Met.O. 764

The Marine Observer

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April 1965

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THE MARINE OBSERVER

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

VOL. XXXV No. 208 APRIL 1965

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Editorial

Geneva seems a long way from the sea and from its geographical position one would not normally associate Switzerland, much more than (say) Afghanistan, with the shipping industry. It might be felt, therefore, that the Commission for Maritime Meteorology (CMM) was rather like a duck out of water during its Fourth Session, which was held at Geneva from 23rd November to 8th December 1964. But *Lloyds Register's* statistical tables show that there are now 21 ships under the Swiss flag, having a total dead weight of 164,367 tons. Both the Rhine and the Rhone rise in Switzerland (the Rhone flows right through Lake Geneva and is navigable by small craft to within ten miles therefrom). So Switzerland's contacts with the sea are by no means negligible. And maritime conferences are not unusual in Geneva—for example the inaugural conference of the Inter-Governmental Maritime Consultative Organisation (IMCO) was held there in 1948.

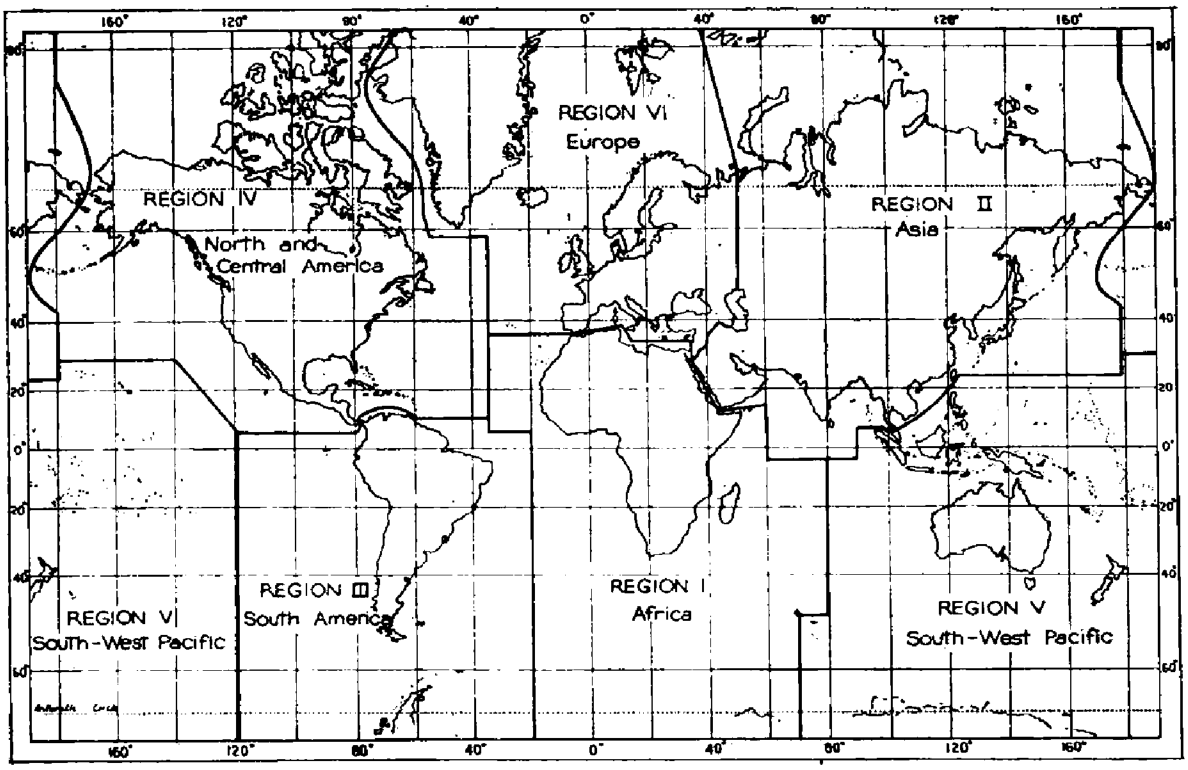
The Session was held at the spacious Headquarters of the World Meteorological Organisation (WMO) which is situated quite close to the United Nations building. It was found very convenient to hold it there, because of the excellent secretarial and simultaneous interpretation facilities which were available.

Thirty-one countries were represented at the Session and nine International Organisations, including the Inter-Governmental Maritime Consultative Organisation and the International Chamber of Shipping. As usual at CMM Sessions many of the representatives, both of countries and of International Organisations, were professional seamen, oceanographers or meteorologists with sea-going experience and included the Port Meteorological Officers of Cape Town, Haifa and Rotterdam and the Marine Superintendent of the British Meteorological Office.

In common with other technical commissions of the WMO, the CMM meets only once every four years but during the intervals between Sessions the work of the Commission—which is largely the preparatory work for the next Session—is done by Working Groups, which are composed of experts from various countries; many of the recommendations resulting from the Session were therefore derived from preparatory work done earlier by these Working Groups. All these recommendations will need to be approved by the Executive Committee of WMO at its meeting in May 1965 before they can come into force internationally.

One of the main functions of the CMM is to organise and keep under review the arrangements for the collection and dissemination of radio weather messages from merchant ships, to make efforts to ensure that the network of observations from the oceans is reasonable and to organise the provision of radio weather bulletins and warnings for shipping. In order to facilitate the collection of reports, the Commission now recommends that radio officers aboard voluntary observing ships be given considerably more freedom of choice than at present as to the coastal station to which they send their weather messages. There is evidence that under existing WMO arrangements, many of the messages are delayed or fail to be 'cleared' due to various practical difficulties and it is felt that the new scheme, by giving the radio officer more freedom of choice, will result in many more messages being received and with a minimum of delay. Under the new scheme, the oceans will be divided into the six WMO Regions (see the map opposite) and when a ship is in a particular Region, if the radio officer can't clear his message to the nearest station, he will have much freedom of choice as to an alternative station to which he can send it. Steps are also being taken to ensure that aboard 'single operator' ships, the maximum number of messages can be transmitted when the radio officer is on watch by making suitable adjustments to the time at which an observation can be made. For example, the 0600 observation might be made at 0500 GMT, if this facilitates its transmission before the radio officer goes off watch, and the time of observation in the coded message would read 05 accordingly.

Practical steps are also recommended so as to ensure that in all cases radio weather messages from ships are rapidly disseminated, after they have been received ashore,



The new WMO regions for ship reports.

for the benefit of all meteorological services concerned. There is evidence that this has not been done as effectively as it might have been in the past, with the result that meteorological services responsible for the issue of radio weather bulletins for shipping have not always had at their disposal all the reports that had been received by the shore stations of other meteorological services in the same region. These new arrangements will therefore be for the ultimate benefit of ships themselves; the more ship reports that are received by all the meteorological services which issue weather bulletins for shipping, the better the forecasts that can be issued.

Discussions at the Session showed that there is still a great shortage of reports in certain oceanic areas, particularly in the Southern Hemisphere. It is realised that there is a limit to the number of 'Selected' Ships that can be recruited, for various practical reasons (even if only for financial reasons, for it costs quite a lot to equip a 'Selected' Ship with her instruments), and the Commission now recommends that energetic steps be taken to recruit more 'Auxiliary' ships to report in areas where shipping is sparse but that an effort also be made to recruit as many extra 'Selected' and 'Supplementary' ships as funds will permit.

The Commission also recommended that a small Committee of experts should meet in order to consider in detail the operational characteristics of automatic meteorological/oceanographical buoys, their servicing and other related problems, with a view to the possibility of establishing such buoys in particularly sparse oceanic areas where the depth of water is suitable. The U.S.A. delegates at the Session stated that they have had successful operational experience with such buoys, using a mooring composed of chain, polypropylene and dacron, in depths of about 1500 fathoms in the Caribbean area and that the buoys have remained on station (although their instruments have become damaged) during winds of hurricane force. These buoys, having the underwater form of a miniature ship with a displacement of up to about 20 tons, are fitted with instruments for recording barometric pressure, air and sea temperatures, wind force and direction, and transmit the coded observations by radio on a strict time schedule. Electrical power for such a buoy can be provided by using a miniature windmill, associated with a generator and emergency batteries, or by atomic means, IMCO have already laid down the international requirements for lighting and marking such buoys.

A more ambitious project, to help provide information from sparse areas, is the possible establishment of a stationary meteorological/oceanographical ship somewhere in the Southern ocean; the possibility of chartering a medium sized tanker or dry cargo ship for the purpose, on an international basis is being considered and a small Committee of technical experts is to meet to draw up a plan for the establishment, management and operation of such a station, and give a detailed estimate of its possible cost. The Executive Committee of the WMO have already indicated possible sites for such ships; one of these sites in the Indian Ocean, about 2400 miles from Cape Town, might be considered suitable for a pilot project; there seems to be no practical reason why the ship concerned cannot stay 'on station' for 3 to 6 months, and she might conveniently be based at Cape Town.

Meteorologists have an urgent need for more upper air observations over the ocean. To help meet this need, the CMM envisages a meteorologist sailing aboard certain merchant ships (preferably bulk carriers, because of the comparatively little time they spend in harbour) and making radio-sonde observations, to a height of about 60,000 feet, twice a day. The observations would need to be transmitted by radio, and provision would have to be made for the carriage of (say) 50 cylinders of hydrogen, perhaps a temporary shelter on deck for filling the balloon and accommodation would have to be provided for the meteorologist—the radio-sonde receiver being situated in his cabin. Certain shipping companies of various countries have indicated their willingness to assist in such a project. The U.S.A. authorities have already had success in making these observations aboard merchant ships—particularly in the Caribbean area. The CMM recommended that each maritime country endeavours to recruit at least one ship, trading in an area where shipping is relatively sparse, for making these radio-sonde observations as a trial project.

As for the provision of radio weather bulletins for shipping, the relevant Working Group had given much study to the question and had consulted numerous shipmasters, as a result of which the general opinion was that the coverage is reasonably adequate in most oceanic areas—notable deficiencies are in the eastern part of the South Pacific and part of the Southern Ocean, where shipping is extremely sparse. The Commission agreed that there was no objection to the overlapping of forecast areas as occurs in various areas—in fact, it was advantageous because it provided a 'second opinion'—but it was felt that, in each area, a common system of nomenclature should be agreed, so as to avoid confusion on the part of the user of the bulletin. There was general agreement that there were many practical advantages in ships being fitted with facsimile receivers so that they can receive frequent and up to date weather maps (forecast and analysis maps), wave maps and ice maps and thereby avoid the tedious business of receiving the coded data in morse and plotting it by hand. It was felt that the maps which are broadcast at present by Meteorological Services in various parts of the world can be of great help to a shipmaster, particularly if some minor additions could be made to their content, in association with the written bulletins broadcast by radio. Much time was given during the Session to the question of weather advice for fishing operations and it was agreed that a booklet would be prepared by WMO and FAO (The Food and Agriculture Organisation of the United Nations) pointing out the weather information that is available to fishermen and encouraging them to make observations, particularly in areas where shipping is sparse, and to transmit them by radio.

The U.S.A. and Netherlands Authorities gave some details about the success of their programmes for the weather routeing of merchant ships and claimed that much economic advantage had been gained by the ships that had been routed in this way—it was emphasised that at present this procedure has to be on an individual basis for each ship that is routed. It was noted that similar work is also being carried out by the U.S.S.R. Authorities, although no details were given about this.

The CMM is the International Authority for arranging the reporting and nomenclature of sea ice and the provision of symbols for plotting sea ice on maps; a Sub-Committee of experts met during the Session and discussed these questions in some detail and recommended the publication without delay of a final selection of photographs to illustrate the existing international ice nomenclature. A working Group of these same experts was set up to continue the study of various problems that arose during their discussions.

One of the Commission's activities is to arrange for the provision of climatological information for shipping and fishing. A Working Group has for some years been preparing a scheme for the publication of annual marine climatological summaries—derived from observations made by voluntary observing ships in all oceans, during the year in question. Under this scheme, specific countries have been made responsible for the collection of all the observations (taken from the logbooks and transferred on to punched cards) for a particular section of the oceans. Thus the United Kingdom is responsible for the eastern North Atlantic, U.S.A. for the western North Atlantic, India for the Indian Ocean etc. This is the first time that such climatological summaries have been prepared; they will include information about all the meteorological elements, including wind force and direction, waves and visibility—and may provide a ready means of answering certain marine enquiries. The first of these summaries will cover the year 1964, and is now being prepared.

Other subjects dealt with during the Session included a study of the methods of observing sea surface temperature, wind force and precipitation at sea; proposals for changes to be made in some of the equivalent wind speeds for Beaufort numbers; observations of waves; accuracy of observations; reporting of visibility; various questions concerning codes and the provision of an International guide for Port Meteorological Officers and for marine observers aboard merchant ships.

Eighteen days sounds quite a long time for such a meeting, but as can be seen from this summary, the subjects were numerous and varied, so the delegates had quite a strenuous time, at the Session during the day (including Saturday forenoon) and studying documents (138 of them) during the evening. But Geneva is an attractive place; most of the delegates knew each other quite well and it was a pleasant friendly Session, with a minimum of politics!

At the conclusion of the Session, Working Groups were re-established to deal with the day-to-day work of the Commission. Mr. K. Mcleod of the Canadian Meteorological Service, who has been a member of the CMM since 1952 was elected President and Mr. G. Verploegh, of the Netherlands, who has been largely responsible for the programme of weather routeing merchant ships in his country was elected Vice-President. The next Session of the Commission will take place in 1968.

C. E. N. F.

April, May, June

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

It sometimes happens that we are unable to offer an explanation for phenomena reported. In such cases we shall be very glad to hear from any reader who can put forward an authoritative or a possible explanation, which could be published in this journal. We should also be glad to hear from any reader who has witnessed a similar phenomenon in the past, but which has not previously been communicated to us.

SEA SMOKE
North Atlantic Ocean

s.s. *Esso Exeter*. Captain R. R. Phillips. Aruba to New York. Observers, Mr. P. J. Woodridge, 2nd Officer and Mr. D. Davies, lookout.

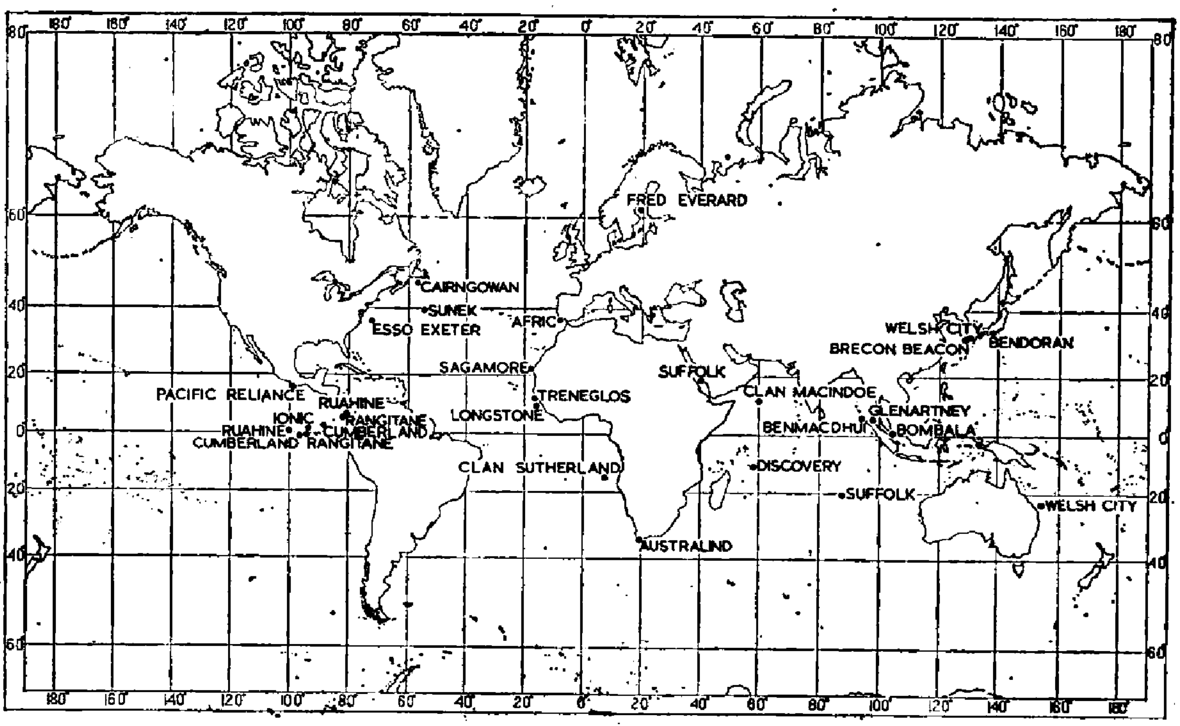
21st April 1964. Sea smoke was encountered on two occasions between 0610 and 0745 SMT. The first belt seemed to stretch from horizon to horizon in an E–W direction, and was not thick. It lay on the sea to a height of 15–20 ft and above this height, horizontal visibility was quite good, though the sky was overcast. The air temperature and the wet bulb were both 47°F throughout, but the sea temperature varied considerably. Before entering the fog it was 48°; in the fog belt it rose to 62½° and after leaving it the reading fell to 55°.

The passage through the fog took 5 min at a speed of 16 kt.

Twenty minutes later sea smoke was again encountered, but this time it was very much denser and resembled steam rising from a nearly boiling pot. It was in well defined lanes and extended upwards to about 70–100 ft. The belt was about 13 miles long and while passing through it the ship remained clear, no fog passing across the vessel. A few yards away from the sides, however, nothing could be seen. Both the air temperature and the wet bulb rose slowly to 54°. The sea temperature, initially 55°, rose to 67°, to 70°, to 73° at five minute intervals and attained a maximum of 75°; it did not decrease until after noon when it became 68°.

Position of ship at 0610 LMT: 36° 35′N, 72° 35′W.

Note. This observation occurred at a time of the year and position where cold air of continental origin passes over the convergence of cold Labrador current waters and Gulf Stream water. The sea has rapid variations in temperature and the structure of the atmosphere above is very complex. Stable, unstable, saturated and unsaturated air exist in close proximity.



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

ST ELMO'S FIRE

North Atlantic Ocean

s.s. *Sunek.* Captain H. Syversen. New Orleans to Rotterdam. Observer, Mr. R. Green, 2nd Officer.

22nd April 1964. St. Elmo's Fire was observed at 0650 GMT. Frequent showers had been experienced during the night and some lightning seen, but no thunder heard. During a short heavy rain shower, the port aerial, which runs from the mast above the accommodation aft, to a smaller mast forward of amidships was seen to glow brightly. Through binoculars it could be seen that the light was composed of individual beads running the length of the wire. The display lasted about 5 min and ended abruptly. The starboard aerial was not affected, nor any other part of the ship. Air temp. 47°F, wet bulb 44°, sea 61°. Wind NW'W, force 6.

Position of ship: 39° 40'N, 54° 00'W.

SUDDEN STORM

off Guinea

m.v. *Treneglos.* Captain W. Phillips. Walvis Bay to Avonmouth. Observer. Mr. C. J. Double, 2nd Officer.

18th June 1964. At about midday the sky was clear, but soon afterwards a line of small cumulus clouds appeared on the horizon. The wind was then NW, force 3. Slight rain began at 1310 and the wind increased to force 4 from NNW. Ten minutes later the line of cloud was overhead and the wind continued to veer quickly. At 1324, the wind, now round to ENE, suddenly increased to force 8 and soon after it became force 10–11. The sea was a mass of foam and spray, the rain became heavier and visibility was down to 100 yd. The air temp. fell from 84°F to 83°. By 1345 a good sea and swell were running from ENE. At 1400 the wind veered to E'S and quickly began to decrease to force 6; the rain stopped and the sky began to clear. By 2000 the wind was E'ly force 2, it then began to back gradually and by 2200 was again NNW, force 2–3.

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

Note. This storm was probably associated with the Inter-tropical Convergence Zone off west Africa.

Riouw Straits

m.v. *Bombala*. Captain F. A. Everett. Fremantle to Singapore. Observer, Mr. A. M. Barker, 2nd Officer.

25th May 1964. Between 0317 and 0334 GMT while at the lower end of the Riouw Straits, a particularly severe 'Sumatra' was experienced, with winds of between force 8 and 10 from W's. The increase in wind speed was rapid, as there had been a flat calm at 0000. The surface of the sea became milky white with spray which was particularly turbulent close to the ship and blowing completely over us at times. Torrential rain was also falling and this combined with the spray, reduced visibility both optically and by radar, to nil. The vessel took a 5° heel with the wind and had an alarming rate of sideways drift. We were heading 280° and had to make good a course of 330° between the Islands. There was only a fall and rise of 1 mb during the storm. Due to the necessity to navigate in the constricted waters, there was no opportunity to record more information about the weather.

Position of ship at 0000: 0° 06′N, 104° 54′E.

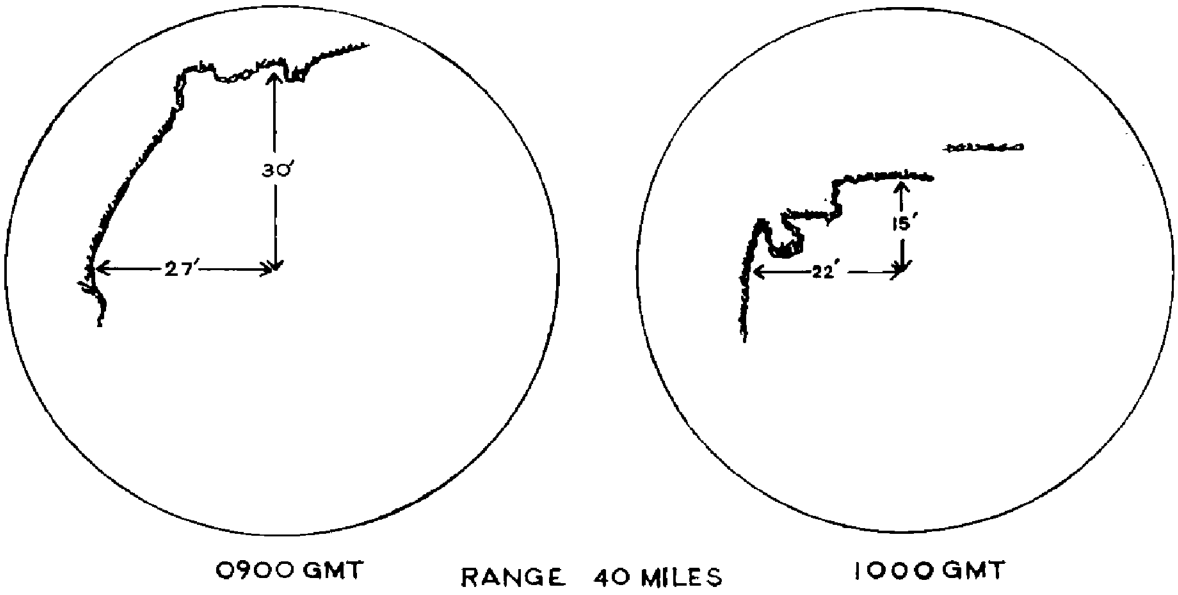
Note. The severe conditions which m.v. *Bombala* experienced occurred at a time of the year when monsoon air masses converge over the East Indies. Severe storms and torrential rains are therefore characteristic of this area at this time. (See page 72 in *Marine Observer* of April 1962.)

DUST STORM

Red Sea

m.v. *Suffolk*. Captain H. J. D. Sladen. Aden to Suez. Observers, the Master and all officers.

20th June 1964. At 0420 GMT the wind quite suddenly increased from force 4 to force 6 from WNW and visibility dropped to ½ mile due to wind-borne sand or dust. These conditions continued until 0935, when the air became clear almost as suddenly as it had thickened, and the wind gradually fell to force 4. During this time the air temperature remained steady at 89°–90°F, with the wet bulb at 81·0°, while the barometer varied somewhat erratically between 1002·6 and 1003·6 mb. Sea temperature 88·5°. The radar was in use throughout the dust storm and giving a good performance, picking up ships at 35–40 miles. At 0815 an echo on the PPI, very like that produced by a front, was observed at 40 miles. The sketches show the



Radar display observed by m.v. *Suffolk*.

appearance of the front at 0900 and 1000 respectively. On coming up with the front it gradually faded from the PPI and no trace of it could be seen in the sky.

Position of ship at 0500: 18° 22′N: 40° 01′E.

Note. These are storms in unstable air coming from off the desert. The Inter-tropical Convergence Zone is located near this position at this time of the year and could have been associated with the storm. The radar pattern indicates the development, location and structure of the line of storms.

FOG AT THE EQUATOR

Eastern Pacific Ocean

m.v. *Rangitane.* Captain D. H. Chadwick. Balboa to Tahiti.

13th April 1964. At 0650 GMT, when the night was dark and moonless, the vessel suddenly ran into fog, which was plainly indicated by the characteristic 'loom' around the navigation and deck lights. The sky was cloudless and the stars remained visible overhead, although the intensity of the fog varied. At 0740 the vessel ran clear of the fog patch as suddenly as she had entered it, and the horizon became clear. Little change of air or sea temperature was noted. On first entering the patch the air temperature was 73·1°F, the wet bulb 72·9° and the sea 74·2°. After leaving the fog, the readings were 73·2°, 73·0° and 74·2° respectively. Between 1800 GMT on the 12th and 0600 on the 13th the sea temperature had fallen from 84·8° to 74·1°. Subsequent temperatures at 1200 were, air 73·7° and sea 74·1°.

Position of ship: 0° 40′S, 94° 24′W.

On June 22nd on the homeward passage to Balboa a similar fog patch was encountered at 1130 GMT. The air temperature fell from 70·0° to 67·2° on entering the fog; the wet bulb was 66·8° and the sea 68°. At 0600 the sea temperature had been 71·2°; at one period during the fog it fell to 66·8°. The fog lasted rather longer on this occasion, clearing only slowly as the sun rose and finally dispersing at 1330 when the air temperature was 69·0° and the sea 70·1°.

Position of ship: 0° 10′N, 97° 12′W.

m.v. *Ionic.* Captain R. G. E. Grant. Balboa to Auckland. Observers, the Master and all officers.

24th April 1964. When the vessel was NW of the Galapagos Islands at 0600 GMT, the sea temperature which had been falling for 6 hours became steady at 75°F, having gone down by about 7°; humidity was very high and the sky was cloudless. Low, ragged Cu clouds were seen to be rapidly increasing from the SW soon after the observation hour and at 1000 the ship ran into a very thick fog bank. Apart from a few short clear intervals the fog continued until sunrise when it began to disperse. At the time the fog was encountered the air temperature was 74·5° and the sea 73·7°. Wind SW'ly, force 2. Speed of vessel 20 kt.

Position of ship: 1° 17′N, 93° 25′W.

m.v. *Cumberland.* Commodore H. N. Lawson. Balboa to Wellington. Observers, Mr. M. J. R. Jackson, 2nd Officer, Mr. R. H. Thompson, 3rd Officer and Mr. R. I. Duce, Jnr 3rd Officer.

26th April 1964. At 0100 GMT, about an hour after sunset a very heavy dew began to form and this continued throughout the night until all upperworks were dripping wet. At first the sky was completely clear, with a full moon at high altitude, but on several occasions visibility was reduced to about 3 miles by a white mist lying at a distance. At 0515 an $\frac{8}{8}$ covering of stratus invaded the sky, moving very fast from SSW. By 0545 the sky was again completely free of cloud and visibility was about 7 miles, but at 0845 the vessel ran into a thick patch of fog with nil visibility for 15 min. Afterwards the visibility remained at 5–7 miles until sunrise; later it became 20 miles or more. Throughout the night the wind was never more than 4 kt from a s'ly direction; for the most part there were only light airs. At 0600: air temperature 73·9°F, wet bulb 73·9°, sea 73·4°. Speed of vessel 17·3kt.

Position of ship at 0300: 0° 48'S, 96° 07'W.

m.v. *Ruahine.* Commodore A. Hocken. Balboa to Tahiti. Observers, the Master, Mr. P. Barr, 2nd Officer, Mr. P. J. B. Low, Senior 3rd Officer and Mr. A. Coxon, Junior 3rd Officer.

11th May 1964. Extensive fog was encountered between 1055 and 1138 and between 1215 and 1315 GMT. The first indication of fog in the area was a thin line of sea smoke rising up to a height of about 20 ft; this lasted for about 20 min after which visibility became normal. A similar line was observed at 1055; it soon became extensive and thickened, reaching a height of about 80 ft. Sometimes the visibility decreased to a few hundred yards, but at other times it improved to between 1 and 2 miles. After three quarters of an hour the fog cleared away, only to return at 1215 when it lasted for an hour. In the 45 years that the Master had been on this route to New Zealand he had never previously encountered fog on the equator. Was the fog due to the colder Humboldt Current meeting the Equatorial Current when the dew point at the time was at the critical temperature? At 0600: Air temp. 69·0°F, wet bulb 68·0°, sea 69·8°. At 1200: Air temp. 68·5°, wet bulb 68·0°, sea 69·7°.

Position of ship: 0° 34'N, 100° 10'W to 0° 12'N, 101° 12'W.

Note. The conditions experienced by *Rangitane, Ionic, Cumberland* and *Ruahine* are due to these ships passing into the cold water of the Peru (or Humboldt) Current.

BAND OF DEMARCATION

West African waters

m.v. *Sagamore.* Captain W. F. Swann. Newport (Mon) to Freetown. Observer, Mr. P. Warne, Chief Officer.

8th March 1964. At 1715 GMT the vessel passed through a band of demarcation, lying 040°–220°, approx 9 cables wide, in which the surface of the water was smooth, as though due to the effect of oil, except for small eddies and rips. There was however, no trace of oil anywhere. The water on either side was disturbed to the normal extent by winds of force 2–3 from NW. The edges of the band were marked by patches of dirty white foam. Temperature of water in the band, 70°F. To the south of it, the sea temperature was 67·8°. No reading was taken on the north side. The charted depth was approx 200 fm.

Position of ship: 21° 54'N, 17° 14'W.

Note. The band of smooth sea experienced by m.v. *Sagamore* was probably caused by upwelling of cold water off the African coast. There would be sharp gradients of current and sea temperature between the cold water and warm surface water.

DISCOLOURED WATER

South Atlantic Ocean

s.s. *Clan Sutherland.* Captain A. F. Banks. Walvis Bay to Dakar. Observers, Mr. R. A. Hunter, 3rd Officer and Mr. W. Gay, Radio Officer.

1st May 1964. At 1035 GMT, a band of discoloured water, greenish-brown in colour about 1 mile long and 20–30 yd wide was observed running 340°–160°. The vessel passed through the band which seemed to consist of small brown objects about an inch in size, with one larger irregularly shaped dark coloured object (about 2 ft in size) in the middle of the band. It was not possible to see them very clearly as the ship's wash obscured them to some extent. Sea temp. 70·3°F. Wind SSW, force 4.

Position of ship: 15° 41'S, 7° 31'E.

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

"This report comes from a position well out in the SE Atlantic off Angola, a region near the normal equatorial limits of the Benguela Current influence, where blooms have quite frequently been reported. The known ones have been composed of the Atlantic species of *Trichodesmium* which has rafts up to some 2·5 mm. The mention of particles 1 in. in size, in the present instance, leaves one guessing helplessly, so I would rather not offer further comment."

Japanese waters

m.v. *Brecon Beacon*. Captain G. A. Austen. Singapore to Yawata. Observer, Mr. H. E. Carlisle, 2nd Officer.

4th April 1964. When off West Kyushu, Japan, at 0730 GMT, a streak of material, pinky-orange-brown in colour was seen stretching in a N'W to S'E direction. Later on, the streaks became more frequent and numerous, and whales were observed in the vicinity. After dark, presumably when the substance was disturbed by the vessel's passage, brilliant phosphorescence was seen, the colour being a vivid 'sidelight' green. A sample was taken and bottled. Sea temp. 64·5°F. Wind, light variable.

Position of ship: 32° 14'N, 128° 17'E.

Note. Dr. T. J. Hart comments:

"'Red tide' due to various dinoflagellates was first reported in Japanese Waters about 60 years ago. It is sometimes harmful to fishes and to pearl oysters. The brilliant phosphorescence makes this a more probable cause than the more widespread *Trichodesmium* but only microscopic examination of the sample, when it arrives, could confirm this."

Mexican waters

s.s. *Pacific Reliance*. Captain C. G. Killick. Stockton (Cal.) towards Panama. Observer Mr. L. J. Stephenson, 3rd Officer.

17th January 1964. At 0100 whilst on course 117°, observed on the water a very distinct white line running ENE–WSW. As the vessel passed through this, it was observed to be a clear cut line of discoloured water. The line stretched some considerable distance, in fact as far as the eye could see. The wind at the time was SW'S force 2, with very slight sea from the same direction. The discoloured water therefore was lying very much across both wind and sea. The colour would best be described as a 'milky white'.

Position of ship: 16° 08'N, 99° 24'W.

Note 1. Dr. T. J. Hart of the National Institute of Oceanography comments:

"The position given for this most intriguing observation of white line running ENE–WSW athwart the slight southerly wind, is well out of Punta Maldonado on the Pacific coast of Mexico. This is a most interesting area, and the observation provokes several guesses as to what might be involved. I have one record of a demarcation line in the area, but that was between greenish coastal water containing a rich mixed diatom bloom and blue oceanic water containing little plankton. I do not think that the unusual alignment of this discoloration compels one to look beyond normal wind effects, because it would take a long time for a wind so slight as that recorded to dissipate a concentration possibly built up by previous stronger easterly winds such as usually prevails there. However, it does render some other explanations such as a current effect more probable. The area is one in which a seasonally shifting convergence between the tail-end of the California current, approaching from the north and swinging off-shore, meets a coastal current from the south that also swings off-shore in this vicinity. The latter is a resultant of the deflection of a part of the equatorial current system to the north from off the Panama region. The north equatorial current flowing westwards further offshore may absorb elements from both the converging water masses nearer the coast. Although the actual colour was probably due to unusual accumulation of some form of micro-plankton there is the added complication of the more remote possibility of its being due to some form of volcanic activity in this area."

Note 2. Many observations of discoloured water recorded in ships meteorological logbooks mention that the discoloration appears to be caused by sand or spawn. All observations are forwarded to Dr. Hart who has mentioned that sea-surface discolorations are very rarely caused by sand or spawn, in fact less than three per cent of those properly investigated have proved to be so. The vast majority of them are blooms of various kinds of microscopic algae.

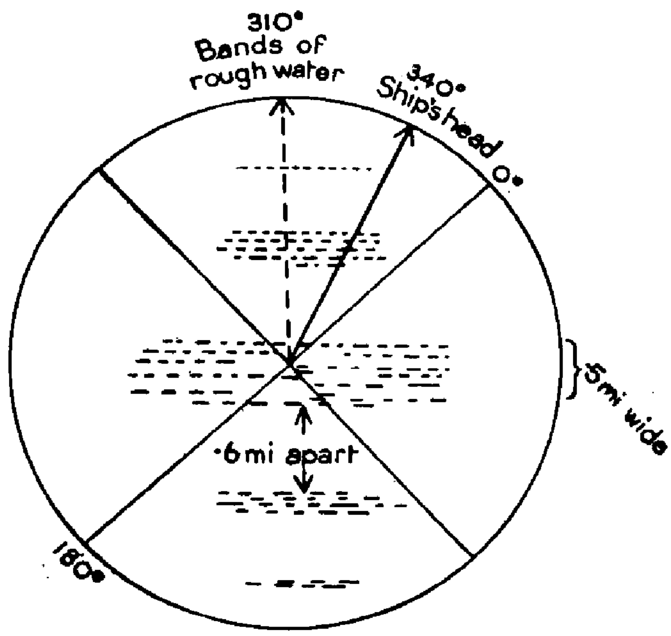
Only the scientific analysis of a preserved sample can properly identify a discoloration; bottles and preservative for the collection of samples are readily available from any Port Meteorological Officer in the United Kingdom.

WAVES

Indian Ocean

R.R.S. *Discovery*. Captain R. H. A. Davies. Aden to Mauritius.

28th March 1964, 1930–2000 GMT. Bands of breaking waves of height 2 ft and period 1 sec, about ½ mile in width and 6 miles apart were observed by radar, heading in a 310° direction. When the bands passed the ship, which was hove-to, the wind did not change in direction or increase in force. The swell died down completely. There were five bands in all, the first and last being comparatively weak, while the middle one was the strongest. They had the appearance of waves breaking on a flat sandy shore. Wind ENE, force 3. Sea temp. 85°F.



Radar display observed by R.R.S. *Discovery*.

Position of ship: 11° 30′S, 58° 00′E.

29th March. Similar waves, moving from 300°, were observed from 0530–0620 GMT. Wind NW, force 3. Sea temp. 84·9°.

Position of ship: 11° 30′S, 58° 00′E.

Note. This phenomenon appears to be a resonance between wind and current. The sea surface temperature was extremely high (85°F) and probably only a very shallow layer of the sea was involved in the waves.

CURRENT RIPS

Eastern Pacific Ocean

m.v. *Rangitane*. Captain D. H. Chadwick. Tahiti to Balboa.

24th June 1964. At 2230 GMT the vessel entered an area of numerous visible current rips of variable directions and strengths and continued to meet them during the following half hour. Large quantities of vegetation and tree trunks were seen floating on the surface and it was noticed that each trunk had numerous birds as passengers. The sea temperature rose from 80·6°F to 83·5°, but fell again to 80·6° by 2300. The air temp. was 78·5° throughout.

Position of ship: 5° 18′N, 82° 04′W.

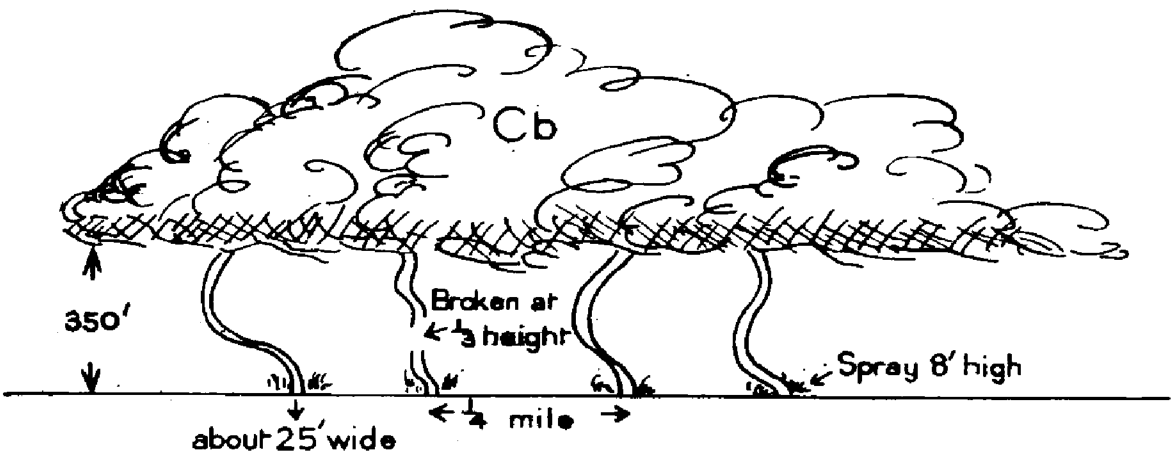
Note. This observation occurred where the sea water masses are complex. Hence the numerous current rips are not unusual. However tree trunks, vegetation, etc. are of land origin and suggest the occurrence of a severe storm. Please see comment concerning observations off Cape Mala by m.v. *Rakaia* published in *The Marine Observer* of January 1965.

WATERSPOUTS

Strait of Malacca

m.v. *Glenartney*. Captain R. G. Rippon. Aden to Singapore. Observer, Mr. D. M. Richard, Extra 3rd Officer.

25th June 1964. At 0000 GMT, four waterspouts were observed simultaneously, hanging from a low ridge of cloud the base of which was approx 350 ft above the sea. They were spaced at $\frac{1}{4}$ mile intervals in an apparent straight line. The wind



increased from light airs to force 3, accompanied by light rain and only moderate visibility for a period of 10 min; the air temp. fell by 1°. Air temp. at 0000: 81·5°F, wet bulb 80·4°, sea 84·0°.

Position of ship: 5° 18′N, 97° 48′E.

Note. This observation is of interest because it shows that the line of instability associated with the hanging low cloud had a cellular structure revealed by the waterspouts.

PHOSPHORESCENCE

North Atlantic Ocean

m.v. *Longstone*. Captain F. Surtees. Monrovia to Middlesbrough. Observers, Mr. H. P. Davies, 3rd Officer and A.B.'s on lookout duty.

24th June 1964. During the eclipse of the moon it grew very dark. Quite bright marine bioluminescence which took the form of specks of electric blue flashes in the water and just below the surface was then observed. The largest appeared to be about 6 in. across, the average life of each flash being from 4–7 sec. Also seen were slight white phosphorescent patches giving off a vague glow, rather reminiscent of the surfaces in an auroral display. The Aldis was flashed on the sea and the radar was switched on but in neither case was there any change of size or luminosity of the bioluminescence.

Position of ship: 9° 39′N, 16° 17′W.

Japanese Waters

m.v. *Welsh City*. Captain D. Beynon. Observers, Mr. R. M. Gidden, 2nd Officer and the Japanese pilot.

10th April 1964 between 0200 and 0400 SMT, excessive phosphorescence in broad bands was observed stretching across the Channel, coming from seaward. Large fish were clearly seen in it and when the vessel passed through a band, a brilliant green glow appeared around the hull totally obscuring visibility. The bands which appeared whitish at a distance consisted of millions of small twinkling lights. The pilot said he had never seen any phosphorescence before in that particular stretch of water and if it was like this, he hoped he'd never see it again either. All attempts to obtain some in a bucket were unsuccessful. The phosphorescence also obscured the radar display as it caused the clutter to be excessively bright emphasising the dark shadow areas behind islands etc. and being almost as bright as the land echoes despite all manipulation of radar controls to decrease it.

Position of ship: in the Minamata Approaches from Ganoshiro Seto to Klagashima Kaikyo (approx 32° 18'N, 130° 15'E).

North Pacific Ocean

s.s. *Bendoran*. Captain J. Cringle. Hong Kong to Yokohama. Observers, Mr. A. Milligan, 2nd Officer and Mr. Thomson, Able Seaman.

21st April 1964 at 1800 GMT. The sea suddenly became phosphorescent stretching in long streaks or bands in an E–W direction. The sea surface was calm and ripples appeared as the lights of a fishing fleet seen at a distance. Observed on the radar the phosphorescence appeared as dense clutter. A passing vessel was brightly illuminated as was our own hull and the wake gave the impression of masthead lights at a distance. The sea temperature at 1500 had been 71°F but at 1800 it had dropped to 64°. During the intense phosphorescence the air temperature also dropped from 71° to 66°. At 1815 the only visible phosphorescence was of a dull green colour in the bow wave. Previously it had been a vivid green and visible for a considerable time.

Position of ship: 33° 56'N, 138° 07'E.

North Indian Ocean

m.v. *Clan Macindoe*. Captain L. Pogson. Tuticorin to Aden. Observer, Mr. J. W. Wilcock, 2nd Officer.

12th April 1964 at about 0000 GMT. While attempting unsuccessfully to signal another ship, I shone the beam of the Aldis lamp into the sea abeam of the ship. At once the sea around where the beam struck glittered with phosphorescence which continued for a full minute after the beam had been extinguished. Previous to this the only phosphorescence was in the form of flashes of light along the ship's side.

Position of ship: 11° 44'N, 60° 07'E.

South Indian Ocean

m.v. *Suffolk*. Captain H. J. D. Sladen. Albany to Aden. Observer, Mr. A. D. Welsh, 3rd Officer.

8th June 1964 at 1800 GMT. Phosphorescence in the form of a pale blue-white light in the disturbed water alongside the ship had been seen for some hours when it was decided to see what effect the shining of the Aldis lamp on the sea would have.

When the Aldis was flashed on the sea surface for short periods, numerous spots of the usual blue-green coloured phosphorescence were seen. In addition, when the lamp was directed steadily at the surface, many pinpoints of orange-red light were observed having the appearance of sparks. These were usually seen singly but as many as five were seen at one time in the loom of the lamp. Sea temp. 73·8°F.

Position of ship: 20° 28'S, 87° 57'E.

Note. Dr. R. H. Kay of the University Laboratory of Physiology at Oxford, to whom we send all observations of phosphorescence received from ships, regrets that, owing to family illness, he has been unable to write a comment on the above five observations. He has, however, selected them for publication, out of the many which we have sent him, because each one makes reference either to radar or to the effect of an Aldis lamp. (See Dr. Kay's notes on page 15–16 of the January 1965 number of *The Marine Observer*.)

SEA COWS

off Sierra Leone

m.v. *Longstone*. Captain F. Surtees. Middlesbrough to Monrovia. Observer, Mr. A. Magrath, Chief Officer.

21st June 1964, 0820 GMT. The vessel passed close to a herd of dugongs, or sea cows, numbering about a dozen in all. Their heavy breathing was quite clearly heard, and although we passed near to them they made no move to flee from the ship. At the time they were approximately 50 miles from the land.

Position of ship: 9° 32′N, 16° 03′W.

Note. Dr. J. C. Fraser, Department of Zoology, British Museum comments:

"I am myself very doubtful about the correctness of the identification of the animals seen from m.v. *Longstone*. To begin with they would have been manatees and not dugongs, the latter not occurring in the Atlantic. It seems improbable that manatees would occur so far offshore; they are dependant on plants for food and these would be hard to come by in deep water. I have referred the report to Dr. Colin Bertram, Cambridge, who is the authority in this country on the Sirenians (the group including dugongs and manatees)."

Dr. Bertram replied as follows:

"If they were Sirenians, I agree that they would be manatees rather than dugongs. We certainly have met no reference to manatees being seen so far from land and it would seem most improbable, especially in deep water. Furthermore, manatees breathe quietly and the heavy breathing suggests Cetaceans (the group which includes whales)."

SEA BIRD AND TURTLE

Eastern Pacific Ocean

m.v. *Ruahine*. Commodore A. Hocken. London to Curaçao. Observers, Mr. M. Keat, 3rd Officer, Mr. W. Shepherd, Chief Radio Officer and Mr. A. Tetley, 2nd Radio Officer.

8th May 1964, 1630 GMT. A large sea bird of unknown type was seen resting, between dives, on the shell of a medium sized turtle which was swimming very slowly just below the surface of the sea. The turtle appeared to be unaware of the passenger on its back. Several other birds were also seen in the vicinity, resting between dives, on pieces of driftwood. Air temp. 86°F, sea 88°. Wind, light airs.

Position of ship: 6° 50′N, 81° 15′W.

GRASSHOPPER

Eastern Pacific Ocean

m.v. *Cumberland*. Commodore H. N. Lawson. Balboa to Wellington. Observers, the Master, all deck officers and Mr. P. A. Lloyd, Chief Radio Officer.

24th April 1964. At 2100 GMT (1500 SMT) a large insect resembling a locust was discovered by Mr. Lloyd, on a deck-chair on the Boat Deck. It was an unusual and fearsome looking creature, so several other people were called to have a look, including the Master who suggested trying to catch 'Oscar', as it was nicknamed. This was done by Mr. Lloyd and the creature was put into deep-freeze until it was dead. A sketch was made by the Master and 'Oscar' was sent to the Government Entymologist at Levin in New Zealand for identification.

The creature's dimensions and appearance were as follows:

Overall length: 5¼ in., feelers 1 in. long, the mantle was black with white spots, resembling a lizard. Wings were greenish, mottled, underside pink; head, brick red, with large black protruding eyes; feet, bright red with three toes; lower legs black; thighs were lizard or snake-marked.

Position of ship: 2° 54′N, 88° 33′W.

Note. Miss Z. Waloff of the Anti-locust Research Centre, London, comments:

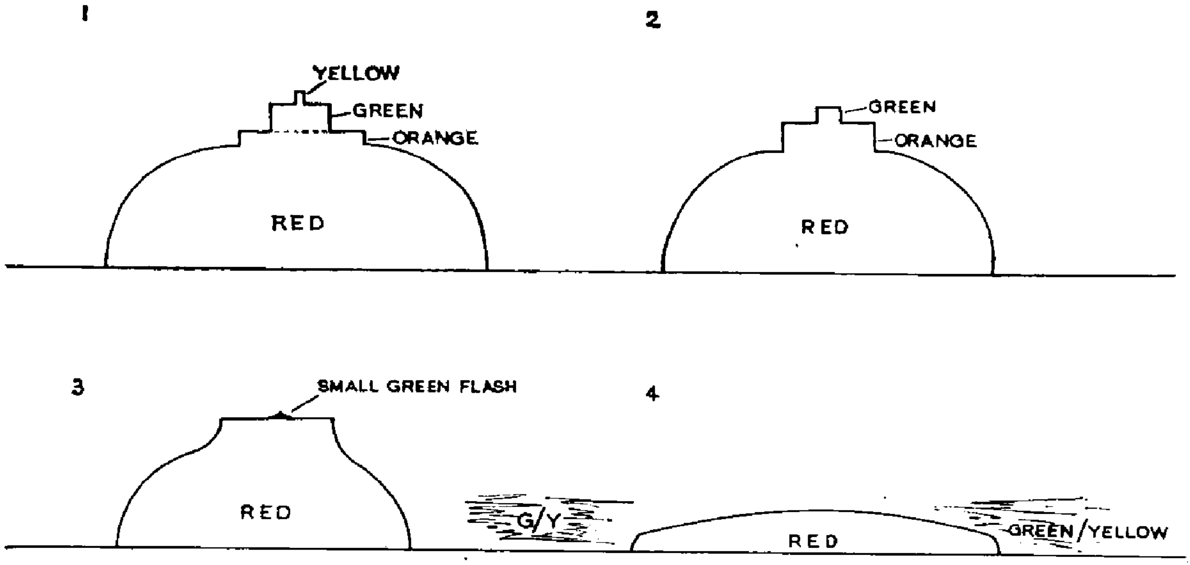
"I have shown Captain Lawson's sketch and description to Sir Boris Uvarov, who has identified the locust as a species of *Tropidacris*, a large grasshopper which occurs in Central and South American forests and occasionally becomes numerous and damages trees, including coconut palms."

GREEN FLASH

North Atlantic Ocean

m.v. *Afric*. Captain R. T. Welch. London to Port Said. Observers, Mr. P. V. Haswell, 3rd Officer and Cadet J. Nott.

3rd May 1964. At 2025 GMT, towards sunset, the sun was observed to be distorted as shown in the sketches. At first, the sun's disc appeared to shrink, and then for a



few seconds before disappearing it became elongated. An unusual feature was the occurrence of a green flash on the upper limb, while it was still well above the horizon. Air temp. 64°F, wet bulb 60°, sea 60°. Wind NNW, force 3.

Position of ship: 36° 45′N, 8° 25′W.

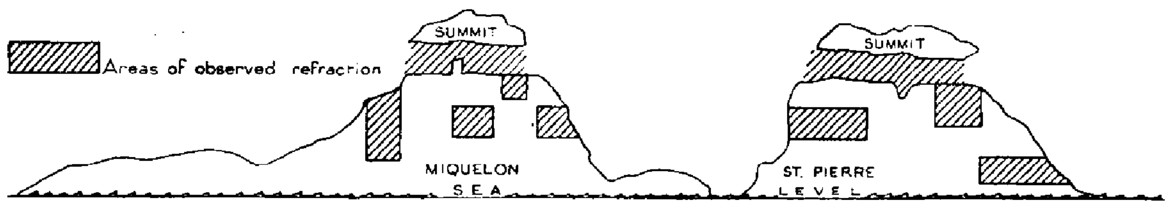
Note. This very complex display reflects the existence of great complexity of the thermal structure of the atmosphere. Not only is there the normal scattering of light but the sun's light has also been broken up quite irregularly.

ABNORMAL REFRACTION

North Atlantic Ocean

s.s. *Cairngowan*. Captain I. G. Foster. Quebec to Leith. Observer, Mr. M. W. Robson, 2nd Officer.

15th May 1964. When the vessel was approaching St. Pierre and Miguelon at 1830 GMT, and 17 miles distant, the appearance of the two islands was affected by abnormal refraction. In both cases, the summits were apparently cut off at the same level, giving a flat-topped appearance. The true tops were visible at an unnatural elevation in the sky. In some parts of the islands, indicated by the shaded areas,



there appeared to be larger gaping spaces. Air temp. 46°F, sea 35°. Wind w'ly, force 2. Sky cloudless.

Position of ship: 46° 44′N, 56° 47′W.

Note. This phenomenon is the result of the atmosphere being much warmer than the sea.

South African Waters

m.v. *Australind.* Captain J. D. Blake. Curaçao to East London. Observers, the Master and Mr. A. Braddock, 3rd Officer.

27th May 1964. When proceeding eastwards towards Cape Aghulas, a false horizon was observed at 0830 GMT and for a considerable time afterwards, over an arc of approx 70° on the starboard bow. A vessel observed in the direction of the false

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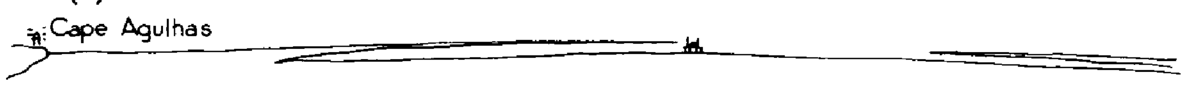

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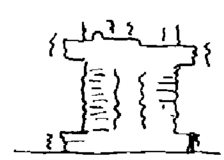


horizon, 11 miles away, took on the two shapes shown in the sketch, changing alternately from one to another as our own vessel rose on the swell. Air temp. 65°F, sea 62·5°. Wind SE, force 1.

Position of ship: 34° 50′S, 19° 20′E.

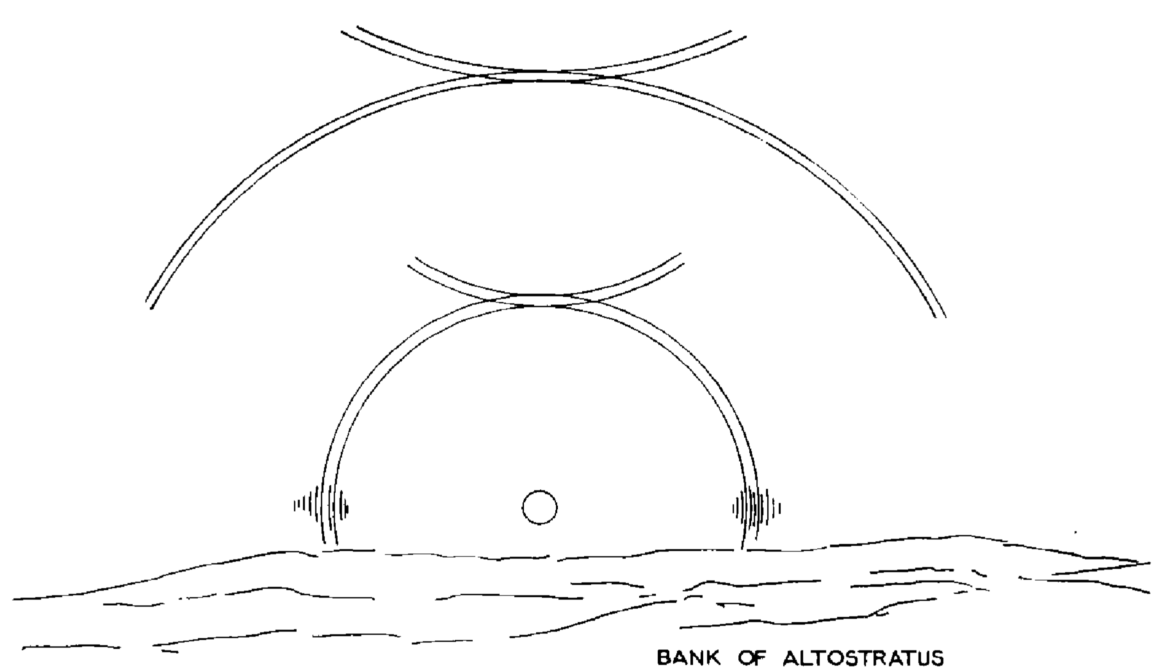
Note. This observation is typical of conditions likely to be expected off southern Africa where water masses of differing origins exist side by side.

HALO COMPLEX

Gulf of Bothnia

m.v. *Fred Everard.* Captain W. G. Hunt. Lapaluoto (Finland) to Grangemouth. Observers, the Master and Mr. J. London, Chief Officer.

19th June 1964. From 1745–1810 GMT the solar halo complex shown in the sketch



From top to bottom: circumzenithal arc in contact with 46° halo, arc of contact to 22° halo and 22° halo with mock suns.

was observed. The radii of the arcs were found by sextant angle. All the arcs were coloured, the 46° halo and circumzenithal arc showing most of the spectrum; the mock suns and points of contact of the arcs were very bright. Altitude of sun 11°, azimuth 294°.

Position of ship: 61° 20′N, 19° 23′E.

Note. This is an example of true halo described in meteorological text-books.

Indian Ocean

s.s. *Benmacdhui.* Captain W. C. Watson. Aden to Penang. Observers, Mr. B. C. Smith, 2nd Officer and Mr. J. Edwards, lookout.

2nd June 1964. At 0400 GMT, the lunar halo complex shown in the accompanying

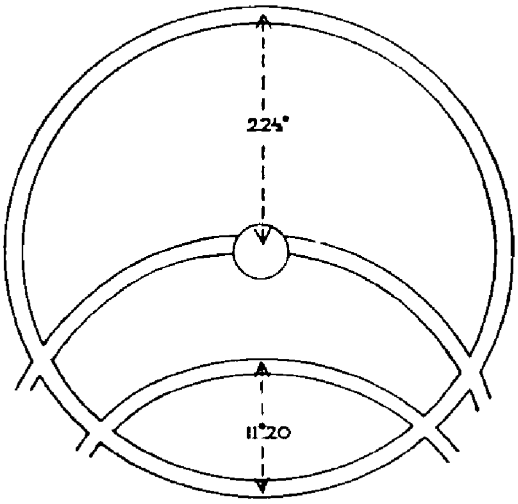


diagram was observed. The only cloud present was some $C_{H}5$, and the visibility was excellent.

Position of ship: 5° 54′N, 94° 30′E.

Note. This is a very unusual halo and it is useful and interesting to have it recorded.

ABNORMAL APPEARANCE OF THE MOON
off Eastern Australian Coast

m.v. *Welsh City.* Captain D. Beynon. Yokohama to Thevenard. Observer, Mr. R. M. Gidden, 2nd Officer.

7th May 1964. The double image of the moon, shown in the accompanying

sketch, was seen at 1730 GMT through stratus cloud. There was also some cirrus above. Air temp. 73°F, wet bulb 76°, sea 75·5°.

Position of ship: 23° 06′S, 154° 26′E.

Note. This phenomenon is a result of abnormal atmospheric refraction.

AURORA

Listed briefly below are auroral observations made in British ships April–June 1964, and forwarded to the Balfour Stewart Auroral Laboratory of the University of Edinburgh, where visual auroral data from the Northern Atlantic and Western Europe are collected. They are interchanged with data from Cornell University, New York, and Moscow—the two other data centres for the northern hemisphere—with the idea of making the data generally available to any wishing to study them. The co-operation of all observers and those concerned in recording and forwarding the information—the Meteorological Office, Bracknell, and the Ocean Weather Ship Base, Greenock—is greatly appreciated.

Sketches from *Weather Monitor* (5th and 15th April), s.s. *Marengo* (16th April) and *Weather Reporter* (19th April) were a helpful accompaniment to the descriptive reports.

April showed the usual slight equinoctial increase in auroral activity, even at a period of sunspot minimum. On the night of 15th–16th April, aurora was widely reported by ships, land observers and aircraft from N.W. Norway, N. Scotland and the Faroes, and various points across the Atlantic to the American mainland, although the index figure of geomagnetic activity is not listed above 3+.

There were periods of higher geomagnetic activity during May and June, but during the summer months, visual observation of aurora in the high northern latitudes is very much restricted by the fact that twilight persists during the short night. s.s. *Cairngowan* in the Cabot Strait was far enough south to be able to see the vivid display reaching almost to her southern horizon on 9th–10th June, when the geomagnetic planetary index figure reached 7–.

As mentioned in the October 1964 edition of *The Marine Observer*, a record number of noctilucent cloud observations and photographs was received for the 1964 observing season. Observers on *Weather Surveyor* reported seeing the clouds on 15th–16th July when at station 'India'. Investigations into the composition and origins of the cloud are now being made in many countries. We would like to remind you again that in our latitudes of the northern hemisphere they are seen mainly in June and July, and in order to record the geographical position and extent of the clouds, observations made in ships are of the utmost importance.

DATE (1964)	SHIP	GEOGRAPHIC POSITION	Λ	Φ	I	TIME (GMT)	FORMS
2nd Apr.	*Weather Surveyor*	62°06'N 32°20'W	060	70	+76	2330–0145	RR, V, N
3rd	*Weather Monitor*	58°50'N 18°54'W	070	65	+72	2313–0300	HA, RA, N
	Weather Surveyor	62°00'N 32°50'W	060	70	+76	2328–0002	HB, RB
5th	*Weather Surveyor*	62°20'N 32°20'W	060	70	+76	0001–0100	N
						0245–0500	RR, N
	Weather Monitor	59°00'N 18°25'W	070	65	+72	0100,0300	N
		59°00'N 18°54'W	070	65	+72	2200–0200	HA, RA, N
6th	*Weather Surveyor*	62°06'N 33°06'W	060	70	+76	2347–0015	RB, N
7th	*Weather Surveyor*	61°50'N 33°00'W	060	70	+76	2325–2330	RR, N
9th	*Weather Surveyor*	61°50'N 32°50'W	060	70	+76	0145–0400	RA, RR, N
	Weather Monitor	58°50'N 19°06'W	070	65	+72	0200,0300	N
10th	*Weather Surveyor*	62°00'N 32°25'W	060	70	+76	0017–0100 0245–0523	HA, RB, N
12th	*Weather Surveyor*	61°50'N 33°00'W	060	70	+76	0145–0345	HA, N
	Weather Monitor	58°54'N 19°40'W	070	65	+72	0300	N
13th	*Weather Monitor*	58°54'N 19°20'W	070	65	+72	0200	N
14th	*Weather Reporter*	62°12'N 32°45'W	060	70	+76	0100	N
15th	*Weather Reporter*	61°52'N 33°12'W	060	70	+76	0100	RA
	Dukesgarth	68°25'N 16°28'E	110	67	+76	2200–0130	All forms
	Weather Monitor	58°54'N 19°12'W	070	65	+72	2245–0300	HB, RA, RR, N
16th	*Marengo*	49°50'N 65°00'W	010	61	+75	0100–0315	HA, RA, RR, N
17th	*Weather Monitor*	58°48'N 18°48'W	070	65	+72	0110–0408	RA
18th	*Weather Reporter*	61°49'N 33°33'W	060	70	+76	2355–0400	HA, RA, RB, RR, N
19th	*Weather Reporter*	61°55'N 33°05'W	060	70	+76	2345–2355	RB, RR, P
20th	*Weather Reporter*	61°52'N 33°12'W	060	70	+76	0145	RR
24th	*Weather Reporter*	61°51'N 33°16'W	060	70	+76	0500	N
27th	*Weather Reporter*	61°40'N 33°09'W	060	70	+76	0050–0120	HA, RB
11th May	*Weather Adviser*	59°03'N 19°15'W	070	65	+72	0100–0315	RB
15th	*Cairngowan*	47°55'N 61°05'W	010	59	+74	0530–0615	RR
9th June	*Cairngowan*	47°00'N 59°00'W	010	58	+73	2300–0630	All forms.

KEY: Λ = geomagnetic longitude; Φ = geomagnetic latitude; I = inclination; HA = homogeneous arc; HB = homogeneous band; RA = rayed arc; RB = rayed band; R(R) = ray(s); P = patch; V = veil; N = unidentified auroral form.

551.46: 622.24

The Problems of Operating an Oil Rig at Sea

BY G. C. HARPER

(Mr. Harper is a member of the Trade Relations Division of Shell International Petroleum Company Limited, and has been engaged for some time in studies concerned with the North Sea development.)

Despite the rapid growth of oil consumption, particularly in the last twenty years, the effort and investment which the oil industry has put into exploration have enabled supplies to more than keep pace with increased demand. Oil companies are constantly seeking new potential oil bearing regions even in the most remote corners of the globe.

The Development of Off-Shore Drilling Rigs

The fact that these regions might be beneath the sea as well as on land was realised many years ago and offshore drilling was carried out in the bayous of Louisiana in the 20's from wooden pile platforms strong enough to accommodate all the necessary drilling equipment and high enough to stand above the maximum expected flood level. The first drilling barge was built in 1935. It was floated to a location and then submerged; if the water was too deep, a sand bench was dredged up for the vessel to rest on. Even under these simple conditions every conceivable difficulty seemed to arise, storms being a particular hazard.

The post-war increase in demand for oil and evidence that oil fields did exist under certain continental shelves have now led to high seas drilling as far as 20 miles from shore and in some 500 ft of water.

In 1949 the first mobile barges for offshore waters were built. In later years when drilling in deeper waters was required, these mobile barges were made capable of being jacked up out of the water. The barge is towed to the location, where its legs are lowered to the ocean bed. When they are firmly embedded, the barge is then jacked up until the platform is at a suitable height above the sea. This height varies between 25 and 60 ft depending on how exposed the location is. This type of barge can drill in water as deep as 250 ft and is capable of riding out normal tides and storms but since the legs must rest firmly on the ocean bed in order to resist the danger of overturning during drilling, it has one major disadvantage. In areas where there is a soft silty floor the legs penetrate deeply into the bottom, and thus, with a fixed leg length, the water depth in which the unit can stand and operate is here considerably reduced.

Finally the industry was faced with the problem of drilling in waters too deep for existing mobile bottom-supported units and as a consequence floating drilling units were developed. Two basic types have evolved. One is derived from a standard ship-type hull or hulls and the other has a submerged but buoyant hull with the operating deck supported above water by large diameter buoyancy columns. In both cases the design is the result of endless experiments taking into account many criteria, among the most important of which are the weather and sea conditions likely to be encountered.

In assessing the structural strength of a drilling unit, together with its operating limits and its operational efficiency, the main factors taken into account are the strength of the winds, the height, length and period of the waves generated by them, the extent of the open sea crossed by the winds and the water depth.

As criteria for the design of offshore structures whether fixed, mobile or floating, the maximum waves that might be expected, based upon data covering a standard period of one hundred years, are used. Together with the condition of the sea bottom these design criteria determine the water depth in which bottom-supported mobile drilling platforms can operate, or whether they are stable enough and how they should be anchored when floating. In view of the many other possible factors that could endanger the safety of offshore structures, designers ensure that a substantial safety margin is incorporated.

Another set of standards to be taken into account is termed 'operational criteria'; these are concerned with the frequency with which winds and waves of different magnitudes occur. These are required to determine how frequently the operating limits of an existing drilling unit and its supporting craft will be exceeded, thus making them, in effect, inoperative or at least reducing their efficiency.

Currents and tidal differences and even ice conditions can of course also be regarded as operational criteria, but waves are generally the most important, particularly with regard to the operation of floating drilling units because of their 'dynamic' character, whereas the influence of winds and currents is mostly 'quasi-static'.

Anchoring of Rigs

High winds and tidal forces make the anchoring of floating units a difficult problem. The need to keep the drilling unit 'on station' is obvious: there is a certain flexibility in the drilling pipe but this is limited and will vary according to the length of the pipe at any time. A fairly general rule is that the lateral movement in any one direction of the unit from a point directly over the well centre should never exceed 5% of the water depth.

Although many experiments have been made to produce the ideal anchoring system, the best way of keeping the rig on station is still a difficult and complex problem. Some prefer chain, others cable, and many use a combination of both. A choice has to be made from a wide selection of anchors, a choice obviously influenced by the sea bottom conditions. The latter may be such that anchor piles have to be used to provide the necessary holding force.

A Shell designed mooring system has enabled drilling operations in some 300 ft of water to continue through seas as high as 22 ft. The rig is secured at a location by eight mooring lines. The lines are connected to spring-buoys, which in turn are fastened to anchors on the seabed. From the mooring station, platform personnel can read the tension in the mooring lines from continuously indicating monitors, and adjust the tensions by means of electrically-driven winches.

A further Shell development is a self-positioning ship, the *Eureka*, using fore and aft propellers, which can swivel in any direction. A taut wire from a weight on the sea bottom senses the motion and movement of the ship, activating a tiltmeter. This information is fed to the control room, where a computer calculates where the ship is and where it should be, and controls the propellers accordingly. This ship is small in relation to the size of a large drilling unit, but it is likely that, when drilling in depths of over about 1000 ft in the future, self-positioning will be required for these drilling units and systems for this are under development.

Servicing the Rigs

Since drilling is often carried out many miles from shore, support is usually given from a specially constructed base where a warehouse, small repair shop and similar facilities are established. The rig has to be kept supplied with fuel, water, food, casing, cement and mud materials, and to forestall delays due to bad weather large stocks must be held. The supply boats must be large and fast to bring out supplies in good time and in many cases must be powerful enough to move the drilling tender or barge. The crew boats, used for moving personnel and light packages must be large enough and fast enough to make crew changes quickly and comfortably. It is essential for efficient and safe working that they be fitted with ship-to-shore telephone, Decca equipment, radar, searchlights and echo-sounder.

All boats operate day and night and in almost any type of weather—rough seas, fogs and sandstorms. In some areas it is the practice to keep one boat always standing at the rig in case of emergency.

Helicopters are an alternative means of transport but their use is restricted, chiefly by expense. Their carrying capacity is limited and several trips are needed to make a crew change.

The North Sea

Now that licences have been awarded for exploration in British waters of the North Sea, oil companies will be anxious to move into their areas as soon as possible. Operators will be bringing one very valuable asset to the area—many years of offshore drilling experience, but conditions will be very different from those encountered by oilmen off California, in the Gulf of Mexico, in the Arabian Gulf or in the South China Sea where much offshore drilling has already been carried out. It is true that hurricanes occur in the Gulf of Mexico and the waves whipped up by them exceed the worst that can be expected in the North Sea, but the weather in the North Sea is much less predictable and storms, gales and fogs more frequent.

The North Sea, open to the ocean to the north and almost completely closed in the south, is particularly susceptible to storm surges of meteorological origin. These invariably take a common form: a storm surge moves like a tide eastwards to the north of Scotland, then down the North Sea.* As the sea gets shallower and narrower the effect of the surge is magnified and high tides result. Tides of 8 to 10 ft above the normal have been experienced at the Hook of Holland and of nearly 6½ ft at Southend (even in eastern Scotland they can be as much as 3 ft.). Wind forces too are often at gale strength—gusts with velocities of over 100 mph are recorded; it is noticeable that many of the orders for drilling rigs have stipulated that they be capable of withstanding sustained winds of 100 mph and waves 60 ft high.

Obviously accurate weather forecasts will be essential, not only are drilling platforms very vulnerable to even a choppy sea when moving from one location to another but the pattern of weather can affect the supplies reaching the rig. One firm of weather consultants, after a study of British, Dutch and German weather records made over the last fifty years, will provide a useful service when the oil companies move in. It will be necessary to set up a special meteorological service able to prepare the most accurate local forecasts of the winds and waves to be expected. Such intelligence is essential both for the work to be adapted to the conditions and for the prompt evacuation of rig personnel, if necessary, when a severe storm is imminent, although it is hoped to keep rigs continuously in operation for 24 hours of the day.

The hydrology of the North Sea also poses problems. Three tidal waves flow into it, one through the English Channel, one along the Scottish coast and a third along the coast of Norway. Interaction between these gives a complex tidal system. The rise and fall of tide in the area is larger than in the offshore areas of the Gulf of Mexico and the Middle East.

The nature of the sea bed also complicates conditions. The average water depth of 650 ft in the north shelves to 100 ft in the south with a subsequent deepening to some 160 ft towards the English Channel. To aggravate the tidal situation the sea bed has a number and variety of topographical features. There are closed depressions, for example, often twice as deep as the surrounding sea bottom; to mariners they have familiar names—Coal Pit, Silver Pit, Devils Hole and so on. There are also a number of elevated features on the North Sea floor—Smith's Knoll, Leeman Bank, Owen Bank and, probably most familiar of all, Dogger Bank.

The sand on the sea bed is constantly being remoulded by the tidal currents, and storms scour the bottom; wrecks have been known to be completely covered in a short space of time. Scour can be particularly hazardous to the jacked-up platform leaving it listing to one side. This can be corrected by filling in with shell or other material, but if this list is a bad one the rig may have to be moved a few feet to a new location.

Orders for Rigs

The most immediate problem for operators is the scarcity of oil exploration platforms. With marine drilling equipment in demand in many parts of the world and

* See The Storm Tide Warning Service, *The Marine Observer*, April 1964.

all existing units already in use, usually on a long-term contract, a number of orders for new rigs have been placed with shipyards. So far more than twelve firm orders have been placed, at least eight with British shipbuilders, and many more will undoubtedly follow. It is interesting to note the variety in the designs of the platforms ordered, which is not dictated by variations in water depth alone, but also by sea-bottom conditions and possibly even more so by individual preferences for one type or another.

The mobile self-elevating platform appears to be the most popular choice but these will have three, four, six or eight legs. To date few floating drilling units have been selected for this area but it is likely that more will follow. Even though designs have been made for self-elevating mobile units for depths of water ranging from 200 ft to as much as 300 ft, a number of operators seem to consider that in the weather and sea conditions obtaining in the North Sea this type of unit should not be used in much over 150 ft; in fact, in water depths of over 150 to 200 ft they might well become too expensive to justify their use for exploration purposes. It is reasonable to suppose that for depths of over 150 ft the use of floating drilling units will receive serious consideration.

Production Facilities

The North Sea has probably the most highly concentrated shipping population in the world and the problems of developing oil or gas fields in this region without being a danger to shipping or vice versa will be formidable. The normal method of collecting oil from underwater wells is to run the pipes direct to shore or, where distances are too great, to a central fixed platform where tankers can berth alongside and load.

In some areas where facilities for storage on shore and for access of tankers are not readily feasible or available, methods of loading tankers at sea have been devised. For some time, tankers have been successfully loaded in the Arabian Gulf with oil from a field located some 50 miles from shore. In this instance a tanker is used as a floating storage facility and every few days another tanker comes alongside and is loaded from the first tanker without port facilities ever being needed.

Experiments and development of equipment for the completion of wells under water, so as to avoid the danger to shipping and the very heavy costs of platform installation in deep water, have been under way for some years. So far only one or two oil or gas fields have been completed in the world in this manner, in view of the general reluctance to go 'under water' and the very high expense expected to be involved in operating a field in this way.

There are still many problems to be overcome. Most can be solved but that great imponderable, the weather, will probably remain the most intractable of all.

555.507.22

The Work of a Weather Ship

By P. B. Swift

(Mr. Swift is Chief Officer of *Weather Monitor* and has served in Weather Ships since 1948)

The seventeen years that have elapsed since British Weather Ships first commenced patrols in the Western Ocean have brought many changes and improvements as a result of the experience gained. The ships themselves, Air-Sea rescue methods, conditions of employment for personnel have all undergone radical alteration for the better. Only the old enemy—the weather—remains unchanged: six months winter and six months bad weather. Few who sail regularly in the North Atlantic trade will disagree.

Weather Monitor might be seen on a dark and cheerless winter day in James Watt Dock, Greenock, preparing for a routine tour of duty on a North Atlantic Weather

Station. She is a vessel of some 1400 tons gross, 225 ft in length and 34 ft beam. Built in Belfast as the Castle-Class Corvette (latterly Frigate) HMS *Pevensey Castle*, she was completed in 1944, too late for spectacular war service. However she assisted in the rounding-up of surrendering U-boats in the Atlantic and the escorting of these vessels into home ports. Shortly after the completion of these duties she was given mothball treatment and laid up in a Bristol Channel port.

Eventually she was taken over by the Meteorological Office and after conversion to a Weather Ship at Blyth, in May, 1961, she was renamed *Weather Monitor* and proceeded to Greenock to replace the elderly *Weather Recorder* which was reaching the end of her useful life.

The usual last-minute activity which accompanies the preparation of any ship for sea is by no means missing from the scene in James Watt Dock. It may be taken as a pretty fair indication that everything is going to plan. Replacements have to be found for personnel who may meet with misfortune or sickness—and all the necessary items of stores and equipment (some of them highly specialised) have to be taken aboard; it would be remarkable if some item, somewhere, did not go astray or were not found difficult to obtain in time for sailing. Nevertheless, the Shore Establishment performs quite a few minor miracles from time to time in producing personnel and equipment at very short notice. The Shore Establishment, comprising Administrative Offices and Stores, has not been overlooked in the matter of improvements over the years and now occupies modest but nevertheless quite handsome premises adjacent to the Weather Ship's berth.

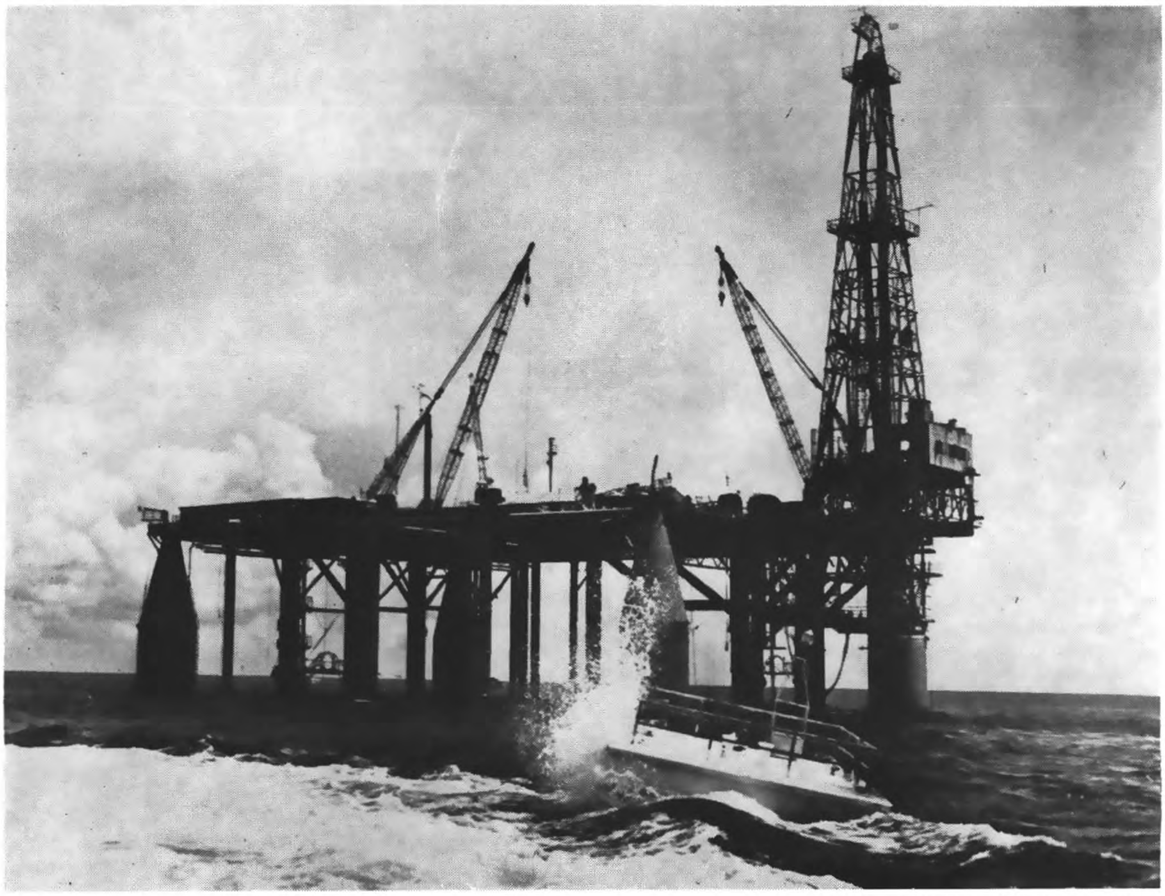
It is extremely rare that a ship fails to sail on time, laden with hydrogen cylinders —over 100 of these—meteorological balloons, radio-sonde transmitters, radio and radar components and all the paraphernalia essential to keep the ship operating without interruption for the forthcoming voyage which is of a month's duration. Refuelling is carried out either at the RFA vessel stationed at the Tail o' the Bank or at the Admiralty Fuelling Depot at Loch Striven, shortly after which a signal is transmitted to the effect that the ship has commenced her outward passage.

Probably this piece of intelligence scarcely lifts an eyebrow on arrival in the hands of the several addressees—but it may confidently be predicted that it is received with enthusiasm by the ship waiting to be relieved. From thence forward it is probable that no vessel's progress is more assiduously noted and there is no shortage of well-wishers for a smooth and speedy 'passage out'.

By the following forenoon *Weather Monitor* will be off the north coast of Ireland and leaving the land astern. No more land to be seen for a month, nevertheless, what remains is scarcely given a backward glance. There is too much to attend to—to be put right. After a couple of weeks in dock the ship has acquired a coat of grime which must be accepted as inevitable; the activities of shore repair parties have never been noted in the annals of shipping as enhancing a ship's cleanliness.

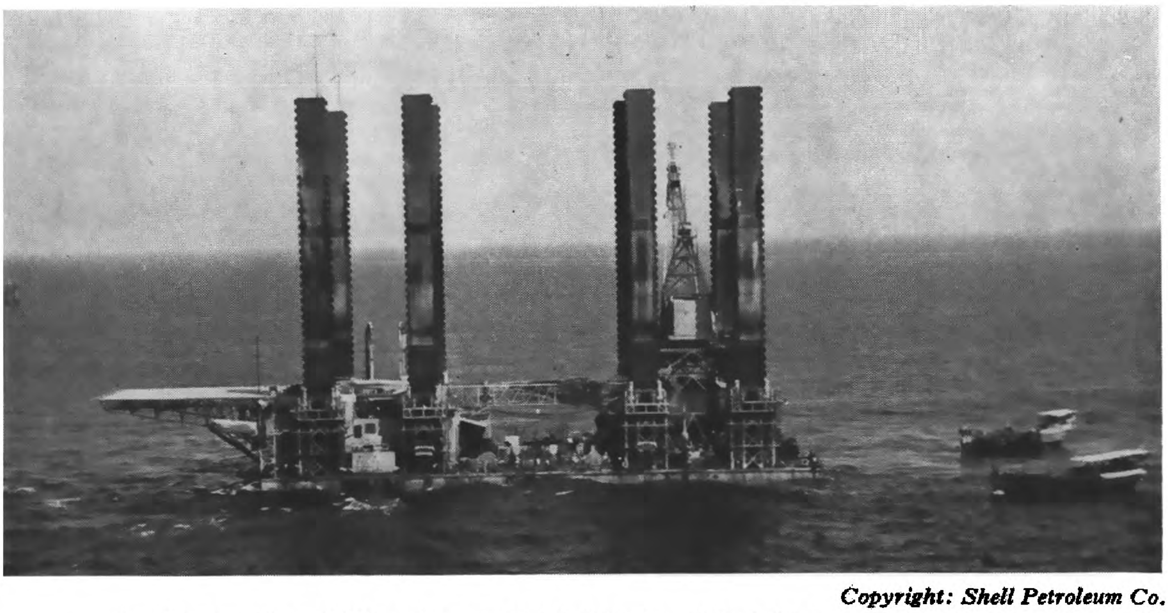
Given reasonable weather conditions the ship's appearance will show marked improvement by the time the Station area is reached after two and a half days steaming. Homeward-bound mail will have been written during the interval, and this, together with the mail for the relieved ship is packed into weatherproof bags, marked with a flare and dropped overboard as the ships close. Within a few minutes it is recovered and the inward-bound ship loses no time in transforming herself into a puff of smoke on the horizon, leaving to *Weather Monitor* the privilege of being in charge of a few hundred square miles of ocean—but not entirely isolated as we shall see. The time and position of transfer being agreed during R/T conversation, *Weather Monitor* is now in business; the M/F radio beacon commences its transmissions, the radio and radar office is fully manned and in the Meteorological Department preparations are made for the first balloon ascent of the voyage, which must take place at the next scheduled hour. The ship will not have been 'on station' many minutes before the radio-telephone loudspeakers commence a clamour that will continue with only brief respite for the next few weeks. This activity heralds the approach of trans-Atlantic airliners delivering information about themselves and

(Opposite page 72)



Copyright: Shell Petroleum Co.

Blue Water No. 1, one of the latest types of floating drilling vessel, at work in the Gulf of Mexico. It is a floating space frame drilling structure that rides practically motionless despite wind and waves, while the drill is lowered into the sea bed. Associated with *Blue Water* is a system for controlling and completing wells on the ocean floor by remote control from the surface.

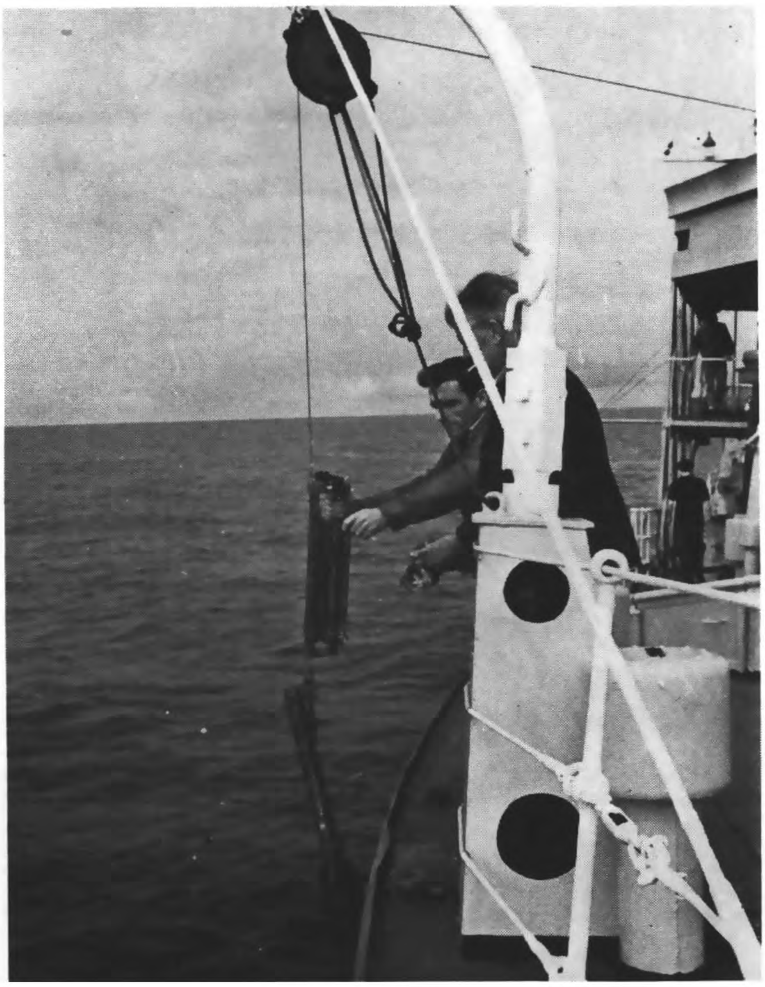


Copyright: Shell Petroleum Co.

A self-elevating drilling barge *Seashell* in the Idd el Shargi Oilfield, Qatar.

OIL RIGS AT SEA; *see* page 68. (Another photo is opposite page 81.)

(*Opposite page 73*)



OPERATIONS OF A WEATHER SHIP (*see* page 71).

Top photo: commencing a bathythermograph sounding. Lower photo: air-sea rescue exercise.

requesting advice as to the latest 'winds aloft', radar fixes, course and speed checks, or sometimes requesting relay of messages to the eastern or western sides of the ocean—to mention but a few of the services which may be desired. Whereupon the ship's loudspeaker intercommunication system sets up a howl exhorting the duty radar operator to get busy with his set. As a rule the operator has the call beaten by a fine margin and is already installed at his equipment, flicking switches and adjusting knobs of which he has an abundance. With his scanner turning, he has already commenced searching for the first of the approaching aircraft.

There is certainly a sense of professional pride in all departments of the ship—although on question it is likely that this would be disclaimed: such is human nature. But nowhere will it be more apparent than in the efforts of the radio and radar operators to supply the passing aircraft with all the information desired. Radar operators will stretch themselves—and their equipment—to the limit in an effort to secure for some distant aircraft a fix which will enable the navigator to adjust his course or make allowance for wind not previously anticipated. Aircraft navigators seem to have developed a flattering confidence in the abilities of weather ship radar to locate them and will sometimes call up from quite remote distances to cheerfully inquire if they can be given a radar fix. Sometimes, due to the precise tuning of the set and to the perseverence of the operators, an aircraft navigator will be pleasantly surprised to find himself 'fixed' at a range of up to 150 nautical miles.

The installation of automatic D/F repeaters has proved most useful to the radar operator in locating aircraft with the minimum of delay. Also it is invaluable in sorting out the individual aircraft of several which may be approaching in something of a group as frequently happens. As the aircraft radio operator transmits his flight information the pointer of the automatic D/F indicates the direction of the source of transmission and a glance at the dial is all the radar operator needs in order to align his scanner on that bearing and with a rough idea of the distance—and often without it—he soon has the target located and identified.

These activities to assist directly the navigation of aircraft must, however, be interrupted when the meteorologists announce that a sounding balloon is about to be launched. With clocks synchronised, the departure of the balloon is heralded by a bell signal and from then on, at minute intervals, radar provides information about the balloon's progress in the form of bearing, range and elevation for the duration of the flight, which is generally in the region of forty to fifty minutes. These factors are plotted in the Meteorological Office as crosses showing the position of the balloon each minute, relative to the ship. From this information the wind speed and direction may be determined and as the balloon ascends at a pre-determined rate of twelve knots, the result is that winds from surface to terminal height of the balloon (70 to 80,000 ft) are available almost immediately for the advice of aircraft in the vicinity.

Meanwhile the radio-sonde transmitter is registering changes of temperature, pressure and humidity which are received aboard the ship and fed into a remarkable device—the CINTEL—which promptly digests the information and issues it in the form of permanent records on graph paper. This is coded by the Meteorological staff into five-figure groups and at the completion of the ascent is transmitted together with the upper winds to the Central Forecasting Office (CFO).

Four balloon ascents are carried out every twenty-four hours, all ascents determine upper winds and two ascents obtain radio-sonde data. Surface observations are made hourly and transmitted by radio to CFO.

Not to be outdone by the meteorologist's sounding upwards, the Deck department carry out a programme of sounding downward—weather permitting. Deep-sea sounding equipment is used to lower a succession of Nansen or Ekman sampling bottles to selected levels from the surface to the lowest depths available. The available depths have been found to vary more than was supposed and at the centre of Station 'India' (59°N 19°W) the normal depth is in the region of 2,500 metres (about 1370 fathoms) except in an area to the south-east at a distance of about twenty miles where the soundings are reduced and it would appear that a submarine ridge exists the presence of which does not seem to have been generally realised. However that may be, the result of the sounding operations—which take at least three hours and are most uncomfortable in low temperatures—is that water samples at the selected levels are obtained for analysis ashore and that the water temperature at these levels are recorded in order to assist in forming some idea of the system of temperature changes and the movement of water masses throughout the ocean.

In the field of 'side-lines' the deck department specialises in obtaining samples of plankton life on station and also on passage inwards and outwards by means of a plankton recorder which deposits plankton on to a moving strip of material through an aperture 1 cm square. Examination of the deposit in conjunction with the ship's position as determined from the record kept will reveal the movements of plankton concentrations in the ocean which is essential to an understanding of the habits of this creature. Considering that plankton form the staple diet of practically all fish—and not a few mammals, including the whale—it is possible to get an insight into fish movements also and thus to offer valuable advice to deep-sea fishing fleets.

Drift bottles are set adrift at intervals in the hope that they will eventually be recovered on some shore to the east and thus provide information about the movement of surface water. At Station 'Alfa', mid-way between Iceland and Greenland, fishing with rod and line is attempted in an effort to gain information concerning the concentration and movement of 'Red-fish'. This creature lives at a considerable depth and has long been popular in Iceland, Greenland and Scandinavia—but so far does not seem to have enjoyed the same popularity in Britain. But then who has seen it for sale under that, or any other name? It seems to be equally good eating as any other sort of fish and there seems to be no very good reason why it should not become as familiar as cod or plaice.

Should the reader have the perseverance to struggle through the narrative so far, he may be forgiven for assuming that by this time the ship must have developed an air of quiet desperation; radar scanners whirling, balloons going up, scuppers awash with plankton, sampling bottles being hauled up from the blackest ocean depths, air temperatures and cloud types and amounts recorded—to mention but a few. However, it is contrived to make things work to a manageable routine and it becomes critical only on occasions when, for example, it is necessary to steam head to wind to facilitate a balloon launching just when the Chief Officer is desirous of getting his bottles down to 2,000 metres. But the situation resolves itself, aided by expressions of good will (and some vulgar remarks, *sotto voce*).

It is doubtful if anyone could claim the life to be monotonous, but just in case it should prove so, a suitable day will see all hands engaged in a full-scale Air-Sea Rescue exercise when the ship takes on for a while the appearance of a disturbed ant's nest. However, it has been found possible to have the boats uncovered, manned and ready for lauching in seven minutes flat which cannot under any circumstances be considered dilatory. Stretcher parties and First Aid squads get ready for action. Smoke-floats and flares are prepared for the laying of a ditching path for the supposed distressed aircraft, and the frog-men arrayed in their rubber suits stand ready to assist injured and helpless persons in the water. Quite often a liferaft will be launched containing two or three persons who are to represent 'survivors'. Upon sounding the alarm signal the ship may steam away from this position until all is readied on deck. A flare path will be laid and marked with fire-fighting foam if the sea conditions are suitable. At the end of the flare-path the ship will stop and the rescue boat will be lowered and sent away, being directed by R/T signals or by prearranged visual signals if necessary. Reaching the liferaft, the 'survivors' will be recovered, wrapped in blankets and waterproof sheets and returned to the ship to be lifted aboard and turned over to the first-aid party who are standing-by with stretchers ready to get the casualties below to the sick-bay. Alternatively, 'survivors' will be assisted in the water by the frog-man team, who swim out from the ship taking a line fitted with a snap-hook which can quickly be secured and the survivor either hoisted aboard bodily or placed in a specially constructed recovery basket and lifted to deck level.

But such activities, interesting and diverting though they may be, are scarcely to be thought of as recreation and it is in this sphere that the weekly cinema show takes pride of place. As a rule the quality of the films shown—which are made available by the RAF Cinema Association and also by the kindness of the British Sailor's Society—are of a fairly high standard. Preference is generally expressed for films of a lighter vein—musicals, westerns and comedy, rather than those of a sombre or horrific nature. The effect of one particularly devastating Hitchcock 'X' film was to plunge the entire ship into an atmosphere of gloom which took days to dispel. Hobbies are of a diversified nature but are limited to some extent by the lively motion of the ship and by the space available. They also appear to run in phases—rug making, marquetry, model-making all have their turn. Some artistry expresses itself in water-colours and short-story writing. The Bosun of one of the Weather Ships has become expert at producing ships in bottles and now organises things on mass-production lines—so great is the demand for them. Probably amateur photography is here to stay—there is always a fresh subject for the enthusiast in changing weather conditions, variations of light and shade, seabirds and black-fish which are about from time to time. Developing and printing are carried out aboard and some very fine examples of the photographer's art are produced at the regular meetings of the 'Camera Club'. An instance of the zeal with which this hobby is pursued was apparent recently when the Nuclear Ship *Savannah* made a call whilst *Weather Monitor* cruised on station. Despite the early hour, the enthusiasts were out in force and some excellent photographs obtained for the *Savannah* obligingly reduced speed and circled the ship to give ample opportunity to admire her. However, it was discovered later, with much dismay, that of the two cine cameras trained on the *Savannah*, one unaccountably refused to function at the critical moment and the other operated perfectly but without much effect for the reason that the magazine was empty.

Such, then, is a brief look at Weather Ship life. It can be hard and frequently is, but many of the personnel have served for a decade and some much longer than that. Bad weather is surveyed with a baleful eye and the thought that it might be worse. Storms and hurricanes are regarded with an even more malevolent glare accompanied by the sentiment that at any rate it can't last for ever—although sometimes it seems to try. The thought of returning to the shelter of home is wonderfully sustaining, where it is a refreshing change for a cup of tea to stay safely 'put' without the need for constant vigilance least it should fly off the table and dash itself into a thousand pieces, given half a chance. When sailing day comes round again the crew is ready to have another look at the weather, wondering what it will be like this time and consoling itself with the eternal thought that at any rate it cannot possibly be anything near so bad as last time, . . . one hopes.

The Russian Research Ship "Zarya"

551.507.25:06

By L. Jacobs

(Mr. Jacobs is the Assistant Director (Organisation and Methods) in the Meteorological Office.)

The writer was fortunate enough to be a member of a small party organised by the Royal Society for a specially invited visit to the Russian research ship *Zarya*, when she was moored off Tower Bridge on 2nd November 1964, on her way home to Leningrad.

The *Zarya* is a non-magnetic wooden sailing and motor schooner of about 600 tons displacement, and was built in Finland in 1952 especially for the purpose of making geomagnetic observations all over the oceans of the world, to supplement the observations made by land observatories, so that more accurate geomagnetic world charts could be drawn. It is the only ship in the world available for such measurements and continuous recording of all the components of the earth's magnetic field, the U.S. non-magnetic ship *Carnegie* (580 tons) having unfortunately been accidentally burnt out in Apia, Samoa, in 1929, after some 20 years' service, and the British non-magnetic ship RRS *Research* (770 tons), launched in 1939 and laid up during the war, was eventually, for lack of funds, broken up in October 1952. Other measurements have been made at sea by towing instruments sufficiently far astern of ships so as to be clear of interference by steel in the ship, but these instruments, owing to orientation difficulties, measure only the earth's total field.

The *Zarya* is 115 ft in length along the water line, 28 ft wide and has a 12 ft draught; she is rigged with three masts and gaff and staysails. The total area of sails is over 2150 square ft. The ship is furnished with a 300 horse power engine and auxiliary 25 kw diesel generators.

All the major metal parts of the hull, the bolts, nails and special fittings are made of various grades of brass and bronze. A number of the ship's mechanisms and appliances, the steering gear, the anchor chains, the anchors, the windlass, the mooring bitts and the numerous rigging ropes are likewise made of special brass and bronze, and, in some cases, of non-magnetic steel. The ship's engines and generators are made in the main of ordinary steel, and only some of the heavier parts are of non-magnetic alloys. There was a preliminary measurement of the magnetic field set up by all the power plants, and these were mounted in position only after it had been ascertained that their effect on the special magnetic devices on the ship was negligible.

Instruments known as fluxgate magnetometers give continuous pen records of the four elements of the earth's magnetic field—the declination, the horizontal and vertical components and the total force. There are also proton magnetometers for check measurements. The instruments are stabilised by gyroscopes and gimbals, so that uninterrupted recordings are possible—the ship pitches up to 40° and rolls up to 20°.

The ship's voyages have always been planned according to seasonal winds to make full use of the sailing possibilities. The scientific and navigational aids and power plants were placed in the ship in 1953, and in 1956 the ship made her first trip from Leningrad to Reykjavik and back, putting into Danish and Norwegian ports. During the IGY period, 1957–1958, the ship, after leaving Leningrad, crossed the north and south Atlantic six times, and then carried out several traverses of the Indian Ocean returning to Leningrad via the Mediterranean, a total voyage of 47,000 miles over 15 months.

On all voyages, a maximum period of about 1 month is spent at sea before putting in at a port where checks are made, as far as possible, against the records of the nearest available land geomagnetic observatory. In 1959 the ship left Odessa and went to the Indian Ocean around Australia and Indonesia and returned to Vladivostok. In 1962–63 several voyages were made in the Pacific. In 1964 the ship went on a zigzag route north of Leningrad to 74°N then down to Dakar, across to Newfoundland and then came to London via Iceland. The next long voyage is planned for a series of traverses of the South Atlantic, beginning in the autumn of 1965. So far the ship has been engaged in covering the oceans of the world, so that the only parts which have been visited twice are where the later path crossed the earlier path. The plan in future is to return to repeat the observations in different areas so that the secular changes may be determined.

In addition to acting as a travelling geomagnetic observatory, the ship is equipped as an ionospheric sounding station. Pulses of radio energy of different frequencies are used to determine the height and electron density of the ionospheric layers, the frequency range from 1 to 18 mc/s being swept automatically in a period of 16 seconds and the observations repeated every 15 minutes. The variation of the intensity of cosmic rays is measured at times by means of a neutron monitor. The ship also makes regular meteorological observations every four hours.

The total number of ship's staff is about 35, including 8 scientists headed by Dr. Ivanov, who was responsible for the design of the scientific part of the ship's equipment, and Mr. A. Pushkov the son of a well-known geomagnetician Dr. N. V. Pushkov. Part of the analysis of the results is done on board the ship, but the main part is done by the staff at Leningrad Geomagnetic Institute after each voyage.

At a reception kindly given to the visiting party on board *Zarya* after the tour of the ship, there was full opportunity of discussion on details of the equipment and of the significance of the geomagnetic measurements made on the various voyages. The results of the scientific observations are being made freely available, and the writer is sure that the readers of this Journal join in the best wishes given by the Royal Society party for the future success of voyages of the *Zarya*.

Ocean Wave Statistics

A report on progress in the compilation of a book of Wave Statistics derived from the Voluntary Ship Observations and covering the oceans of the world.

By N. Hogben, B.Sc., Ph.D.

(Dr. Hogben is a scientist employed at the Ship Hydrodynamics Laboratory of the National Physical Laboratory; much of his work is concerned with ocean waves.)

Introduction

Plans for comprehensive analysis of the wave reports from voluntary observing ships were outlined in a previous article in this journal (reference 1). In this article some indication of the practical value of the observations was given and it is not necessary to dwell on this again. It will be sufficient to say that they have application in such fields as shipping (which includes the designing and operating of ships and also marine insurance), oceanography, meteorology, civil engineering and fisheries.

The present purpose is to give a brief description of the form the finished work is to take and an indication of the substantial progress which has already been made.

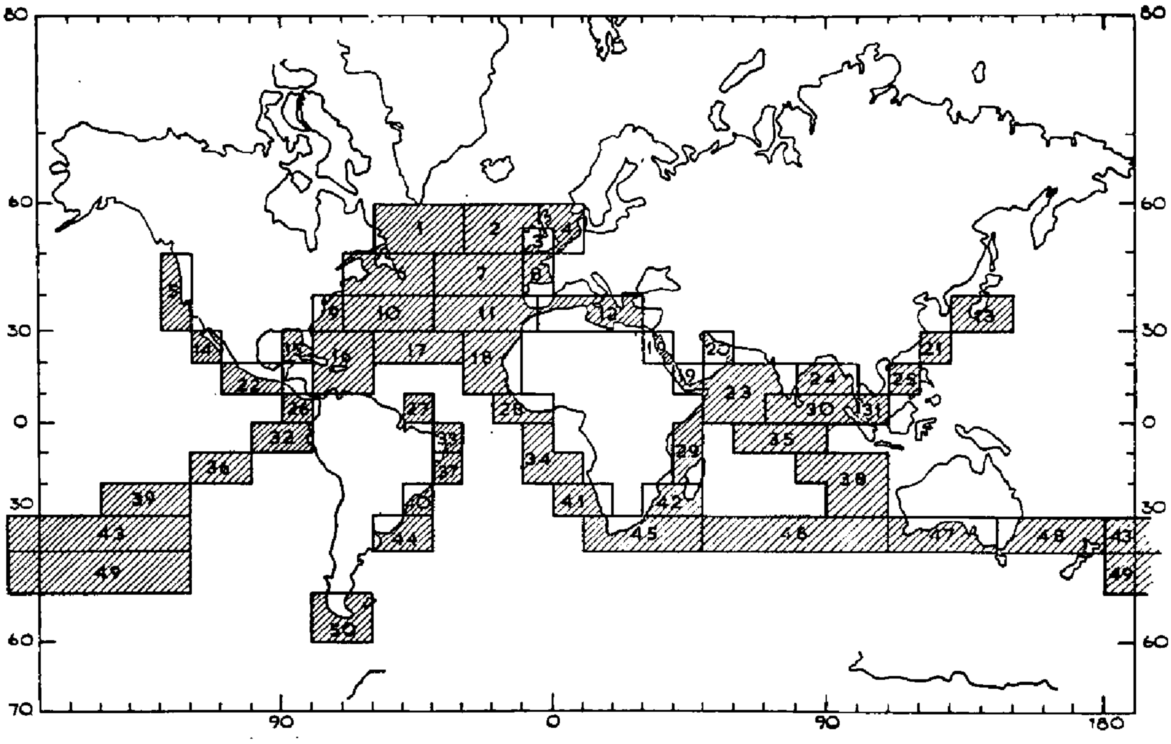


Fig. 1. The Ocean Areas used in compiling "Ocean Wave Statistics".

AREA 8

FIG. 13.

ALL SEASONS

WAVE HEIGHT CODE	WAVE HEIGHT FEET	WAVE HEIGHT METRES
00	1	0·25
01	1·5	0·5
02	3	1
03	5	1·5
04	6·5	2
05	8	2·5
06	9·5	3
07	11	3·5
08	13	4
09	14	4·5
10	16	5
11	17·5	5·5
12	19	6
13	21	6·5
14	22·5	7
15	24	7·5
16	25·5	8
17	27	8·5
18	29	9
19	30·5	9·5
90	33	10
91	36	11
92	39	12
93	43	13
94	46	14
95	49	15
96	52	16
97	56	17
98	59	18
99	62	19

DIRECTION CLASS - ALL DIRECTIONS

WAVE PERIOD CODE

WAVE HEIGHT CODE	X	2	3	4	5	6	7	8	9	0	1	TOTALS
00	963	1210	48	17	22	9	5	1	2	23	9	2309
01	98	2951	350	108	56	12	16	4	1	6	99	3701
02	140	5428	2683	637	249	78	31	8	5	14	55	9328
03	111	2669	4705	1772	512	194	63	28	4	5	11	10074
04	62	817	2867	2298	791	253	73	21	11	1	2	7196
05	61	283	1501	1732	1001	356	126	33	9	2	2	5106
06	36	121	730	1087	770	338	104	33	7		1	3227
07	32	75	379	698	551	325	123	36	13		1	2233
08	15	25	190	323	367	209	80	35	10	1		1255
09	11	20	139	276	269	191	106	51	17			1080
10	7	5	16	49	49	33	15	2	1	1		178
11	6	8	14	36	35	29	11	6		1		146
12	4	12	29	45	52	35	21	13	2		1	214
13	2	2	22	37	46	34	13	8	3	2		169
14	1	4	7	24	12	11	6	3	1			69
15	3		12	15	26	21	8	3	3		1	92
16		1	5	11	13	22	7	3		1		63
17			7	5	7	7	2	4		1		33
18	1			2	4	3	5	2			1	18
19	1		4	12	12	13	5	3	2	1		53
91					1							1
99			1		1							2
TOTALS	1554	13631	13709	9184	4846	2173	820	297	91	59	183	46547

WAVE PERIOD CODE	WAVE PERIOD SECONDS
X	CALM OR PERIOD UNDETERMINED
2	5 OR LESS
3	6 OR 7
4	8 OR 9
5	10 OR 11
6	12 OR 13
7	14 OR 15
8	16 OR 17
9	18 OR 19
0	20 OR 21
1	OVER 21

350° — 000° — 010°

	2	3	4	5	6	7	8	9	0	1	
00	138	3	3	1					4	1	150
01	363	29	6	1		2			1	8	410
02	758	266	35	15	1	3	1	1	1	9	1090
03	349	491	116	22	15	2	2			3	1000
04	100	306	147	32	9	3	2	1			600
05	33	129	118	41	13	3	2				339
06	22	65	72	33	14	1					207
07	14	27	61	31	13	2		2			150
08	2	7	22	16	11	1					59
09	5	13	16	15	6	2	1	1			59
10	1	2	2	4							9
11		2	3	1		2					8
12		5	5	4	6					1	21
13								1			1
14			1	1	1						3
15			2								2
17		1									1
18						1					1
19		1			1						2
	1785	1347	609	217	90	22	8	6	6	22	4112

020° — 030° — 040°

	2	3	4	5	6	7	8	9	0	1	
00	86	4	1	1		1			1		94
01	278	30	10	2		1			1	4	326
02	511	207	30	7	2				2	3	762
03	243	367	95	18	2	3				2	730
04	87	216	108	20	10	1				1	443
05	27	124	95	35	9	2	2				294
06	11	58	52	30	10	2	1				164
07	3	31	42	20	13	5	2				116
08	2	12	15	16	7	3					55
09	2	4	14	10	6	2					38
10	1	1	4	2	2						10
11		1	1	2							4
12			1	3							4
14			1								1
16	1	1	1		1						4
19				1							1
	1252	1056	470	167	62	20	5		4	10	3046

050° — 060° — 070°

	2	3	4	5	6	7	8	9	0	1	
00	87	5				1				1	94
01	225	22	5	1		1				7	261
02	376	169	23	11	3	2			1	1	586
03	171	253	61	15	2	3					505
04	59	161	87	18	7				1		333
05	20	60	67	19	6	1					173
06	5	32	37	28	4						106
07	4	27	29	19	2						81
08	5	8	7	10	5	1					36
09		6	5	4	3		1				19
10	1		5	1	1						8
11	1	1									2
12	1	2		2	2	1					8
13		1	2								3
14	1		1								2
15		1									1
	956	748	329	128	35	10	1		2	9	2218

080° — 090° — 100°

	2	3	4	5	6	7	8	9	0	1	
00	69	1		2	1					2	75
01	134	13	4	1						4	156
02	200	77	23	9	3		2		2	2	318
03	84	132	41	8	1	1					267
04	25	62	47	8	5						147
05	5	36	26	16	5						88
06	3	4	17	7							31
07	2	1	10	4	1						18
08		3	2	3	1	2					11
09		4	2		1		1				8
10					1						1
11		1									1
12				1							1
15				1							1
	522	334	172	60	19	3	3		2	8	1123

110° — 120° — 130°

	2	3	4	5	6	7	8	9	0	1	
00	58	3		3	2						66
01	145	11	4	1		1	1			5	168
02	187	89	24	6	5	1				5	317
03	77	112	30	11	1	1	3				235
04	19	63	44	12	4	2					144
05	11	23	23	6	2		1				66
06	4	7	12	12	4						39
07	1	5	3	2		2	1				14
08		7	5	1							13
09	1	1	5	1				1			9
10			1			1					2
14			1								1
15				1							1
	503	321	152	56	18	8	6	1		10	1075

140° — 150° — 160°

	2	3	4	5	6	7	8	9	0	1	
00	74	3		1							78
01	177	21		4						13	215
02	284	113	17	13	2	2			1	2	434
03	145	225	49	5	4	2	1	1		1	433
04	47	128	93	18	3	2	1				292
05	22	67	80	34	10	4					217
06	5	38	49	28	11	2	2				135
07	5	17	37	12	14	10	2	2			99
08	2	11	14	12	5	2	1				47
09	3	4	21	12	3	8	2				53
10			1	5	1	1					8
11			2	1	1		1				5
12	2	1	1	3		2					9
13		1	2	1		1					5
14	1		1	1							3
15					1		1				2
16		1			1						2
17						1					1
19					1						1
	767	630	367	150	57	37	11	3	1	16	2039

170° — 180° — 190°

	2	3	4	5	6	7	8	9	0	1	
00	87	5							1	1	94
01	240	27	13	7	2					5	294
02	445	194	31	13	4	1	2		1	2	693
03	236	432	115	14	12	3	1	1	1		815
04	86	265	231	46	9	5					642
05	25	169	157	61	18	7	2		1	1	441
06	12	78	110	67	21	8	5				301
07	14	37	78	44	15	8	4	1			201
08	6	17	37	45	23	5	6	1			140
09		20	28	24	13	10	4				99
10	1	2	6		3						12
11	3	2	5	4	3	1					18
12	1	3	5	7	3	2	1				22
13		4	7	4	3	1	2				21
14		2	4	1	1						8
15			1	4	1						6
16		1		1	1						3
17		3		3	1						7
18					1						1
19		2			1			1	1		5
	1156	1263	828	345	135	51	27	4	5	9	3823

200° — 210° — 220°

	2	3	4	5	6	7	8	9	0	1	
00	102	2	2	3					2		111
01	222	27	9	7	1	1				6	273
02	467	278	70	19	10	4	1		1	4	854
03	264	517	196	61	23	3	2		1		1067
04	59	337	290	93	32	11	3	1			826
05	28	200	222	130	47	24	5		1		657
06	7	87	148	121	44	11	7	2			427
07	4	62	95	90	43	13	7				314
08	1	29	52	59	26	11	4	1			183
09	2	25	44	34	26	9	10	4			154
10		5	1	6	2				1		15
11	2	4	8	6	10						30
12	1	7	10	4	2	3	2				29
13		3	8	7	8	2			1		29
14		1	3	2	2	1					9
15		4	3	2	3	1	1	2			16
16			3	1	1	1					6
17			1	2			1				4
18			1	1		1				1	4
19				2	3	1		1			7
	1159	1588	1166	650	283	97	43	11	7	11	5015

230° — 240° — 250°

	2	3	4	5	6	7	8	9	0	1	
00	124	6	3	3	4	1			3	2	146
01	273	36	14	9	2	1				12	347
02	531	340	116	53	20	6	2	2	1	4	1075
03	272	642	342	115	42	11	6	1	1	2	1434
04	85	371	395	151	63	15	7	3			1090
05	40	234	319	220	103	28	9	4			957
06	15	108	196	158	94	34	8	2		1	616
07	7	47	131	117	78	26	6	2		1	415
08	1	31	64	74	55	20	12	3	1		261
09	1	19	55	61	58	29	11	3			237
10		3	10	9	7	3					32
11	1	3	8	8	8	4	1		1		34
12	1	4	16	15	11	9	3				59
13	1	3	5	14	6	3	3				35
14	1	2		2	3	1	2				11
15		5	2	10	8	1				1	27
16		2	1	7	10	2			1		23
17		2	2	1	1	1	1				8
18			1			2					3
19		1	8	3	3	2	1				18
91				1							1
99		1									1
	1353	1860	1688	1031	576	199	72	20	8	23	6830

260° — 270° — 280°

	2	3	4	5	6	7	8	9	0	1	
00	96	3	3	4	1				1		108
01	226	49	14	15	1	5				8	318
02	465	297	108	47	15	5		1	1	6	945
03	239	488	303	123	48	14	10			3	1228
04	54	341	349	173	59	12	4	4			996
05	16	166	271	209	89	36	5	2			794
06	10	92	171	119	69	21	6	1			489
07	8	48	99	116	83	24	8	3			389
08	1	24	46	81	41	19	8	3			223
09	1	20	48	62	45	26	12	6			220
10	1	1	12	16	6	7	2	1			46
11	1		7	12	3	2	2				27
12	3	4	6	9	8	3	5	1			39
13		8	7	11	10	4	1	1			42
14	1		5	1	1	1		1			10
15			7	3	5	1					16
16			3	2	5	4	2				16
17		1	2	1	5				1		10
18				2	1	1	1				5
19			2	4	4	2	1				13
	1122	1542	1463	1010	499	187	67	24	3	17	5934

290° — 300° — 310°

	2	3	4	5	6	7	8	9	0	1	
00	107	6	2	2	1	1	1	2	2		124
01	286	44	18	5	4	1	1	1	2	13	375
02	503	311	95	38	10	3		1	2	6	969
03	248	517	260	85	35	12	2	1	2		1162
04	67	292	280	139	43	18	4	1			844
05	24	146	207	159	41	15	4	2			598
06	8	80	128	106	49	17	2	1			391
07	4	37	62	60	54	27	4	2			250
08		24	37	39	28	9	2	2			141
09	1	14	30	30	24	19	5				123
10		1	4	4	7	1					17
11			1	1	3	1					6
12	2	2		4	3		2				13
13		2	3	7	5	2	2	1			22
14		2	5	1	2	3	1				14
15		2		5	3	5	1	1			17
16			1	1	3		1				6
17							2				2
18				1	1		1				3
19			2	1			1				4
99				1							1
	1250	1480	1135	689	316	134	36	15	8	19	5082

320° — 330° — 340°

	2	3	4	5	6	7	8	9	0	1	
00	182	7	3	2		1			9	2	206
01	382	41	11	3	2	3	2		2	14	460
02	701	342	65	18	3	4			1	11	1145
03	341	529	164	35	9	8	1				1087
04	129	325	227	81	9	4		1		1	777
05	32	147	147	71	13	6	3	1		1	421
06	19	81	95	61	18	8	2	1			285
07	9	40	51	36	9	6	2	1			154
08	5	17	22	11	7	7	2				71
09	4	9	8	16	6	1	4	2			50
10		1	3	2	3	2					11
11			1		1	1	2				5
12	1	1	1			1		1			5
13	1		3	2	2				1		9
14			2	3	1						6
16			2	1							3
19				1							1
	1806	1540	805	343	83	52	18	7	13	29	4696

Fig. 2. A specimen page of "Ocean Wave Statistics".

The Finished Work

A preliminary report (reference 2) outlining the plans and giving some sample statistics has already been issued. The completed work is to be published by HMSO as a book entitled "Ocean Wave Statistics". The principal contents will be sets of contingency tables for observed wave height, period and direction compiled for each of 50 sea areas covering the oceans of the world. The configuration of areas chosen according to consideration of climatology, disposition of shipping routes and availability of data, is shown on the map, fig. 1. For each area there will be sets of tables for each of 3 or 4 seasons (according to local climatology) plus a set covering all seasons. Each set of tables will occupy a page of the book and will contain 13 tables, one for each of 12 30° directional classes plus one covering all directions. Each individual table will show the number of observations reported (in the years 1953–1961) for every combination of wave height and period. A sample page is shown in fig. 2 and from the foregoing it may be deduced that there will be about 250 such pages containing altogether some 3,250 tables. In addition there will be a short introductory text explaining the layout and discussing with illustrative diagrams the interpretation and reliability of the data.

Report on Progress

The operations of sorting, counting, summarising and listing the observations from the punched cards have been carried out at the Meteorological Office and in the Mathematics Division of the National Physical Laboratory. Although this has all been done on machines, it has been a gigantic task as may be judged from the fact that about 1¾ million sets of observations have been processed.

These machine operations are now virtually complete but the work remaining before the book can be published is scarcely less formidable. The next major tasks, which are now in hand, are the mounting of all the listings in a form suitable for direct reproduction and in parallel with this the detailed planning of the text and presentation. When these are finished, the work of printing can begin.

It would be premature at this stage to venture any firm forecast of the completion date. All that can be said is that it is unlikely to be less than 18 months from now. This may not seem so long to wait if it is remembered that the information to be presented has been collected from the officers of some 500 ships over a period of 9 years. Statistics based on such a sample will have permanent value as a world wide index of ocean waves.

REFERENCES

1. Hogben, N. Sea State Studies at the Ship Hydrodynamics Laboratory, Feltham. *Mar. Obs. London*, Vol. XXXIII, July 1963, p. 130.
2. Hogben, N., and Lumb, F. E. The Presentation of Wave Data from Voluntary Observing Ships. *Ship Division Report* No. 49, 1964.

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551.555.8

THE AUSTRALIAN "BRICKFIELDER"

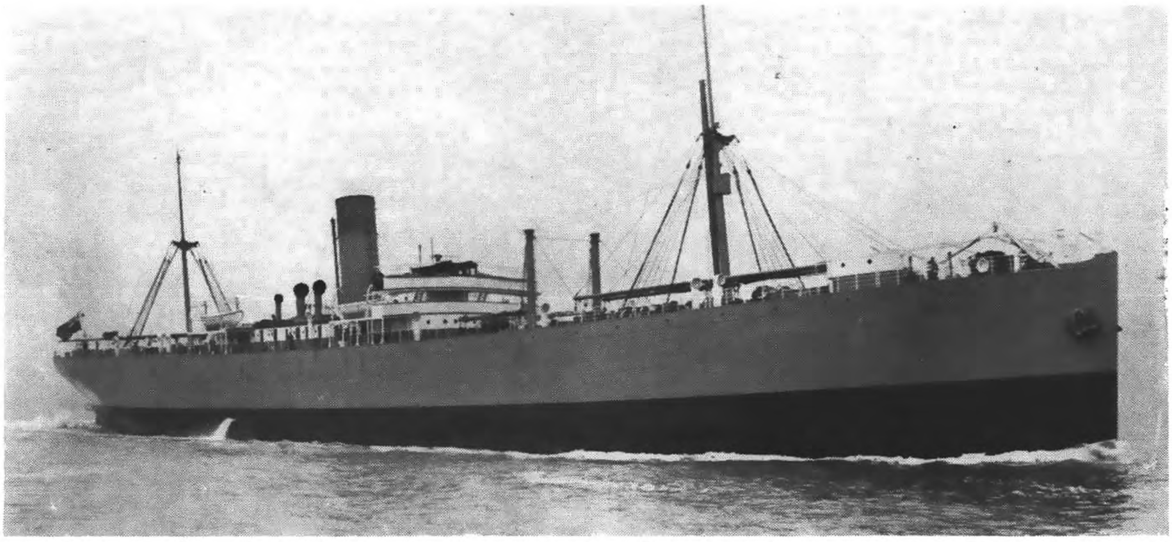
(In the Marine Observers' Log for January 1965 we published an observation from the m.v. *Nordic* under the title 'Brickfielder'. The following article about this phenomenon has been received from the Commonwealth Bureau of Meteorology).

In many parts of the world local winds are named according to some particular characteristic often associated with the direction from which they blow, their duration or intensity.

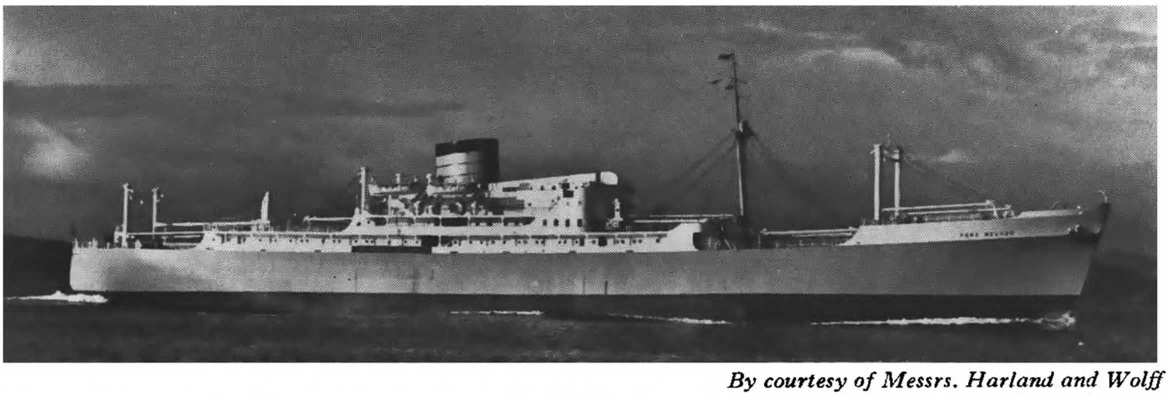
The best known of these have endured since ancient times; for example, the Mistral (Master Wind), the Bora (North), the Gregale (from the direction of Greece) the Levanter, Sirocco (from the direction of the rising sun) and the Chinook (from the direction of the Chinook Indian camp). Unlike these, the Australian Brickfielder

(Opposite page 80)

Jane Porter.



Muritai (later *Port Victor*).



By courtesy of Messrs. Harland and Wolff

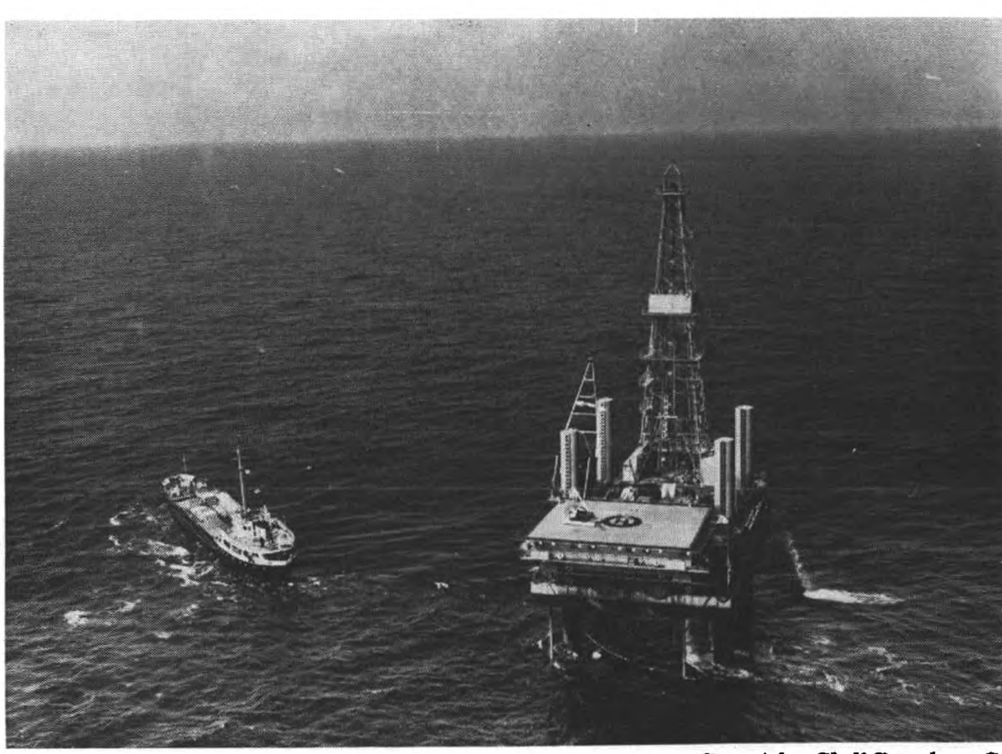
Port Nelson.

THREE SHIPS OF THE PORT LINE (*see* page 83)

(*Opposite page 81*)

BBC *copyright*

Meeting at Broadcasting House on 19th October 1964 (*see page* 81). L. to r. Mr. F. Phillips, Mr. T. Crowe, Mr. D. Smith (BBC), Captain E. J. O'Keeffe, Commander C. E. N. Frankcom, Group Captain Haylock, Mr. J. Matheson (Port Meteorological Officer, London), Captain Green, Mr. V. R. Coles (Meteorological Office), Mr. N. B. Marshall (Meteorological Office), Mr. H. Rooney Pelletier (BBC), Miss P. Walker (BBC). The blackboard was used by Mr. Coles, who is in charge of the Central Forecast Office, to explain how the bulletins for shipping are prepared.



Copyright:* *Shell Petroleum Co.

Mobile self-elevating drilling platform *Triton* which has already drilled some wells in the North Sea off the coast of the Netherlands (*see* page 68).

has not stood the test of time. The name stems from the early days of Australian history when Sydney (then Port Jackson) was in its infancy. At this time, early in the nineteenth century, a considerable portion of the district now known as the Haymarket was occupied by brickfields. These fields were only about three miles south of the sparsely settled shores of Port Jackson and whenever a strong southerly wind, typical of this region in summer, struck the infant city, its approach was heralded by a cloud of reddish dust from the brickfield area—hence the name 'Brickfielder'.

Over half a century later, in the year 1894, Henry A. Hunt, then second meteorological assistant, Sydney Observatory, but later to become Commonwealth Meteorologist (1908–1931), describing the southerly winds, wrote:

"The brickfields have long since vanished and with them the name to which they gave rise, but the wind continues to raise clouds of dust as of old under its modern name of Southerly Burster."

In the ensuing period of seventy years since these words were written, Sydney's metropolitan area has ranged out for twenty miles on both sides of the harbour. A consequence of this development, together with intensive cultivation over much greater distances, has been that the natural dust referred to by Hunt no longer accompanies the southerly.

Thus the characteristic features of a dust-laden southerly, the 'Brickfielder', no longer exists. All that remains of the original 'Brickfielder' is the still quite frequently explosive character of the southerly onset, or line squall, giving rise to the term 'Burster'. Perhaps the name most frequently used today is simply the less picturesque 'Southerly'.

The cold post-front southerly is retarded over the Alps of south-eastern Australia but surges strongly around and off the New South Wales coast with gusts often as high as 60 MPH and temperature falls of 20°F. The sudden wind change from the pre-front northerly presents a serious hazard to small craft and a small craft warning system has been found necessary.

According to Hunt, common usage of the term 'Brickfielder' had ceased prior to the writing, in 1894, of his essay on southerly bursters. Today the term is familiar, in its original sense, to only a few of the older generation of Australian meteorologists.

Nevertheless, confusion has arisen in various quarters from time to time and the name 'Brickfielder' has been given to the hot dry northerlies over south-east Australia in summer. The report of the m.v. *Nordic* at 0630 GMT on 4th March 1964 whilst in port at Whyalla, South Australia, of dry bulb 97·5°F, wet bulb 66·5°, wind north, force 4, and relative humidity 14 per cent (published in *The Marine Observer*, January 1965) is typical of such conditions. Some extreme values of this kind were recorded over south-east Australia on 13th January 1939. In Melbourne on this date the maximum temperature was 114·1°F and the 0500 GMT (1500 local time) readings of dry bulb 113·0°, wet bulb 71·8° gave a relative humidity of 8 per cent.

The confusion referred to above has in all probability arisen from the fact that these northerlies represent tropical continental air, dry and unstable due to strong surface heating, with a minimum of relative humidity during the day due to advection over arid regions and intense eddy transfer in the vertical. Under such conditions red dust from the interior is not infrequently borne aloft and carried over the south-eastern states, thus giving a brickfielder condition although on a much larger scale than was provided by the local brickfielder at Port Jackson over a century ago.

WEATHER BULLETINS FOR SHIPPING BROADCAST BY THE B.B.C.

Weather bulletins for shipping have been included in the BBC broadcast programme every day since October 1925, except for the period of the last war, 1939 to 1945 (see *The Marine Observer*, January 1964). Up till 1956 these bulletins were broadcast on the Home Service, but they were transferred that year to the Light Programme, (1500 metres) at the suggestion of the BBC, in view of the fact that this frequency was generally the best for reception in the various areas covered by these bulletins. Until 1956 these bulletins only consisted of the gale warnings in force, a general statement of the meteorological situation and forecasts of wind, weather and visibility for the various sea areas. In 1956, at the request of users of the bulletin, actual reports of wind, pressure and visibility at a number of coast stations (mostly light vessels and lighthouses) were included in three of these bulletins each day. The times at which the bulletins are issued have varied from time to time—one advantage of their timing is that they differ from the times of the bulletins issued by GPO coast stations, thereby giving a somewhat better 'spread' of the times which bulletins are issued—a very convenient arrangement for the mariner. But it is to the very small ship, which doesn't carry a radio set suitable for listening to GPO broadcasts, that the BBC bulletins are probably of the greatest value. Also they are of very great value to ships of all classes when in harbour and about to sail.

The British Broadcasting Corporation, under the terms of its Charter, has a primary function to broadcast information, education and entertainment. By including in their programmes these bulletins for shipping four times each day, the Corporation is making a very useful contribution towards safety of life at sea—and this involves not only merchant ships and fishing vessels but also the ever-increasing number of yachtsmen around our coasts. And this service, extending as it does to Iceland and to the Bay of Biscay, is not only of national but of international value, for seamen of all nations sail on these seas and English is understood by most mariners. In consequence, the reputation of the BBC is high in the maritime world, although there are, of course, complaints from time to time about such details as the speed at which the bulletins are read, their contents and the time of issue. But such complaints are in the nature of compliments, for they emphasise the value of the bulletins to the users!

Whenever changes in the content or timing of the bulletins have taken place the users have been consulted beforehand. In most cases a meeting has been held well before the changes are due to take place, at which representatives of the users, the BBC and the Meteorological Office are present and, as a result, modifications to the proposed changes are often made.

On 19th October, 1964, following some complaints about the speed at which the shipping forecasts were read and some consequent changes which had been introduced in the number of words in the bulletin, a meeting was held at Broadcasting House, at the invitation of the BBC, at which representatives of the users and Meteorological Office together with all the available BBC announcers were present. Among the visitors were Captain O'Keeffe, Royal Mail Lines Ltd. and Captain Green of Messrs. F. T. Everard & Sons Ltd., a representative foreign-going master and coasting master respectively; they were the only masters of ships in the London docks that were available at the time. Group Captain Haylock represented the Royal Yachting Association.

The discussion confirmed that the users find that the BBC weather bulletins for shipping are, at times, read at somewhat too fast a rate which makes it difficult, even when using a specific form and pre-arranged abbreviations, to write down what is being said. It was agreed, in principle, that by omitting from the bulletin the repetitive use of words like 'visibility', 'wind', 'force', and 'millibar' the announcer could read the bulletin somewhat more slowly, provided this length wasn't added to in other ways! Among the announcers present was Mr. Frank Phillips, who was retiring that very day, and who was a very popular announcer with the mariners, because of the effective way he had of reading the shipping bulletins. Captain Green referred to him as the ideal announcer, who read the bulletins at exactly the right speed.

In reply to questions, the BBC representatives pointed out that the different timings of the bulletins on Sunday compared with week days were dictated by the need to accommodate the general audience.

During the discussion the value to the mariner of using a tape machine to record spoken bulletins was mentioned; it seems that this might be of considerable help in some cases, for it would obviate the difficulty of trying to write down the bulletin if it were read a little on the fast side, and it would not be very expensive to provide.

The change of the midnight BBC bulletin to 0202 was mentioned; the meeting appreciated that this change was necessary from the BBC's viewpoint because of recent changes in programme and because they have a much wider audience to serve than the group of listeners using the shipping bulletins.

Altogether it seems that it was useful to give the BBC announcers this chance of meeting some of the mariners for whom these bulletins are issued, and of discussing their problems with them.

C. E. N. F

THE PORT LINE

Our annual series of pictures of ships of one ownership spanning over a century of voluntary observing at sea is continued opposite page 80 with photographs of three ships belonging to the Port Line or its constituent companies.

We first became associated with this company on 23rd March 1855 when our Agent in Belfast equipped the *United Kingdom*, a full-rigged ship of 1267 tons owned by Messrs. J. P. Corry & Co. of Belfast, as an observing ship. Her first meteorological logbook was received on 22nd September 1855 and she continued to observe regularly for us until 7th January 1859 when we received her last returns. In those early days, more than a century ago, we also had two other of Messrs. Corry's sailing ships on our voluntary observing list, the *Persian* which we equipped in September 1856 and the *St. Helena* which started observing for us in September 1858.

Unfortunately, no pictures of any of these three ships are available and our first picture therefore has to be of one of Messrs. Corry's later ships. She is the *Jane Porter*, a full-rigged ship of 953 tons which was equipped by our Agent at Hull on 10th December 1878. Her observing career was a short one; we received meteorological logbooks from her in April and December 1880 and thereafter she disappears from our registers.

Our second picture is of the *Muritai*, a twin screw steamer of 7280 gross tons built in 1910 by Workman Clark of Belfast for the Tyser Line. In 1914 when various companies who had been in close association for many years were merged to form the Commonwealth and Dominion Line, later to be known as the Port Line, the *Muritai* was renamed *Port Victor*. She ran for them until 1935 when she was sold to the shipbreakers. The writer of this article was her last third mate. We received her first meteorological logbook in 1920 and she continued with regular observations until May 1931 when her last returns were received.

Our third picture is of the company's latest recruit to the voluntary observing fleet, the *Port Nelson*. She is a twin screw motor vessel of 8950 gross tons, built in 1951 by Harland and Wolff of Belfast. She started observing for us in 1964.

Through one of its constituent companies, Corry & Co. of Belfast, the Port Line has the longest connection of any shipping company with the Meteorological Office; it is interesting to note that there is still a bearer of the name Corry on their Board of Directors.

We take this opportunity of recording our thanks to the masters and officers of the company's ships who together have given us more than a hundred and ten years of faithful voluntary service; the name of one or more of their ships have seldom, if ever, been absent from our registers and today, out of a fleet of 30 ships, 22 are observing for us whilst 3 are observing for the Australian Bureau of Meteorology and 1 for the New Zealand Meteorological Office.

Over the years too, the Marine Division of the Meteorological Office has taken two of its officers from the Port Line; Captain Campbell Hepworth who came from

Milburn's Anglo-Australian Line to become our Marine Superintendent from 1899 until 1919, and the present Nautical Officer at Bracknell.

L. B. P.

WEATHER INFORMATION IN RUSSIAN

The Master of a British ship which called at Leningrad in June 1964 sent us the weather map in Russian which was given to the ship by the meteorological authorities before he sailed. The information contained on this map was all in Russian; a translation of it shows that it included a summary of the weather situation extending well out into the North Atlantic, a 24-hour forecast for the Gulf of Finland, Baltic, and North Sea, including estimated height of wave, actual reports from coastal stations (including wave heights), a forecast of the water level at the mouth of the River Neva and a 24-hour forecast for the Norwegian Sea and Denmark Strait. The map and its accompanying information are similar to that supplied to ships leaving London, Liverpool and certain continental ports. The International Convention for Safety at Sea (1960) encourages meteorological services to issue maps of this nature.

The translation of Russian meteorological terms into English is not quite as difficult to the seaman as might be imagined. The glossary of terms used in weather messages on page 265 of the *Admiralty List of Radio Signals*, Vol. III, was prepared by the World Meteorological Organisation and gives the Russian meteorological terms in arabic letters. The morse code is so designed that the radio message in Russian can be written down by the radio officer aboard the receiving ship, direct in their arabic equivalents. All that is needed then is to pick out the English translation of the equivalents—e.g. 'prerivisty dojdi' = intermittent rain. This procedure does not, however, enable one to read a written bulletin. It would take up rather a lot of space in the glossary to include the Russian characters as well. In the Arctic Pilot, however, there is a table for the transliteration of Russian geographical names. This contains the letters of the Russian alphabet (the Cyrillic alphabet) and their arabic equivalent. With the aid of this, combined with the glossary in the *Admiralty List of Radio Signals*, it should be possible to understand the essentials of the text accompanying a Russian weather map. For example the Russian word 'Ветер' (in Cyrillic characters) transliterates into 'Vyetyer' in arabic characters and the glossary tells us that the meaning of this word is 'wind'. This may seem rather a ponderous method of translation, but it is better than nothing!

It should be mentioned that, according to the *Admiralty List of Radio Signals*, some of the radio weather messages broadcast by U.S.S.R. authorities are given in English as well as in Russian.

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NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM OCTOBER TO DECEMBER 1964

OCTOBER

Relevant weather factors. The whole of the Arctic basin. Baffin Bay and Greenland experienced, on average, air temperatures up to 4°C below normal.

Canadian Arctic Archipelago including Baffin Bay, Hudson Bay and Strait. Most of Northern Canada was ten days behind the seasonal normal in the degree of cooling but conditions were not excessively abnormal. Coronation Gulf, the Beaufort Sea and Hudson Bay and Strait had less than normal ice but Baffin Bay remained largely normal. Sea temperatures suggested that a mass of Atlantic water had moved into the centre of Baffin Bay from the south.

Davis Strait and Labrador Sea. This area was largely ice free except for icebergs which continued to drift southwards to the entrance of Belle Isle Strait. Icebergs also continued to move northwards along the Greenland Coast.

Belle Isle Strait, Great Bank and East Newfoundland Coast. These were largely ice free.

Gulf of St. Lawrence, River St. Lawrence and Great Lakes. These were also largely ice free but it was reported that the Great Lakes were at their lowest level for more than one hundred years.

Greenland Sea. All of Greenland except the extreme south-west experienced abnormal cooling during October. It was estimated that the season was about ten days ahead of normal.

The fast-ice off East Greenland was approximately normal but the area of pack-ice was in excess of normal. The area of open water north-west of Spitzbergen was considerably in excess of normal while both Spitzbergen and Bear Island were largely ice free. Arctic water penetrated south of Spitzbergen from the north-east but south of this was the warm Atlantic water similar to that experienced in 1963.

Denmark Strait. The narrow belt of Arctic water and polar pack extended all along the Greenland Coast similar in a way to that in the corresponding period of 1963, but the mass of ice off Greenland, north-west of Iceland was less. Isolated icebergs and pack-ice were reported off Northern Iceland.

Barents Sea. The south and east of this area were largely ice-free and the area of pack-ice to the north was estimated to be largely normal. The area of polar pack that had penetrated southwards off eastern Spitzbergen was in excess of that observed in 1963 (when arctic water moved southwards beyond the limit of the polar pack) but was still less than normal. The warm Atlantic water was clearly evident from sea temperatures in the south and the centre of the Barents Sea. The White Sea was ice free.

Baltic Sea. At the end of October the ice situation in this area was very similar to the corresponding period in 1963. The amount of ice was very much less than normal.

NOVEMBER

Relevant weather factors. Pressure was on average up to 7 mb above normal over the Polar Basin, Baffin Bay, North-east Canada and Greenland. It was exceptionally low from the North Atlantic across north-west Europe to Asia. Temperatures were on average up to 10°c below normal in North Asia and Greenland but up to 4°c above normal over northern Canada.

Canadian Arctic Archipelago including Baffin Bay and Hudson Bay and Strait. Conditions of October continued on into November. Developments were normal except in Baffin Bay where ice formed rapidly as a result of excessive atmospheric cooling. The warm Atlantic water continued to be evident off the coast of Greenland.

Davis Strait and Labrador Sea. There was widespread fast-ice around the coast of South-east Baffin Island. Although warm Atlantic water remained off the Greenland coast, extensive areas of new, young, and winter ice developed off Baffin Island during November. The area of this ice was in excess of that experienced in 1963 and generally above normal. The number of icebergs off Disko Island was generally greater than in 1963, with land stations reporting 16–50 icebergs at one sighting. Icebergs continued to move northwards from Cape Farewell along the Greenland coast and southwards off the Labrador coast. New ice was developing in all the shallow inlets of the Labrador coast.

Belle Isle Strait, Great Bank and East Newfoundland Coast. This area was ice free apart from isolated icebergs moving southwards past the entrance to Belle Isle Strait.

Gulf of St. Lawrence, River Saint Lawrence and Great Lakes. These were largely ice free.

Greenland Sea. From October to November there was a general increase in the area of Polar pack-ice which almost reached Jan Mayen and extended south-westwards along the Greenland coast. There was no observable change in the iceberg population. New and young ice formed in the fjords and shallow waters of West Spitzbergen. Bear Island continued ice free.

Denmark Strait. Polar ice drifted south-westwards all along the Greenland coast and penetrated west of Cape Farewell. There was also a corresponding southward drift of icebergs.

Barents Sea. There was no observable change in the ice situation from October in the north and north-east of the area but there was normal rapid seasonal development of ice in the White Sea and along the Russian coastal areas of the south-east Barents sea.

Baltic Sea. Ice formed in the north of the Gulf of Bothnia and east of the Gulf of Finland but the season remained very light.

DECEMBER

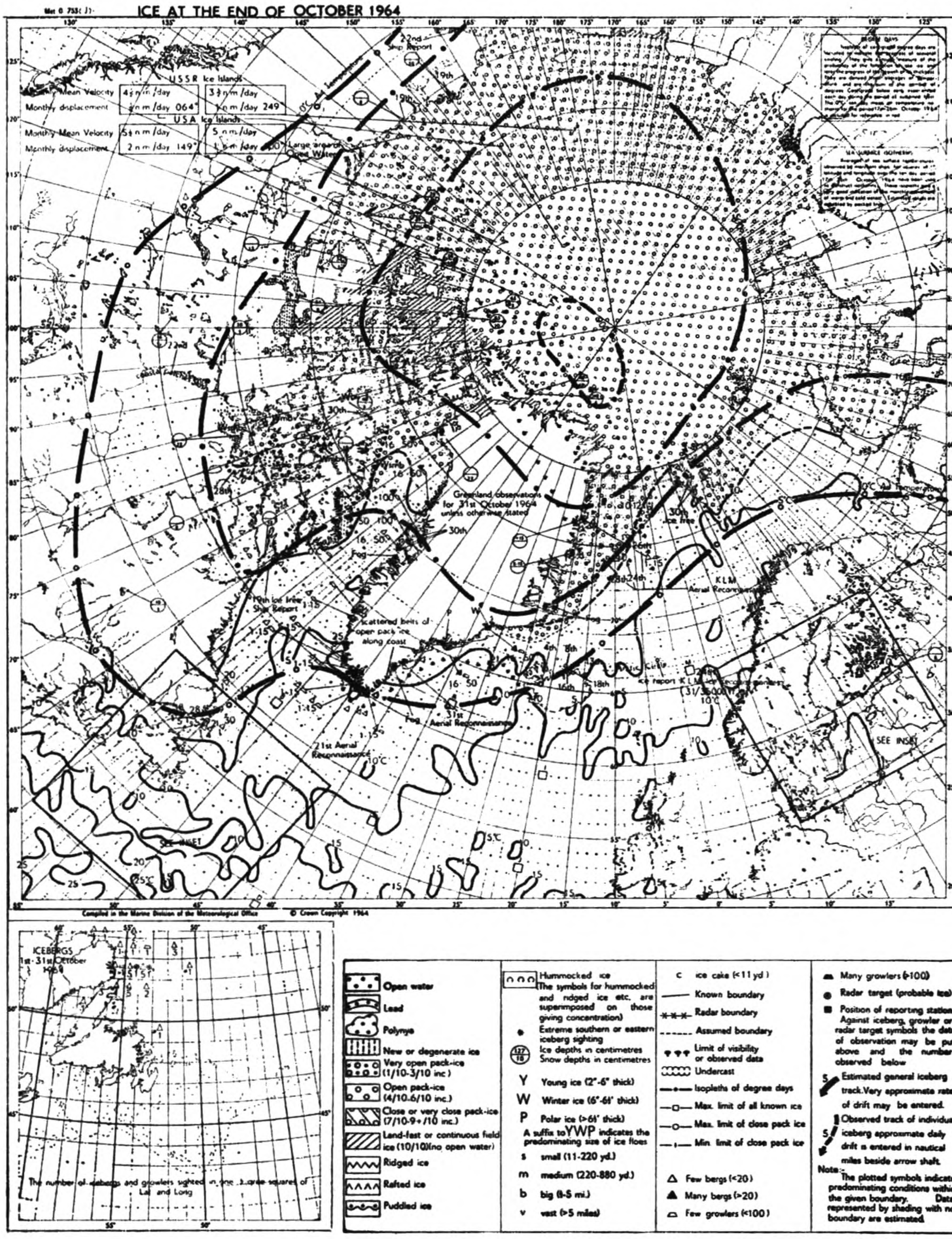
Relevant weather factors. There was a considerable change in the general circulation from November to December. Pressure was on average up to 10 mb above normal over the North Atlantic and the same amount below normal from north-west Europe to the Canadian side of the Polar Basin. The area of greatest cold was displaced to western Canada and Alaska where the monthly average was as much as 10°c below normal.

Canadian Arctic Archipelago including Baffin Bay, Hudson Bay and Strait. There were the normal seasonal developments in ice over this area but there was an increase in the iceberg population off Disko Island.

Davis Strait and Labrador Sea. The area of all types of ice was less than normal but pack-ice formed rapidly during December all along the Labrador coast with an extensive southward drift which affected the approaches to Belle Isle Strait. New ice formed during December in fjords and shallow water of south-west Greenland.

Belle Isle Strait, Great Bank and East Newfoundland Coast. There were few changes during December in this area but drift-ice moved southwards towards the entrance of Belle Isle Strait and new ice formed in coastal waters of north-east Newfoundland. Isolated icebergs were off the entrance to the Belle Isle Strait.

The Gulf of St. Lawrence, River St. Lawrence and Great Lakes. New ice formed in the shallow water of the Great Lakes. Rapid formation of ice created navigational difficulties in the



—— o —— Air temperature: 0°C isotherm (mean for 17th–26th October).

—— · —— Air temperature: negative degree days, °C.

————— Sea temperature, 0°C, for 17th–26th October. These isopleths give an indication of the monthly movement of warm and cold water.

—— — —— Sea temperature, as above, but only estimated values.

Note. The notes in this article are based on information plotted on ice charts each month, similar to the map above, but on a much larger scale (39 in. × 27 in.). They are available at the price of reproduction on application to the Director-General, Meteorological Office (Met.O.1), London Road, Bracknell, Berks. Alternatively, they may be seen at any Port Meteorological Office or Merchant Navy Agency.

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

(This does not include growlers or radar targets)

Limits of Latitude and Longitude		Degrees North and West					
		58	56	54	52	50	48
Number of bergs reported south of limit	October	*	>35	>31	14	1	0
	November	*	*	>9	>6	0	0
	December	*	*	2	1	0	0
	Total	*	*	>42	>21	1	0
Number of bergs reported east of limit	October	>35	>26	12	4	0	0
	November	>9	7	2	0	0	0
	December	*	2	0	0	0	0
	Total	*	>35	14	4	0	0
Extreme southern limit	October	49° 39′N 52° 42′W on 28.10.64					
	November	50° 17′N 53° 40′W on 10.11.64					
	December	51° 24′N 55° 00′W on 26.12.64					
Extreme eastern limit	October	52° 22′N 50° 55′W on 3.10.64					
	November	50° 42′N 53° 35′W on 17.11.64					
	December	52° 07′N 54° 36′W on 23.12.64					

* Probably large numbers, but none reported in excess of those sighted in further south positions or in further east positions.

> ("greater than") has been inserted where there is some doubt as to the actual number of icebergs at some of the sightings, but the true value is probably greater than the value given.

Table 2. Baltic Ice Summary: October–December 1964

No ice was reported at the following stations during the period: Kiel, Emden, Lubeck, Bremerhaven, Flensburg, Ventspils, Tallin, W. Norrskar, Mantyluoto, Aarhus and Kristiansandfjord. No ice was reported at any of the stations during October.

Station	November 1964									December 1964								
	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
Tonning	0	0	0	0	0	0	0	0	—	28	31	4	0	4	3	0	0	—
Husum	0	0	0	0	0	0	0	0	—	23	31	9	0	0	8	0	0	—
Gluckstadt	0	0	0	0	0	0	0	0	—	27	29	3	0	0	0	0	0	—
Riga	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	56
Pyarnu	0	0	0	0	0	0	0	0	—	9	31	15	4	0	4	4	0	39
Leningrad	24	30	7	5	0	2	5	0	94	1	31	30	18	12	18	11	0	205
Viborg	23	30	8	8	0	7	1	0	—	1	31	31	25	6	8	23	0	—
Stettin	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	23
Gdansk	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	8
Klaipeda	0	0	0	0	0	0	0	0	1	28	31	4	0	0	4	0	0	37
Helsinki	0	0	0	0	0	0	0	0	55	21	31	5	0	0	2	0	0	122
Mariehamn	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	34
Turku	0	0	0	0	0	0	0	0	32	29	31	3	0	0	0	0	0	81
Vaasa	0	0	0	0	0	0	0	0	46	1	31	31	28	0	19	4	0	177
Oulu	26	30	5	3	0	4	1	0	104	1	31	31	31	0	0	31	0	294
Roytaa	26	30	5	5	0	2	3	0	82	1	31	31	31	0	0	13	18	279
Lulea	24	30	7	1	0	7	0	0	78	1	31	31	31	0	18	13	0	286
Bredskar	0	0	0	0	0	0	0	0	—	16	31	7	0	0	5	0	0	—
Alnosund	0	0	0	0	0	0	0	0	34	17	31	15	3	0	14	0	0	151
Stockholm	0	0	0	0	0	0	0	0	3	28	31	4	1	0	4	0	0	57
Kalmar	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	40
Visby	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	18
Goteborg	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	23
Skelleftea	0	0	0	0	0	0	0	0	—	27	31	5	0	0	3	0	0	—
Copenhagen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
Oslo	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	102

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

* These figures give a rough measure of first the probability of the formation of sea ice, and later the progress of the growth and of 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.

River west of 70°w and on the north bank of the Estuary west of 67°w. There was much ice (mainly new) in Chaleur Bay otherwise the Gulf of St. Lawrence was clear. The movement of ships in the Great Lakes ended on December 4th and the St. Lawrence seaway was closed on December 7th.

Greenland Sea. Normal seasonal developments continued in this area but air reconnaissance observed what must be an abnormally large area of open water north of Spitzbergen. It appears that Atlantic water had flowed strongly northwards west of Spitzbergen. However ice continued to develop in the shallow water and fjords of west Spitzbergen. Bear Island remained ice free.

Denmark Strait. The developments that took place in November continued into December but there was in addition an increase in the iceberg population. An individual land station reported 50 to 100 icebergs off Cape Farewell where it appeared that bergs were congregating.

Barents Sea. On December 8th most ports in the White Sea except Archangel were closed to shipping. Elsewhere in the Barents Sea area seasonal developments were normal.

Baltic Sea. Ice conditions remained very light during December.

G. A. T.

Book Reviews

Aquarius, by Philippe Tailliez. 8½ in. × 5⅝ in. pp. 224. *Illus.* Harrap, London, 1964, 25*s.*

This is the story of a man who saw immense possibilities in the concept of controlling an underwater vessel by changing the volume of gas contained above the water in a variable buoyancy chamber by liquefaction and evaporation. The author is Commander Tailliez of the French Navy who has done extensive underwater research and, among other things, has worked with Commander Cousteau and Professor Piccard on the testing of bathyscaphs.

The author chanced to see a paragraph in a magazine giving the name and address of a German who was reported as saying that he had discovered a new method for raising wrecks from great depths. He met this man who claimed that, while a prisoner of war at Murmansk, he had built a vessel from materials salvaged from scrap-metal dumps and dived in it to a depth of 7,800 feet below the North Cape of Norway; this was before the deep dives of Houot, Willm and Piccard took place.

It was a fantastic story that the man, Heinz Sellner, told to Commander Tailliez. As neither spoke the other's language, the narration was slowed down by the need to translate although this was helped by the use of a tape recorder. The first half of the book is largely Sellner's story—his youth, his first experiments with gas as a diving control, his wartime experiences, the building of a vessel in the prison camp at Murmansk and his dive to 7,800 feet. Commander Tailliez, sceptical at first, was convinced that Sellner's story was fact, not fiction, and agreed to help him to build another vessel—which was later named *Aquarius II.* The support—both moral and financial—of the French underwater research organisation was sought and obtained and the project was started.

Heinz Sellner was so sure of the possibilities of his revolutionary method of control and foresaw vessels of his design being used for salvaging sunken vessels that he kept going despite terrific difficulties which would have daunted any man but one who was obsessed with the possibilities of his idea. The hardships were of every sort imaginable—money difficulties (on some occasions only a loan from a friend forestalled bankruptcy), accidents and bad health, storms, heatwaves, pilfering of equipment and materials—but Sellner doggedly kept going.

The building of the vessel was commenced on the banks of the Rhine at Budenheim and later *Aquarius II* was moved to Marseilles for completion and testing. Here, under the auspices of the French underwater research organisation, conditions for the work were better but there were still many difficulties to be overcome. Finances were very limited, which meant much searching around scrap-metal yards to find cheap materials which could be used in building *Aquarius II.*

This book is a fascinating story of a man with a dream—a dream of being able to recover sunken vessels—who persevered to build, with his own hands, primitive equipment and under adverse conditions, the prototype vessel for this purpose. But this book is fact, and, unlike a fairy tale, there is not a happy ending. *Aquarius II* did not achieve the hoped for results, although the work was continued in order to study the principle of gas ballasts, by using a series of models known as Aquariculus. These models provided conclusive proof that the principle of gas ballasts for a submersible vessel is a workable one.

The book ends with the statement that one day soon, work will begin on *Aquarius III*—perhaps the story will have a happy ending after all.

C. E. A.

A Colour Guide to Clouds, by Prof. R. S. Scorer, Imperial College, London, and the late Dr. H. Wexler, formerly of the U.S. Weather Bureau. 5¼ in. × 7¾ in. pp. 63, plus index. *Illus.* The Pergamon Press, Oxford, 1964. 12*s.* 6*d.*

This handbook is No. 187 of a series produced by the Commonwealth and International Library of Science, Technology, Engineering and Liberal Studies and it is intended to be a reference book for anyone who is interested in the 'whys and wherefores' of cloud formation. As the Introduction says, "above all the book should be used—taken out on all trips along with maps and binoculars and carried to the office, workshop or school, because this part of the study of nature can be continued even in the centre of cities."

The first seven papers of the guide are devoted to describing clearly and concisely, assisted by diagrams but with no mathematics, how various cloud forms come into being. The next section contains 48 colour plates each measuring 3½ in. × 2½ in. and disposed two to a page. On the opposite page there is a full description written in very clear and simple English of the processes involved in producing the particular cloud structure illustrated.

It was a happy decision to reproduce the colour photos against a background of medium grey, as this treatment greatly enhances the beauty of the pictures. Various forms of Cumulus are illustrated in plates 1 to 18, while the Clouds typical of a low pressure area are dealt with in plates 19 to 26. Wave clouds, ice clouds and coloured arcs are shown in plates 27–39 and clouds of layered form occupy plates 40–43. A menacing-looking tornado threatens in plate 46, while the remaining two pictures take us 100 miles up to give us views from a space capsule, of a hurricane and an extensive cloudscape. The book concludes with suggestions for various practical studies to be used as a basis for further work by the keen student. It is the right size for the pocket and is attractively produced, the colour work being for the most part pleasing to the eye—the picture of the sun pillar and arc of contact is quite a masterpiece. In a few instances however the colours are in the reviewer's opinion somewhat unnatural, due to an excess of yellow or green, this being especially noticeable in the case of plates 33, 40 and 41. These are relatively minor points however and do not detract from the usefulness of the book which is excellent value at the price.

G. M. R.

The English Climate, by H. H. Lamb. 7¾ in. pp. 212, The English University Press, 12*s.* 6*d.*

One of the New Science Series, this is an extensive revision of a book by the well known climatologist, the late Dr. C. E. P. Brookes, which was published in 1954. Mr. Lamb is also an expert in his subject and as the general editors—who are themselves distinguished scientists—say in their foreword, the revision which he has undertaken is "to be recommended as an authoritative account of what lies behind our favourite topic of conversation." They tell us how the original book described the vagaries of our weather and how Mr. Lamb has "used a wider canvas and considered our weather as part of a whole—that of the Northern Hemisphere . . . the subject of dynamical climatology relates the long term average of weather to the global motions of the atmosphere, and this philosophy is the main-spring of the present book".

Although largely a scientific book, it has its moments of humour—the opening lines read "An English woman reproached by a friend with not having visited her for ten years replied 'But, my dear, look what weather we have been having!'"

After telling us, in the introduction, what we mean by climate, the next three chapters which describe the weather systems, the roles of sun, atmosphere and ocean upon climate and tell us something about the reasons for our 'winds, warmth and weather types', might seem a bit heavy to the lay reader, but are worth struggling through, for they give such a useful background to the subject. It seems that the book is primarily written for the student and these chapters should prove valuable to anybody with some basic knowledge of meteorology including the average reader of *The Marine Observer*, because it gives such a good 'thumb nail' sketch of how the atmospheric engine behaves.

The next five chapters are the meat of the book and describe and analyse all aspects of our climate and include useful information about such items as climate and health, where to live and where to holiday. These chapters are written in an interesting and simple manner and should be readily understandable by almost anybody. Information is included about such varied aspects as atmospheric pollution and its serious affect on the health and economies of the country; glazed frost, described as an 'unmitigated evil'; climate hints for the gardener including advice about the heat capacity of different soils; climate aspects of building and siting of houses; and confirmation of the fact that for sunshine the early summer months have the advantage. It is comforting for the nervous to read that the official death rate from lightning in England and Wales averages 'a little more than one person per four millions per year'!

The title of the chapter 'Seasons and Saints Days' sounds a little quaint; it contains condensed information, based upon statistics, about the tendency of weather of certain types to persist in certain seasons of the year and shows how much of this is related to folk weather lore of the past, the dates being often identified by names of Christian saints. Obviously St. Swithin and the Buchan cold spells figure in this chapter. The author summarises it with the comforting words "taken over all the year, the evidence suggests that, given sensible houses, our climate is one of the best in the world to live and work in . . . ".

For the historically inclined, there is an interesting chapter about our climate down the ages, from about 8000 B.C. The final chapter is devoted to a simple description of the weather map.

There are three appendices, the first giving a calendar of weather singularities, the second a calendar of historic weather events since 1500, while the third gives details of some of the essential units used in meteorology and conversion of barometer and thermometer scales.

The book is profusely illustrated with tables and with excellent black and white maps portraying such items as sea temperatures in August, areas of heavy atmospheric pollution and consequently hazy days; and 'bracing' and 'relaxing' climates. It is, perhaps, surprising to note from one of the maps that the average amount of bright sunshine in South-west Ireland is similar to that of Anglesey and the North Wales coast.

The inhabitants of these islands who are not English might rather wonder why the original author chose the title "The English Climate" for a book which describes so well the climate of the British Isles. It is true that the climate of England figures rather prominently in the book—but it ranges also as far afield as the Shetlands and western Ireland.

All the temperature readings are given in degrees Celsius and it is only occasionally that the Fahrenheit equivalents are given in brackets—this is surely rather infuriating for the average reader in this country who still thinks of temperature in terms of Fahrenheit although he is gradually getting (rather unwillingly) used to the sound of the Celsius scale.

In appendix 3, the author tells us that the Beaufort scale of wind force goes up to force 17; there were a few years during which this was true, but it was agreed internationally in 1956 that it is unrealistic to go above force 12.

The above are only minor criticisms of a very readable book which anybody who is interested in the weather would find useful to have by him. Paper backed, it is good value for its low price.

C. E. N. F.

Personalities

RETIREMENT.—COMMODORE G. S. GRANT, R.D., retired from the sea on 6th November 1964 when he brought the *Amazon* into London.

Gilbert Shaw Grant comes of a scholastic family, numbering more than one professor among his ancestors. His father was a Hampshire schoolmaster.

On completion of his pre-sea training in H.M.S. *Worcester* in 1920, he entered the Royal Naval Reserve as a probationary midshipman. In 1921 he commenced his apprenticeship in the *Somme*, owned by the Royal Mail Steam Packet Company which is now named Royal Mail Lines Limited. By 1924 he had passed for second mate and was appointed fourth officer of their *Navasota*.

In 1931 he obtained his master's certificate and was appointed to his first command, the *Tweed*, in 1949. Thereafter he commanded in succession the *Berbice*, *Parima*, *Loch Garth*, *Deseado*, *Loch Gowan* and finally *Amazon* in which he remained for three and a half years. In 1963 he hoisted his Commodore's burgee in that ship.

During his time with the Royal Mail Lines Co., Captain Grant was twice involved in West Indian hurricanes; the first was in October 1937 when as second officer of the *Loch Katrine* he was hove-to for two days to the north of the Leeward Islands and the second was in 1951 when, as master of the *Berbice*, he put to sea from Kingston, Jamaica, for safety.

During the second world war he was appointed as gunnery officer of the armed merchant cruiser *Asturias*, one of his Company's ships requisitioned for the purpose. Later he commanded the ex-American destroyer *Clare*, subsequently being appointed to H.M.S. *Spragg*, a captain-class frigate. In 1945 he was appointed to the staff of the Royal Naval College Greenwich and remained there until the conclusion of hostilities. He retired from the Royal Naval Reserve in 1948 with the rank of Commander.

Commodore Grant's association with the Meteorological Office goes back to 1925 when he sent his first meteorological logbook from the *Araguaya*. Since then, in 18 years he has sent us 40 logbooks of which 15 were classed excellent.

We wish him many happy years of retirement at his home at Bitterne Park, Southampton.

D. M. MacL.

RETIREMENT.—COMMODORE A. G. PATEY has recently retired after nearly 36 years' service with the Union-Castle Mail Steamship Company which he joined as a junior officer in 1923, after service with F. C. Strick & Co. and the Ben Line.

His first command, the cargo ship *Rochester Castle*, came in 1943, and after commanding four new cargo ships, straight from the builder's yard, he was appointed to command of the passenger ship *Durban Castle*.

From 1955 to the end of 1957 he served as relief Master in the Mail Service, and in 1962 was appointed Commodore of the Fleet and Master of the *Windsor Castle*. He remained in command of this ship until his retirement in January.

Commodore Patey's record as a voluntary observer for the Meteorological Office goes back to 1932, and in 12 years of observing he has sent in 27 meteorological logbooks.

We wish him good health and a happy retirement.

A. D. W.

RETIREMENT.—CAPTAIN J. L. MACLAREN retired in December 1964, after over 48 years at sea, 26 of which were spent with the Manchester Liners.

John Laverock Maclaren served his apprenticeship with Frederick Leyland and Co. Ltd, his first ship being the *Mercian* in 1916. Passing for 2nd Mate in 1920 and for Master in 1926, Captain Maclaren served with the Atlantic Transport Line and Red Star Line before joining Manchester Liners in 1938 as 3rd Officer of the *Manchester Producer*; he was appointed relief Master of the *Manchester Regiment* in 1948.

Captain Maclaren was appointed permanent Master in 1951 and subsequently commanded many of the company's ships. His command, the *Manchester Faith*, was in 1959 the first British ship to transit the St. Lawrence Seaway.

Captain Maclaren's record with the Meteorological Office dates back to 1938 when serving in the *Manchester Producer*, and in 17 years of observing he has sent in 40 logbooks, 10 of which have been classed 'Excellent'.

We wish him health and happiness in his retirement.

J. R. R.

OBITUARY.—We regret to record the death of SKIPPER A. E. HALL, outside manager of St. Andrews Steam Fishing Company.

Albert Ernest Hall was born in Hull in 1910 and was the son of a well-known trawler skipper. He started his career with the Kingston Steam Trawling Company and held a Skipper's Ticket for 33 years. He joined St. Andrews Steam Fishing Company in 1940.

During the early part of World War II he was based at Fleetwood, where he skippered several Polish Trawlers which Boston Deep Sea Fisheries were managing for the Polish Government.

Returning to Hull his first command for the St. Andrews Steam Fishing Company was the trawler *Saragon*. Later he skippered various new ships including the *Prince Charles*, *Princess Elizabeth*, and *St. Chad*. For the last two years he was outside manager for his company. After taking up his shore appointment he still put in an occasional fishing trip when required. His last command was the *William Wilberforce*.

Skipper Hall commenced taking observations for the Meteorological Office in 1957, and in 1960 he received an award for his excellent work. As outside manager he maintained his interest in the Voluntary Meteorological Observations carried out by his company's trawlers, and encouraged his Skippers in this work.

We offer our sympathy to his widow, his two sons, and his two daughters.

E. R. P.

Notices to Mariners

PORT METEOROLOGICAL OFFICES - MONTREAL AND SAINT JOHN, N.B.

The Port Meteorological Officer in Montreal is Mr. F. K. Upton whose address is P.O. Box 1705, Place d'Armes, Montreal, P.Q. and telephone number 849-7184.

The Port Meteorological Office in Montreal is closed during January, February and March. During this period Mr. Upton is located at Room 221, Customs Building, 189 Prince William Street, Saint John, N.B., with telephone number Oxford 3-3500.

BBC FORECASTS FOR SHIPPING

Since Saturday, 6th March 1965, the BBC have been broadcasting a weather forecast for coastwise shipping on the London, Midland, West, Welsh and North Home Services at Close Down (approx 2345). A similar forecast for Northern Ireland waters is broadcast at the same time from Belfast and the forecast for Scottish waters is broadcast on weekdays at approx 1108.

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Selected Publications of the Meteorological Office

A Course in Elementary Meteorology. Met.O.707, 1962. *17s. 6d. (18s. 4d.)*

Cloud Types for Observers. Met.O.716, 1962. *8s. 0d. (8s. 7d.)*

Handbook of Weather Messages, Codes and Specifications. Met.O.510.

Part I Transmission schedules and station index numbers (3rd Edition 1960). *8s. 0d. (8s. 7d.)*

Part II Codes and Specifications (4th Edition 1963). *10s. 0d. (10s. 8d.)*

Part III Coding, Decoding and Plotting (4th Edition 1963). *12s. 6d. (13s. 2d.)*

Marine Observer's Handbook. Met.O.522 (8th Edition 1963). *21s. 0d. (22s. 4d.)*

Meteorological Glossary. Met.O.729, 1963. *32s. 6d. (33s. 10d.).*

Observer's Handbook. Met.O.554 (2nd Edition 1956; reprinted 1962). *21s. 0d. (22s. 4d.)*

Pictorial Guide for the Maintenance of Meteorological Instruments. Met.O.725, 1963. *10s. 0d. (10s. 7d.)*

Some Typical Weather Maps. Met.O.632, 1957 (reprinted 1961). *2s. 0d. (2s. 3d.)*

Weather Map. An Introduction to weather forecasting. Met.O.595 (4th Edition 1956; reprinted 1963). *12s. 6d. (13s. 5d.)*

Prices in brackets to include postage

The above publications may be purchased over the counter or by post from the Government Bookshops at the addresses given on the 'Contents' page or through any bookseller

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