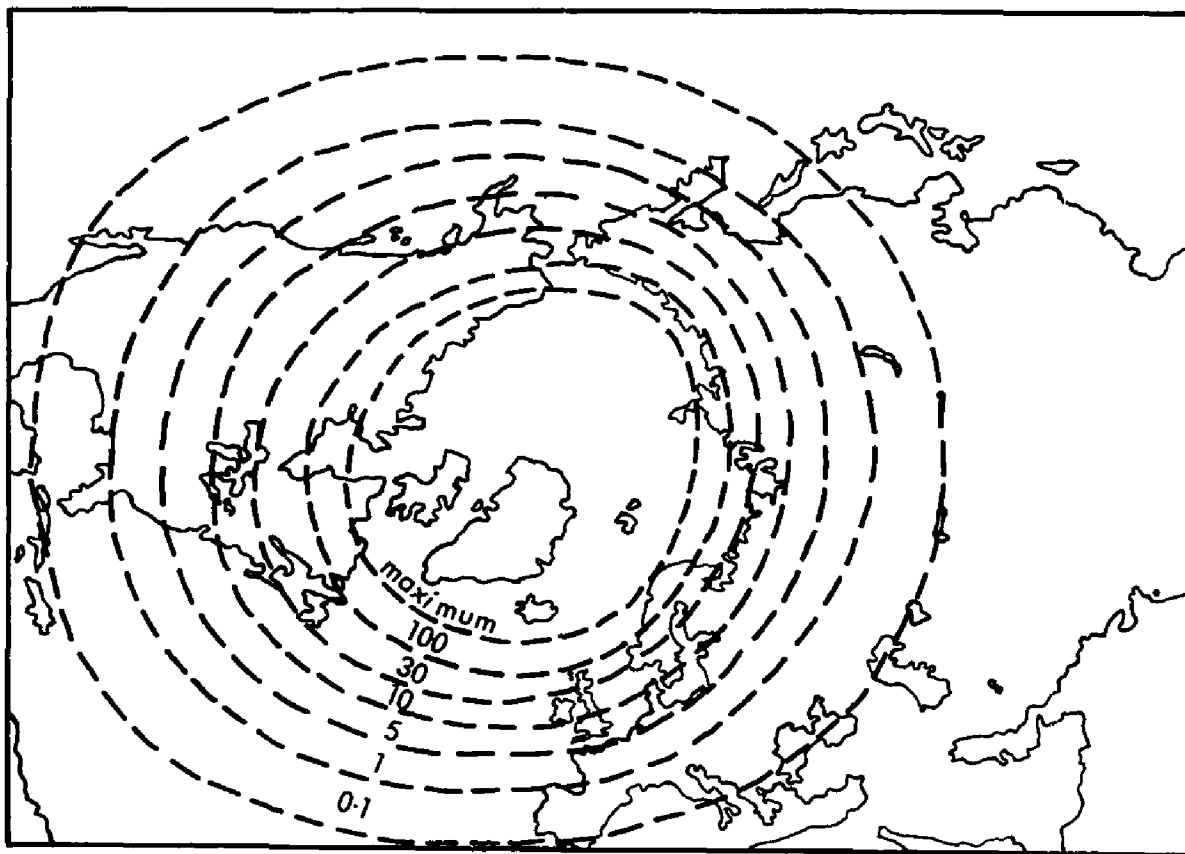
The event of 15 March correlated with radio reflections from the ionosphere observed at Aberdeen. A solar flare on 18 March probably caused the all-sky aurora reported on the 20th. Lerwick noted a magnetic storm on the 26th. The aurora reported on 28 March appeared as one of a series of recurrent aurora traceable between January and July 1978.

The event of 29 January observed in the Southern Hemisphere is valuable in the study of northern events as aurora takes place simultaneously in both hemispheres.

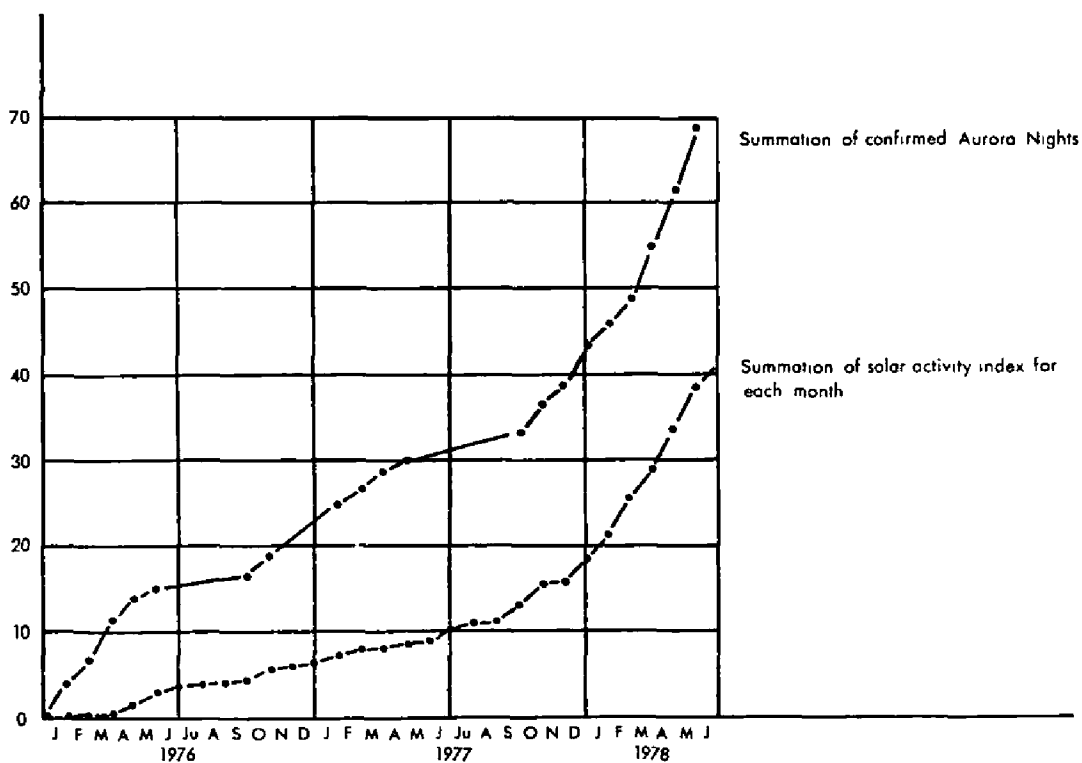
It will be noted that m.v. *Miranda* made several reports of aurora during the course of one voyage round the North Cape within the zone of maximum auroral occurrence. In years of minimum auroral activity, this tends to remain polewards within the auroral zone where it is of nightly occurrence. Disturbances of the earth's magnetic field and atmosphere by particle streams, ejected from increasing numbers of active solar areas as the sunspot cycle develops, will cause the aurora more frequently to spread equatorwards thus leading to more storms in lower latitudes. The average number of nights per annum in which aurora may be detected in the Northern Hemisphere are plotted on the accompanying Modified Fritz Diagram. The number of auroral storms visible at a variety of geomagnetic latitudes in north-west Europe in 1977 are given in the following table:

Geomagnetic latitude	..	60	59	58	57	56	55
No. of aurora nights	..	61	60	40	11	4	3

To show that auroral activity is rising with increased solar activity the accompanying graph of the two integrated activities has been prepared. The auroral curve represents the addition of the number of nights upon which two or more observers reported active displays or three or more observers reported quiet activity, the latter being designed to ensure that doubtful sky illumination is not due to other causes. The solar curve represents the addition of the monthly solar active sunspot area numbers derived from continuous daily observations of the sun at Glasgow made by the writer. The similar shape of the two curves is indicative of common changes in frequency.



**Modified Fritz Diagram. Isochasms, or lines joining locations having equal frequency of visible aurora. Numbers give nights per annum**



**Comparison of solar and auroral activity in north-west Europe**



The contribution of observations by the Voluntary Observing Fleet is gratefully acknowledged, the data is used in the over-all analysis. Apologies are made in advance for any observation which has been omitted from this report and which may not have reached the writer in time for its inclusion.

DATE 1978	SHIP	GEOGRAPHIC POSITION	TIME (GMT)	FORMS
7 Jan.	<i>Speciality</i>	58° 40'N 03° 20'W	1900	N
10	<i>C. P. Voyageur</i>	46° 24'N 44° 17'W	0130-0215	G. AmR, QR, G
28-29	<i>Admiral FitzRoy</i>	56° 35'N 16° 40'W	2248-0025	QG
29	<i>Piako</i>	43° 23'S 114° 11'E	1220-1230	QG, AmR
9 Mar.	<i>C. P. Voyageur</i>	47°N 71°W	0200-0300	QA, RdA
13	<i>Miranda</i>	68° 24'N 11° 42'E	1750-1830	QN
15	<i>Miranda</i>	67° 48'N 11° 03'E	1800-2100	AmN
20	<i>Miranda</i>	70° 48'N 20° 48'E	2000-2300	AmRdA, As
28	<i>Miranda</i>	71° 18'N 26° 54'E	1850-2300	AmR

KEY: Am=actively moving, Q=quiet, N=Auroral light form unspecified, A=arc, R=ray, Rd=rayed, G=glow, As=All sky activity.

### Marine Aurora Observations January–March 1978

## ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM JULY TO SEPTEMBER 1978

The charts on pages 43 to 45 display the actual and normal ice edges (4/10 cover), sea-surface and air temperatures and surface-pressure anomalies (departures from the mean) so that the abnormality of any month may be readily observed. (The wind anomaly bears the same relationship to lines of equal pressure anomaly as wind does to isobars. Buys Ballot's law can therefore be applied to determine the direction of the wind anomaly). Southern and eastern icebergs 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).

### JULY

Pressure was higher than normal east of Greenland but near normal in other areas. In the Labrador Sea and Davis Strait this pattern gave an anomaly for south-easterly winds replacing that for colder westerlies which had prevailed during June; as a result there was a rapid clearance of ice so that the excess of the previous month became a deficit by the end of July. However, the cold weather persisted further west and north with ice generally slow to clear in Hudson Bay, amongst the Canadian Arctic Archipelago and in Baffin Bay. Ice conditions became normal in Denmark Strait and the Greenland Sea. There was a tendency for cold north-easterly winds in the Barents Sea where ice persisted south of its normal position for the end of July.

### AUGUST

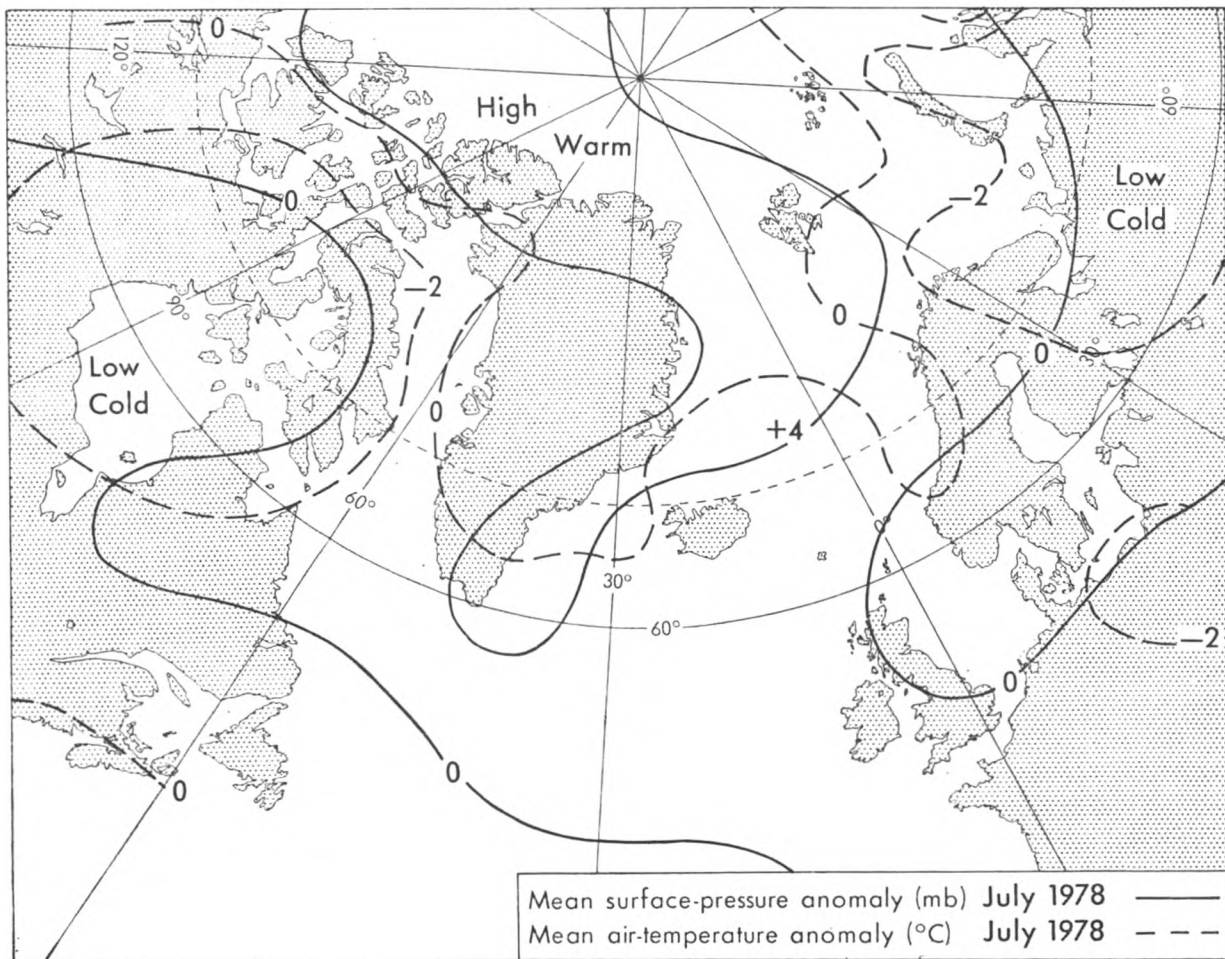
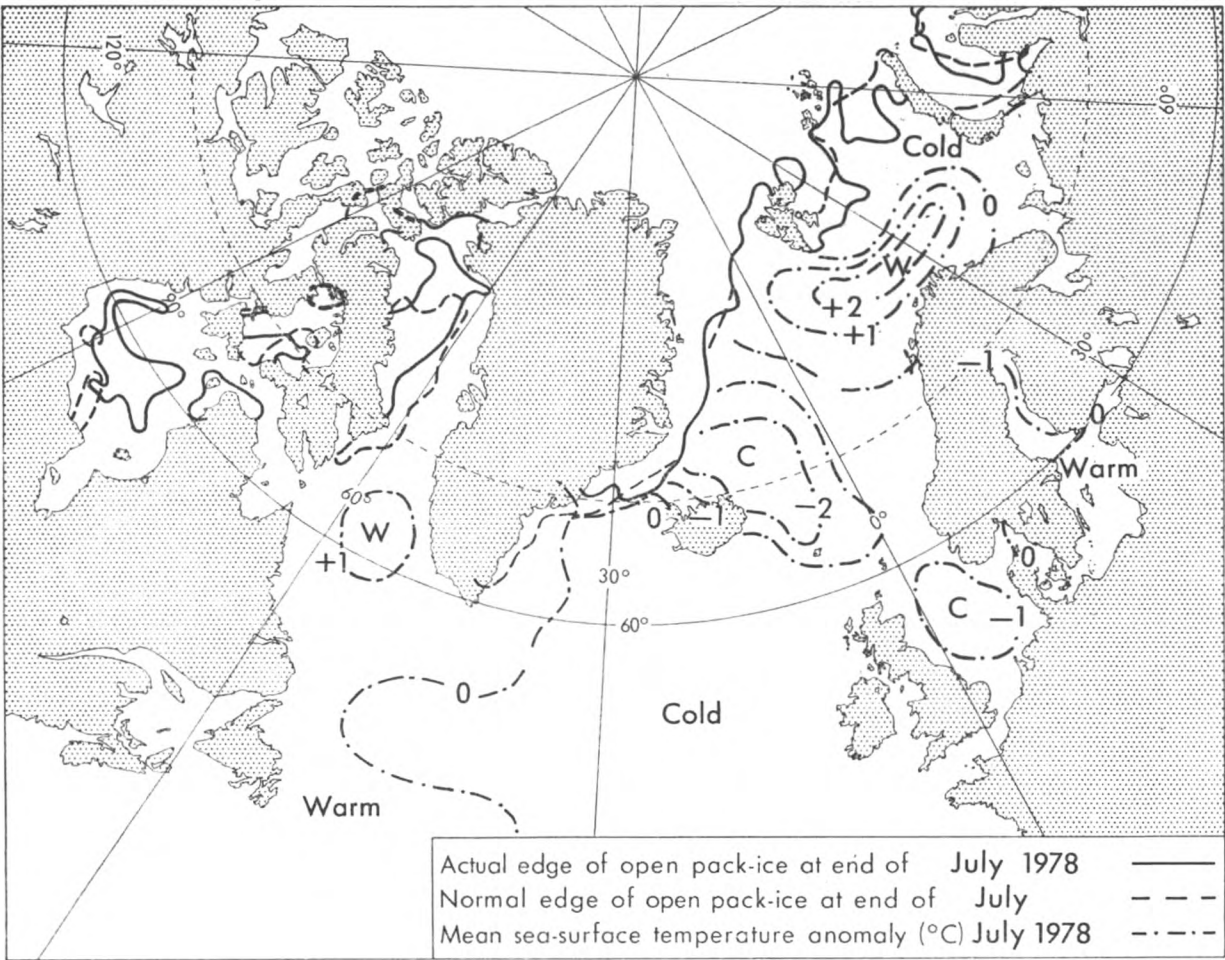
The cold weather persisted over northern Canada so that ice amongst the Canadian Arctic Archipelago and in Baffin Bay did not clear to the extent that is usual by the end of August. Over the Greenland Sea and much of the Barents Sea there were anomalies for south-westerly winds and above-average temperatures, resulting in deficits of ice with marked disintegration and areas of weakness off the east coast of Greenland. By contrast ice conditions in the Kara Sea by the end of August were the heaviest recorded at this time of year since 1969; here north-easterly winds were unusually frequent with accompanying cold weather.

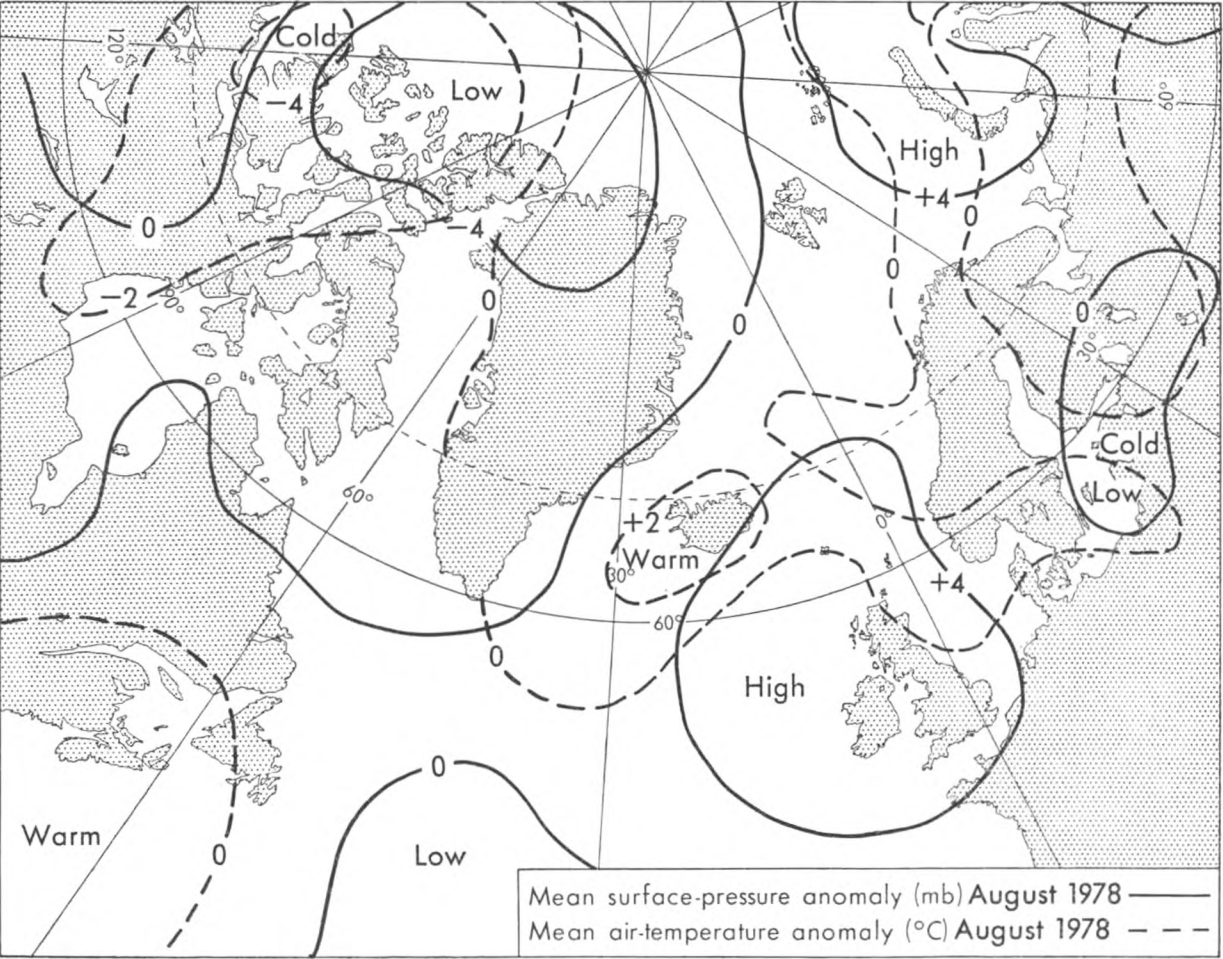
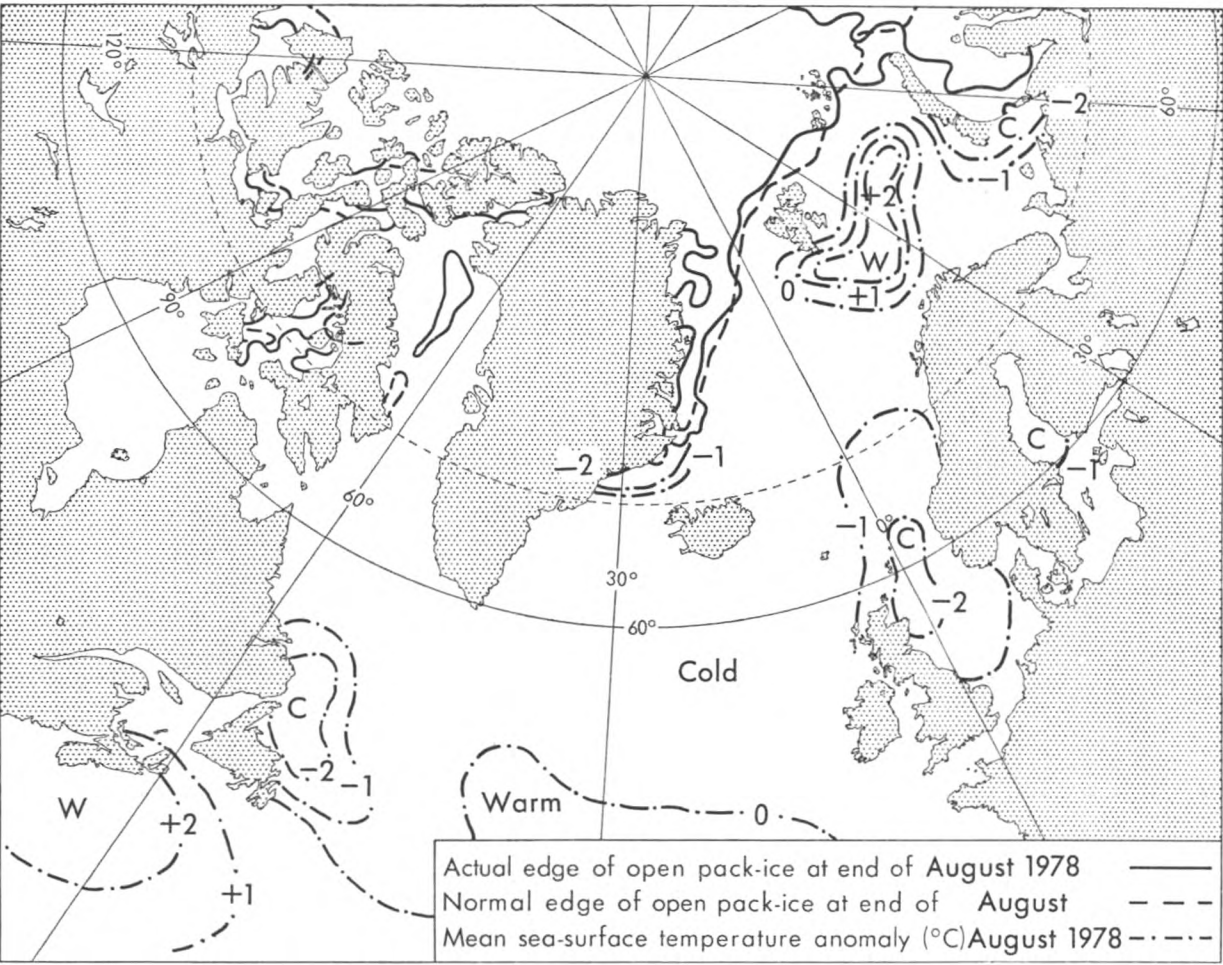
SEPTEMBER

Pressure reverted to near normal east of Greenland with higher pressure than usual over northern Canada. Although this pattern resulted in temperatures becoming near average for time of year, re-freezing consolidated the excess ice of previous months near Canada and in the Kara Sea and also resulted in a return to near-normal ice conditions in the Greenland Sea where previously there had been some deficit.

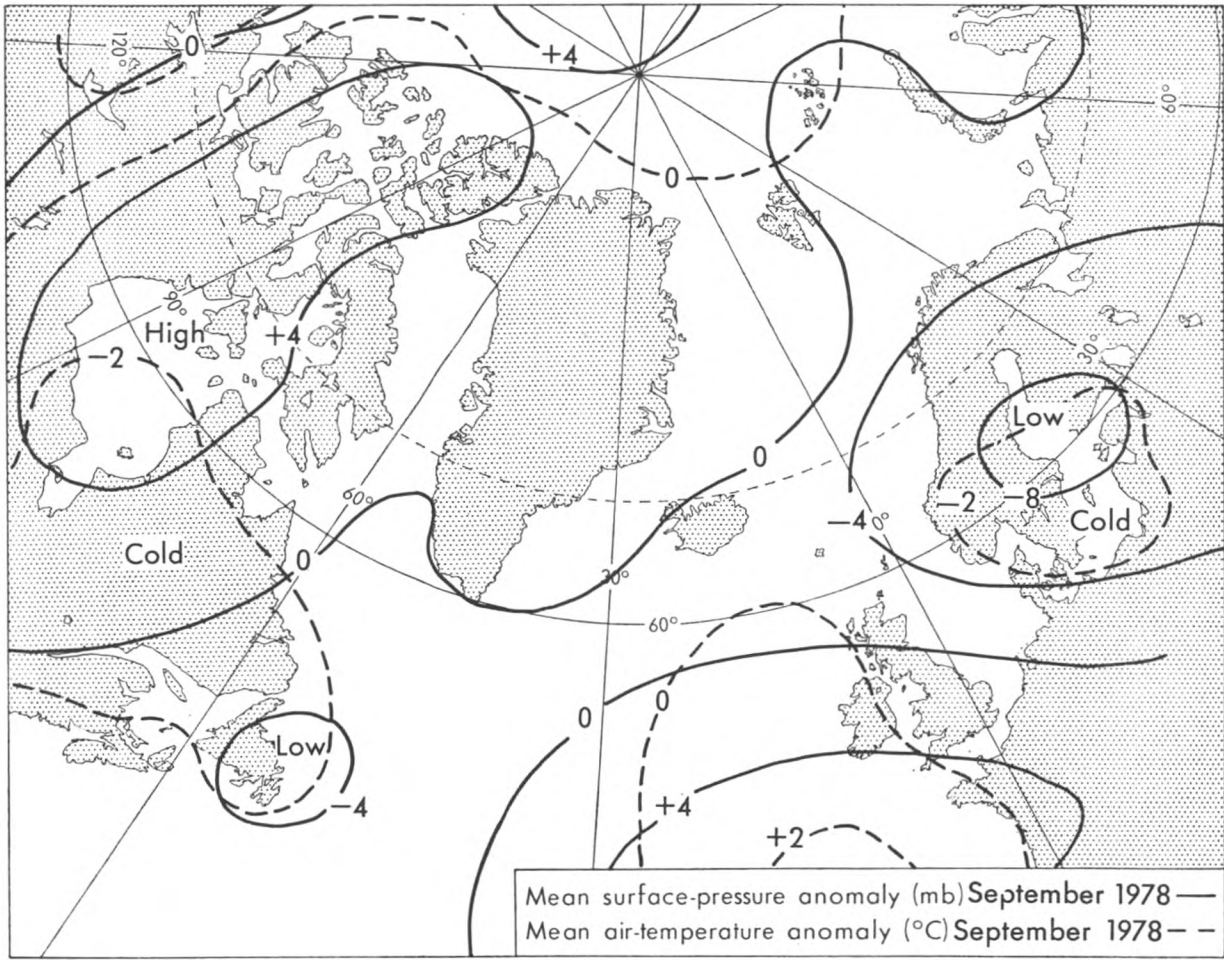
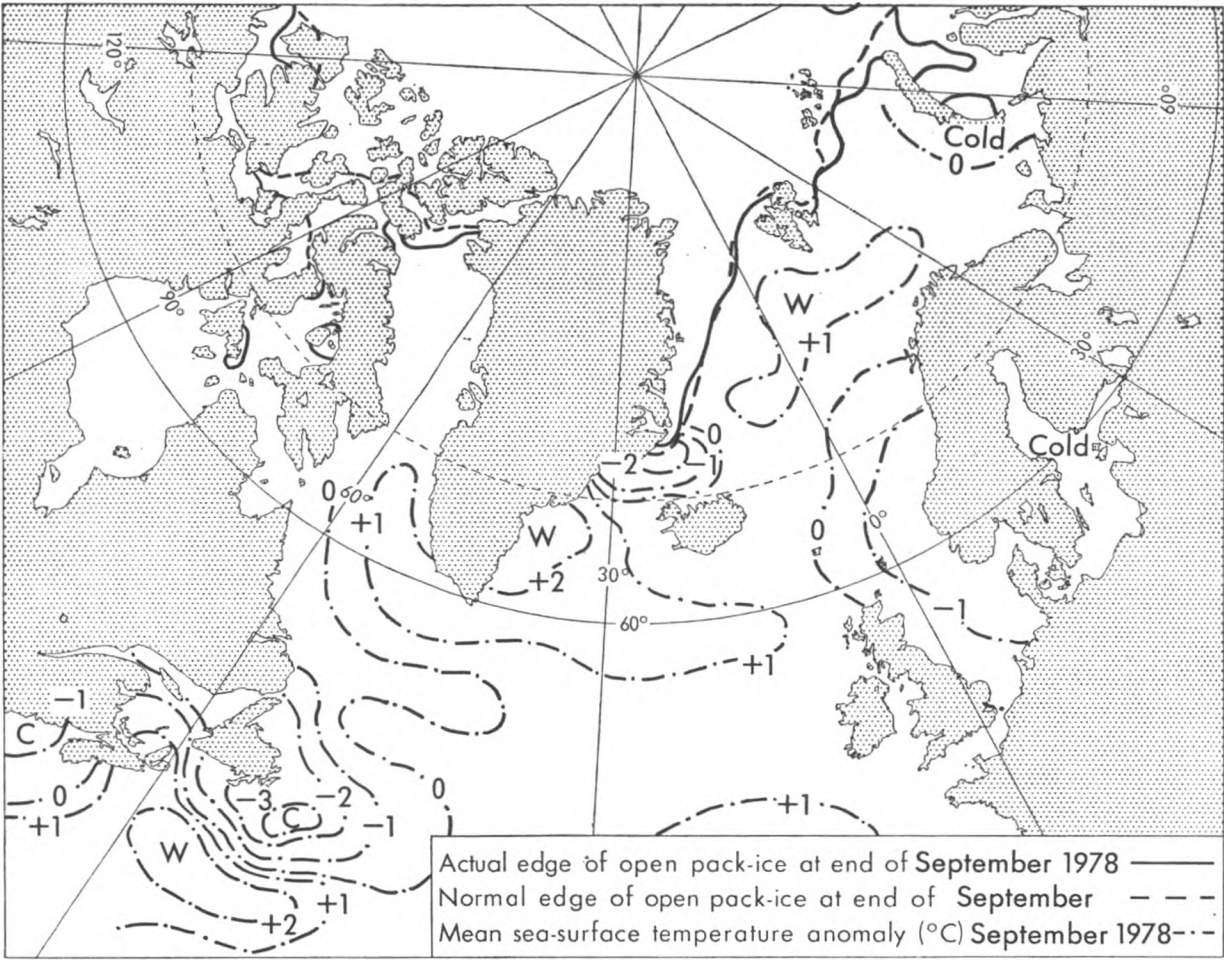
REFERENCES

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, DC	1965	World weather records, 1951-60. North America.
US Naval Oceanographic Office, Washington, DC	1967	Oceanographic atlas of the North Atlantic Ocean, Section II: Physical properties.









## ROYAL VISIT TO THE METEOROLOGICAL OFFICE

On Friday 14 July 1978 the Meteorological Office was honoured with an informal visit by Her Majesty The Queen.

During the visit Her Majesty was conducted by the Director-General and other senior staff through the Central Forecasting Office (CFO) and the Computer Laboratory. In the course of her tour through CFO Captain A. Phillips, a Nautical Officer attached to the Ship Routeing Service of the Marine Division, was introduced to The Queen and during their conversation, Her Majesty expressed interest in the successful routeing of a vessel carrying horses on deck across the North Atlantic.

The photographs opposite pages 16 and 17 show Her Majesty signing the Visitor's Book in the Meteorological Office foyer and Captain Phillips being introduced to The Queen.

## Personalities

OBITUARY.—It was with great regret that we learned of the sad death of Mr J. N. BROOK, Chief Officer of m.v. *Adventurer*, as the result of a heart attack whilst his vessel was sailing from Curaçao on 27 February 1978.

Nigel Brook served with Moss Hutchison Line prior to joining Harrison Line in 1968 as 2nd Officer; he was promoted to Chief Officer in 1969.

Mr Brook sent us his first meteorological logbook from the *Philosopher* in 1973, since then we have received a further four logbooks bearing his name.

We extend our sincere condolences to his family.

RETIREMENT.—CAPTAIN D. L. EMERY retired on 31 July 1978 after serving 42 years at sea.

David Lander Emery was born in Glasgow and received his pre-sea training in HMS *Worcester*. In 1936 he was indentured as Midshipman with Blue Funnel Line and was appointed to the coal-burning s.s. *Pyrrhus*. During the war he was present at the Dunkirk evacuation and was sunk twice by enemy action—on the first occasion by a German bomber whilst serving in m.v. *Clytoneus* and later by a Japanese submarine whilst on detachment to the Admiralty Salvage Department and serving in HMS *Salviking*.

Captain Emery obtained his Master's Certificate in 1947. He was promoted to Master in 1960 and appointed to command of s.s. *Myrmidon*. Since then he has commanded many ships of Ocean Fleets Limited, the last being the *Phemius*.

We received the first meteorological logbook bearing Captain Emery's name from the *Ajax* in 1947, since then he has sent us a further 35 logbooks of which 11 were classed as excellent. He received Excellent Awards in 1972 and 1978.

We wish him a long, healthy and happy retirement.

RETIREMENT.—CAPTAIN A. DAVIES retired on 31 August 1978 after serving 41 years at sea.

Alan Davies was educated at the Dame Allens School in Newcastle and in 1937 was indentured as Apprentice to British Tanker Company joining his first ship, the *British Security*, on Christmas Eve.

During the war Captain Davies was several times in action but was fortunate in that he was never sunk. He writes that probably his most vivid experience during those years was serving in a convoy to Russia and running into ice somewhere north of latitude 80 degrees. He comments 'It was unfortunate that there was a complete cessation of weather reporting, as I would have enjoyed sending in an Ice Report.'



Captain Davies obtained his Master's Certificate in 1948 and was subsequently promoted to command of s.s. *Khuzistan*. Since then he commanded many of the B.P. Tanker Company's vessels and was latterly appointed Commodore in command of s.s. *British Respect*.

Captain Davies sent us his first meteorological logbook from the *British Commodore* in 1948, since then we have received a further seven logbooks bearing his name of which three were classed as excellent.

We wish him health and happiness in his retirement.

RETIREMENT.—CAPTAIN D. COOPER retired on medical grounds on 30 September 1978 after completing 32 years service with Shell Tankers (UK) Limited.

David Cooper was indentured as Apprentice to Shell in January 1946 and was appointed to m.v. *Clam*. He obtained his Master's Certificate in 1954 and was promoted to master in June 1966, his first command being s.s. *Amoria*. Since then he has served in many of the Company's vessels, his last command being the *Donax*.

Captain Cooper sent us his first meteorological logbook from the *Amoria* in 1966. Since then we have received a further six logbooks bearing his name. He was awarded an Excellent Award in 1967.

We wish him a speedy recovery in health and a long, happy retirement.

RETIREMENT.—Mr H. H. LYON, Radio Officer, retired on 20 August 1978 from Marconi International Marine Company after 44 years service at sea.

Howard Harwood Lyon was appointed to the sea-going staff of Marconi in 1934 as Radio Officer. In November 1940 he was serving in the *Congonian* when she was sunk by enemy action. During his service he was appointed to a number of passenger vessels but more recently served in coastal vessels.

We received the first meteorological logbook bearing Mr Lyon's name from the *Esperance Bay* in 1952, since then he has sent us a further 17 logbooks of which no less than 14 were classed as excellent. He received Excellent Awards in 1952, 1954 and 1966.

We wish him a long and healthy retirement.

RETIREMENT.—Mr J. M. LYONS, Radio Officer, retired on 25 August 1978 after 34 years service with Marconi International Marine Company.

John Martin Lyons joined the sea-going staff of Marconi as Radio Officer in June 1944 and served in ships of many companies. More recently he has served in the ferries of the British and Irish Steamship Company.

Mr Lyons sent us his first meteorological logbook from the *Port Brisbane* in 1966. Since then we have received a further nine logbooks bearing his name of which five were classed as excellent. He received Excellent Awards in 1969 and 1971.

We wish him a long, healthy and happy retirement.

## **Notices to Marine Observers**

### **APPOINTMENT OF NEW PORT METEOROLOGICAL OFFICER**

Captain Stuart Morison Norwell has been appointed Port Meteorological Officer in Glasgow to succeed the late Mr H. M. Keenan.

Captain Norwell received his pre-sea training in HMS *Conway* and, in 1956, was indentured as Apprentice with Donaldson Line. On obtaining his 2nd Mate's Certificate in 1960 he joined the Ocean Weather Service of the Meteorological Office as 3rd Officer. Apart from a year spent with Shaw Savill Line to gain cargo ship experience, Captain Norwell remained in the Ocean Weather Service until his recent appointment to Glasgow. He obtained his Master's Certificate in 1965 and for the past six years has been Relief Master of the Ocean Weather Ships.

### **LOCUST REPORTS**

The Desert Locust Information Section of the Centre for Overseas Pest Research in London advise that sightings of locusts at sea continue to be of great importance, particularly in view of the current upsurge in numbers of locusts which has resulted in the production of many swarms in NE Africa and SW Arabia and could result in another plague. Recent reports received by the Centre have provided evidence of an eastward migration of desert locusts into India and Pakistan. If a new plague does develop, desert locusts can be expected to be seen at sea in very large numbers off the coasts of West Africa, in the Red Sea, Gulf of Aden, Persian Gulf and Arabian Sea.

Marine Observers are earnestly requested to report all sightings of locusts in their Meteorological Logbooks and also to send details, in plain language, by radio to ANTILOCUST LONDON through Portishead Radio. Full details of how these reports should be made are contained in the instructions in the front of the Meteorological Logbook but Observers should note that the telex number preceeding the address has been discontinued and, therefore, should not be used.

# Fleet Lists

Corrections to the list published in the July 1978 edition of *The Marine Observer*.  
Information regarding these corrections is required by 30 September each year. Information for the July lists is required by 31 March each year.

## GREAT BRITAIN (Information dated 9.10.78)

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

NAME OF VESSEL	MASTER	OWNER/MANAGER
<i>Beacon Point</i> .. ..	A. Alves .. ..	Christian Salvesen (Shipping) Ltd.
<i>Earl William</i> .. ..	M. C. Mills .. ..	British Rail
<i>Esso Clyde</i> .. ..	R. Rendell .. ..	Esso Petroleum Co. Ltd.
<i>Whitethorn</i> .. ..	H S. Cully .. ..	Sir William Coe & Co. Ltd.

The following vessels have been deleted:  
*Mairi Everard, Portelet.*

# GREAT BRITAIN (Contd.)

The following ships have been recruited as Selected or Supplementary Ships:

NAME OF VESSEL	DATE OF RECRUITMENT	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Aeneas</i> ..	7.9.78	G. F. Williams	B. A. S. Halim, A. B. Johnson, G. Illingworth	A. J. Thomson	Ocean Transport & Trading Co. Ltd.
<i>Anco Sceptre</i> ..	23.5.78	R. T. W. Davies	J. O. Portus, K. K. Tan, A. Sorrace, A. G. Wilson	G. J. Monkman	Panoccean-Anco Ltd.
<i>Anco Sovereign</i> ..	5.5.78	F. Billing	S. Woods, I. Davis, R. Chaplin, J. Gillis	J. Dixon	Panoccean-Anco Ltd.
<i>Atlantic Projector</i> ..	16.5.78	I. Oscroft	I. M. Stubley, J. K. Brocklehurst, K. M. Griffiths	M. Fowler	Cunard-Brocklebank Ltd.
<i>Atlantic Prosper</i> ..	7.4.78	E. L. Jackson	G. H. Rees, I. M. Stubley, I. B. Rankin	J. E. P. Magee	Cunard-Brocklebank Ltd.
<i>Australind</i> ..	7.7.78	D. A. Dickinson	P. D. Orman, J. Beck, A. E. Wilkinson	G. Szymanski	Australind Steam Shipping Co. Ltd.
<i>Benhope</i> ..	16.4.78	R. E. Cowie	A. W. Morrison, D. M. Staff	H. E. Brookfield	Ben Line Steamers Ltd.
<i>Benworlich</i> ..	16.8.78	I. R. Ansell	C. Shaw, B. Wood, D. M. Staff	W. Goddon	Ben Line Steamers Ltd.
<i>British Pride</i> ..	5.6.78	I. Worthington	G. Schoolbraids, S. Cochrane	P. Stewart	B.P. Tanker Co. Ltd.
<i>Calabria</i> ..	17.4.78	G. Robson	K. Wind, A. J. McVicar, M. Mitchell	L. S. Hartney	Walter Runciman & Co. Ltd.
<i>Canberra</i> ..	11.6.78	D. J. Scott-Masson	I. Jerman, P. Chirgwin, H. Reid	H. Williams	P. & O. S.N. Co.
<i>Capalonga</i> ..	7.4.78	N. Vucetic	I. C. Murray, G. J. Knowles, M. Blois-Brooke	P. Grundy	Thalassa (Offshore) Scotland Ltd.
<i>City of Durban</i> ..	20.5.78	R. Bell	W. Stewart, C. Hainsworth, J. C. Harris	D. C. Smith	Ellerman Lines Ltd.
<i>Cluden</i> ..	19.9.78	C. A. Morrison	D. C. Fickling, A. Anning	V. Y. F. Li	Matheson Shipping Services Ltd.
<i>Crestbank</i> ..	24.4.78	C. B. Davies	P. Hull, P. Lovat, P. Nance	B. Neary	Bank Line Ltd.
<i>Custodian</i> ..	25.8.78	C. Wilde	I. A. Cook, E. P. Oddy, P. R. Walton	A. I. Thomson	P. & O. S.N. Co.
<i>Elk</i> ..	8.8.78	R. Gibson	G. Thwaites, B. Luke, N. Hardy	P. Hurt	Bank Line Ltd.
<i>Fenbank</i> ..	24.8.78	A. Brodie	S. D. Crowther, T. N. Morris, W. Esler	L. C. Robinson	Canadian Pacific Steamships Ltd.
<i>Fort Hamilton</i> ..	2.6.78	D. L. Burt	K. Lee, A. Dewar, D. Glass	O. Grimsdall	United Baltic Co. Ltd.
<i>Goya</i> ..	4.9.78	F. J. Merino	J. R. Scott, E. Allison, T. Clure	R. J. Brien	Salen (U.K.) Ship Management Ltd
<i>Irish Wasa</i> ..	5.6.78	C. T. Marchant			
<i>Magdalena</i> ..	12.5.78	D. A. Hamilton	M. Cleary, A. Smith, A. Murray	M. Bayley	Fyffes Group Ltd.
<i>Marangi Bay</i> ..	11.5.78	L. E. Howell	M. Taxis, B. Brierley, N. Dabin, R. Brinkworth	C. Hughes	Container Fleets Ltd.
<i>Oroya</i> ..	14.4.78	R. T. Riley	J. R. Monk, P. M. Gregson	C. J. Hawkrige	Pacific S.N. Co. Ltd.
<i>Overseas Argonaut</i> ..	18.5.78	A. C. McNab	R. I. Waterton, T. A. Edwards, T. Dace	P. Harbour	London & Overseas Freighters Ltd.
<i>Pacific Fisher</i> ..	25.7.78	I. J. Groundwater	M. Grimsdall, J. Miller, A. Eaton		James Fisher & Sons Ltd.
<i>Pacific Wasa</i> ..	10.4.78	C. T. Marchant	M. J. Ander, A. Huber, T. Schofield	R. I. Forrer	Salen (U.K.) Ship Management Ltd.
<i>Pomella</i> ..	25.7.78	A. Charlesworth	D. B. Limmack, G. W. Keilty, M. F. T. McKellar	S. R. Robinson	Shell Tankers (U.K.) Ltd.
<i>Reynold</i> ..	7.7.78	M. A. Gater	J. Meier, T. Bailey, E. Miles	E. Hughes	Bolton Steam Shipping Co. Ltd.
<i>Riverina</i> ..	22.3.78	J. Richmond	I. Johnson, A. Ross, I. Linke	C. Redstone	Shaw Savill & Albion Co. Ltd.
<i>Ross Sirius</i> ..	27.4.78	D. Paterson	A. Fulcher	A. Fulcher	British United Trawlers Ltd.
<i>St. Helena</i> ..	13.9.78	M. L. M. Smith	D. Wheel, M. Underwood, W. Hughes	N. Abbott	Curnow Shipping Ltd.
<i>Seafarth Clanisman</i> ..	29.6.78	J. R. Jackson	R. Duncan, C. Wilmot, G. Campbell	S. Shays	Seafarth Maritime Ltd.
<i>Shetland Shore</i> ..	14.8.78	D. Hogarth	A. Daly, I. Brown		Offshore Marine Ltd.
<i>Star World</i> ..	28.3.78	J. A. Cullen	D. R. Gear, C. T. Tong, K. C. Lam	B. D'Souza	Marine Navigation Co. Ltd.

# GREAT BRITAIN (Contd.)

The following ships have been recruited as Selected or Supplementary Ships:

NAME OF VESSEL	DATE OF RECRUITMENT	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Strathgus</i> ..	30.6.78	D. Foster ..	S. Matthews, H. Jewell, D. Skentelbery ..	G. England ..	P. & O. S.N. Co.
<i>Sunnyway</i> ..	10.3.78	J. B. Caley ..	D. McCullough, D. Ray, E. E. Talbot ..	D. Gibbs ..	Newgate Shipping Co. Ltd.
<i>Table Bay</i> ..	7.6.78	J. S. Catterall ..	S. H. Cant, J. Mercer, R. Speight ..	D. Pegg ..	Cayzer Irvine & Co. Ltd.
<i>W. M. Neal</i> ..	9.5.78	P. Atkinson ..	P. Kirkman, S. Coles ..	P. Mansden ..	Canadian Pacific Steamships Ltd.
<i>Weybank</i> ..	10.5.78	P. H. Thomas ..	S. Braund, F. Hunter, R. J. S. Lillis ..	L. K. Dillon ..	Bank Line Ltd.

The following Selected and Supplementary Ships have been deleted:  
*Agamemnon, Alban, Anadara, Anrino, Auckland Star, Author, Baltic Jet, Baron Renfrew, Benalbanach, Bengloe, Benlawers, Benledi, Benloyal, Buenos Aires Star, Cairnmore, Cape Sable, City of Ankara, City of Dundee, City of Glasgow, City of Lichfield, City of Newcastle, City of Wellington, City of Worcester, Cortes, Cunard Colamanda, Cunard Carrier, Cunard Cavalier, Edenfield, Farnella, G. A. Raey, Grafton, Graigaur, Heythrop, Hobart Star, Icenic, Illyric, Industria, Ionic, King James, La Loma, Lutetian, Makaria, Marabank, Melita, Muirfield, Norse, Orient City, Peisander, Perseus, Photinia, Priam, Protesilaus, Roland, Romney, Strathaird, Strathavie, Strathanna, Stratharlick, Strathaslak, Strathavoch, Susan Miller, Sydney Bridge, Welsh Endeavour, Westbury, Wimpey Sealab.*  
 Correction to Supplementary Fleet List in the July 1978 edition of *The Marine Observer*: for *Viking Gallant* read *Viking Valiant*.

# BRITISH COMMONWEALTH

## CANADA (Information dated 1.9.78)

The following have been recruited since the corrections published in the January 1978 edition of *The Marine Observer*:

*A. T. Cameron* (Government of Canada)  
*Ben Ocean Lancer* (Chevron Standard Ltd.)  
*Bernes* (Jebsen (U.K.) Ltd.)  
*Bolnes* (Jebsen (U.K.) Ltd.)  
*Fort Nelson* (Canadian Pacific Steamships Ltd.)  
*Fort Walsh* (Canadian Pacific Steamships Ltd.)  
*Grenfell* (Government of Canada)  
*Gulf Mackenzie* (Gulf Canada Ltd.)  
*Gypsum Empress* (Fundy Gypsum Co.)  
*Keewatin* (Northern Transportation Co.)  
*Louisburg* (Government of Canada)  
*Marine Evangeline* (Canadian National (Marine))  
*Northern Shell* (Shell Oil (Canada) Ltd.)  
*Pierre Radisson* (Government of Canada)  
*Port Vancouver* (Canadian Pacific Steamships Ltd.)  
*Sir James Douglas* (Government of Canada)  
*Thor I* (Thor Dahl Lines)  
*Thorscape* (Thor Dahl Lines)  
*Tupper* (Government of Canada)

The following ships have been deleted:

*Canberra*, *Frobisher Transport*, *Hector*, *Lord Selkirk II*, *St. Lawrence Prospector*, *Thorshope*, *Thorsriver*, *Thorstream*.

Canada now has 71 ocean-going Auxiliary Ships and 82 Auxiliary Ships operating on the Great Lakes and Inland Waters.

## HONG KONG (Information dated 8.9.78)

The following ships have been recruited since the list published in the July 1978 edition of *The Marine Observer*:

*American Sioux*, *Benrimmes*, *D. F. Fajemirokun*, *Eastern Muse*, *Laertes*, *Memnon*, *Tamano*.

The following ships have been deleted:

*Eriskay*, *Star Bellatrix*, *Strathcarron*, *Trianon*.

## INDIA (Information dated 8.9.78)

The following have been recruited as Supplementary Ships since the list published in the July 1978 edition of *The Marine Observer*:

*Ajanta* (Shipping Corporation of India)  
*Maldives Energy* (Bombay Ocean Carriers (Pvt.) Ltd.)  
*State of Andhra Pradesh* (Shipping Corporation of India)  
*State of Nagaland* (Shipping Corporation of India)  
*Vishva Mohini* (Shipping Corporation of India)

The following ships have been deleted:

*Jag Jawan*, *Mohemmedi*, *Mozaffari*, *Vaishnavi*.

## NEW ZEALAND (Information dated 1.8.78)

The following ships have been recruited as Selected Ships since the list published in the July 1978 edition of *The Marine Observer*:

*Amokura* (Union S.S. Co. N.Z. Ltd.)  
*Eagle Arrow* (Gearbulk Ltd.)  
*Fetu Moana* (Shipping Corporation of N.Z.)  
*Pacific Installer* (Swir Northern Offshore)

The following ships have been deleted:

*Athel Viscount*, *Blue Whale*, *Karepo*, *Lorena*, *N.Z. Aorangi*, *Totara*, *Union Melbourne*, *Torrens*.

New Zealand also has a fleet of 11 Auxiliary Ships currently reporting.







ISBN 0 11 725373 1  
ISSN 0025-3251