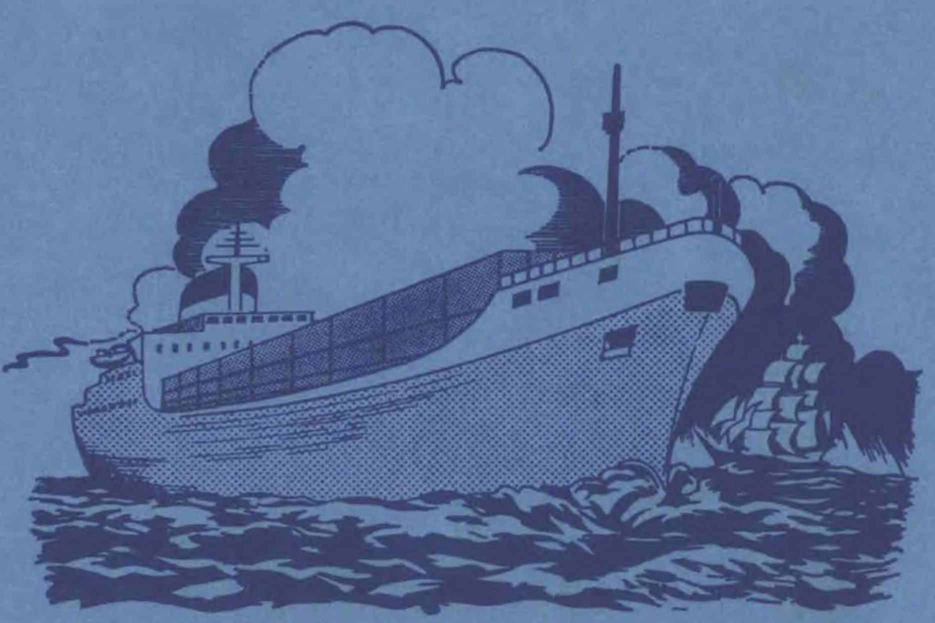
Met. O. 957

The Marine Observer

A quarterly journal of Maritime Meteorology



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THE MARINE OBSERVER

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

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October, November, December

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

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

LOCAL REVOLVING STORM

South Atlantic Ocean

m.v. *British Trent*. Captain P. Harrison. Falkland Islands to Ascension Island. Observer, Mr A. Peerless, 3rd Officer.

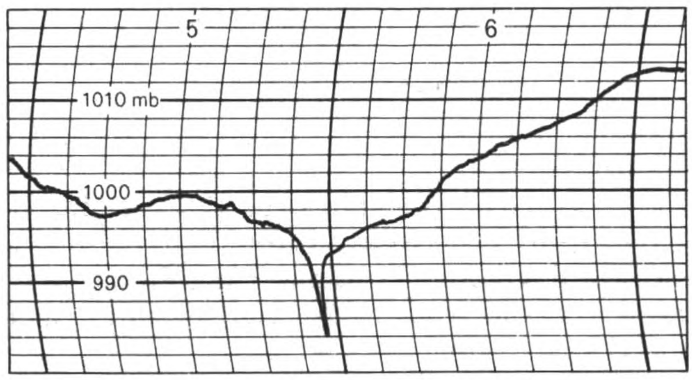
5–6 October 1982. Whilst on passage from the Falklands to Ascension Island on a heading of 041°(T) the vessel encountered a small revolving storm with irregular winds. The storm was moving in an approximately SE'ly direction from 310°(T) to 130°(T). During the transit, gale-force winds of 60 knots (Beaufort force 11) were experienced; the ship's speed was involuntarily reduced from 14½ to 10½ knots and it was later estimated that the vessel had been moved over 4 n. mile off course along the path of the storm. One radar had to be switched off owing to the effect of the wind on its scanner, whilst minor damage was suffered by a bridge-wing lamp, a gyro repeater cover, and the thermometer screen!

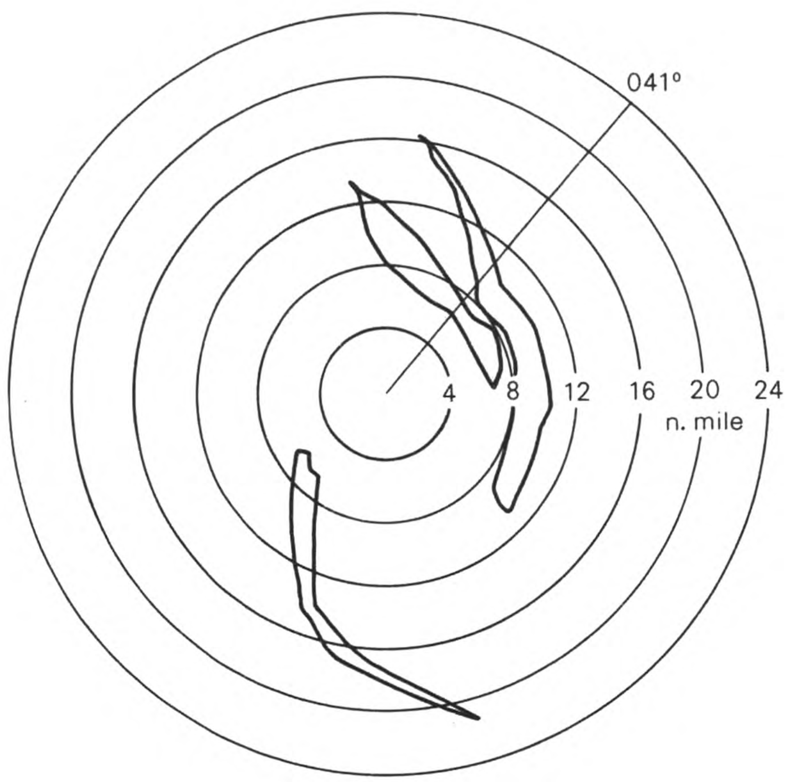
The barograph trace shows an almost sheer vertical line; at one stage the pressure drop was in excess of 1 mb in 1 minute.

The following extracts are from the deck and meteorological logs.

5 October

2230 GMT.	Wind NW, force 5, visibility 10 n. mile.
2240 GMT.	Wind NNW, force 7. Sky completely overcast. Heavy continuous rain and spray experienced. Visibility poor.
2300 GMT.	Wind NNW, force 11. Barometric pressure 987·2 mb (corrected). The eye of the storm was now calm with large swell waves as expected. Clear skies with no precipitation; horizontal visibility, however, reduced almost to zero by spray. The sketch of the storm was taken from a radar's retro-reflective plotter at this stage.





2315 GMT.	Abrupt change in wind direction from port bow to port quarter. Heavy rain and hail experienced. Vessel seen to be just in advance of second front.
2319 GMT.	During storm's transit, fronts moved relative to each other and two fronts appeared to join.
2322 GMT.	First distinct band of cloud seen to finish.
2326 GMT.	Vessel in tail end of larger front. Second band of cloud begins. Very strong electrical activity, sheet lightning visible for same period of time as storm moved away to the SE.
2350 GMT.	Vessel passed through last front, 16 n. mile from its tail end.

6 October

0000 GMT.	Wind WNW, force 4.
0013 GMT.	Three-metre swell wave from direction 325°(T) experienced. Frequent small squalls could be seen on the radar for a further 40 n. mile along the ship's track, again moving SE'ly.
0300 GMT.	Wind W'N, force 7–8.
0700 GMT.	Wind returned to NW'ly, force 5.

Position of ship: 35° 27′S, 35° 31′W.

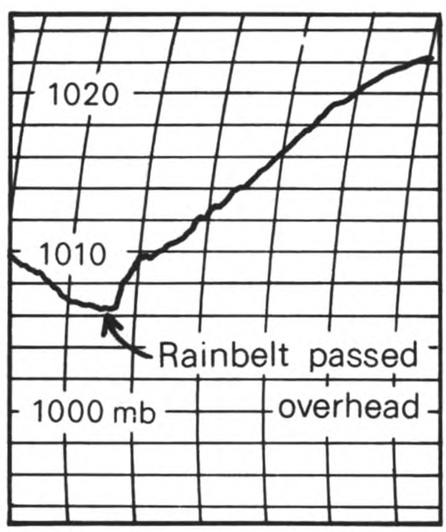
North Atlantic Ocean

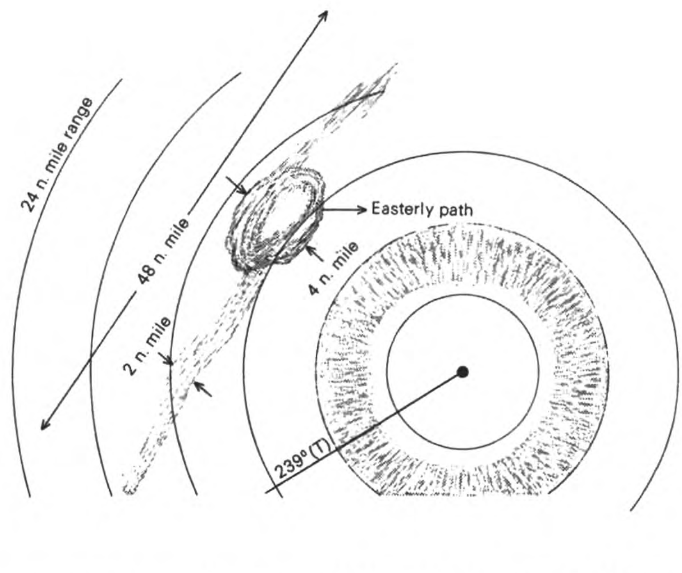
m.v. *California Star*. Captain T. Black. Le Havre to Cristobal. Observers, the Master and Mr R. Betts, 3rd Officer.

25 October 1982, 2230 GMT. The ship's speed was reduced to 15·5 knots by high winds and heavy swell as she passed through numerous rain squalls. These squalls were not unusually vigorous, but a weather facsimile chart had just been received which showed a cold front in the vicinity and heavier rainfall and an increase in wind speed were therefore expected.

An additional weather observation was made at this point and the following values were logged:

Dry bulb 17·7 °C, wet bulb 17·4, barometric pressure 1010·6 mb and falling, wind SW'ly, force 7–8.





The radar picture was watched carefully; it showed a line of rain which was presumed to be the frontal rainbelt travelling in an easterly direction at approximately 18 knots. As the belt drew nearer, a kink was observed, and what looked like a small 'tropical rain storm' had formed around this kink. The sketch gives an indication of the appearance of the radar picture when the belt was 12 n. mile away. The thickest part of the rainbelt took approximately 4 minutes to pass over the vessel and during this period torrential rain fell continuously.

The Master commented that he had never previously seen such a pronounced rain circle.

Position of ship: 43° 44′N, 18° 24′W,

North Sea, English Channel and North Atlantic Ocean

m.v. *Gas Enterprise*. Captain R. Higgins. Flushing to Khor al Fakkan. Observers, Mr R. Lanz, Chief Officer, Mr C. Shoolbraid, 2nd Officer, Mr N. Gregson, 3rd Officer, Cadet S. Tyler and other members of the ship's company.

5–8 November 1982. The following account is derived from the meteorological and deck logbooks.

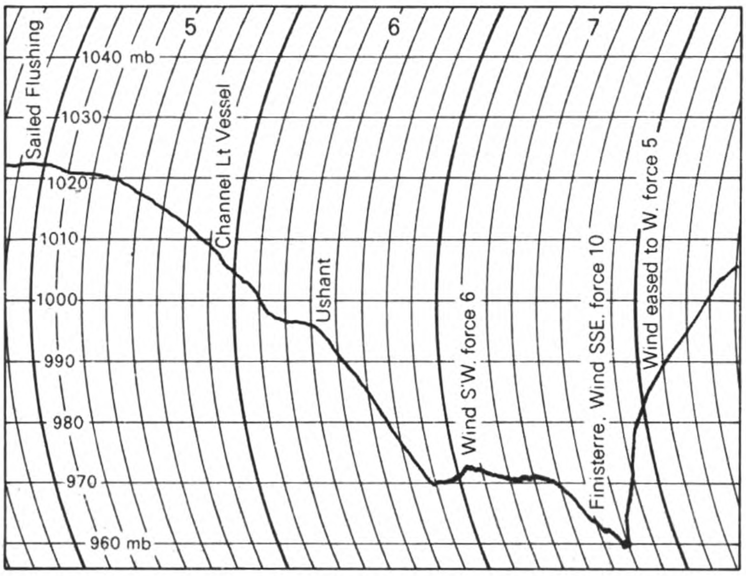
At 0042 GMT on the 5th the vessel sailed from Flushing. At 0700 the vessel altered course to enter the south-west-bound traffic lane in the English Channel. Throughout the rest of the day the wind varied between a SE'ly, force 3 early on, increasing to S'E, force 6 at midnight. The sea was slight, becoming moderate. The barometric pressure decreased fairly rapidly throughout the day and was 1005·3 mb at 0000 GMT on the 6th. The visibility was poor most of the day with 3 n. mile in the mist, increasing to 7 n. mile at midnight. It was overcast all day with stratocumulus cloud.

At 1020 GMT on the 6th the vessel altered course around Ushant. Since 0000 GMT the wind had averaged SE'S, force 5, with sea moderate although rough early on. The barometric pressure had continued to drop steadily until 0400; from 0400 to 1000 it steadied out and at 1000 started to fall again. The visibility was moderate at first, becoming good. From noon to midnight the wind was a steady S'E, force 5 with moderate seas. Visibility was more than 10 n. mile and the sky was mainly overcast. At 2040 GMT a line-squall approached the vessel. After the line-squall had passed the barometric pressure stopped dropping and became fairly steady before rising to 971·5 mb at 0000 GMT on the 8th. At 2300 GMT the vessel started to feel the first effects of the weather as she began to roll and pitch easily.

For the remainder of the Bay of Biscay crossing between 0000 and 1200 GMT on the 7th the wind was a steady S'W, force 7 with rough seas; visibility was very good, there were frequent showers, and the sky was mainly overcast. As the SE'ly swell became more pronounced the vessel's movement was more violent, with frequent rolls of 20° either side of the vertical, the period of the rolls being about 6 seconds. By 1200 GMT the vessel was occasionally rolling and pitching heavily, with rolls of 30° being recorded.

At 1400 GMT the vessel was 6·5 n. mile NW of Cabo Villano in north-west Spain. The wind had increased to a SSE, force 9 with rough seas and a heavy swell. By 1445 the wind was estimated at SE'ly, force 10 with a heavy SE'ly swell. At 1500 the barometric pressure was 962·9 mb and the visibility had been reduced to 3 n. mile by driving sea spray. By 1600 the wind had veered slightly to SSE, force 9–10, with a heavy sea, and the barometric pressure was 960·8 mb. By 1700 the wind had decreased to force 8 and the barometric pressure was 960·7 mb. At 1730 and again at 1800 GMT the Master of the vessel reduced the engine revolutions owing to the severity of the weather.

At 1800 the barometric pressure had started to rise very quickly, after having just reached the lowest recorded pressure of 958·8 mb. The wind had veered to SW'S, force 8 with sea rough. The visibility had increased to 7 n. mile and the sky was 7/8 covered with fractostratus. By 2300 the wind had veered round to W'N, force 9 and the sea state was rough with heavy swell. The visibility was very good and the barometric pressure was 980·1 mb; between 1800 and 0000 GMT on the 8th it had increased by 11·2 mb. The vessel was rolling and pitching, heavily at times.



By 0030 GMT on the 8th the wind had abated to W'N, force 5 with moderate seas and the visibility was very good. At 0115 GMT the Master of the vessel increased the engine revolutions back to full sea speed. For the remainder of the 8th the wind was fairly strong, averaging W'N, force 3–5 with moderate seas and the visibility was very good. The swell was W'ly for the most part and very heavy until about 1400. The movement of the vessel was steady by 1500 GMT at which time the wind was W'N, force 5 with moderate seas. The visibility was very good and the barometric pressure was still rising although not as rapidly as before.

Position of ship at 1500 GMT on 8 November: 38° 15'N, 09° 35'W.

Arabian Sea

m.v. *Ruddbank*. Captain C. B. Davies. Yokohama to Shuaiba. Observers, the Master and ship's company.

6–8 November 1982. The following account is based on extracts from the deck and meteorological logbooks.

6 November, 0800 GMT. Request received from Indian ship concerning information of heavy weather. No information received by *Ruddbank* of any such weather.

6 November, 1700 GMT. First report received from Bombay Radio of cyclonic storm. Position of storm at 1200 GMT on 6th given as 15·0°N, 66·5°E, wind 50–65 knots, storm likely to intensify to central pressure of 992 mb. Ship on course 313°(T), speed 14·0 knots.

6 November, 2300 GMT. Wind SSW, force 5, barometric pressure 1007·1 mb, heavy SW'ly swell, vessel rolling heavily.

7 November, 0500 GMT. Position 14° 00'N, 70° 36'E. Course altered to 000°(T) to reduce heavy rolling. Wind SW, force 7, barometric pressure 1006·5 mb, vessel rolling heavily. Reports of storm indicate that it is stationary; speed of ship increased in order to pass ahead of storm. Satellite fix of storm centre at 0200 GMT on 7th received from Guam (Pacific) was 15·0°N, 66·6°E—approximately the same as the earlier report from Bombay.

7 November, 1100 GMT. Wind S'E, force 8, barometric pressure 1003·5 mb, heavy SW'ly swell.

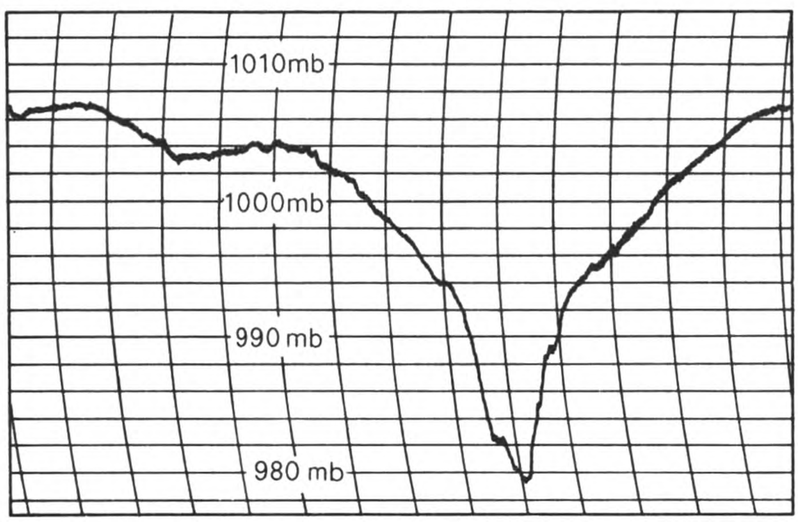
7 November, 1500 GMT. Wind SE'S, force 8, barometric pressure 1004·2 mb, heavy SW'ly swell.

7 November, 1700 GMT. Position 17° 00′N, 70° 41′E. Course altered to 350°(T) to clear coast; at this time the barometric pressure started to fall rapidly.

7 November, 1900 GMT. Wind SE's, force 8, barometric pressure 1001·8 mb, overcast with heavy rain. At this time it was realized that either the positions given were wrong or the storm was travelling much faster than had been expected.

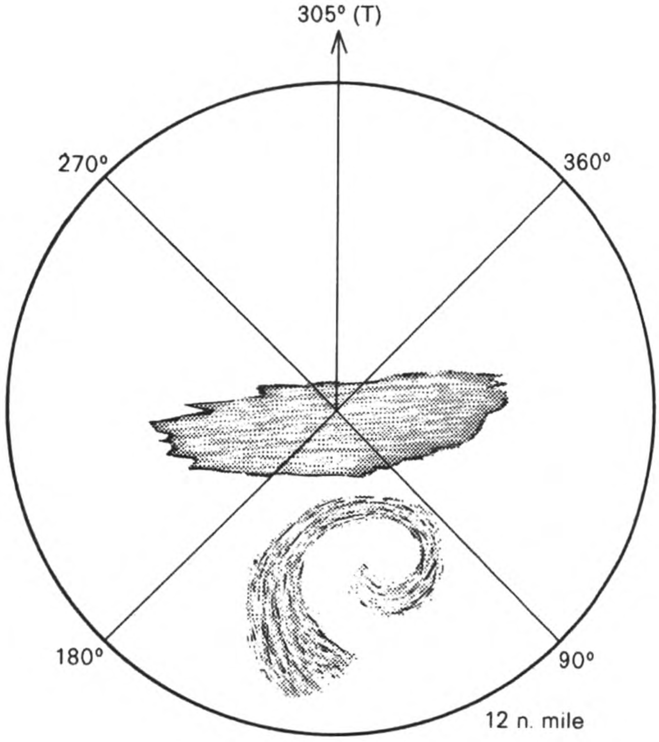
7 November, 1900–2300 GMT. The wind remained SE'ly, force 8 and the barometric pressure fell from 1001·8 mb to 995·4 mb. Intermittent very heavy rain was experienced. Position of ship at 1900 GMT was 17° 42′N, 70° 34′E. Course altered to 340°(T). It was realized that shore stations had little idea of the position of the storm, and reports were therefore sent to Bombay of all information available on the ship.

8 November, 0200 GMT. Swirls and a crescent-moon shape were sighted astern at about 7 n. mile on the radar and it was felt that this might have been the eye of the storm.



The following table consists of extracts from the meteorological logbook for 8 November.

Time GMT	Wind Dir'n	Wind Force	Barometric Pressure (mb)	Remarks
0000	SE'E	8	992·3	Position 18° 54′N, 70° 07′E, a/c to 330°(T)
0100	SE'E	9	988·3	
0130	SE	10	983·2	
0200	SE	11	980·3	Position 19° 34′N, 69° 36′E. Swirls of cloud and rain
0230	SE	11	978·2	7 n. mile astern on radar indicating possible storm
0300	SE	11	978·0	centre moving NE'ly (see sketch).
0430	NNE	12	985·6	
0500	N	12	989·5	Vessel hove-to. Course 305°(T). Wind speed stops radar scanners.
0530	N	11	992·3	Position 19° 50′N, 69° 00′E.
0600	N	11–12	992·7	
0700	NNW	11	994·6	Position 19° 58′N, 68° 57′E.
0900	NNW	9–10	997·6	
1000	NNW	9	998·9	
1030	NW'N	8	999·5	Position 20° 23′N, 68° 42′E.
1200	N	8	1000·2	Position 20° 35′N, 68° 33′E.
1500	NNE	8	1003·8	
1600–2000	NNE	8	1007·6	After 2000 GMT the wind died to force 5 and the swell became slight to moderate from astern on a course of 289°(T).



Position of ship at 0800 GMT on 6 November: 09° 18′N, 75° 42′E.
Position of ship at 2000 GMT on 8 November: 21° 28′N, 67° 42′E.

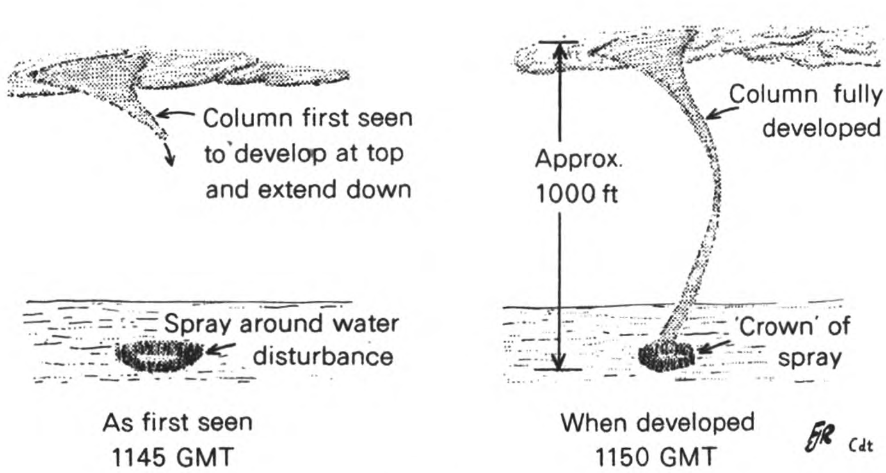
Note. This storm reputedly killed approximately 500 people on the west coast of India.

WATERSPOUTS

Mediterranean Sea

m.v. *British Ivy*. Captain M. J. Goulding. Mellili (Sicily) to Fos. Observers, the Master, Mr D. C. Williams, 2nd Officer, Mr W. M. Lowe, 4th Engineer and Cadet F. J. Routledge.

8 October 1982, 1145–1155 GMT. The vessel was on a course of 289°(T). On the starboard beam at a distance of some 2 n. mile a waterspout was observed to develop beneath a large cumulonimbus cloud. At first it was noticed as a water disturbance with a 'crown' of spray rotating round what appeared to be



a whirlpool. It was then noticed that the column of rotating 'water' appeared to develop down from the cloud in the shape of a bow, being denser at the upper end developing down to the water surface until the entire spout was formed. It ceased to be visible at 1155 GMT.

Weather conditions: dry bulb 22·8 °C, wet bulb 15·6, barometric pressure 1014·1 mb, wind WNW, force 3, 6/8 cloud mainly large cumulus and cumulonimbus.

Position of ship: 38° 00'N, 11° 05'E.

Caribbean Sea

m.v. *Andalucia Star.* Captain I. C. Mackintosh. Hamburg to La Ceiba (Honduras). Observers, the Master, Mr W. F. Todd, 3rd Officer and Cadets V. Moran and W. Mead.

24 October 1982, 1505 GMT. A waterspout was sighted at a distance of 9 n. mile on a bearing of 240°(T). It extended from the base of a cumulonimbus cloud near the edge of the area of heavy rain falling from the cloud, the base of which was estimated to be between 800 and 1000 ft. The spout was clearly visible for three-quarters of its length, the sea surface below being greatly disturbed with much spray. The diameter of the spout was perhaps 10 to 15 m, but as the ship's closest approach was 4 n. mile, the direction of rotation could not be determined. The waterspout and rain shower appeared to be moving in a generally sw'ly direction. Whilst the formation of the spout had not been observed, after 6 minutes it appeared less well defined, but quickly regained its former clarity and lasted for a further 5 minutes. Finally the lower portion seemed to retreat from the sea surface and the rest of the column quickly disappeared into the funnel above. Throughout the observation the column did not appear oblique. Two hours earlier two less well-developed spouts had been sighted.

Weather conditions at time of observation: dry bulb 28·2 °C, wet bulb 26·5, sea temperature 28·9, barometric pressure 1012·5 mb, wind NE'E, force 2–3, sea rippled, low swell, 7 oktas of cumulonimbus with associated cirrus.

Position of ship: 18° 43'N, 78° 21'W.

UNUSUAL LIGHTNING SIGHTING

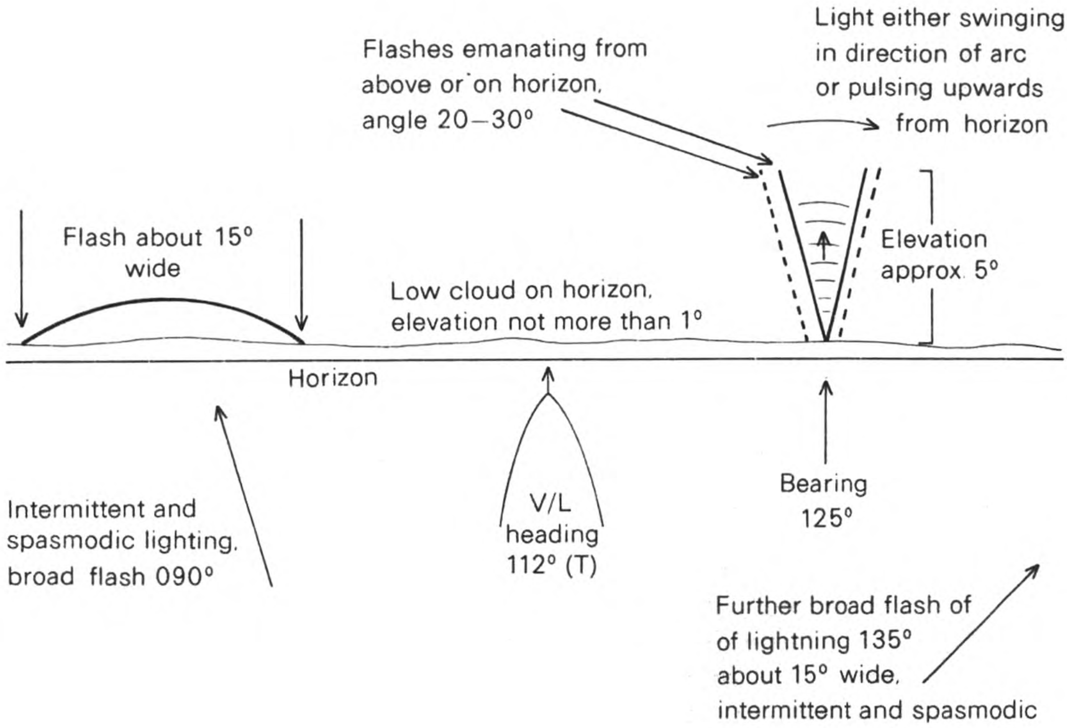
Bay of Plenty

m.v. *Coastal Trader.* Captain J. Stanaway. Auckland to Lyttelton. Observers, the Master, Mr J. Champion, Chief Officer, Mr J. Davis, 3rd Officer and Mr W. Sawyers.

16 October 1982. At 1930 the vessel was in the vicinity of White Island on a course of 112°(T) at a speed of 14 knots. At 2217 the vessel was abeam of Cape Runaway at a distance of 8·5 n. mile.

At 1935 lightning was observed bearing 125°, with a flash duration of half a second and an interval between flashes of 22 seconds. The flash appeared sometimes as a single pulse and occasionally as a triple pulse but two-pulse flashes predominated. At 1940 lightning was observed covering 15° of the horizon and bearing 090° and also 135°. The broad flashes did not appear to have any frequency period, and appeared to be unrelated to each other.

Details of the sightings made on a virtually constant bearing of 125° are as follows:



Each flash was similar and looked like the loom of light, in that no light was seen, but only a very bright loom. This loom had a base 1° above the horizon and extended to about 5° above the horizon. The angle of the loom was estimated to be 20–30°. Very low cloud not more that 1° above the horizon was also noted, though the type was not discernible.

At 1945 the period between flashes varied between 18 and 25 seconds. At 1950 the period between flashes lengthened to between 20 and 60 seconds. The bearing did not alter. It was also noted that this flash appeared either as emanating from a point source radiating upwards, or in the form of an arc similar to the loom of a light. This pulse or arc did not appear in any fixed pattern though the arc always swung from port to starboard.

By 2000 the short periods had lengthened and by 2020 the flashes were from 1 minute to 2 minutes apart.

At 2020 lightning flashes were observed approximately every 1–2 minutes and there was a marked decrease in flashes in other directions.

At 2045 the characteristics were the same as at 2020, with occasional lightning flashes which continued to decrease in frequency.

At 2215 an isolated flash was sighted after 30 minutes with no sightings. At 2235 there was another flash also bearing 125°. At 2400 lightning was observed out to sea. The sky throughout remained clear and the barometer steady. The met. report was filed as usual at 2100.

Mr Champion remarks as follows:

'The only comment that I can make is that air turbulence off East Cape was causing the lightning. In the past I have seen waterspouts off East Cape, caused by westerly winds flowing from north of the cape meeting winds from the south, and the resulting turbulence creating waterspouts. On one occasion there were seven spinning away to the east from the cape—however, the cloud was quite significant at the time.'

Weather conditions at 2000: dry bulb 12·9 °C, barometric pressure 1008·8 mb, wind WSW, force 5–6, sky clear except for the very low cloud.

Position of ship: 37° 11′S, 117° 16′E.

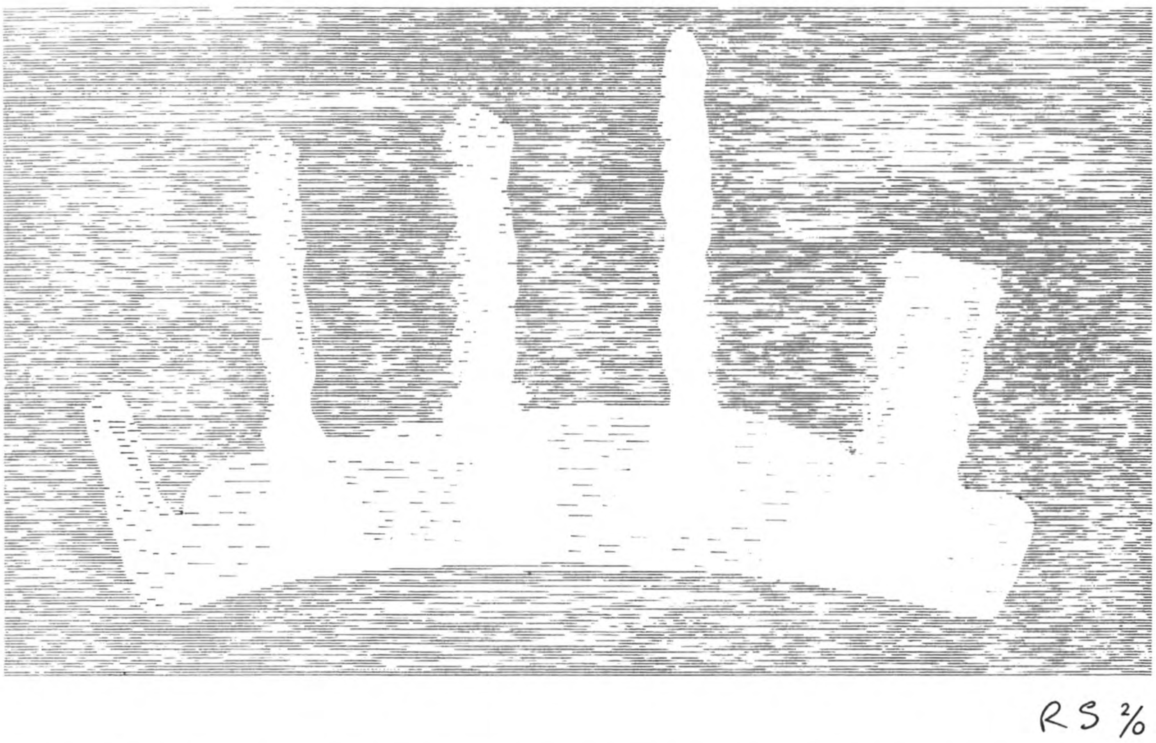
Note. The *Coastal Trader* is a New Zealand Selected Ship.

AURORA AUSTRALIS

Southern Ocean

m.v. *Gazana*. Captain C. A. Hatcher. Melbourne to Panama. Observer, Mr R. Spencer, 2nd Officer.

17 December 1982. At 1300 GMT a dull glow was observed above the southern horizon. By 1325 the glow had developed into a rayed arc of weak to moderate intensity which extended from a bearing of 190°(T) to a bearing of 220°(T) and ranged from approximately 2° above the horizon to a maximum altitude of 23° (measured by sextant). From 1325 to 1330 GMT a particularly bright ray was



observed on a bearing of 200°(T). The arc was milky white and no colours were observed. The period of maximum intensity was between 1325 and 1345. The display lasted until 1420 when the arc disappeared and only a weak glow remained.

Position of ship: 41° 50′S, 177° 00′E.

OROGRAPHIC CLOUD

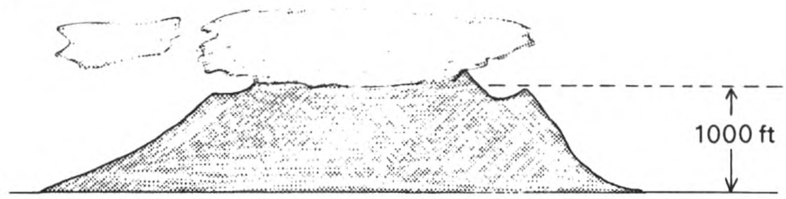
Shetland waters

m.v. *Naticina*. Captain P. Blackshaw. Sullom Voe to Le Havre. Observers, Mr D. Freeman, 2nd Officer, Mr J. Reid, 3rd Officer and Mr M. E. Collins, Radio Officer.

2 October 1982, 0930 GMT. At this time a good example of orographic cloud was sighted over the island of Foula. The cloud was of stratocumulus type, elongated by the wind (see sketch). The cloud appeared to cover the top third of the island. The wind at the time was s'ly, force 4.

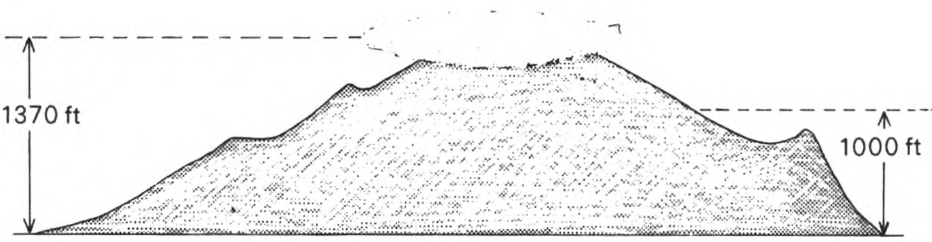
At 1005 GMT the cloud base was observed to be lifting and the cloud itself started to dissolve, finally disappearing at 1015 GMT. It was unfortunately impossible to obtain photographs owing to the strong sunlight.

0930 GMT



Viewed from NW at distance 11·8 n. mile

1005 GMT



Viewed from W at distance 10·0 n. mile
(summit of Foula visible)

Weather conditions (0930 GMT): dry bulb 12·5 °C, wet bulb 10·4, barometric pressure rising steadily, cloud cover 3 oktas, mostly cirrus; (1005 GMT): dry bulb 12·6 °C, wet bulb 9·5.

Ship's course and speed: 213°(T) at 12 knots.

Position of ship: 60° 19′N, 02° 16′W.

CETACEA, FISH AND BIRDS

North Atlantic Ocean

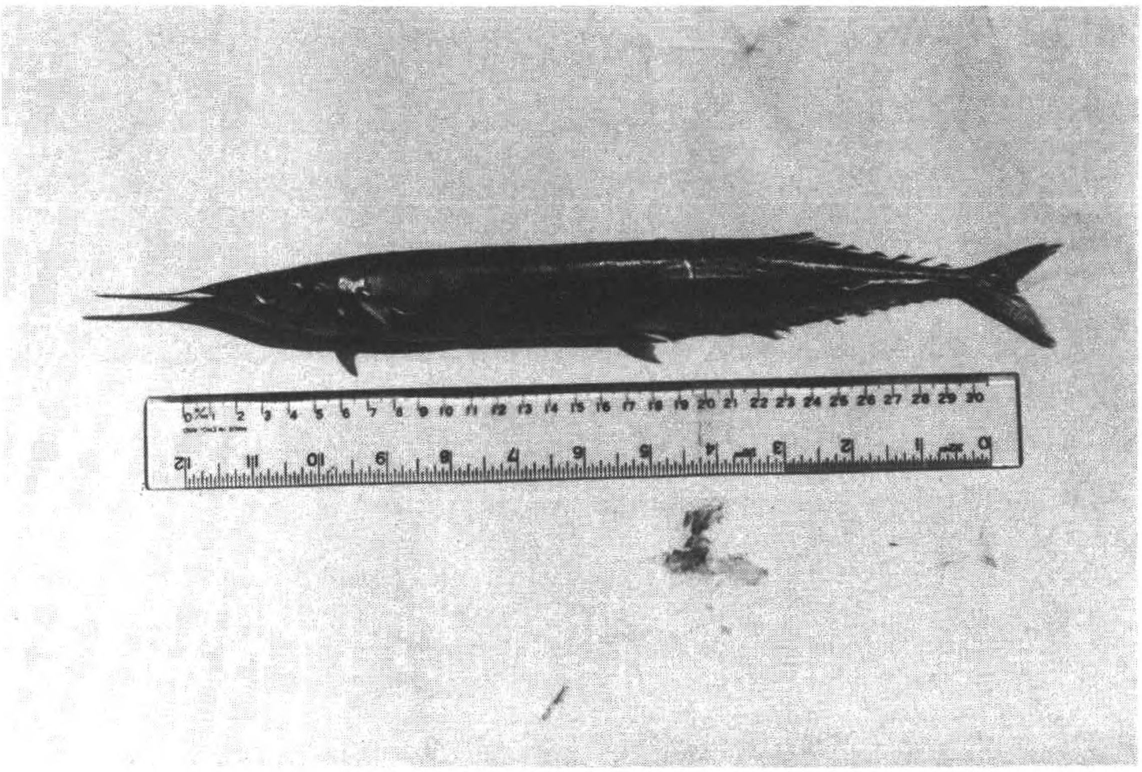
m.v. *Kowloon Bay*. Captain T. J. Illingworth. Port Said to Southampton. Observers, the Master, Mr R. S. Hopkins, 2nd Officer, Mr T. J. Illingworth, Supernumerary 2nd Officer, Mr B. Fletcher, 3rd Engineer, and Cadet G. A. Periez.

7–8 October 1982. At 1424 GMT on the 7th the vessel passed through an area of very active marine life. Forty or 50 porpoises and dolphins and a type of marlin or swordfish were observed and there were many other smaller fish, all of which were leaping out of the water. There were also many seabirds including both adult and juvenile gannets, shearwaters, herring gulls and terns.

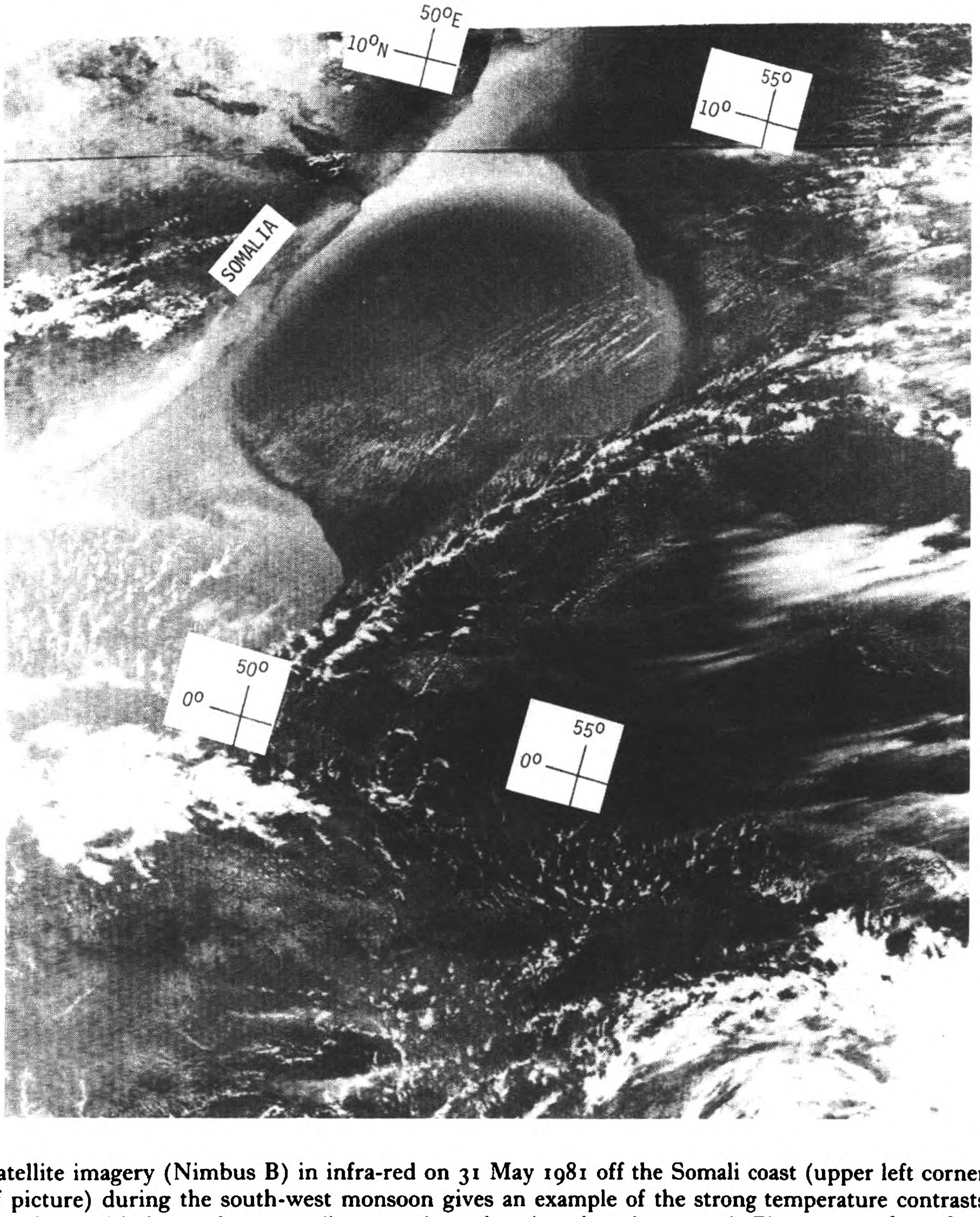
At 0905 GMT on the 8th when the vessel was south of Cape Finisterre about 10 whales were observed to port heading in a direction of 020°(T). The back was black and what was visible of the belly was off-white to grey. One of them also had a grey patch on the rear of its dorsal fin, which was about 45 cm long. The whales were about 4·5 m in length. Half an hour later another six whales were observed leaping over the ship's wake. They appeared to be of the same type but were only about two-thirds as long. Also observed at this time were about 150 terns with black wingtips, 50 gannets, 20 shearwaters, 50 herring gulls, 2 storm petrels and 1 black-headed gull. During the afternoon large numbers of porpoises and small fish were observed.

Position of ship at 1424 GMT on 7 October: 36° 54′N, 09° 00′W.

Position of ship at 0905 GMT on 8 October: 42° 36′N, 09° 30′W.



Saury Pike Skipper found on board m.v. *Mairangi Bay* (*see* page 193).



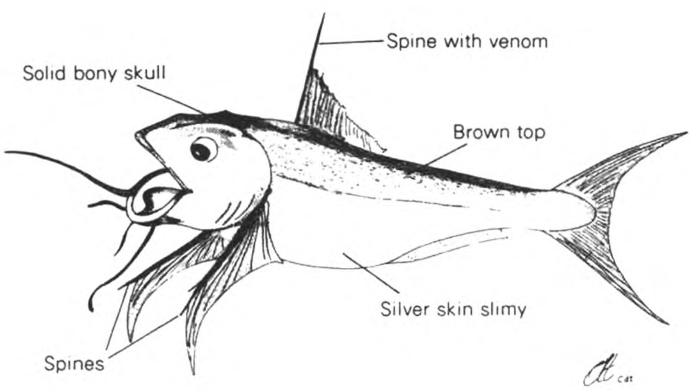
Satellite imagery (Nimbus B) in infra-red on 31 May 1981 off the Somali coast (upper left corner of picture) during the south-west monsoon gives an example of the strong temperature contrasts associated with the northern gyre (in approximate location of northern gyre in Figure 1a, ≈5°N–10°N). A wedge of cool water (light colour imagery) is brought offshore along the edge of the northern gyre (lower left corner of picture) and also where the flow turns offshore to the south of the gyre (again similar to that in Figure 1a). Clouds show up as white in the imagery. (*See* page 218).

FISH

Gulf of Tehuantepec

m.v. *Ardmore*. Captain R. C. Lister. At anchor off Salina Cruz. Observers, the Master, Cadet J. C. Hutchins and other members of the ship's company.

October 1982–January 1983. On several visits to Salina Cruz during this period shoals of fish, believed to have been catfish, were seen swimming on the surface of the sea. Until closely examined the shoals of fish resembled groups of small aquatic mammals. Each shoal consisted of between 25 and 100 individuals and as many as four shoals were seen together. They were normally sighted when the local north-easterly gales were blowing, causing the sea to be disturbed but with only a short fetch.



Accompanying and swimming below the shoals of catfish other types of fish, believed to have been mackerel, could be seen. Whilst the catfish were on the surface herring gulls (or a closely related species) and brown boobies were attracted to the area. They dived into and sat amongst the catfish, apparently endeavouring to catch the mackerel. The catfish remained unperturbed by the antics of the birds.

Position of ship: 16° 10′N, 95° 12′W.

SAURY PIKE SKIPPER

Southern Ocean

m.v. *Mairangi Bay*. Captain J. Cosker. Rotterdam to Melbourne via Cape Town. Observers, the Master, Mr B. L. Brierley, 2nd Officer, Mr H. A. Wren, 3rd Officer and Cadet P. Johnson.

17 October 1982, 1800 GMT. Whilst the vessel was on passage from Cape Town to Melbourne a fish was discovered on the after mooring deck. It was not known precisely how long it had been there but the consensus of opinion was that it was a fairly recent addition to the ship's complement. Having originally thought that it might have been a flying fish that had tried to fly through somewhere just a little bit too narrow, the observers decided to check with the *Illustrated Guide to Marine Life* (Werner de Haas and Freddy Knorr). The only fish which bore any resemblance to the visitor was the 'Saury Pike' Skipper, which according to the reference book abides in the Atlantic and Mediterranean, with no indication that it is known to exist in the southern hemisphere.

It is quite likely that the fish was washed on board, as some time previously the vessel was experiencing heavy following seas and shipping water on to the after mooring deck. (*See* photograph opposite page 192.)

Position of ship: 45° 05′S, 82° 00′E.

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

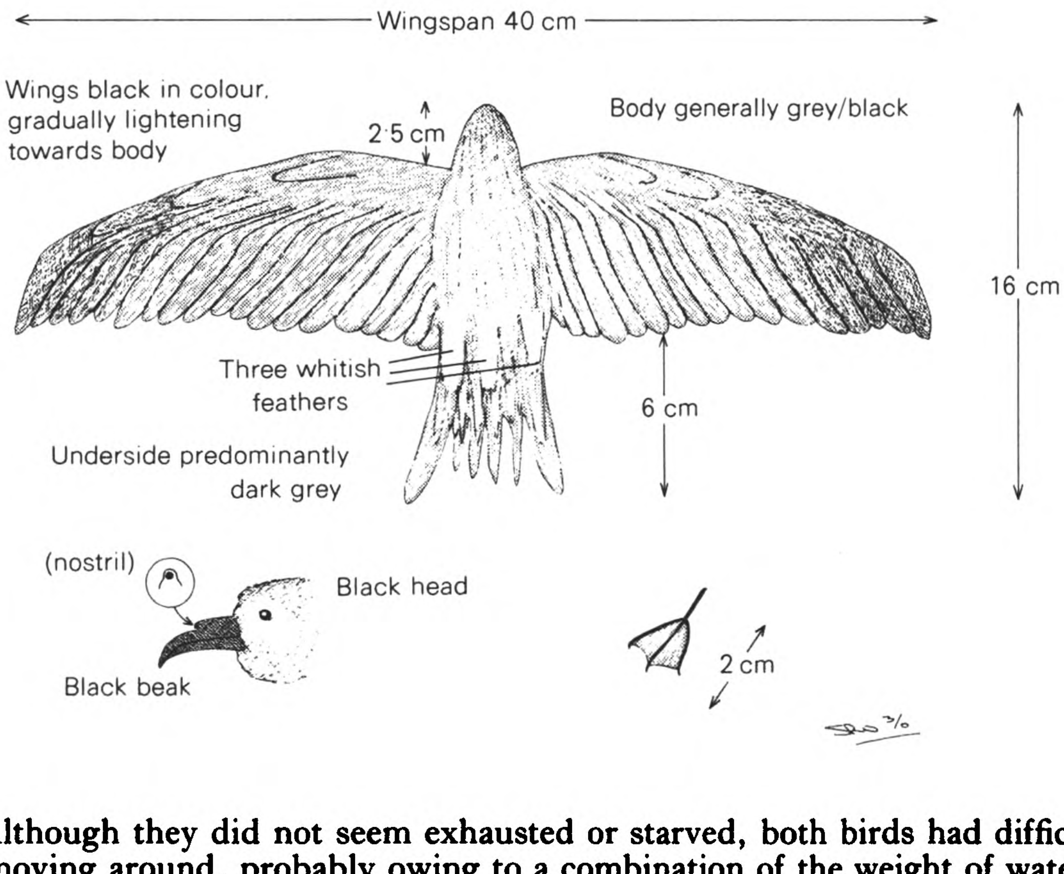
'The fish was indeed a saury pike or skipper, *Scombresox saurus*, a fish not infrequently washed on to ships' decks. Wheeler, in his useful book *Key to the Fishes of Northern Europe* clearly shows that the species is found in temperate waters in the southern hemisphere as well as over much of the North Atlantic (but not the North Pacific or northern Indian oceans: a curiously spotty distribution). There is a further record of a skipper from the southern hemisphere in *The Marine Observer* of January 1980.'

BIRDS

North Atlantic Ocean

m.v. *British Tay*. Captain P. T. Morris. Devonport to Ascension Island. Observer, Mr S. P. Weston, 3rd Officer.

12 November 1982. At about 0930 GMT two birds were found on the boat deck, flapping around and apparently 'soaked'. They were brought up to the bridge deck to enable them to 'dry out' and to be observed more closely. They were mainly dark grey/black in colour and about 16 cm long with a wingspan of 40 cm (see sketch for further details).



Although they did not seem exhausted or starved, both birds had difficulty in moving around, probably owing to a combination of the weight of water in their wings and the unsuitability of their webbed feet on a steel deck.

Later in the afternoon another bird was brought up to the bridge in a similar condition and caked in salt. It was dried off but to no avail as this bird later died. Of the two original birds one flew off during the evening 4–8 watch but the other was still on board the ship at 2400, apparently recovered and 'dried-out'.

The birds were thought to have been storm petrels; it would be interesting to know how they came to be found in such a 'soaking-wet' condition.

Position of ship: 17° 40′N, 17° 43′W.

Note. Captain A. S. Young, of the Royal Naval Birdwatching Society, comments as follows:

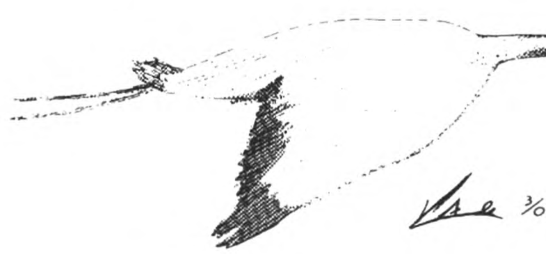
'It is difficult to distinguish these birds from other possible North Atlantic storm petrels, but I would plump for 'Madeiran' (*Oceanodroma castro*). The size and colour are about right, together with the very shallow fork and rump patch (I'm not sure how many feathers constitute this white patch—the bird may have lost one or two!). I wonder if the other storm petrels mentioned were the same or just "quite" similar and so another species?

'With regard to their bedraggled condition, I can only quote my own experience of these little birds alighting on the ship and flapping about in wet areas such as the scuppers, their legs not being strong enough to support or propel them as they are oceanic and only come ashore to breed.'

Bay of Biscay

m.v. *D. C. Coleman.* Captain R. Stanage. Richards Bay to Rotterdam. Observers, the Master. Mr P. A. Chalmers, 3rd Officer, Mr D. MacLeod, Chief Engineer, and ship's company.

2 November 1982. At 1005 GMT six birds flew on to the ship from a NE'ly direction. At first they circled high above the ship in a line of three pairs. The second pass was low across the ship and on the third pass one of them landed on one of the hatches. The others remained circling above the ship for a further 5 minutes before landing. They stayed on board for approximately 30 minutes before flying off in a SW'ly direction.



Their overall length was about a metre and their wingspan rather less. The beak was about 15 cm long and the neck 25 cm. They were of a light grey colour with black tips and edges to the wings. There was a reddish patch on the top of the head. The legs were 60 cm long and distinctly jointed. One of the birds appeared to have been ringed.

They were assun .d to be a variety of wading bird lost on migration, possibly of the Heron/Stilt-petrel/Stork family.

Position of ship: 46° 36′N, 7° 18′W.

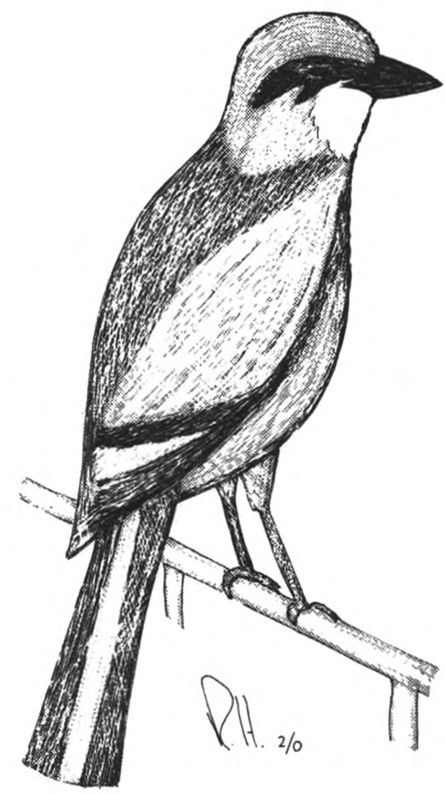
Note. Captain Young comments as follows:

'The excellent description and drawing leave no doubt in my mind that they were Cranes (*Grus grus*). The red on the head and black on the neck are diagnostic. This is a very interesting record—the Cranes were almost certainly migrating from central Europe to winter quarters in southern Spain or North Africa via Gibraltar, but they were unusually far west for the normal direct route.'

Mediterranean Sea

m.v. *Kowloon Bay*. Captain D. G. Brown. Southampton to Port Said. Observers, the Master, Mrs M. A. Brown, and ship's complement.

24 October 1982. From 0800 GMT what was believed to be a Great Grey Shrike was observed on board for several hours, during which it made several unsuccessful attempts to capture a sparrow. It was about 20 cm long and had a large flattish head and a very large black beak. It had a dark bar running through the eye to the back of the head and dropping like a moustache below the eye. The throat was white and the belly greyish off-white. The head, back and wings were medium grey with some dark patches. The wingtips were black, with a white and black bar above. The tail was long, with black stripes down the edges and a white strip down the centre. The underside of the tail was greyish off-white and the legs medium grey.



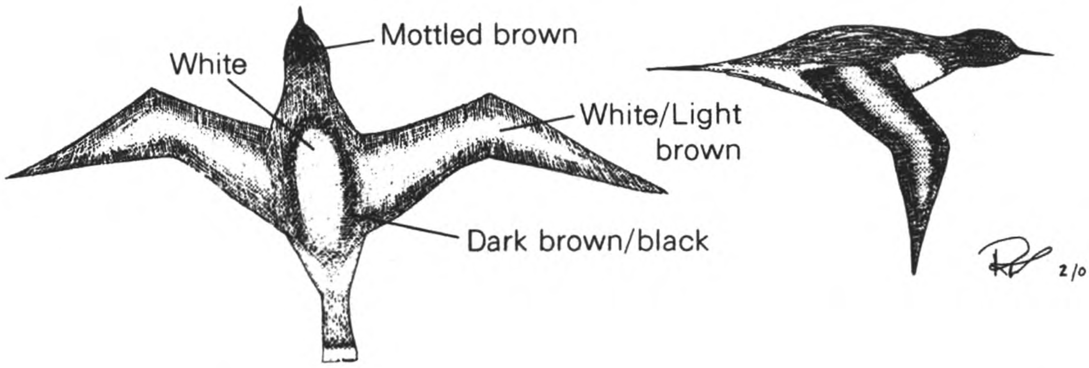
Position of ship: 36° 18′N, 15° 18′E.

Note. Captain Young commends the excellent drawing of a Great Grey Shrike (*Lanuis excubitor*).

Arabian Sea

m.v. *Almeria Star,* Captain J. Calabrase. Aden to Sydney. Observer, Mr R. J. Tucker, 2nd Officer.

6 October 1982, 1030 GMT. A small wader was observed flying around the ship and attempting to land, but it eventually flew off on the appearance of a member of the crew. The bird was about the size of a sandpiper with a mottled brown head, neck, back and upper side of wings. There were white or light brown 'W' markings across the wings, which had light undersides, and the legs were red. Owing to the rapid wing beat and the constantly changing direction of flight it was difficult to determine the wing markings accurately.



Calm seas and light to variable winds had been experienced since leaving Aden. At the time of observation the wind was W'S, force 3, the weather was cloudy, fine and clear, and the seas slight.

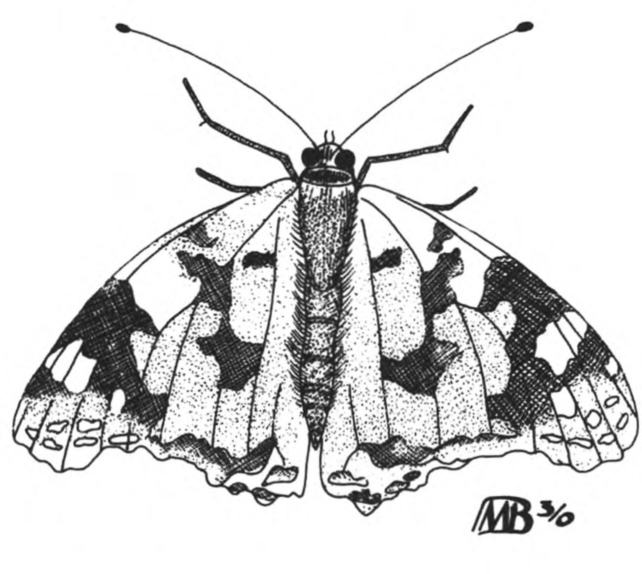
Position of ship: 03° 53'N, 62° 22'E.

INSECTS

North Atlantic Ocean

m.v. *Cape Finisterre*. Captain W. Andersen, Santos (Brazil) to Marina di Carrara (Italy). Observers, Mr N. P. Brewer, Chief Officer and Mr R. Barker, 3rd Officer.

2 October 1982. At 0510 GMT, during the morning 8–12 watch, a butterfly was observed on the starboard bridge-wing deck by Mr Brewer and a sketch was made by Mr Barker. Although this was the first close-up sighting made, a butterfly had been sighted two days previously in the vicinity of 14° 30'N, 21° 50'W. The nearest landfall at the time of the second sighting was Punta Durnford, part of the Spanish Sahara, bearing 110°(T), distance 50 n. mile.



The central wings of the butterfly were orange/red, fading to a pale orange at the lower edges of the wings. The outer lower edges of the wings were brown with distinct white markings. The upper body and head were light brown and the lower body was brown with fine orange rings. The whole of the body was covered with fine brown hair and the underside of the wings was of a mottled fawn and white colour.

The wingspan from wingtip to wingtip was 6·1 cm and the length from head to tip of wing tail was 2·9 cm.

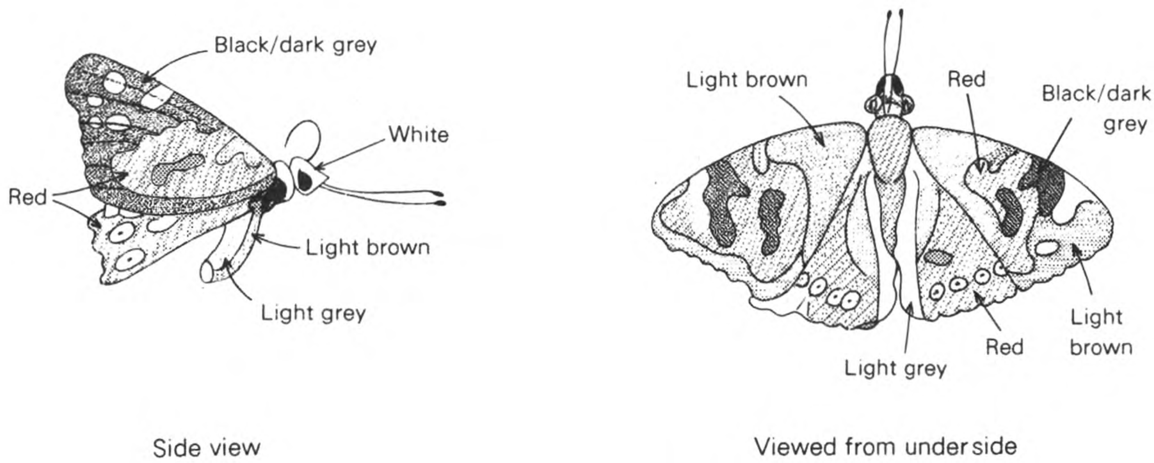
Position of ship: 23° 53′N, 16° 56′W.

Note. Mrs S. M. North, of the British Museum (Natural History) comments as follows:

'The butterfly observed on the *Cape Finisterre* can be identified as *Cynthia cardui* (Linnaeus), the Painted Lady, a highly migratory butterfly found throughout Europe, Asia and Africa.'

m.v. *ACT 7*. Captain D. M. McPhail. Rotterdam to Melbourne. Observers, Mr J. Clayton, Chief Officer, Mr R. Gill, 3rd Officer and Cadet S. Davies.

19 October 1982, 0730 GMT. A butterfly was captured in the wheelhouse. It was probably one of the many which had been observed the previous afternoon being blown by a force 4 NE'ly wind off the coast of Senegal. The nearest land



was Dakar, range 36 n. mile, at 1900 GMT on the 18th. The butterflies were seen for about 3 hours from 1600 to 1900 GMT and over a period of 5 minutes 18 were counted.

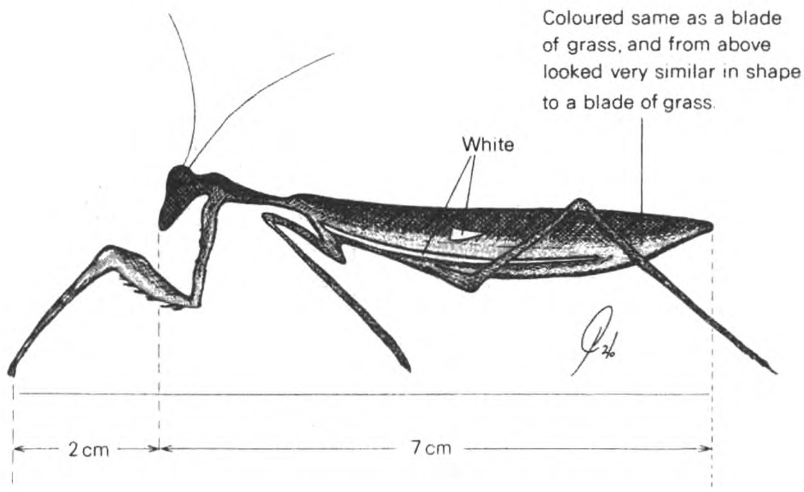
Position of ship: 10° 28′N, 17° 34′W.

Note. Mrs North has identified the butterfly as *Cynthia cardui* (Linnaeus), the Painted Lady, as in her comment on the preceding report from the *Cape Finisterre*.

Moroccan waters

m.v. *Gandara*. Captain G. Hepple. At anchor off Ceuta. Observers, the Master, Mr A. G. Counsell, 2nd Officer, Mr C. S. Card, 3rd Officer and Mr R. J. Leeds, Radio Officer.

9 October 1982, 1200 GMT. One insect only as shown in the sketch was observed. It remained motionless throughout, except for the operation of cleaning its forelegs by appearing to chew them, starting at the end and working its way up as far as it could stretch. Its head was occasionally tilted to the left and when it was approached it would 'eye' the observer up and down and follow his movements until he was out of sight. The insect left the ship during the night.



Weather conditions: dry bulb 19·8 °C, wet bulb 17·6, wind NW, force 3.
Position of ship: 35° 51′N, 05° 19′W.

Note. Mrs J. Marshall, of the British Museum (Natural History), comments as follows:

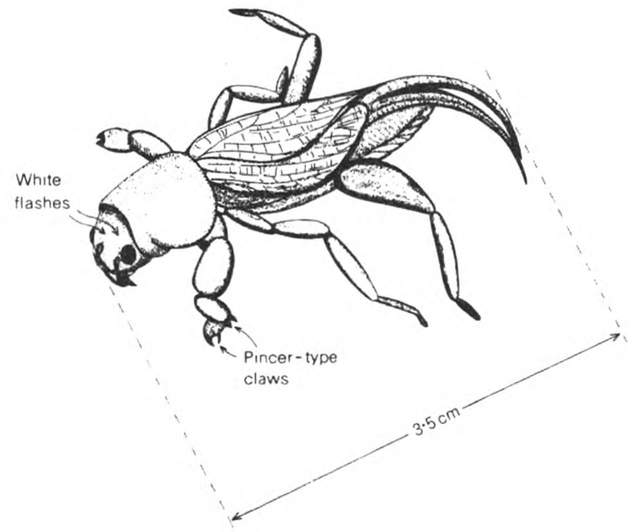
'The specimen illustrated is a praying mantis, but insufficient detail is shown to enable an identification to be made.'

Nigerian waters

m.v. *Overseas Argonaut*. Captain T. S. Nurcombe. Escravos River (Nigeria) to Cayman Island. Observer, Mr T. A. Edwards, 2nd Officer.

22 November 1982. The insect shown in the sketch was one of many species found on board after the vessel had loaded off Escravos. It was coloured in various shades of brown and there were two distinct white flashes between the eyes.

Position of ship: 05° 35′N, 05° 14′E.



Note. Mrs Marshall comments as follows:

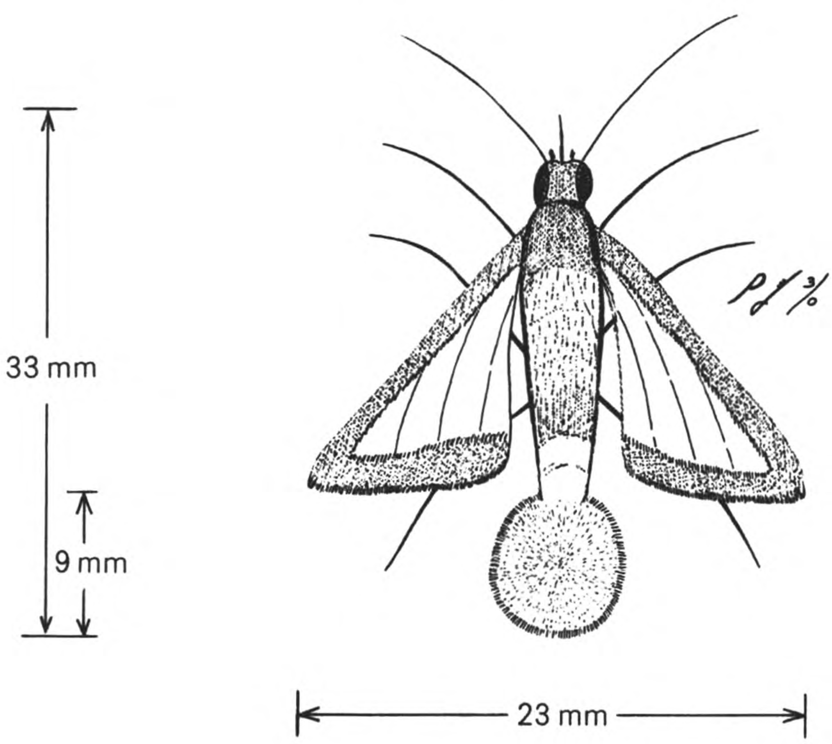
'The specimen illustrated is a mole-cricket, probably *Gryllotalpa* sp., and probably a female, which would make identification to species almost impossible. There are several African species which are similar in appearance but may be distinguished by using the songs produced by the males.'

Cameroon waters

m.v. *London Enterprise*. Captain A. D. Gillie. At anchor at Kole Oil Terminal. Observers, Mr G. J. Smith, Chief Officer, Mr J. L. David, 2nd Officer, Mr P. N. Thompson, 3rd Officer and Mr D. Carey, Electrical Officer.

6 December 1982. At about 1200 GMT the moth described and shown in the sketch was found, alive, on the bridge. The most immediately obvious and striking feature was the 'pompon' tail of the moth which was a dull orange in colour and far larger than its head. This was constantly moving in dipping arcs as the creature was at rest on a window, swaying and swirling as if it were an enticing lure, though the moth certainly did not look large enough, or aggressive enough, to cope with anything that could have been attracted to it. On closer inspection the 'ball' of its tail could be seen to be covered entirely in minute cilia-like filaments, that were themselves also swinging to and fro—much like the fronds of a sea anemone; these 'hairs' were fine orange in colour with black speck tips, no more than a millimetre in length.

This 'ball' was attached to the abdomen by three thick bands of darker brown scale-like muscles leading to a lighter brown abdomen and then a comparatively minute head with burgundy red eyes on either side of a thin black probe proboscis which was coxcombed from 'forehead' to 'chin' much like the prow of Jules Verne's submarine *Nautilus*.



Where the wings joined the abdomen there were lines of delicate, white silky threads, running fore and aft. The wings themselves were edged all around with a thin dark brown band and on the trailing edges there was a second darker brown/black band. The centre part of each wing was almost translucent while shining silk-like with fine, fine traces of pale violet venations.

The six legs looked brittle-bleached, a grey-white colour with three sections each and about 10 cm long. It also had three 'feelers' though one of them was not immediately obvious as it was folded flat against the insect's underside. The entire underbelly area was white.

Position of ship: 04° 06′N, 08° 30′E.

Note. Dr K. Sattler, of the British Museum (Natural History) comments as follows:

'The neat sketch and detailed description submitted have enabled our expert to identify the observed specimen as the pyralid moth *Diaphania indica* Saunders (Pyralidae: Pyraustinae), a species widespread through southern Asia and Africa.'

Venezuelan waters

m.v. *Charon.* Captain H. B. Gobey, Pascagoula (Mississippi) to Caripito (Venezuela). Observers, the Master, Mr A. Bishop, 2nd Officer, Mr F. J. Tolton and Mr W. Kirrane, 3rd Officers, Cadet A. C. Trueman and Mr M. Grant.

2 November 1982. While the vessel was awaiting the tide over the bar at the entrance to the San Juan River in east Venezuela numerous moths landed on deck. These moths are known to the local inhabitants as 'Parmeluta' or the Witch Butterfly for reasons which become apparent when they are encountered. The moths are attracted by light of any description and accordingly all lights including anchor lights were extinguished in an attempt to ward them off. As the light of day came they were found to die off, but even when dead they produced a dust which caused severe irritation of contact areas of human skin. The effect varied from person to person, but it quickly spread round the body, including non-contact areas, and caused the victim total discomfort. Numerous creams were applied but they gave only temporary relief. The rash takes 3 or 4 weeks to disappear, but with two people it did not appear until 2 days after leaving the area. In total 10 out of 29 were affected. While on deck during the hours of darkness all personnel were completely covered as a precaution. Some insects landed on the ship and were carried to Caripito town itself, where the locals show an amazing fear of these Parmeluta.

It was assumed that it was the breeding season as the bodies of the dead insects contained numerous eggs. They looked somewhat like a sensational moth with a large body of a dirty brown colour and light grey or silver wings, overall length about 2·5 cm.

Position of ship: 10° 05′N, 62° 39′W.

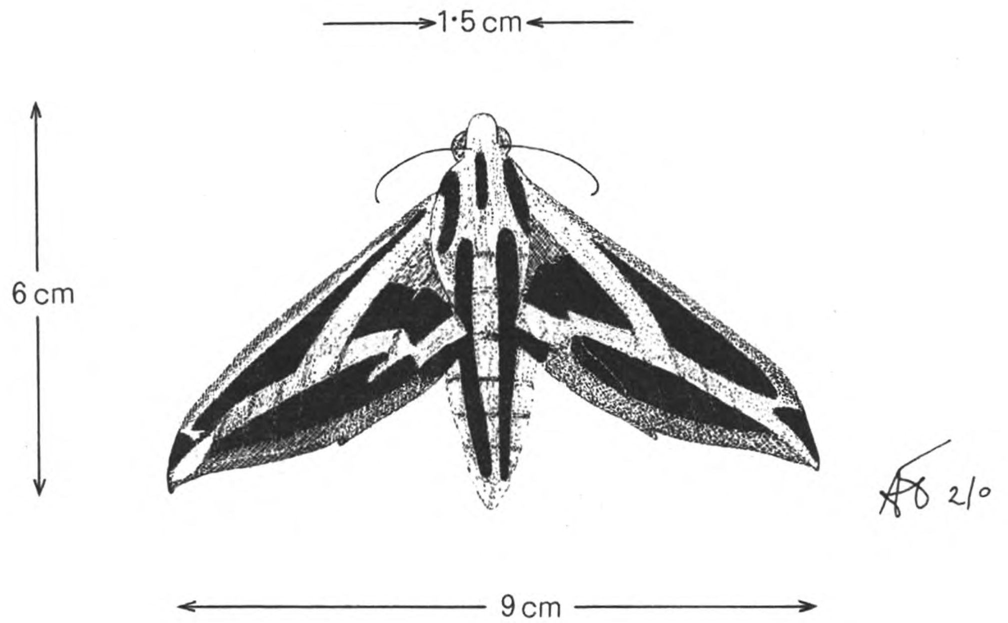
Note. Mr Allan Watson, of the British Museum (Natural History) comments as follows:

'From the general gist of the report I would guess that the insects belong to the Emperor Moth family Saturniidae, and that the genus of moths concerned was probably one known as *Hylesia*. However, without a specimen, I cannot confirm this.'

North Pacific Ocean

m.v. *Columbia Star*. Captain A. H. White. Balboa to Los Angeles. Observers, the Master, Mr A. Tibbott, 2nd Officer and Mr D. G. Robbie, 3rd Officer.

5 December 1982. At 2312 GMT a moth invaded the area of the chart room.



At the time the vessel was approximately 120 n. mile off the coast of Nicaragua. Although the wind was offshore NE'E, force 2–3, it was felt that the moth had joined the vessel sometime during the Panama Canal transit on 3 December.

Position of ship: 11° 17′N, 88° 55′W.

Note. Mr Watson states that the sighting was of a common tropical American Hawkmoth, *Eumorpha fasciatus* Sulz.

BIOLUMINESCENCE

North Atlantic Ocean

m.v. *Qarouh*. Captain R. J. S. Pearce. Wilmington (North Carolina) to Gibraltar. Observers, Mr G. Cowling, 3rd Officer and Mr K. Bacha, Quartermaster.

20 November 1982, 0030 GMT. The Aldis lamp having been shone on the sea, numbers of small marine organisms were observed to glow brightly on the surface. The colours varied in intensity and colour, being golden, silver and green. The organisms were widely spaced and were observed to the limit of the light. The effect was likened to that of 'cat's eyes' illuminated. The phenomenon was observed for two hours.

Weather conditions: dry bulb 18·0 °C, wet bulb 16·5, sea temperature 19·1, wind E'ly, force 2, no cloud, low N'ly swell, rippled sea.

Position of ship: 34° 47′N, 55° 15′W.

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

'The account is very similar to that of the *D. C. Coleman* below. Myctophids were also probably responsible in this case.'

South Atlantic Ocean

m.v. *D. C. Coleman*. Captain R. Stanage. Richards Bay to Rotterdam. Observers, Mr P. A. Chalmers, 3rd Officer and Cadet D. A. Protheroe.

18–19 October 1982. At 2200 GMT on the 18th a variety of marine bioluminescence was observed. This was of the 'white water' type intermingled with greenish glowing patches. The bioluminescence extended out of the white water to passing phosphorescent wheels. These wheels were 2½–3 m in diameter and the greenish patches were marble-to-tennis ball sized. At 2330 GMT a water sample was taken and luminosity was observed. The wheels did not appear to be rotating.

At 1945 GMT on the 19th, luminous glows were noticed in the ship's wash. When the Aldis lamp was switched on and shone at the sea surface, the sea was a mass of amber and white lights, varying up to about marble-sized. In the beam fish of approximately 10 cm in length could be seen jumping at the light. No fine details could be seen, but the fish appeared to be silvery and were assumed to be myctophids.

Position of ship on 18 October: 07° 32′S, 04° 20′W.
Position of ship on 19 October: 04° 19′S, 06° 50′W.

Note. Dr Herring comments as follows:

'The greenish patches may, from their size, have been comb-jellies which have a greenish luminescence. The statement concerning phosphorescent wheels is interesting as these are not normally observed in the Atlantic and are usually very much larger in size. Could they have been local eddies caused by the ship's passage?

'I am sure the identification of the amber and white lights in the beam of the Aldis lamp as myctophids is correct.'

ABNORMAL REFRACTION

Bass Strait

m.v. *Gazana*. Captain C. A. Hatcher. Panama to Geelong. Observers, Mr R. Spencer, 2nd Officer and Mr M. G. Welsh, Senior Radio Officer.

6 November 1982. At 0610 GMT what appeared to be land features were observed on the horizon; at the same time the horizon ahead of the vessel became distorted and gave the impression that the vessel was approaching a solid wall of water. Smoke which was presumed to have originated from bush fires on the mainland was beginning to cover the sky from the west and by 0700 GMT it had completely covered the sky, making the sun a deep orange colour. The nearest land at this time was 85 n. mile away.

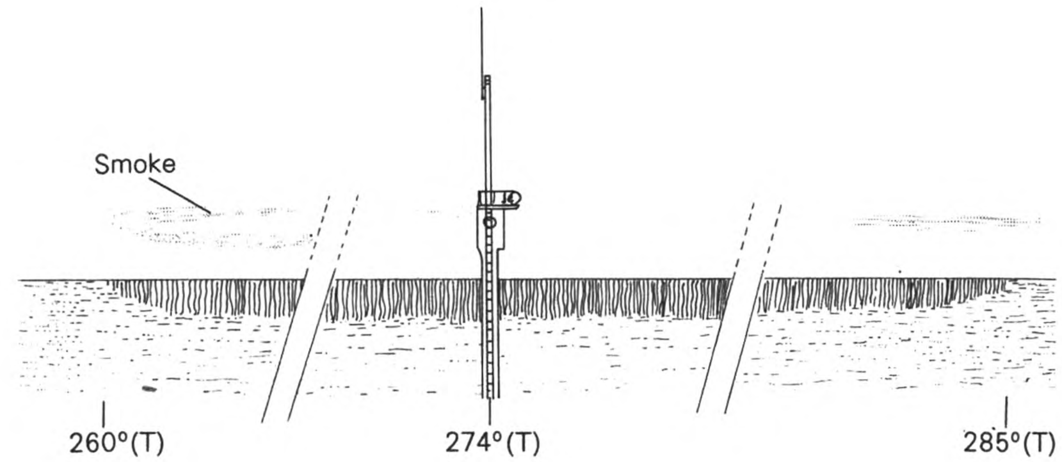
During this period marked fluctuations in air temperature were observed as follows:

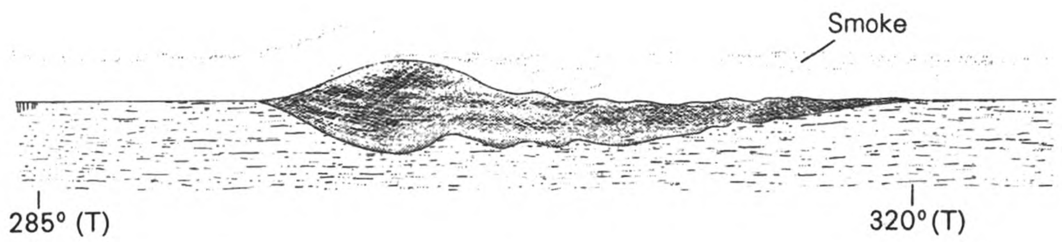
0610 GMT: dry bulb 25·6 °C, wet bulb 17·0.
0620 GMT: dry bulb 21·6 °C, wet bulb 17·0.
0635 GMT: dry bulb 24·7 °C, wet bulb 17·0.

At this time and for several hours afterwards exceptional radar detection ranges were observed, for example Bars West Light Vessel at 45 n. mile.

Weather conditions at time of observation: Wind NW, force 2, sea slight, sea temperature 18·8 °C, barometric pressure 1007·2 mb.

Position of ship: 39° 12′S, 149° 01′E.



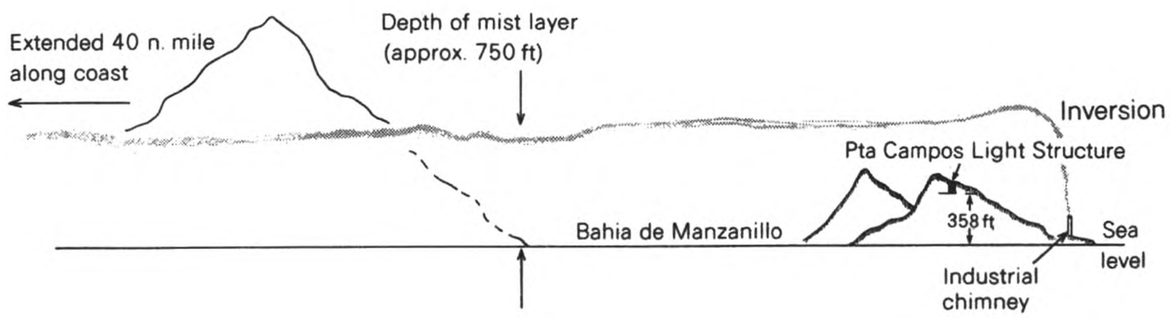


INVERSION LAYER

Mexican waters

m.v. *Columbia Star*. Captain A. H. White. Balboa to Los Angeles. Observers, the Master and Mr A. Tibbott, 2nd Officer.

8 December 1982. At 1330 GMT smoke rising from the chimney of a large industrial works was observed to strike a 'ceiling' and spread out horizontally upwind. The smoke capped a layer of mist and was observed to extend 40 n. mile along the coast. An indication of the depth of the layer was obtained from the fact that the height of the Pta Campos Light Structure (358 ft) was approximately half the height of the layer. The initial peak in the smoke layer above the chimney was probably the result of the kinetic energy of the rising smoke causing the smoke to penetrate the inversion layer.



Weather conditions (13 n. mile off the coast): Dry-bulb temperature 27·6 °C, wet bulb 22·9, barometric pressure 1010·9 mb, wind E'ly, force 2–3, cloud cover 7 oktas of stratocumulus and small elements of cumulus.

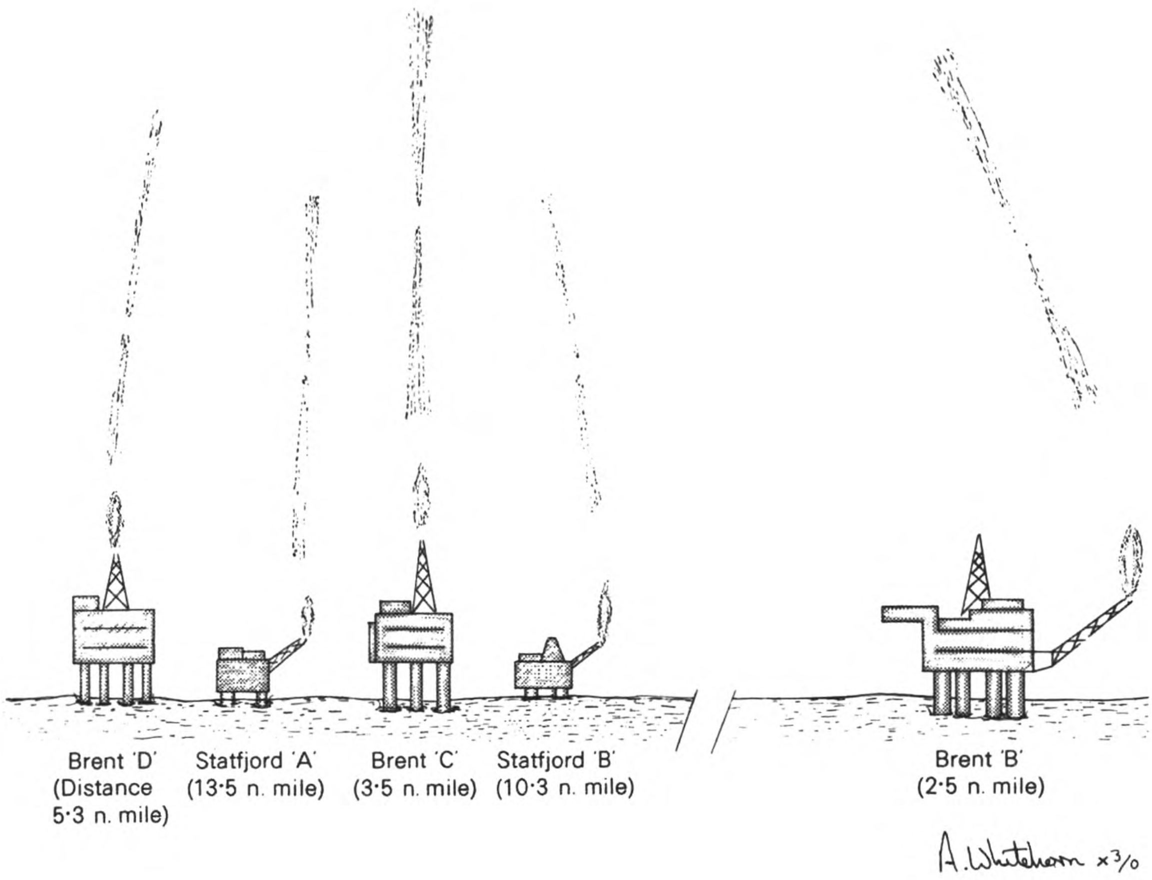
Position of ship: 18° 51′N, 102° 29′W.

COLOURED RAYS

Norwegian Sea

s.s. *Drupa*. Captain B. Bowtell. At Brent Loading Spar. Observers, Mr C. McKay, 3rd Officer and Mr A. Whitehorn, Extra 3rd Officer.

28 December 1982, 1940–2110 GMT. At this time six very distinct orange-coloured rays were observed. They were very narrow, resembling searchlight beams except that the edges were not so well defined, and extended from 15° above the horizon to approximately 45° above the horizon. Each ray seemed to be centred over the marine flares in the oilfield to the north of the vessel. The rays gave the impression that if extended they would have met at the zenith. During the period of observation small gaps appeared in these bands for a time and then closed up again. A conversation with the field Met. Office gave no definite reason for these rays, although it was agreed that it was an effect of the flares in the fairly still conditions prevailing at the time. The sketch shows a view of the sky looking ENE; the Brent Flare in the east has been omitted. The background sky was dark with no visible cloud. The moon's azimuth was approximately 100°(T) and its altitude 70–80°. At 2010 GMT the cloud coverage opened and the brighter stars were visible; the rays faded at this point.



Weather conditions: dry bulb 6·0 °C, dew-point 0·0, barometric pressure 1025·2 mb, wind SW'ly, force 3, no low or medium cloud, veil of cirrostratus with very small close-fitting lunar halo.

Position of ship: 61° 03'N, 01° 40'W.

VOLCANIC ACTIVITY

North Pacific Ocean

m.v. *Arafura*. Captain R. M. Coates. Brisbane to Yokkaichi (Japan). Observers, the Master and ship's company.

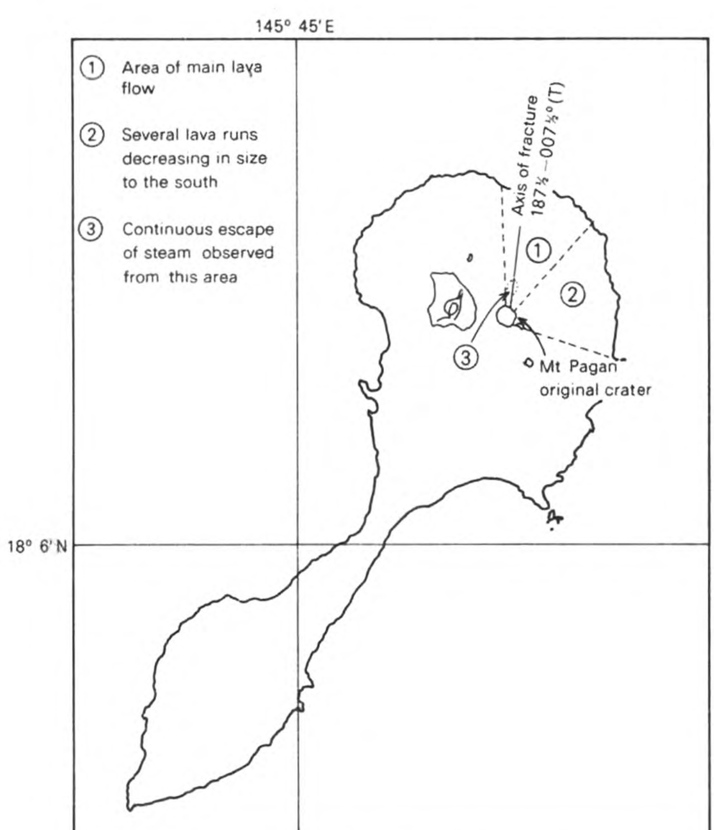
23 November 1982. The vessel passed 5 n. mile off the north-eastern shore of the island of Pagan and this afforded an ideal opportunity to observe the results of the volcanic activity reported earlier in 1981. Mount Pagan dominates the north-eastern portion of the island and the main areas affected by the eruption are the northern, north-eastern and eastern slopes. What was previously a fairly conically shaped mountain now has a large gash down the northern face, extending from the peak down to an altitude of approximately 300 metres above sea level. The axis of this fracture runs approximately N'E–S'W and is about 30 metres deep at the top.

The main flow seems to have been down the northern slope but there are also several large flows on the eastern side. A continuous flow of steam was being emitted from the gash in an area about 130–170 m below the original break. There were heavy ash deposits on the greater part of the mountain area.

Although there are large areas of devastated vegetation, the eastern areas close to the shoreline appear to be making a minor comeback. There appear to be several relatively healthy trees in the area.

Unfortunately at this time of year the sun is not in a favourable position to provide sufficient direct light on the northern slopes to allow detailed observation of this area, large sections of which are covered with ash and/or lava and are consequently obscure when in shadow.

The plan of Pagan Island was traced from Chart BA 910 and is intended to help illustrate some of the details observed.



Position of ship: 18° 09′N, 145° 48′E.

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

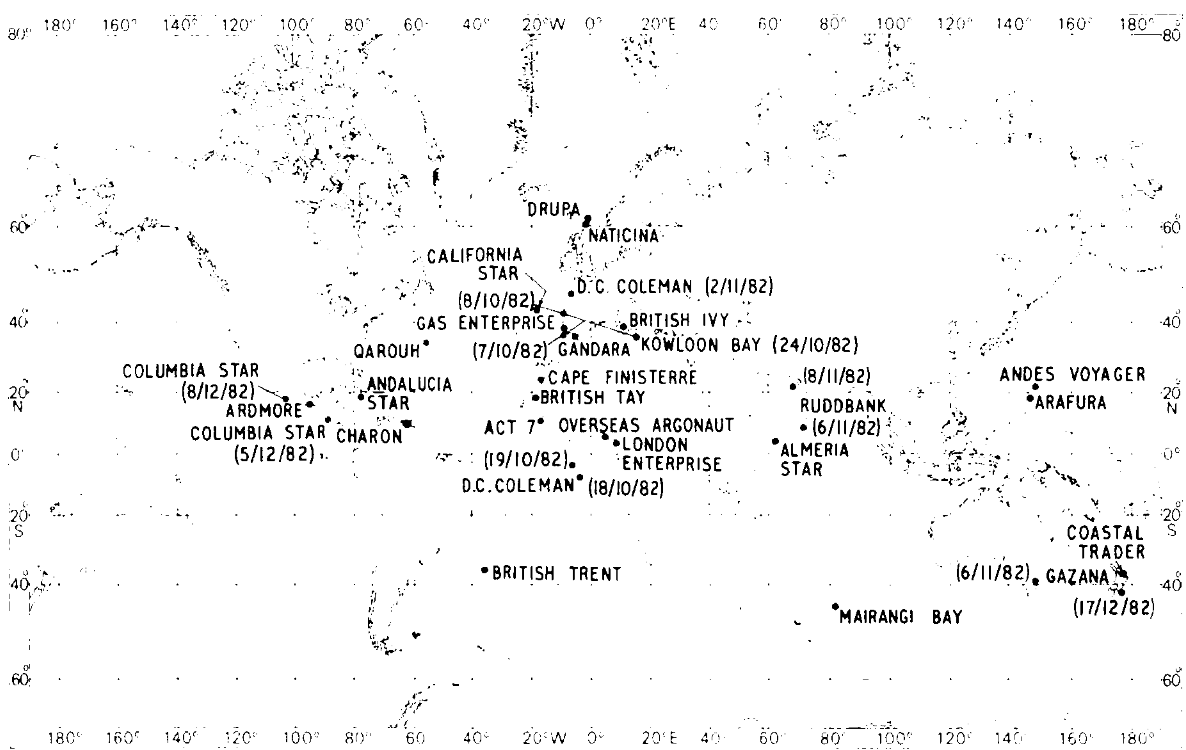
UNIDENTIFIED PHENOMENON

North Pacific Ocean

m.v. *Andes Voyager*. Captain G. N. Gaunt. San Antonio (Chile) to Pusan (Korea). Observers, Mr G. P. Ansell, 2nd Officer and Mr L. Moran.

7 December 1982, 1440 GMT. A very large meteor or re-entering satellite was observed for about 6 seconds. It first appeared 11° below Dubhe bearing 033°(T), was seen to pass through Orion, and finally disappeared on a bearing of 213°(T), altitude 15°. As it was so bright, only an estimate of approximately half the brilliance of the moon in its last quarter can be made (the time of the last quarter being 1553 GMT on 7 December). The silver trail persisted for 6½ minutes with the naked eye and for a further 3 minutes with the aid of binoculars. The persistence of the trail was greatest between Dubhe and Rigel, with the latter part of the trail dissolving much more rapidly. The trail itself seemed to have two distinct parts, viz. two bright edges and a fainter middle part. The weather was excellent, with good visibility and 2 oktas of small cumulus.

Position of ship: 22° 16′N, 147° 51′E.



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

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The Meteorological Office Main Marine Data Bank*

By R. J. Shearman
(Meteorological Office, Bracknell)

Summary

This paper describes the development of the Meteorological Office archive of marine data. There is some discussion of the limitations of the data and a brief outline is given of the services, based upon analysis of the data in the archive, available to industry.

1. Introduction

Marine data have been collected from the birth of the Meteorological Office in the mid 1850s and indeed the Office owes its existence to concern about the effects of adverse weather on maritime operations and loss of life at sea. In this paper some idea is given of the scope of the Meteorological Office archive of marine data, the difficulties in preparing and using it, and an indication of the services available to industry as a result of its development.

The main source of data has always been observations made by deck officers during the course of their normal duties aboard merchant ships. Data are also received from light-vessels and ocean weather ships, and in more recent times from buoys, oil and gas platforms, and soon from satellites. Figure 1 summarizes the main sources of data.

Most of the maritime nations collect and archive marine data from ships of their national merchant fleets regardless of the position of the vessel at the time the observation was made. Since the position at any time is known only by the operator, meteorologists studying particular oceanic areas used to find it difficult to discover just how many ships were in the area at any given time and, hence, how representative their own national archive might be.

In the early 1960s the National Meteorological Services of a number of countries, under the auspices of the World Meteorological Organization (WMO), nominated nine countries each of which was to be responsible for the collection and archiving of marine data from a nominated area. Figure 2 shows the area of responsibility of each of the eight countries remaining in the scheme. All countries send data from their ships to the collecting centre for the area in which the ship happens to be at the time the observation was made. This exercise in international co-operation is working well, aided by modern computer techniques for sorting and exchanging data. Thus, under the provisions of WMO Resolution 35, the Meteorological Office has a complete archive of marine data for the North Atlantic from 1960 to date.

2. The development of the Meteorological Office Main Marine Data Bank

Meteorological data from British ships had been keyed on punched cards before the Second World War, and the process was continued during and after the War. A major effort was made in the late 1940s to accelerate keying of historic data so that much of the contents of logbooks held in document archives

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* This is an updated version of an article having the same title which was published in the January 1983 edition of the *Meteorological Magazine*.

was transferred to cards. Sorting and analysis of data were still relatively laborious, relying on the electro-mechanical Hollerith machine. During the 1960s some marine data were stored on magnetic tape, and computer analysis became possible, but little serious effort had been directed towards the historic data.

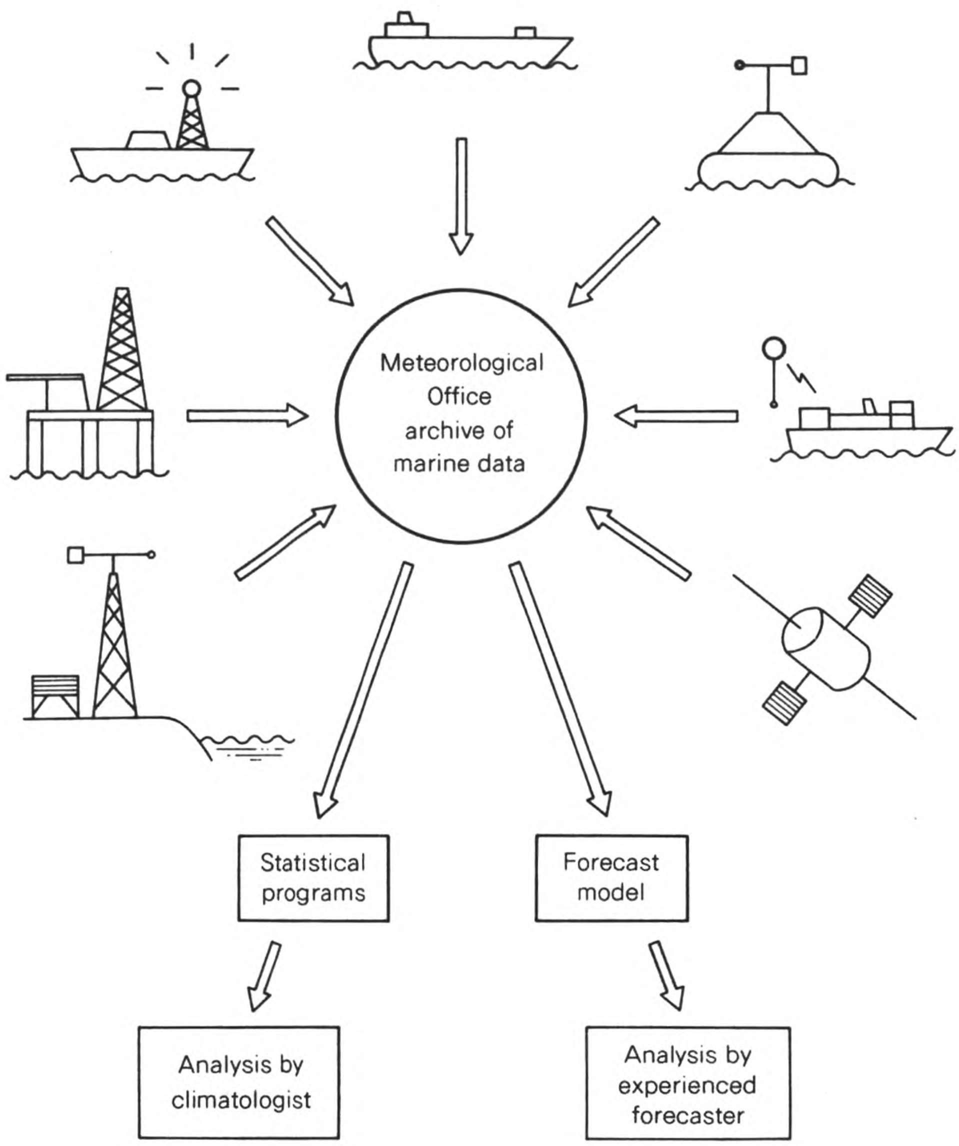

Figure 1. Schematic representation of the Meteorological Office Marine Data Processing System.

In 1972 the Meteorological Office purchased an IBM 360/195 computer and also set up a Systems Development Branch to produce software systems for the new machine. One of the projects allocated to the new branch was to sort and archive the historic marine data, to develop a system to deal with the data collected under the provision of WMO Resolution 35, and to merge these data with those from other sources. At about the same time an international project to extract and archive Historic Sea Surface Temperatures (HSST) and some other marine meteorological parameters was started. The United States Climatological Data Center (Asheville) was the leading organization, largely because

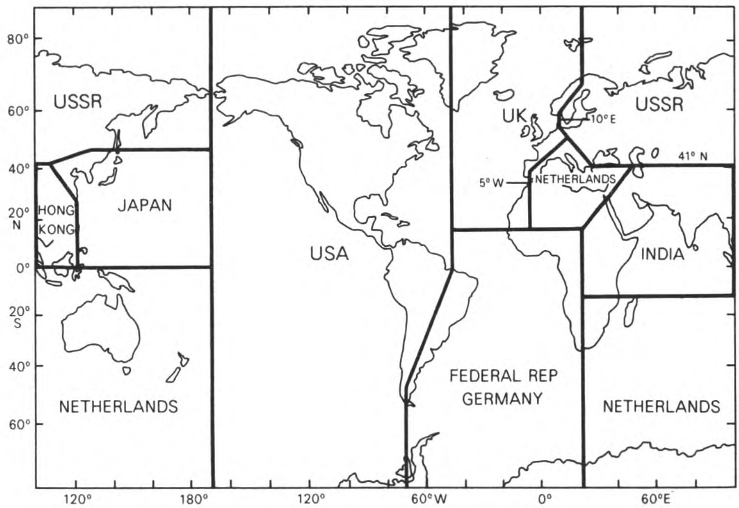

Figure 2. Areas of responsibility of eight countries acting as Data Centres under the provisions of WMO Resolution 35.

of its ordered data base which was considerably in advance of that held by any other centre. The timing of the project was unfortunate as it diverted effort from the main marine data bank to produce a data base (HSST) that was scientifically valuable but not of great interest to commercial operators.

At first sight it may seem a simple process to create a data bank from data already on punched cards. The reality was very different; the cards had been produced with little quality control and without regard to coding changes and so it was necessary to produce programs to cope with each different code form and hybrids which worked on mixed codes. Hybrids were necessary because mariners often did not change codes on the agreed date and sometimes the change-over was spread over a year or two.

Many other problems were found and solved: for example some ships timed observations by GMT, others by local time, and some even by ship's watches. The whole process was complicated by the amount of data, estimated at about 40 million individual observations. This total included a global collection of data purchased from the United States Climatological Center in the late 1960s and known as TDF 11 after the tape shelf number used for storage in Asheville. Historic German data acquired in 1945 were also added. One difficulty in merging data from a number of different sources is avoidance of duplication, so software had to be developed to identify and remove duplicate observations.

The data bank has been designed for direct access. This means, in principle, that data for a given location and time can be extracted directly, by use of comprehensive indexes, thus avoiding a sequential search. In this respect it is more advanced than some other archives which use sequential storage on magnetic tape with a separate record of what is contained on each tape. At present, however, the Meteorological Office archive is also in advance of technology, because direct access devices of the mass storage type, which have sufficient capacity to accommodate the entire meteorological data archive (Shearman, 1980), are not yet available. Thus the data are still stored on magnetic tapes, limiting the speed of access. Transfer of the data bank to an appropriate mass storage system, when available, should be relatively easy without reformatting.

The final stage of development of the data bank has depended upon further international co-operation. Exchange agreements have been made with the United States, Netherlands and the Federal Republic of Germany so that all available data for their respective areas of responsibility can be added to the data bank. Arrangements have also been made to purchase the Hong Kong collection. Figure 3 shows the current status of the main marine data bank.

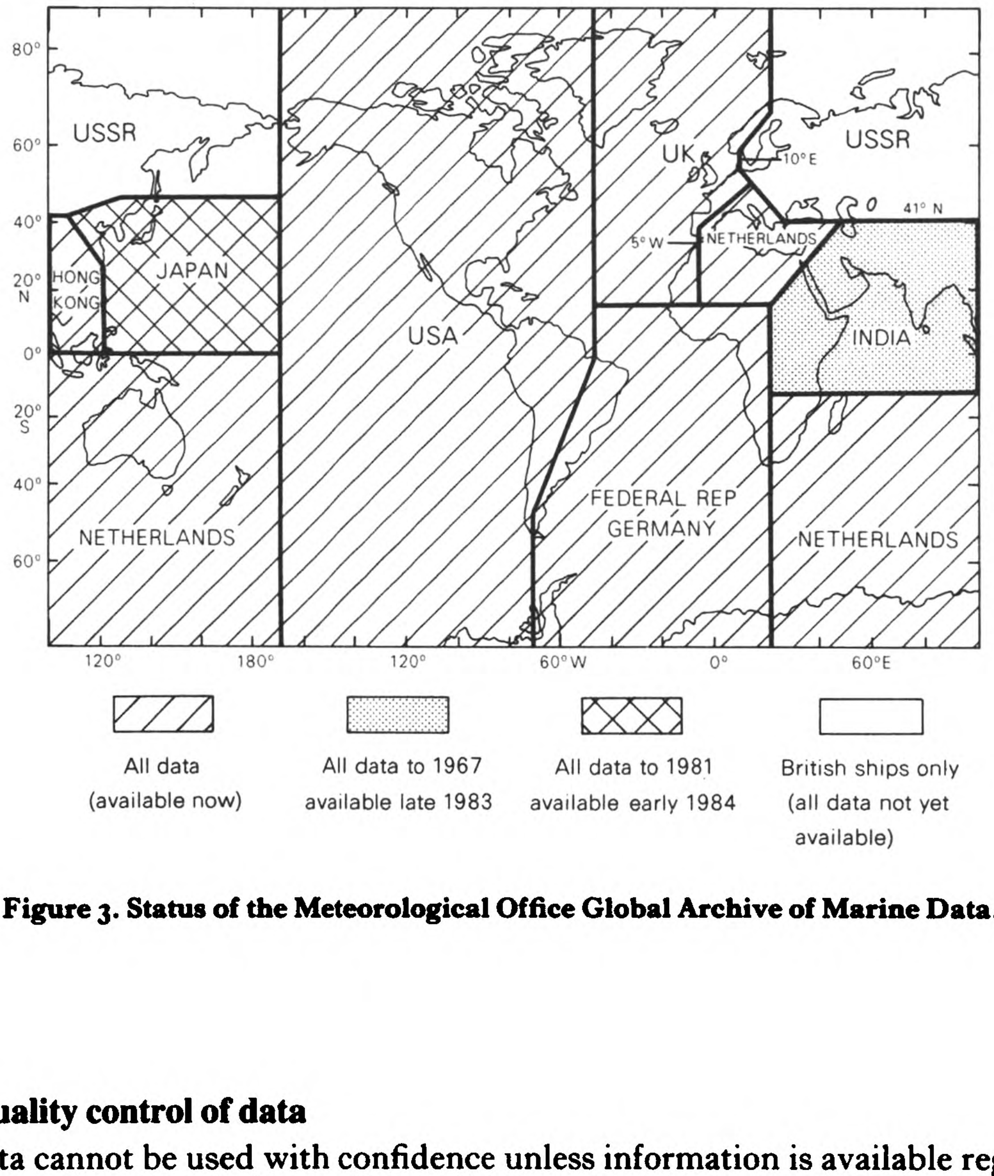

Figure 3. Status of the Meteorological Office Global Archive of Marine Data.

3. Quality control of data

Data cannot be used with confidence unless information is available regarding their quality. Clearly it was impossible to rely upon a manual scrutiny of the vast amount of marine data to be processed, and so a computer-based quality-control system was developed. The computer programs were designed to be used on historical data and also to process future British and foreign data. Historic data originating before 1960 were quality controlled entirely automatically, while data after 1960 were also subjected to some manual verification. The historic data received only 'second-stage' quality control whereas contemporary data are subjected to a two-stage computer check. There is an initial brief scrutiny of the manuscript logbook when it is received to identify obvious coding errors followed by the first stage of computer checking which consists mainly of fairly crude range checks and is designed to screen keying and other gross errors. The second stage checks the internal consistency of each observation and also carries out some more detailed range checking using background fields of air and sea temperature. After each stage the suspect data are either rejected or manually amended. During second-stage quality control the reason for any change that has been made is stored, together with the original data, in a separate, but cross-referenced, quality control data set. This technique ensures that original data are never lost and may be restored if necessary.

Data from other countries are processed in the same way, except for the initial logbook scrutiny which cannot be made. Areal quality control, based on comparisons with surrounding observations are widely practised with land data, is not attempted because the observing network is in a state of flux as ships move between ports. Thus the selection of known reliable 'neighbouring' observations is almost impossible, though it would be possible to use analysis techniques from the numerical modelling schemes to perform some areal checking. However, such methods are based upon pressure fields so that the related wind checking is relatively coarse and aimed at achieving a comparatively smooth field. Similar checks are available for temperatures. It is unlikely that such methods would be any more effective than those based on range checking with background fields. If they were made more rigorous, the data could be too heavily smoothed; legitimate climatic extremes could then be lost. The quality-control routines are used on data from merchant ships, light-vessels and ocean weather ships because all these constituent data sets of the main marine data bank are designed to the same format specification. The only exception is the data from oil and gas platforms; these data are stored in the same format, but lack the detailed present-weather code essential for the quality control.

4. Accuracy of data

The data from merchant ships are based largely on visual estimates, although there is a strong preference for instrumental data in some quarters on the grounds that these must be better than mere estimates. There are a number of sources of instrumental data at present, mainly ocean and other weather ships, light-vessels, oil platforms and buoys. The physical parameters most considered are probably those relating to wind and waves. The Meteorological Office marine climatology group has made a comparison of visual and instrumental data, examining closely instrumental data as part of that study (Graham, 1982). Such data are only as good as the exposure and observing practice associated with them. On weather ships the anemometer is mounted on a yard-arm 20 m above the sea and is subject to a series of impulses as the ship rolls and pitches. The reported winds are spot values taken from a dial gauge, supposedly averaged, by eye, over 15 seconds. The effective height of the anemometer is unknown because it depends upon the state of the sea and the ship's motion.

Winds are measured on light-vessels by using hand-held anemometers and the exposure is entirely dependent on the location and stance of the observer. Although winds are nominally one-minute averages, it is much more likely that they are closer to 15-second spot winds. The least satisfactory collection of wind data comes from oil and gas platforms because exposure is always a compromise, and often poor, because of the nature of these large and complex structures. The anemometer height is often 50 m to 100 m above sea level and it is rarely clear whether attempts have been made to reduce winds to sea level using a simple formula or, indeed, what period has been used for wind averaging.

Such data are usually adequate for synoptic forecasting purposes, despite their shortcomings, because the mainstay of the synoptic analysis is the pressure field; wind observations give additional information to the forecaster and are considered in the context of the general synoptic situation. This is analogous to the position over land where winds are greatly affected by frictional and other effects to produce turbulence. Wind measurements to be used for climatological purposes need to be consistent and should 'stand alone'. Visual observations of wind speed are made primarily from state of sea and, hence, are effectively at sea level. They are equivalent to winds averaged over a period of about one hour, because the response time of the sea is equal to or greater than an hour. Therefore, they form an internally self-consistent body of data. The Meteorological Office study does not reveal any evidence that measured data currently available are any better than visual data. Data from the DB 1 buoy are an exception to this finding. However, the record is so short that it is not acceptable for most climatological purposes.

Visual estimates of wave heights and wave periods are not as reliable as reports of wind speeds; the subjective apportionment into wind wave and swell wave is often dubious and, for climatological purposes, it is preferable to combine the components to give a resultant wave height unless there is a very good reason to isolate one particular component. There is a large body of visual wave data and a reasonable wave climatology can be obtained despite the wide scatter of values and the existence of erroneous estimates. However, estimation of extreme waves is probably best done from the wind field because, on average, three times as many ships report winds as waves, and the effect of erroneous or outlying wave heights upon an extreme value analysis can be disproportionate. In passing it should be noted that the separation of waves into wind and swell components, and sometimes even the reporting of more than one wave train, is of value synoptically. This is another example of the forecaster being able to use data of a lower quality than is acceptable for climatological purposes.

The visual estimate of wave heights remains the only way of obtaining a satisfactory wave climatology because there are very few instrumental records of a suitable length within the continental shelf area. There are records from wave recorders on light-vessels, notably that at Seven Stones, but such recorders are not considered reliable for the entire period between vessel refits. Thus the Seven Stones record reduces from 20 years on site to about 10 years of reliable record.

5. The importance of wind averaging times

Several references have been made to the time period used for wind averaging and the concern of the climatologist about the length of period used. Figure 4 shows six hours of wind speed record from an anemograph on an oil platform.

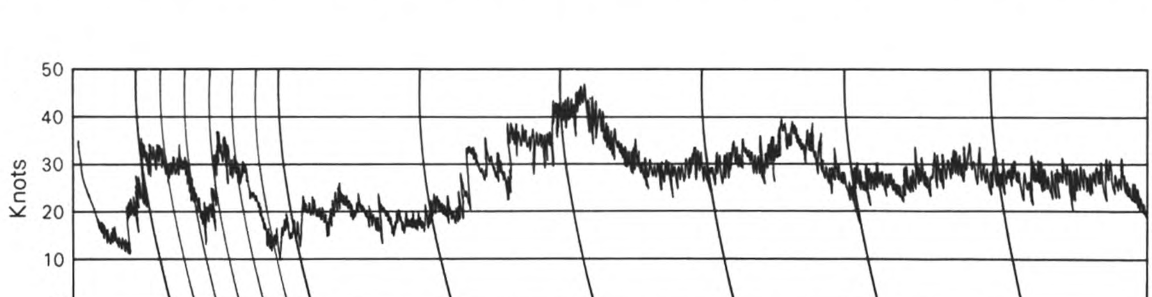

Figure 4. A copy of a six-hour period of an anemograph trace from an anemometer mounted on an oil platform.

Winds may be extracted from this record as averages over various periods from 10 minutes to several hours. The Meteorological Office traditionally uses a wind averaged over the 10-minute period preceding each hour as the synoptic wind for that hour, and an average wind over the entire hour for climatological purposes. An examination of the trace shown in Figure 4 reveals a considerable variability in 10-minute mean winds, some being larger, some smaller, than the corresponding hourly mean wind. If a sufficiently large number of observations is used the mean 10-minute wind and mean hourly wind will be almost identical, but the standard deviation of 10-minute winds will be much higher. This means that a frequency distribution of 10-minute winds will be different in shape from that of hourly winds, and that extreme winds estimated from the two distributions will differ. In fact the extreme derived from the distribution of 10-minute winds is 7 to 8% higher than that from the hourly winds. The variability in the one-minute wind is even higher than for the 10-minute wind, and it is also likely that a mean over a long period of one-minute winds read from a dial will be higher than the corresponding mean hourly wind. The dial will indicate large fluctuations in wind, and the human observer will probably tend to bias his estimated mean value for one minute towards the higher gust. Even without this effect the extreme wind derived from the one-minute distribution is approximately 19% higher than that derived from hourly mean winds.

Thus it can be seen that the wind averaging time must be known, and should be the same throughout the body of data used for any analysis. This is clearly not so for some instrumental data especially when different instrumental data sources are combined. On the other hand, visually observed winds by officers on board ship have been shown to be climatologically self-consistent within the acceptable tolerances, despite their apparent subjectivity in the eyes of the non-mariner.

6. Length of record

With the exception of those from the ocean weather ships and light-vessels, most instrumental records of wind and wave are short, consisting of less than five years of data. Some wave records are less than one year in length. Even if the difficulty of applying an extreme-value analysis technique to a small number of values could be overcome there must always be doubt regarding how representative the short period of data will be when compared with the long-term climate.

Figures 5 and 6 show the year-to-year variations in the percentage frequency of occurrence of several categories of wind speed and wave height. The data used were visual observations from merchant ships for an area off the east coast of Scotland. The year-to-year variations are quite marked and it is easy to see that both frequency distribution and extremes derived from a year or two of data will probably not be representative of long-term conditions.

7. Analyses available from the Meteorological Office Marine Climatological Bureau

Analyses can be produced for most of the traditional meteorological parameters for locations anywhere in the world. A short list is given in Table I. The Marine Climatology Bureau of the Meteorological Office has concentrated upon development of a number of standard sub-programs that produce commonly required analyses from the data stored in the main marine data bank. These computer programs can be assembled to provide information in the form of computer printout for the customer, or as the starting point of an investigation which will end with a comprehensive report. Some examples of typical sub-program

Table I. *A selection of parameters available from the climatological archive*

Wind: speed and direction
Weather: past and present
Cloud: type and amount
Temperature: air, dew-point, wet-bulb and sea
Wind waves: height and period
Swell waves: height, direction and period
Visibility
Air pressure
Sunshine/radiation

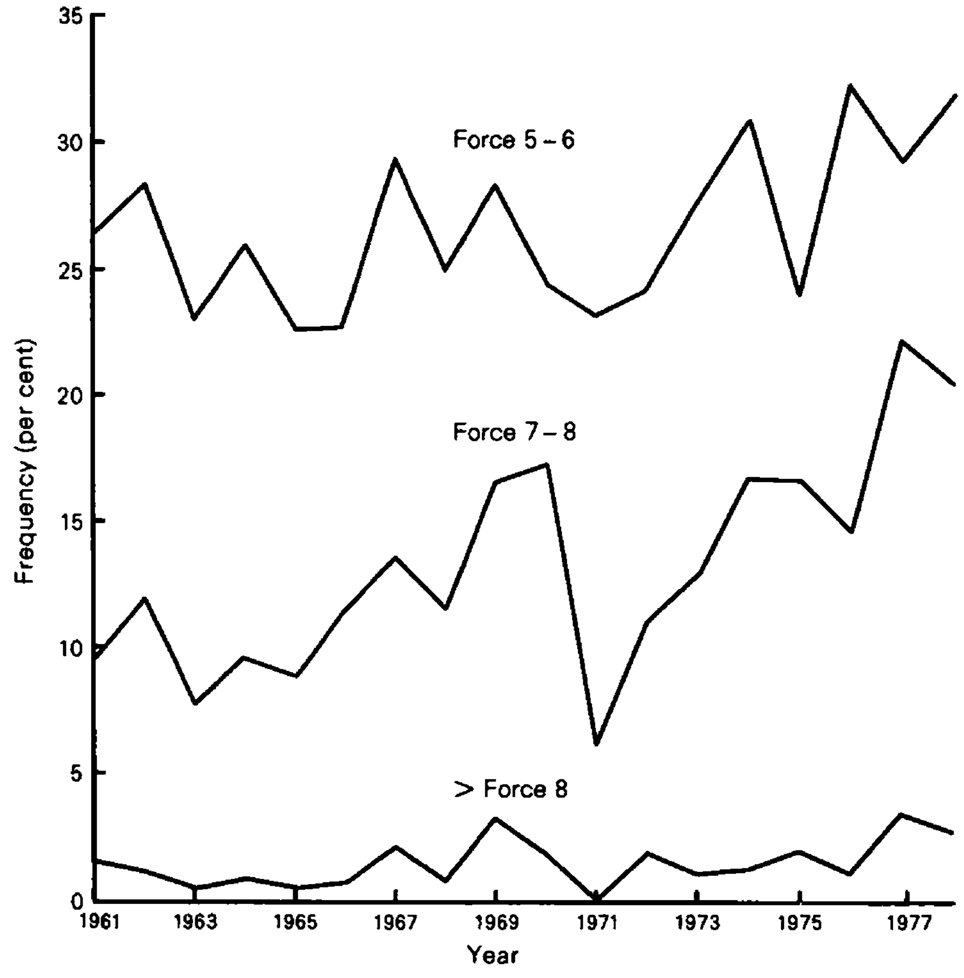

Figure 5. Percentage frequency of occurrence of winds in each year calculated from visual observations from an area 57° N to 59° N, 2°E to 2°W.

analyses are shown in Table II. Use is made of computer graphics so that graphs of percentage exceedences, Weibull extreme-value plots, wind roses and histograms can be produced quickly on microfilm or on paper. In addition to standard analysis programs already available, specialized software can be developed to deal with customers' individual requirements.

Although most investigations involve some computer analysis of data, few enquiries can be answered automatically. Considerable effort is made to discuss the customers' problems and requirements in order to find the best way of

Table II. *Analyses produced from the climatological archive*

Wind frequency according to month, direction, and speed
Waves according to month or season, direction of movement, period and height
Air temperature according to month
Dew-point temperature according to month
Sea surface temperature according to month
Visibility according to month

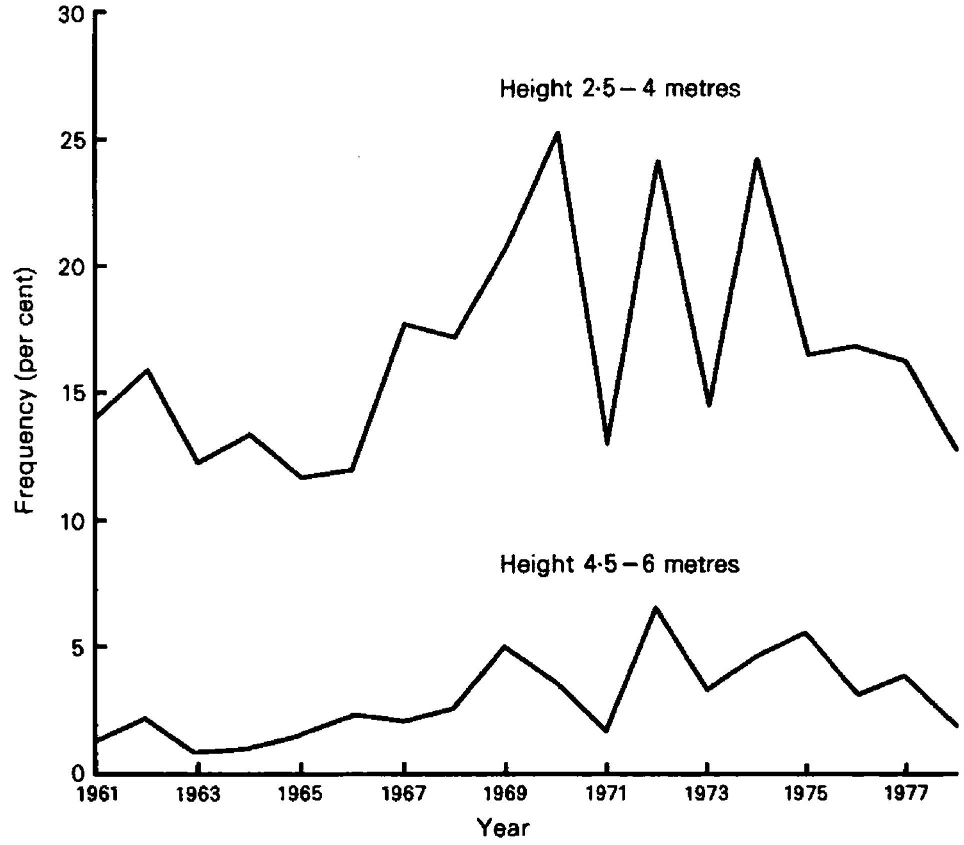

Figure 6. Percentage frequency of occurrence of wave heights in each year calculated from visual observations from an area 57°N to 59°N, 2°E to 2°W.

presenting environmental data to meet those needs. In general, every effort is made to give an answer to even the most difficult of problems, whilst stating firmly any reservations which have to be made because of the inadequacies of the data or uncertainties referred to above.

As well as knowledge of marine climatology, the members of the Bureau have individual experience and expertise in such fields as weather forecasting, meteorological statistics, computer programming and systems analysis and research. They also have access to staff engaged upon research in many relevant branches of meteorology and will seek advice from other experts as necessary.

8. Conclusion

The Meteorological Office has expended a significant amount of its resources upon the development of a global archive of marine data. Much of the data consists of visual estimates which, despite their limitations, form a consistent body of information that can be used by an experienced analyst with more confidence than could reasonably be shown for the short instrumental records available. This situation is unlikely to change significantly until a number of well-exposed robust instruments are deployed and left on site for 10 years or more. Although the data bank, or parts of it, can be purchased by meteorological consultants, and small amounts have been in the past, it is the current position that the computer archive maintained by the Meteorological Office is unique within the United Kingdom. The only comparable data banks are held by a few of the corresponding national authorities in certain other countries. The marine enquiry bureau is therefore confident in its ability to answer marine climatological enquiries from the most trivial to the most complex. Problems can be tackled that are considered intractable by many other organizations.

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Observations of Ship Set by the Somali Current

By J. G. Bruce

(Woods Hole Oceanographic Institution)

The strong currents off the Somali coast during the south-west monsoon (May–September) have long been well known to navigators working in this region. It is somewhat unusual, however, to see a graphic example of the effect of the often unpredictable current on coastal traffic at the same time as an oceanographic survey was being made. This survey in August and September 1970 was made by the Woods Hole Oceanographic Institution in order to learn more about the dynamics and circulation pattern of the upper 1000 m of these waters (Bruce, 1973). Our measurements have shown that during this period the currents can exceed 6 knots (Swallow and Bruce, 1966). The volume transport of the flow in the upper 200 m can be greater than that in the Gulf Stream (Duing, 1977). The circulation consists in part of very large clockwise gyres (up to 300–500 km across) which may vary considerably during a season (Bruce, 1979). During both the 1970 survey and a later one conducted in 1979 the northward coastal current was observed to turn strongly offshore to the east between 4°N and 6°N during June and July. In August the turn-off point had shifted to a higher latitude and was partially merged with the northern gyre (≈5°N–10°N). During other years it appears as if the southern turn-off may be less significant and the northern gyre tends to dominate the circulation pattern.

In the figure shown here, the observations for 4–20 August 1970 indicated a strong turn-off of the coastal current at ≈5°N–6°N (Figure 1a). By late August the turn-off region was ≈6°N–7°N (Figure 1b). At this time the *Virginia Trader* passed along the sea lane on a south-west course. When crossing the offshore current she was set nearly 60 nautical miles off course to the eastward. Our measurements in this region indicated approximately a 4 knot current. By September (Figure 1c) a portion of the current was again turning offshore near 5°N, but the temperature–salinity characteristics of the near-surface water indicated that a considerable amount of the flow had merged with the large northern gyre. Sea surface temperatures can be used to monitor the current because when the flow turns offshore a large volume of relatively cool water (down to as low as ≈13 °C) is advected offshore (Brown *et al.*, 1980). Thus by keeping track of surface temperature a ship could anticipate the effects of the strong currents. In the case of the *Virginia Trader* the temperature would probably have dropped relatively sharply by 2–3 °C when crossing the eastward flow at about 7°N. An example of the strong temperature contrasts is shown by the more recent satellite infra-red imagery (Plate facing page 193). In this case the entire northern eddy (as in Figure 1a) is clearly delineated in the early part of the south-west monsoon.

Of course, with satellite navigation now being used by most vessels, corrections for ship set can often be made relatively soon when encountering a strong current system. Thus such a large set as occurred with the *Virginia Trader* would not be as likely to happen now.

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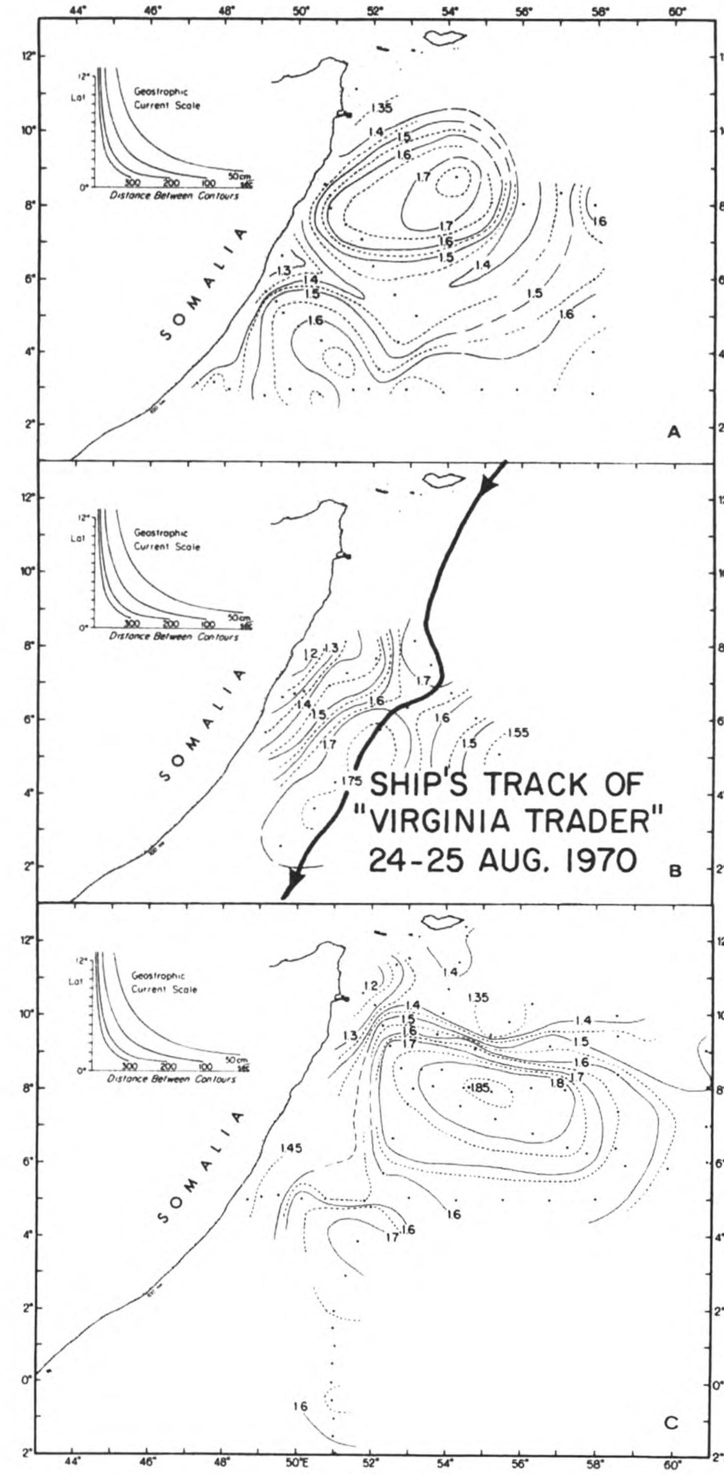

Figure 1. Sea surface dynamic topography in dynamic metres (units in 10 $m^2 s^{-2}$, relative to 1000 decibars) in the north-west Indian Ocean during the south-west monsoon, 1970: (a) 4–20 August; (b) 20–27 August; (c) 5–25 September. Determined from Woods Hole Oceanographic Institution hydrographic stations by R.V. *Chain* (Bruce, 1973). Flow of currents would be in clockwise direction around gyres or 'highs'. Track of the *Virginia Trader* during period (b) of survey shows that the vessel was set off course eastward by approximately 60 nautical miles.

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Indian Ocean S.W. Monsoon Current

By M. Hatch
(Meteorological Office)

(From a story narrated to him by Mr G. Wright, formerly Skipper of the *Saxon Forward*.)

In early June 1980 the *Saxon Forward*, a trawler of 750 tonnes under the command of Skipper Geoffrey Wright, was lying at anchor at Dar-es-Salaam waiting to obtain sufficient stores to continue her passage to Bombay where she was to be handed over to Indian owners.

Having obtained these stores, the *Saxon Forward* sailed from Dar-es-Salaam on 10 June and indicated that her estimated date of arrival at Bombay would be 22 June. To take advantage of the Somali current, she steamed up along the east African coast through the Pemba Channel and along the coast of Somalia until she reached Ras Hafun on 17 June. From thence she took her departure across the Arabian Sea towards Bombay.

At 1830 on Thursday 19 June and 450 nautical miles from the last sight of land the *Saxon Forward* broke down. A cooling system pipe had burst, flooding the engine room and crippling the engines. Drifting in severe gale conditions with no light or power, the crew managed to secure a flange on the burst pipe and, as there was no possibility of using the main engines, a distress MAYDAY call was sent out.

The Japanese vessel *Lorena* answered the call but, as she was on passage from Mogadiscio to Jeddah and only 5 nautical miles off the Somali coast, it would have taken her at least 72 hours to reach the *Saxon Forward*'s last position. It was therefore agreed that she would pass the MAYDAY call to Bombay Rescue Centre and call back the *Saxon Forward* later to confirm that this had been done.

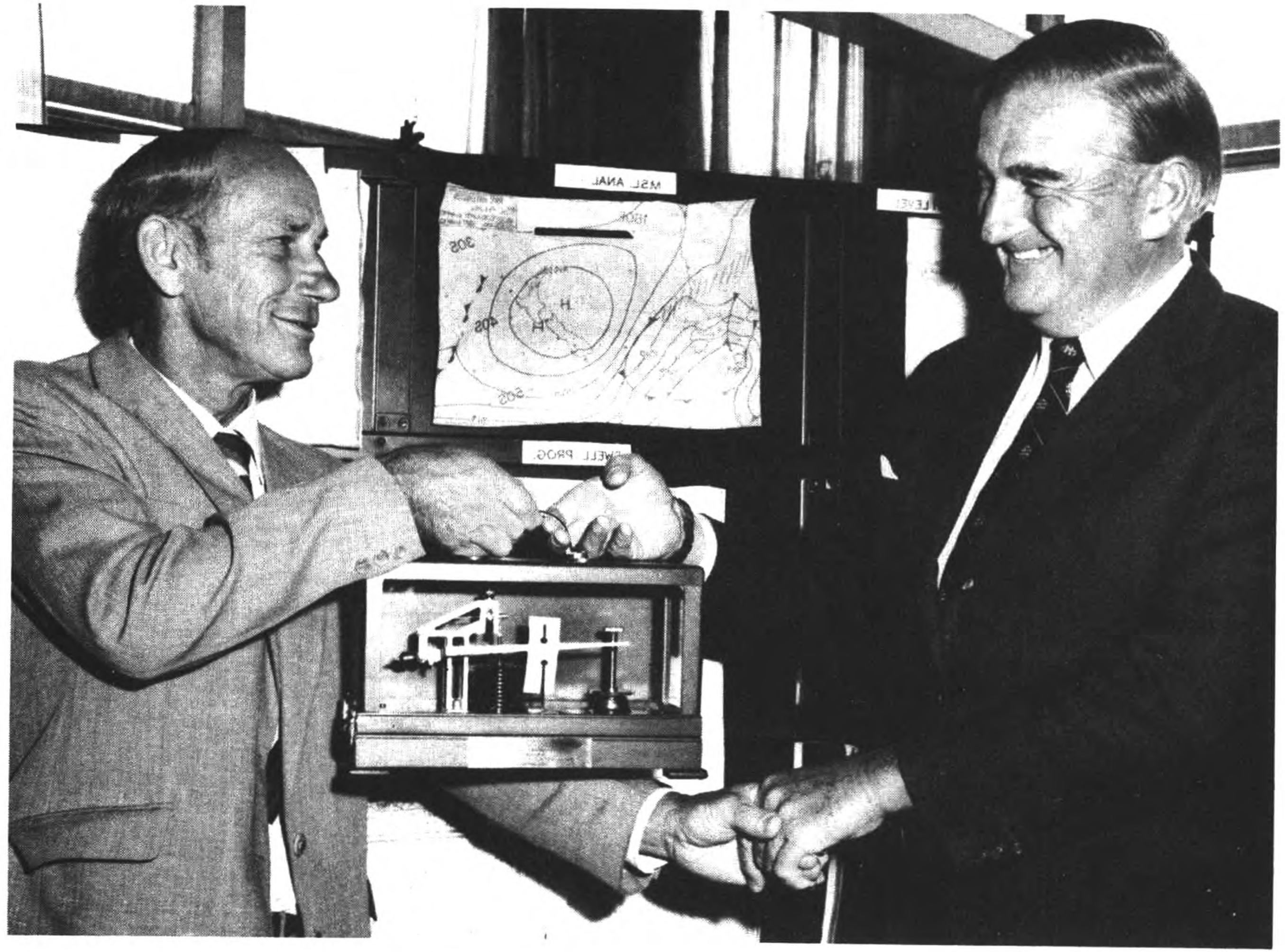
At 1600 the *Lorena* called the *Saxon Forward* and confirmed that the Bombay Rescue Centre had been informed and that the *Lloyd Diana*, an Italian cruise liner, was heading for the *Saxon Forward*'s position to render assistance. However, the *Lloyd Diana* was never sighted as she was heading for a position now 78 hours old.

The *Saxon Forward*, lying deep in the water with no light or power, drifted about 700 nautical miles. Fresh water was not a problem but the food supply was exhausted and conditions got progressively worse. Then, on the night of 14 July, the crew thought their ordeal was over. A ship, the name of which they were unable to obtain, with a Japanese crew, came alongside, causing considerable damage, and passed some food to them but the Master refused to offer them a tow pleading that he did not have time.

Nine days later, they were sighted by the Russian vessel *Simferopol* and at 2230 on 23 July they were taken in tow, their position then being 180 nautical miles west of Cochin in latitude 9° 48′N, longitude 73° 15′E. By the next day the *Saxon Forward* was safely in port and, after repairs, she subsequently proceeded to Bombay.

The *Saxon Forward* had been adrift for 35 days and, in that period, the S.W. Monsoon Current had carried her approximately 900 nautical miles at an average rate of 26 nautical miles per day.

Opposite page 220

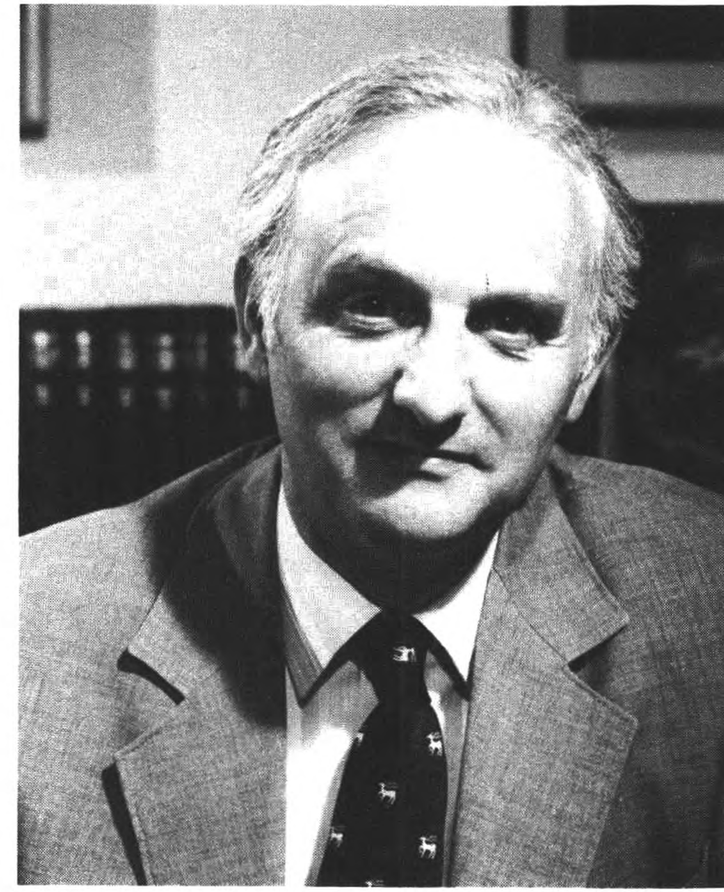


Presentation of a barograph to Captain F. S. Angus, RD, RNR, (Ret'd) by Mr J. Hickman (on right), Director of the New Zealand Meteorological Service on behalf of Sir John Mason at Auckland on 11 April 1983 (*see* page 221).

Opposite page 221

Photo by G. A. Corby

Sir John Mason, CB, FRS, until recently Director-General of the Meteorological Office.



Dr J. T. Houghton, D PHIL, FRS, Director-General of the Meteorological Office.

(*See* page 230)

PRESENTATION OF BAROGRAPH IN NEW ZEALAND

As mentioned in the July 1983 edition of this journal, Captain F. S. Angus, RD, RNR (Ret'd), was unable to be present in Bracknell on 9 March 1983 for the presentation of barographs by Sir John Mason, at that time Director-General of the Meteorological Office. As Captain Angus is now resident in Auckland, the New Zealand Meteorological Service very kindly agreed to make the presentation on Sir John's behalf and this took place at the Meteorological Office in Auckland on 11 April 1983.

Mr John Hickman, Director of the New Zealand Meteorological Service, made a special journey up from his office in Wellington for the occasion. Also present were Captain Angus's wife and son, Captain Owens of the P. & O. Line, Mr S. Milne, Regional Secretary for Transport, Captain R. Frazer of the Auckland Nautical School and staff of the Auckland Meteorological Office.

In presenting the barograph, Mr Hickman explained the importance and use of weather observations, particularly those from ships, and traced Captain Angus's long meteorological observing career. In reply, Captain Angus spoke of the importance of weather forecasts for ships at sea and of his interest in providing the basic information. He also added that the form of the ship's meteorological logbook had not changed substantially since it was introduced over 100 years ago and that when all else was changing it was a comfort to make a weather observation and record it in the time-honoured way. It brought a measure of stability to ever-changing equipment, methods and procedures. The photograph taken at the ceremony appears opposite page 220.

The presentation was featured in the New Zealand national television news and was reported in two Auckland daily newspapers.

We take this opportunity to thank the Director and staff of the New Zealand Meteorological Service for their kind assistance in this presentation.

INDIAN EXCELLENT AWARDS

(From the Deputy Director-General of Meteorology (Weather Forecasting), India)

During the year 1981–82 there was active and continued co-operation between the India Meteorological Department and the ships of the Indian Voluntary Observing Fleet in the collection of meteorological information from the high seas, and this is very much appreciated; we look forward to more and more co-operation in future. It is realized that the oceans and atmosphere should be observed and studied together because they affect each other in a number of ways.

During the year ending 31 March 1982, 276 ships were on the strength of the Indian Voluntary Observing Fleet, out of which 34 were Selected, 211 were Supplementary and 31 Auxiliary. In all 1199 logs were received in this Office.

It is essential that the observations taken by the ships should be transmitted as expeditiously as possible to the nearest coastal radio stations to facilitate their proper reception on a real-time basis at the forecasting offices. Special encouragement is given to ships which send crucial observations during abnormal weather. The ship *Diglipur* of the Shipping Corporation of India in particular sent such observations from the field of the tropical storm in the Bay of Bengal from 5 to 8 December 1981. Due recognition was given to this ship.

The Excellent Awards were distributed on the occasion of the National Maritime Day Function held in Bombay on 5 April 1983 and the Certificates of Merit were handed over to the shipping companies concerned for onward transmission to the eligible officers.

Speech by Dr A. A. Rama Sastry, Deputy Director-General of Meteorology (Weather Forecasting), Pune on the occasion of the National Maritime Day Celebration in Bombay on 5 April 1983.

'It gives me great pleasure to be present here this evening and to be associated with the celebrations of the 20th National Maritime Day. I am also happy to have this opportunity on behalf of the India Meteorological Department to present Awards to Ships and their Officers selected for their excellent work in recording and reporting weather observations from the high seas during the year 1981–82.

'Revolutionary changes have come in the field of meteorology such as weather satellites etc., but the observations sent by ships carry the same importance as before. Thus the valuable observations taken by the ships of the Indian Voluntary Observing Fleet will continue to occupy a very important place on the weather charts used by forecasters.

'Under the auspices of the World Meteorological Organization a Special Ship Weather Reporting Period was observed from October to December 1982 to maximize the collection of ship data during the period of maximum frequency of tropical storms in the region of the Bay of Bengal and the Arabian Sea. The co-operation of the ships was sought by our Department in this connection and I am happy to say that they extended their whole-hearted support and co-operation which yielded some improvement in the collection of ship data during this period. The additional observations will be of great use for Marine Research and Forecasting. I am sure that this type of tempo will be maintained in future also.

'As in the past, the Department has assessed the meteorological work performed by the ships during the year 1981–82 and 15 ships which have performed meteorological work of high order have been selected to receive Excellent Awards in the form of books on general subjects. In addition 10 ships have been selected to receive Certificates of Merit. Three Cash Awards instituted by the Shipping Corporation of India for meritorious meteorological work are also annouced today.

'On behalf of the India Meteorological Department, I would like to thank the ships' masters and other officers and the owners of the ships of the Indian Voluntary Observing Fleet for the valuable and commendable work done by them for meteorology in India. I also wish to thank the National Maritime Day Celebration Committee for making it possible for the Meteorological Department to present the Awards on this occasion.'

The names of the ships which received Excellent Awards are as follows:

Name of Ship	Owner
Vishva Mohini	Shipping Corporation of India
Kanchenjunga	Shipping Corporation of India
Devaraya	Shipping Corporation of India
Tulsidas	Shipping Corporation of India
Andamans	Shipping Corporation of India
Nancowry	Shipping Corporation of India
Annapurna	Shipping Corporation of India
Jalakendra	Shipping Corporation of India
Samudra Gupta	Shipping Corporation of India
Jalakanta	Shipping Corporation of India
Jag Jyoti	Shipping Corporation of India
Vishva Vikram	Shipping Corporation of India
Vishva Tej	Shipping Corporation of India
Jalajaya	Shipping Corporation of India
Diglipur	Shipping Corporation of India

Certificates of Merit were awarded to the following ships:

Ratna Nandini
State of Mysore
Vishva Pankaj
Satyamurti
Jag Doot
Jalagomati
Vishva Chetana
Vishva Parag
Jalagodavari
Chidambaram

AURORA NOTES OCTOBER TO DECEMBER 1982

By R. J. Livesey

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

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

Marine Aurora Observations October to December 1982

Date 1982	Ship	Geographic Position	Time (GMT)	Forms in Sequence
13 Oct.	*Starella*	57° 10′N, 20° 41′W	2005–2220	qN, qR_3B_2
14	*Matco Avon*	59° 30′N, 01° 48′E	0300–0320	pRR
25	*Serenia*	59° 00′N, 00° 35′E	2230	RA
29	*Cumulus*	56° 50′N, 20° 25′W	0500–0615	qR, qmhR, qfhG
13 Nov.	*Cumulus*	56° 40′N, 18° 40′W	0045	qfhG
22	*Starella*	56° 51′N, 19° 54′W	0045–0545	N, apR_3, RB, R_2A, R_2B, RB, N, RB
8 Dec.	*Starella*	57° 15′N, 20° 50′W	1940–2045	qhB, qN
10	*Starella*	56° 10′N, 12° 47′W	0245–0445	qN
10	*Cumulus*	58° 54′N, 05° 54′W	2030	qfhG
12	*Cumulus*	56° 51′N, 19° 27′W	1930–2145	qfhG
21	*Matco Avon*	59° 36′N, 01° 36′E	1730	mRR

KEY: A=arc, a=active, B=band, B_2=2 bands, f=fragmentary, G=glow, h=homogeneous, m=multiple, p=active pulsations, R=rays, RR=ray bundle, R_1, R_2 or R_3=small, medium or long rays.

October began with an isolated observation in central Scotland on the night of the 3rd. A minor storm of rays was seen from Orkney and the weather ship *Starella* on the 13th. Further isolated sightings of rays were seen in Scotland and by the *Matco Avon* on the 14th with quiet arcs and bands on the 18th. Rayed bands were reported from Helsinki on the 19th. Another minor storm appeared to the *Serenia* in the North Sea on the 25th with active rays also being reported from Orkney and Shetland. Active arcs and ray bundles were seen from Oslo on the 27th and on the 28th the Dutch weather ship *Cumulus* together with Scotland reported quiet glows and rays.

More reports were received in November. A minor storm on the 2nd brought coronal ray structures at Helsinki with rays seen at Oslo and in Orkney. Arcs and bands were reported from Helsinki on the 8th and from Oslo on the 11th. The Dutch weather ship reported glows on the 12th and there were sundry glows and ray bundles seen in Scotland on the 13th, 15th, 16th and 17th. At the same time an observer in north Norway was reporting nightly aurorae but in view of his position close to the auroral zone this was to be expected. On the night of the 21st there was a storm reported northwards from northern England and confirmed with active rays seen over a period of hours by the weather ship *Starella*. On the 23rd coronal structures were reported in Orkney and rays in Scotland. A further storm took place on the 24th which was visible as rays in northern England, Scotland and Norway. Further isolated reports of rays came in for the 25th from Scotland and for the 28th and 29th from south Norway.

December began with reports of auroral activity in Michigan, USA, on the 7th and a minor storm on the 8th, with bands and rays reported by the weather ship *Starella*, Scotland, Shetland and Helsinki. Scotland and the weather ships *Starella* and *Cumulus* reported further ray activity on the 10th and 11th as did Helsinki on the first night and Shetland on the second. Quiet glows were noted by the *Cumulus* together with an observer in Shetland on the 12th. There were further sundry reports of minor activity on the 13th, 14th and 16th in higher latitudes followed by a storm of active rays on the 17th which generated reports from England, Scotland, Shetland and Norway. Isolated reports came in from Scotland and Helsinki on the 18th and 19th followed by another storm of active rays on the 21st reported by several Scottish observers and the *Matco Avon* in the North Sea. The month concluded with an isolated Norwegian report of ray bundles on the night of the 23rd.

During the period radio auroral activity comprising distorted signals or unusual transmissions in the VHF band were reported by amateur radio operators. Some of the contributions have come from students of Leith Nautical College, who have been prevailed upon to take an interest in the radio aurora when ashore for studies, and Andy Stevens is to be particularly thanked for his work. Any remarks made in the meteorological logbooks were also taken into account. Marine Radio Officers with access to VHF transmitters and receivers might find it interesting and instructive to investigate abnormal long-distance communications, especially in the North Atlantic area, in view of the ducting and scatter that can be achieved with the auroral ionization.

Radio Aurorae Dates

October: 1, 7, 13, 14, 26, 29, 31
November: 1, 2, 3, 22, 23, 24, 25, 28, 29
December: 7, 9, 10, 17, 18, 19, 20, 21, 22, 23.

Sunspot activity has considerably declined and so too has the frequency of large auroral storms generated from flare or other activity associated with the spots. Many of the aurorae currently being reported are of the quieter kind and are situated further towards the pole. In 1982 there was the great storm associated with sunspots on 13/14 July which reached down into the tropics but the series of storms in the present period under discussion are frequently being reported in north Scotland or Orkney. On the basis of reports received in 1982 the number of nights per annum on which aurorae could have been seen at any location, given clear skies, has been calculated subjectively as follows:

Nights per annum on which Aurora could bave been seen in 1982

Geomagnetic Latitude		Nights	Geomagnetic Latitude		Nights
40	Toronto	1	58	Carlisle	43
53	Calais	7	59	Glasgow	69
54	London	9	60	Aberdeen	73
55	Bedford	10	61	Inverness	84
56	Nottingham	14	62	Kirkwall	104
57	Liverpool	28	63	Lerwick	108

The question arises as to how useful are the observations made by an individual ship. In the following table are shown the reports received in the current period from the Dutch weather ship *Cumulus* normally stationed at 'Lima'.

Month 1982	No. of Aurorae reported	No. of nights on which cloud obscured vision	No. of nights no aurora seen	Total No. of observing nights
August	1	5	4	10
September	2	11	7	20
October	1	4	11	16
November	1	5	10	16
December	2	12	10	24

This represents 7 positive sightings in 86 reporting nights. Extrapolating to 365 days this would represent a score of about 30 sightings per annum. From the previous table it is probable that 108 nights would have carried auroral activity. In round figures about 30% of aurorae would have been detected by the weather ship. Taking cloud and bad weather into account this is not a bad score. The writer has record of 26 consecutive nights of total cloud cover at Glasgow, longer than the rotation period of the sun.

Whereas during a massive auroral storm up to 36 reports have come in for the night in question, analysis of all observations received since 1976 shows that during poor weather conditions, if only two observations come in from ships or land observers randomly located it is frequently possible, by comparison with radio and magnetic records, to determine the probable size of the auroral storm. Thus any observation from an area the size of the North Atlantic may be a critical one.

It is very helpful to record when auroral activity is NOT present as proof that the aurora was not activated at that time. The best time to sample the sky is at 2200 hours local time when, owing to the configuration of the magnetic parameters governing the aurora, it is most likely to be seen if it is at all active.

ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM MARCH TO MAY 1983

The charts on pages 227 to 229 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 iceberg limits will be displayed during the iceberg season (roughly February to July). In any month when sightings have been abnormally frequent (or infrequent) this will be discussed briefly in the text.

The periods used for the normals are as follows. Ice: 1966–75 (Meteorological Office). Surface pressure: 1951–70 (Meteorological Office). Air temperature: 1951–60 (US Department of Commerce, 1965). Sea-surface temperature: area north of 68°N, 1854–1914 and 1920–50 (Meteorological Office 1966), area south of 68°N, 1854–1958 (US Navy, 1967).

March

Pressure was lower than normal over Greenland and much higher than normal over the North Atlantic. West of Greenland the strong anomaly for cold north-westerly winds continued so that the previous excess of ice south-east of the Davis Strait was maintained. The cold offshore winds resulted in some excess of ice off south-east Greenland. In the Gulf of St Lawrence the anomaly for mild southerly winds resulted in ice disintegrating earlier than usual. However, east of Newfoundland (where sea temperatures were near freezing) disintegration was slow and the ice edge remained further south than usual. Over the Greenland and Baltic seas anomalies were rather small and ice conditions continued to be less severe than normal. A stronger anomaly for mild southerly winds over the Barents Sea resulted in further disintegration and recession so that the ice edge remained further north than usual.

April

Pressure was much higher than usual east of Newfoundland with a weak ridge of high pressure over the Arctic regions. Anomalies were rather small west of Greenland and ice conditions quickly reverted to near normal through the Davis Strait. The change to a strong anomaly for south-westerly winds over the Labrador Sea resulted in an extensive flaw lead developing as the drift ice extended further north-east than usual. East of Greenland the previous tendency for ice conditions to be less severe than usual continued. The ice edge remained about 75 n. mile further north than usual and there was rapid melt and disintegration in the Baltic seas.

Baltic Ice Summary: March to May 1983

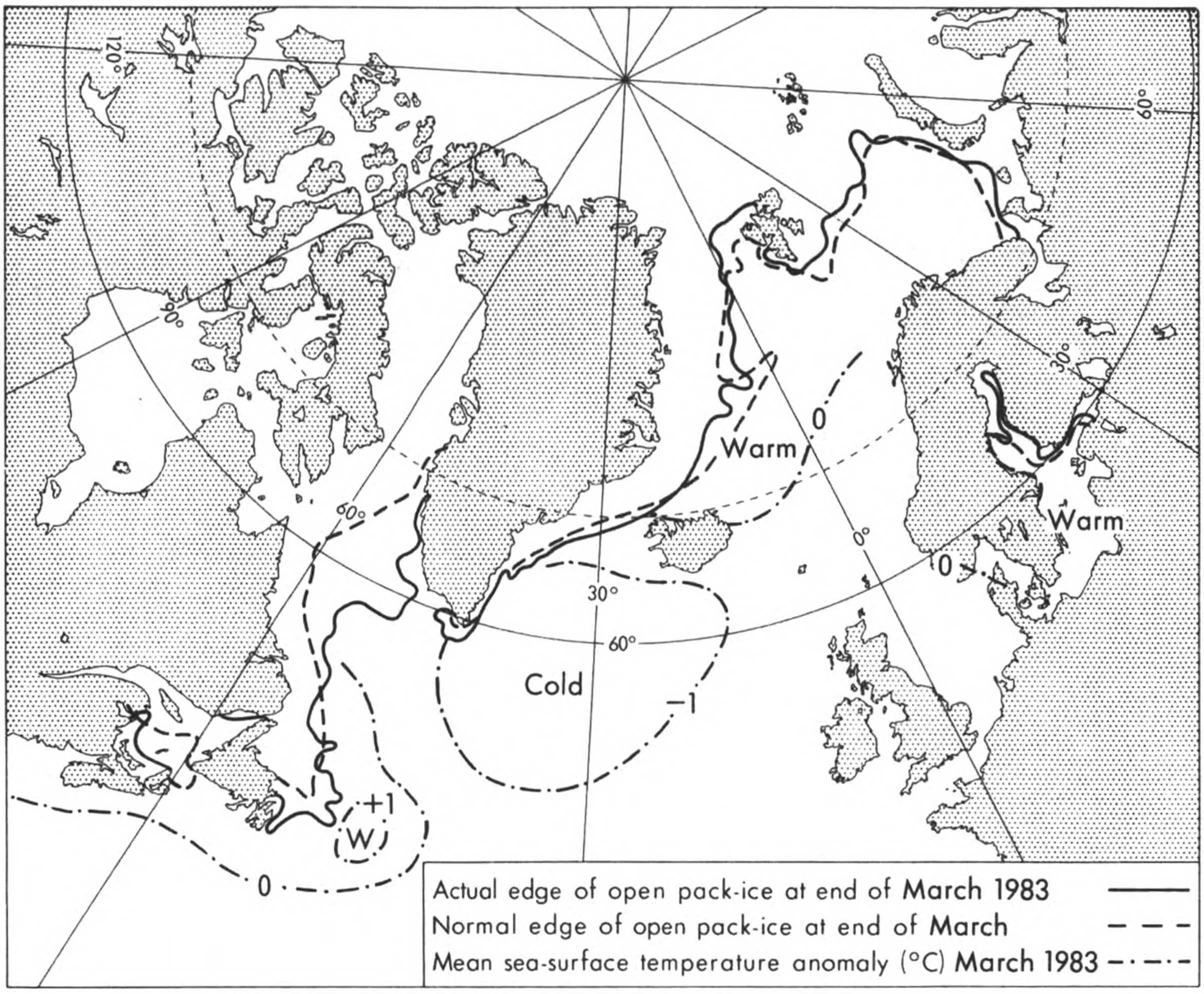
No ice was reported at the following stations during the period: Oxelösund, Visby, Ventspils, Emden, Bremerhaven, Hamburg (Elbe), Flensburg, Kiel, Lübeck, Rostock, Stralsund, Stettin, Gdansk, Aarhus, Copenhagen, Oslo, Kristiansandfjorden.

Station	March									April									May								
	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Luleå	1	31	31	31	0	0	31	0	—	1	30	30	30	0	0	30	0	—	1	13	13	11	2	1	12	0	—
Skellefteå	1	31	31	31	0	0	31	0	—	1	30	30	27	0	0	30	0	—	1	8	8	0	0	0	8	0	—
Bredskar (Vaktaren)	1	31	29	5	15	29	0	0	—	1	22	8	0	7	6	0	0	—	0	0	0	0	0	0	0	0	—
Sundsvall	1	31	31	31	0	31	0	0	—	1	30	15	1	14	14	0	0	—	1	2	2	0	1	2	0	0	—
Sandarne	1	31	31	22	9	9	22	0	—	1	11	11	0	11	11	0	0	—	0	0	0	0	0	0	0	0	—
Kalmar	1	4	4	0	2	0	0	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Göteborg	1	2	2	0	2	2	0	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Stockholm	1	31	31	24	7	31	0	0	—	1	25	25	0	17	17	0	0	—	0	0	0	0	0	0	0	0	—
Helsinki	1	31	31	0	31	0	31	0	—	1	17	12	0	9	0	11	0	—	0	0	0	0	0	0	0	0	—
Turku	1	31	31	24	7	26	5	0	—	1	19	19	0	19	18	1	0	—	0	0	0	0	0	0	0	0	—
Mariehamn	1	19	13	0	7	4	0	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Mäntyluoto	1	31	31	0	31	0	31	0	—	1	8	8	0	5	4	4	0	—	0	0	0	0	0	0	0	0	—
Vaasa	1	31	31	31	0	0	31	0	—	1	17	17	17	0	0	17	0	—	0	0	0	0	0	0	0	0	—
Norrskär	1	31	31	0	23	0	23	0	—	1	17	17	0	0	0	12	0	—	0	0	0	0	0	0	0	0	—
Oulu	1	31	31	31	0	0	31	0	—	1	30	30	29	1	0	30	0	—	1	9	9	0	0	0	9	0	—
Roytta	1	31	31	31	0	0	6	25	—	1	30	30	30	0	0	0	30	—	1	9	9	7	2	0	5	4	—
Leningrad	1	31	31	18	12	0	31	0	—	1	14	14	0	4	3	3	0	—	0	0	0	0	0	0	0	0	—
Vyborg	1	31	31	31	0	0	31	0	—	1	22	22	19	1	3	19	0	—	0	0	0	0	0	0	0	0	—
Tallin	1	23	23	0	23	23	0	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Riga	1	14	9	1	8	4	0	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Pärnu	1	31	31	31	0	0	31	0	—	1	14	14	9	2	0	11	0	—	0	0	0	0	0	0	0	0	—
Klaipeda	1	16	4	0	4	0	0	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—

CODE

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

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


120°
90°
60°
30°
0°
60°
Warm
0
Warm
0
Cold
−1
+1
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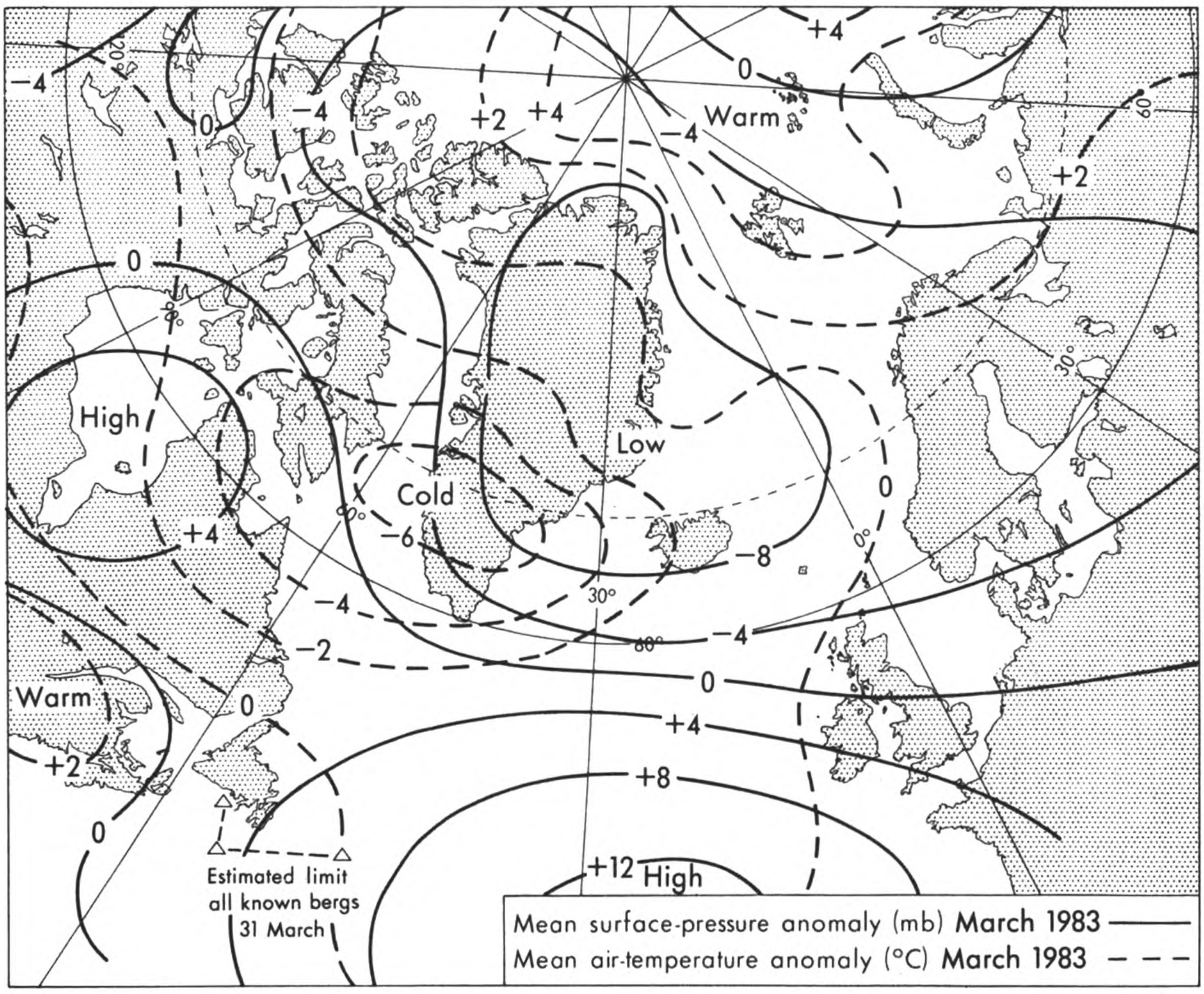
0
Actual edge of open pack-ice at end of March 1983
Normal edge of open pack-ice at end of March
Mean sea-surface temperature anomaly (°C) March 1983


−4
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−4
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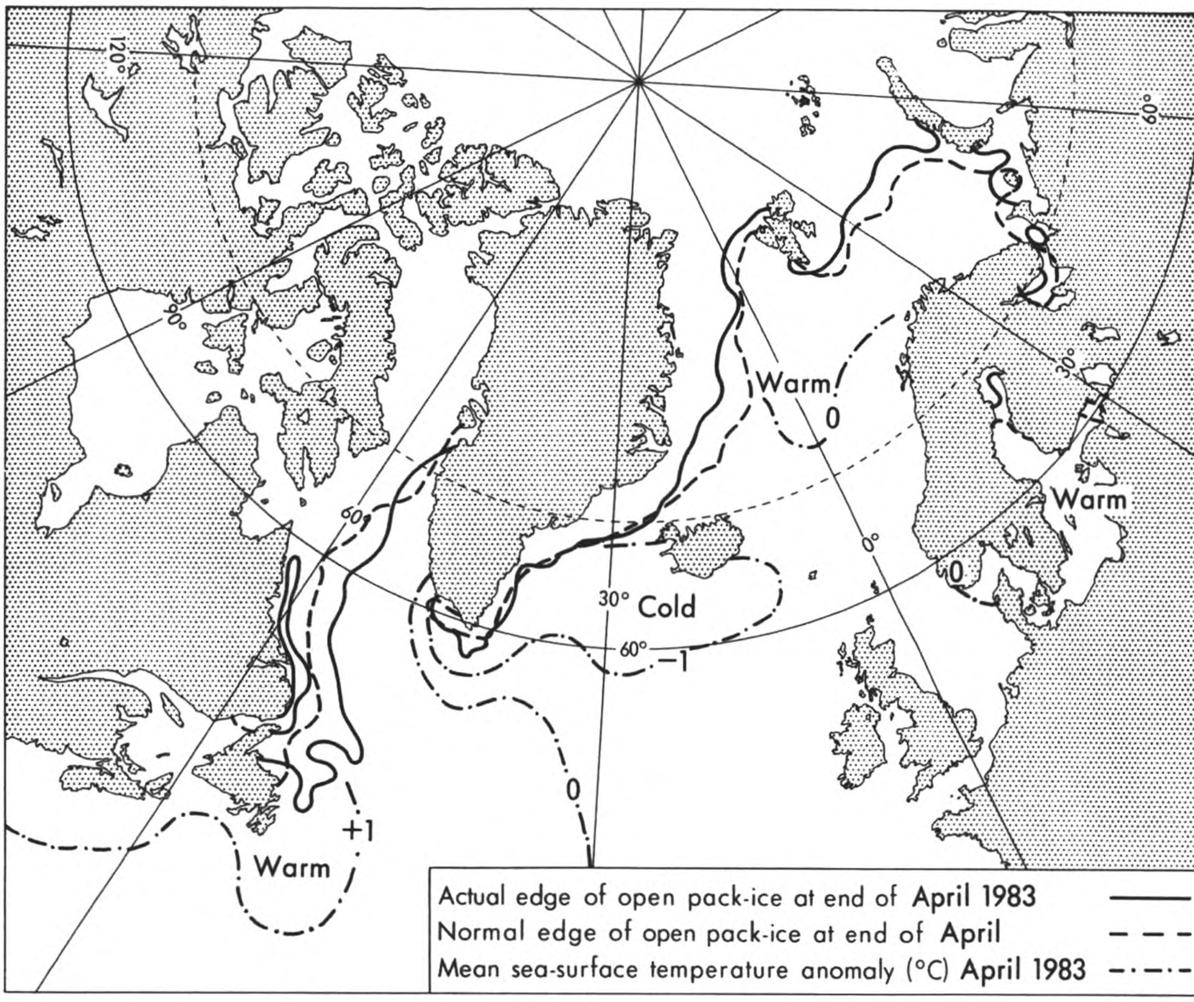
+4
+4
0
Warm
−4
+2
0
High
+4
Cold
−6
Low
0
−8
−4
−2
−4
0
Warm
+2
0
0
+4
+8
+12 High
Estimated limit
all known bergs
31 March
Mean surface-pressure anomaly (mb) March 1983
Mean air-temperature anomaly (°C) March 1983


120°
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60°
Warm
0
Warm
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Cold
−1
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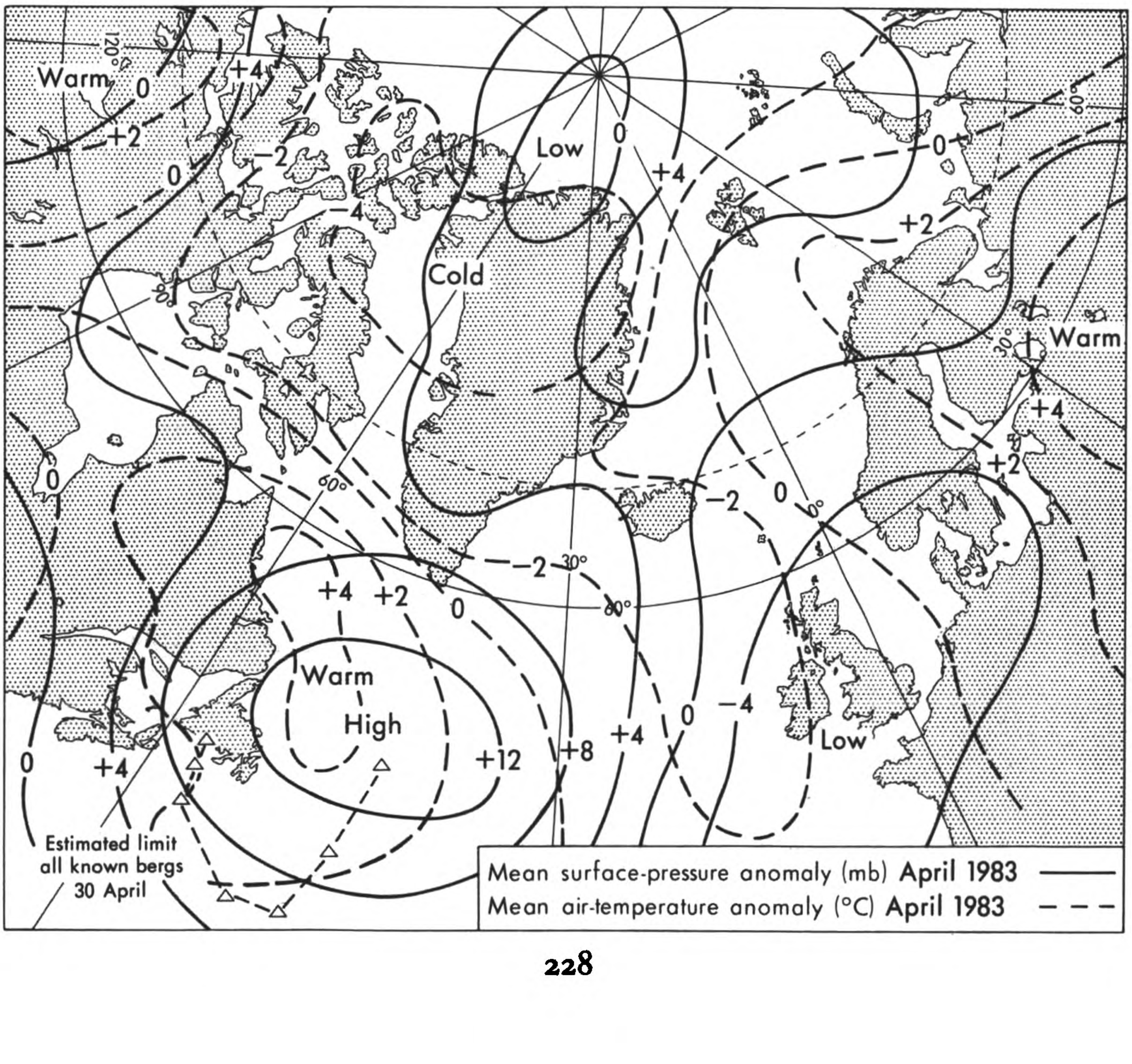
+1
Warm
Actual edge of open pack-ice at end of April 1983
Normal edge of open pack-ice at end of April
Mean sea-surface temperature anomaly (°C) April 1983


120°
Warm
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+4
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Low
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Cold
Warm
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0
−2
+4
+2
0
Warm
High
+12
+8
+4
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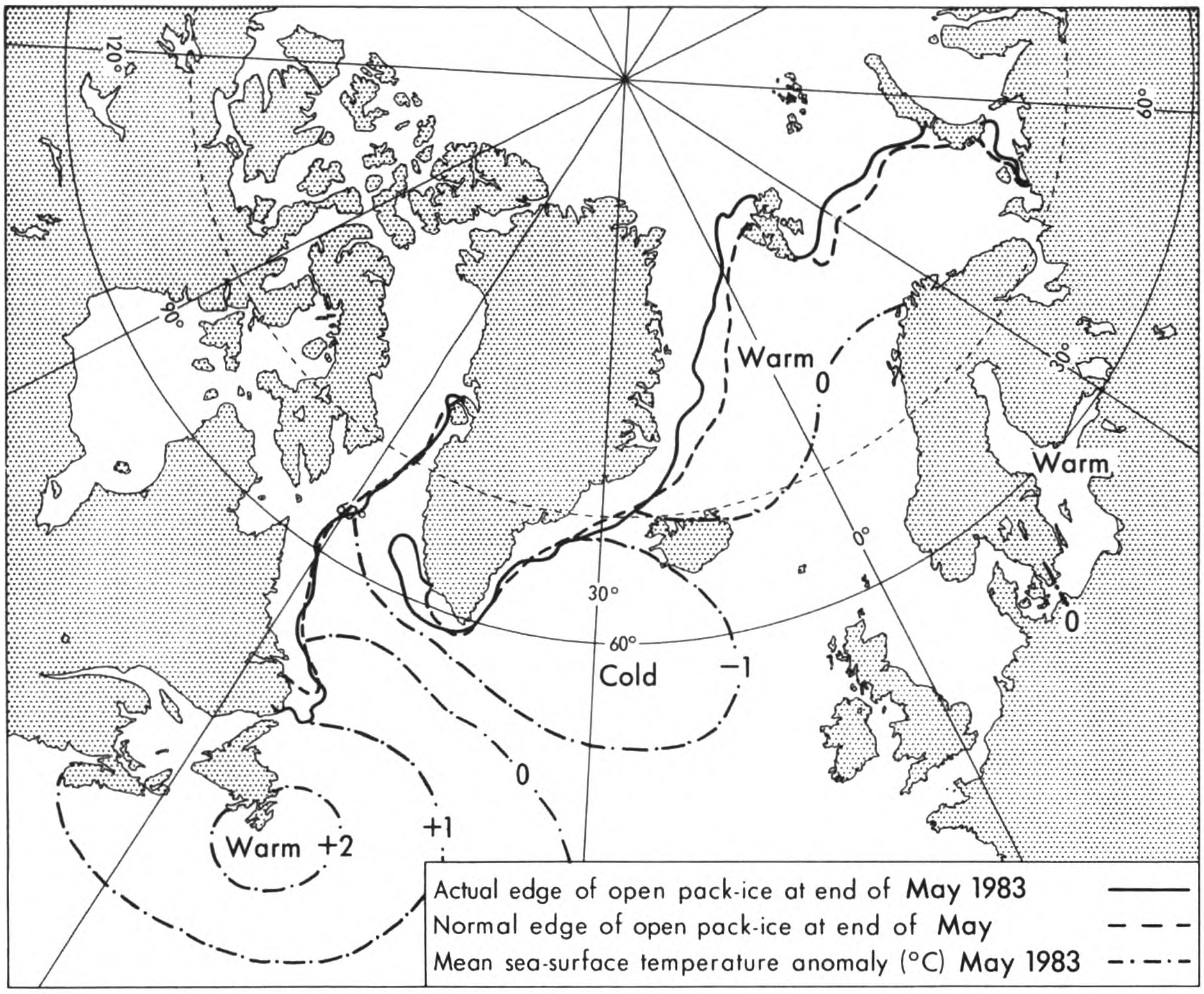
−4
Low
0
+4
Estimated limit all known bergs 30 April
Mean surface-pressure anomaly (mb) April 1983
Mean air-temperature anomaly (°C) April 1983


Warm
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Cold
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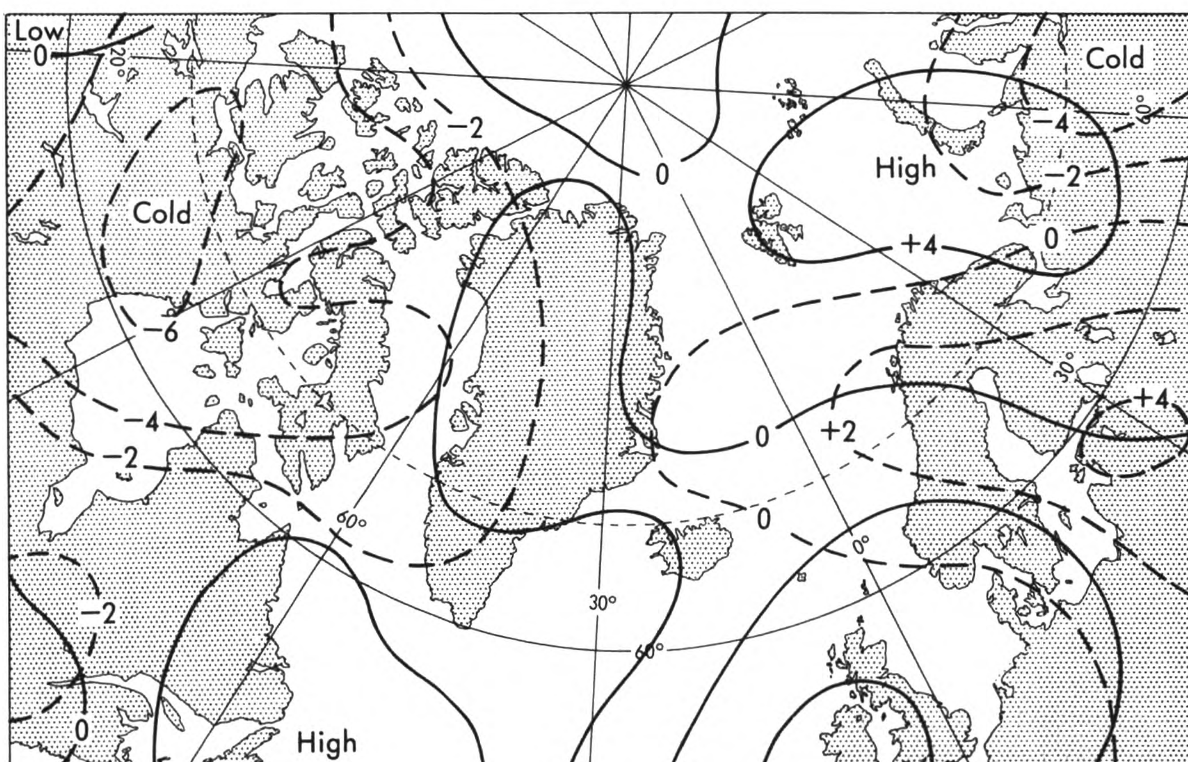
+1
Warm +2
120°
90°
60°
30°
0°
30°
60°
Actual edge of open pack-ice at end of May 1983
Normal edge of open pack-ice at end of May
Mean sea-surface temperature anomaly (°C) May 1983


Low
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+2
+4
0
−2
0
High
0
+4
0
−4
−8
Low
Warm
+2
Estimated limit
all known
bergs 31 May
60°
30°
60°
0°
30°
Mean surface-pressure anomaly (mb) May 1983
Mean air-temperature anomaly (°C) May 1983

MAY

Pressure anomalies were less marked than in recent months. Over the Labrador Sea ice conditions reverted to near normal where previously there had been a significant excess of ice. There was some anomaly for south-easterly winds over the Greenland and Barents seas so that the pattern for ice deficits during recent months was unchanged.

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	—	Sea ice normals (unpublished) and various publications.
US Department of Commerce Weather Bureau, Washington, D.C.	1965	World weather records, 1951–60. North America.
US Naval Oceanographic Office, Washington, D.C.	1967	Oceanographic atlas of the North Atlantic Ocean, Section II: Physical properties.

Director-General of the Meteorological Office

Sir John Mason, CB, DSC, FRS retired on 1 October 1983 and was succeeded as Director-General of the Meteorological Office by Dr J. T. Houghton, CBE, D PHIL, FRS (*see* photographs opposite page 221).

Sir John Mason was appointed Director-General of the Meteorological Office on 1 October 1965. He was born in Norfolk and received his early education at Fakenham Grammar School. During the war he served as an officer in the Radar Branch of the Royal Air Force. He graduated with first class honours in physics at the University of Nottingham in 1947 and in the following year he joined the Department of Meteorology at the Imperial College of Science and Technology, University of London. In 1960 he was appointed Professor of Cloud Physics at Imperial College. He was elected a Fellow of the Royal Society in 1965 and was created a Knight Bachelor in the Birthday Honours List of 1979.

Dr John Houghton was educated at Rhyl Grammar School and Jesus College, Oxford. He has spent most of his professional life at the University of Oxford and has been a Fellow of Jesus College since 1960. He was elected a Fellow of the Royal Society in 1972. In 1976 he was appointed Professor of Atmospheric Physics in the University of Oxford and has been Deputy Director of the Rutherford Appleton Laboratory at Chilton since 1979. Whilst at Oxford, he built up a research group which, in collaboration with the Rutherford Appleton Laboratory, has been extremely successful in applying advanced space technology to a series of sophisticated instruments flown on meteorological satellites launched by the USA.

Dr Houghton served as President of the Royal Meteorological Society from 1976 to 1978. He is married with one son and one daughter. His hobbies include sailing, walking and gardening.

Acknowledgement

Captain G. S. Tuck, DSO, RN (Ret'd)

Readers of this journal will be familiar with the name of Captain Tuck of the Royal Naval Birdwatching Society (RNBWS) which has frequently appeared in connection with the identification and comments regarding observations of birds received from the Voluntary Observing Fleet and published in the Marine Observers' Log section.

Captain Tuck commenced giving this very valuable assistance during 1953 and for almost 30 years we have benefited from his knowledge and expertise in marine ornithology.

Unfortunately, Captain Tuck's health now dictates that he pass on this work to someone of lesser years and Captain A. S. Young, also of the RNBWS, has kindly offered his services. We take this opportunity to express our gratitude to Captain Tuck for all that he has done for us over the years.

Personalities

RETIREMENT.—CAPTAIN T. W. WILLOWS retired in December 1982 after serving 42½ years at sea.

Thomas Walter Willows was born in March 1924 and educated at Carrs Grammar School in Sleaford and Queen Elizabeth Grammar School in Gainsborough. He commenced his first voyage to sea in June 1940 on board the *Stentor* belonging to A. Holt and Company, later known as Ocean Transport and Trading Company. He remained with this Company for the whole of his career at sea.

During the war years, Captain Willows was serving on board the *Phrontis*, which was the last ship belonging to A. Holt and Company to leave Singapore before the city and port were overrun by the Japanese in 1942. Whilst serving on the *Alcinous* in November 1942 he took part in the landings at Arzew in North Africa.

Captain Willows obtained his Master's Certificate in 1952 and was promoted to command of the *Stentor* in 1963. During the last two years of his career he commanded the *Liverpool Bay* on the Far East trade.

Captain Willows sent us his first meteorological logbook from the *Nestor* in 1946. Thereafter, we received a further 21 logbooks bearing his name of which no fewer than 18 were classed as Excellent. He received Excellent Awards in 1969, 1970, 1971, 1972, 1978, 1980 and 1981.

We wish him a long and happy retirement.

RETIREMENT.—CAPTAIN D. M. BELK retired last January after serving 39 years at sea.

Derek Moreland Belk was born in May 1927 and educated at Gainsborough Technical College. After spending one month at the Outward Bound Sea School at Aberdovey he joined A. Holt and Company as Midshipman in February 1944 and sailed from Liverpool for Australia on board the *Nestor*. He remained with A. Holt and Company—later Ocean Transport and Trading Company—for the whole of his career at sea.

During the war years Captain Belk saw only distant enemy action but he was serving as 3rd Officer on board the *Anchises* when she was bombed and machine-gunned in June 1949 whilst in Shanghai.

Captain Belk obtained his Master's Certificate in 1953 and was promoted to command of the *Mentor* in April 1967. During the last few years of his career he commanded the *Cardigan Bay* on the Far East trade.

We received the first meteorological logbook bearing Captain Belk's name from the *Flintshire* in 1965. Since then he has sent us a further 36 logbooks. He received Excellent Awards in 1970, 1972, 1975, 1976 and 1981.

We wish him a long, healthy and happy retirement.

RETIREMENT—CAPTAIN W. P. GOLDIE retired last January after having served over 38 years at sea.

William Peter Goldie was born in 1926 and educated at the George Watson School in Edinburgh. He received his pre-sea training in H.M.S. *Conway* from 1942 to 1944. He was then apprenticed to Alfred Holt and Company (now Ocean Transport and Trading Company) and remained with them for the whole of his sea-going career.

Captain Goldie obtained his Master's Certificate in February 1953 and was promoted to Master in January 1967, his first command being that of the *Automedon*. During the latter part of his career, Captain Goldie commanded a number of the large 'Bay' container vessels on the Far East trade.

We received the first meteorological record bearing Captain Goldie's name from the *Automedon* in 1967. Since then he has forwarded a further 28 meteorological records and logbooks. He received Excellent Awards in 1978, 1979, 1989, 1981 and 1982.

We wish him a long, healthy and happy retirement at his home in Edinburgh.

Notice to Marine Observers

NAUTICAL STAFF OF THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE, GREAT BRITAIN

Headquarters.—Captain G. V. Mackie, Marine Superintendent, Meteorological Office (Met.O.1a), Eastern Road, Bracknell, Berks. RG12 2UR. (Telephone: 0344 20242, Ext. 2456)
Captain R. C. Cameron, Deputy Marine Superintendent. (Telephone: 0344 20242, Ext. 2453)
Captain J. F. T. Houghton. (Telephone: 0344 20242, Ext. 2738)
(To be appointed). (Telephone: 0344 20242, Ext. 2461)

North-west England.—Mr W. G. Cullen, Master Mariner, Port Meteorological Officer, Room 218, Royal Liver Building, Liverpool L3 1HU. (Telephone: 051 236 6565)

South-east England.—Captain C. R. Downes, Port Meteorological Officer, Daneholes House, Hogg Lane, Grays, Essex RM17 5QH. (Telephone: 0375 78369)

Bristol Channel.—Captain J. H. Jones, Port Meteorological Officer, Cardiff Weather Centre, Southgate House, Wood Street, Cardiff CF1 1EW. (Telephone: 0222 21423)

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South-west England.—Captain D. R. McWhan, Port Meteorological Officer, Southampton Weather Centre, 160 High Street, Southampton SO1 0BT. (Telephone: 0703 20632)

North-east England.—Captain D. H. Rutherford, Port Meteorological Officer, Room D622, Corporation House, 73–75 Albert Road, Middlesbrough, Cleveland TS1 2RU. (Telephone: 0642 241144, Ext. 275)

Ship Routeing Service. (Telephone: 0344 20242, Ext. 2577)
Captain A. Phillips
Captain P. B. Hall
Captain C. A. S. Borthwick

Note. From November 1983 the Bracknell telephone numbers shown above will be prefixed by 4.

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