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# The Marine Observer

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# THE MARINE OBSERVER

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COVER PHOTOGRAPH: Post-sunset illumination at Puerto Natales, Chile, taken on 2 December 1985 by Hans K. Wagner, passenger on m.v. *Evangelistas*.

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LONDON: HMSO



## Editorial

Meteorology in general and weather forecasting in particular are heavily dependent upon international collaboration. So organisations such as the Met. Office have a long history of working closely with their counterparts in other countries — mainly under the auspices of the World Meteorological Organisation. Such collaboration is very evident in observing — we all use common observing techniques and, of course, arrange for observations to be made at standard times each day. Common codes have been devised and agreed for the transmission of observations and the circuits which carry them are international.

Meteorological organisations also make bi- and multi-lateral arrangements to provide and maintain observing systems. Perhaps the North Atlantic Ocean Station Agreement was the most complex of such arrangements. It required a few countries to carry out observing functions from ocean weather ships under contract from a consortium made up of many more countries. The charge levied to pay for this was based on an amalgam of a contracting party's Gross National Product and its distance from the centre of gravity of the network, but the arrangement worked very well for a number of years. It has been superseded by bi-lateral arrangements — again of a rather novel kind in the case of Ocean Weather Ship *Cumulus* — bought from the Dutch by the United Kingdom for £1, on the condition that she is operated on the North Atlantic and sold back to the Dutch for a similar sum. I am proud of being involved with that deal, made with the help of Captain Mackie, our Marine Superintendent, in a bar in Geneva — as I recall!

Of course, there is a good deal of international liaison and collaboration involved in supporting ships of the Voluntary Observing Fleets. In principle, and in practice in many cases around the world, Port Met. Officers are there to assist any and all vessels participating in the VOF programme of WMO.

European countries collaborate in the funding of meteorological satellites and have formed an organisation known as EUMETSAT for this purpose. Currently EUMETSAT provides a geo-stationary satellite, located therefore on the Equator and at 0° longitude to give coverage over Europe, Africa and the Eastern Atlantic. The United States is having great difficulty at present in maintaining its Geostationary Environmental Satellite (GOES) programme, nominally of two satellites; one located at 75° W, the other at 135° W. As a result, the Europeans have agreed to move one of their 'spare' satellites to 50° W until October this year. The Americans fear that their single remaining GOES is close to the end of its life, and know that it cannot be replaced for at least two years. Therefore there is a contingency plan to move a European satellite even further west, perhaps to 100° W. The Americans are bearing the additional cost of the arrangement, but this provides yet another example of effective international collaboration.

A consortium of European countries also funds the European Centre for Medium Range Forecasts (ECMWF), based near Reading in the U.K., which as its name suggests carries out research and provides operational services to its Members in the form of Medium Range (3–10 day) forecasts.

There is thriving collaboration in the research field too. The Co-operation in Science and Technology (COST) programme was one of the better initiatives on the European Commission in 1970 and has led to the establishment of the

ECMWF. Research into fixed and drifting buoy technology, co-ordinated under a COST programme, has culminated in operational networks and campaigns in the North Atlantic and Baltic. Similar research into radar networking has resulted in a pan-European network of weather radars, soon expected to become operational. COST programmes have also co-ordinated research into remote sensing through the use of HF and VHF radars, and research into methods of forecasting road weather conditions. A new venture, to carry out research into climate and its prediction is being canvassed at present, and it seems likely that a network of centres, including those at Bracknell, Toulouse in France and Hamburg in Germany, will be set up for this purpose during 1992.

There has been some co-ordination of services provided, particularly to the marine community under the aegis of the International Convention for the Safety of Life at Sea (SOLAS) and also to civil aviation under the terms of the International Civil Aviation Organisation (ICAO) Convention, first formulated in Montreal in 1944. Meteorological services for national defence are co-ordinated, amongst the NATO countries at least, although it is perhaps not surprising that most countries continue to seek a high degree of self reliance here.

There have been few attempts by National Meteorological Services to collaborate on the provision of commercial services, unsecured by statute or intergovernmental agreement. As a result, there is a large amount of duplication in such services and, with some notable exceptions, rather low investment in their provision. As a result, it seems likely that the economies of European countries have failed to benefit from the application of meteorological information, to the extent to which the science now permits. Very often it is the failure to deliver such information in a manner which is timely and persuasive, rather than the accuracy of the underpinning forecasts which has prevented most effective use.

Happily, under the stimulus of funding pressures and the political initiative to open up the European market, National Meteorological Services are now working hard to expand their co-operation into the field of commercial services. The U.K. is taking a strong lead so, before the end of the year, there is every expectation that Met. Office Ship Routeing Services will be being marketed and distributed by all the Met. Services within Europe. Perhaps agricultural services developed in France will be being sold and delivered by the Met. Office to farmers in East Anglia.

In any event, the rich heritage of international collaboration in meteorology is about to be expanded. We will report progress as the year unfolds.

Dr Peter Ryder  
Director of Operations

# Annual Report of the Observations (Marine) Branch for 1991

## 1. Voluntary Observing Fleet (VOF)

At the end of 1991 the following were members of the United Kingdom VOF:

- (a) 453 Selected Ships equipped with complete sets of equipment and stationery loaned for carrying out voluntary observation of the weather conditions at sea at specified hours.
- (b) 2 Supplementary Ships, provided with a reduced complement for carrying out limited observing.
- (c) 42 'Marid' vessels which supply unique sea temperature and current weather information, mainly on coastal and near-continental voyages, of importance in the forecasting of fog and giving forewarning of the possibility of sea-ice formation.
- (d) 2 automatic light vessels and 1 light tower, the *Royal Sovereign* off the East Sussex coast.
- (e) 1 Auxiliary Ship, mainly on voyages to areas where weather data are in short supply, and which is therefore supplied with special forms by Port Met. Officers with which to make reports from these sparse areas.
- (f) 36 Oil Rigs and Platforms which report in the same format as Selected Ships, their operation being guided by the Offshore Advisers at Aberdeen and Bracknell.

The equipment supplied to ships consists of Precision Aneroid Barometer, barograph, air and sea thermometers, screens, sea temperature bucket and logs and code books. Distant reading thermometers are fitted on some ships.

Amongst the new recruits of interest during the year is British Antarctic Survey's R.R.S. *James Clark Ross*, outfitted with specialised oceanographic and meteorological equipment suited to her Antarctic operations. British Telecom (Marine)'s two new cable ships, *Discovery* and *Sovereign*, also became Selected Ships. *CMB Tabora* became the sixth Belgian ship to join the United Kingdom VOF, pending the resumption of operations in her own country. As part of the desire of the Director of Wallem Ship Management (Hong Kong), to have all his ships involved, m.v. *Loyalty* was recruited by our obliging colleague in Rotterdam. After being out of sight in Australia for some time, we were pleased to renew contact with square-rigger *Eye of the Wind* in the run-up to her homeward voyage in company with her partner *Søren Larsen* round the Horn, preparatory to taking part in the 500th anniversary celebrations of Christopher Columbus' voyage to the New World. *Eye of the Wind* will be making oceanographical observations in addition to the normal observing.

As well as gaining much in knowledge and interest from the U.K. VOF logs in the form of phenomena sighting records, we are fortunate to receive similar extracts from our counterparts in Australia, New Zealand and Hong Kong via their respective marine observation branches, with whom we regularly correspond.

A new phase of installing suitable vessels with Meteorological Observing System for Ships (MOSS) equipment is planned to reach a total of 54 ships in years to come. This equipment enables ships to format their coded weather messages on a screen for automatic transmission, enhancing the early arrival of their data at the forecasters' bench for maximum usefulness.

One U.K. ship, *OOCL Challenge*, is still operating within the Automated Shipboard Aerological Programme (ASAP) on the North Atlantic, Met. Office staff having been replaced by contract employees from J. Marr and Son of Hull early in the year. The Met. Office still superintends and stores the operation. Arrangements were made with British Antarctic Survey for their R.R.S. *Bransfield* to have ASAP equipment installed on her arrival at Halley Base in the Antarctic in the New Year. Cost of this installation will be borne by the Met. Office.

Copies of the World Met. Organization (WMO) questionnaire on Marine Meteorological Services were distributed to all ships visited by Port Met. Officers, with a request to return them as soon as possible after the end of November, when they would all be forwarded to the Hellenic National Met. Services for analysis. The aim of the questionnaire is to improve marine meteorological services to the mariner.

In December the deployment of fixed meteorological data buoy *ODAS 24* marked the culmination of more than ten years development work to design a buoy system capable of surviving in the hostile seas of the North Atlantic. This buoy, deployed by a joint Met. Office and Naval Support team at the southernmost position of the five-station network in position 49°N 12°W, measures wind speed and direction, air and sea temperature, relative humidity, pressure and sea state. The data are transmitted every three hours to the forecast centre via geostationary satellite. The average mooring depth of the buoys is about 2,000 metres and the northernmost buoy in the network is in latitude 61.5°N, midway between Iceland and the Western Isles of Scotland. In case of mooring failure a satellite navigation system monitors position and all critical buoy systems are also duplicated. Various comparison readings were made with *ODAS* buoys by the Senior Met. Officer on Ocean Weather Ship *Cumulus* whilst she was on passage near to the buoys. Drifting buoys also continue to play a part in ocean weather monitoring in the North Atlantic.

## **2. Ocean Weather Ship Programme**

OWS *Cumulus* maintained her programme of five-weekly deployments in the region of former Ocean Station 'Lima' in position 57°N 20°W in the North Atlantic, returning to her Greenock base for one to two days for replenishment and crew change each voyage. The only break in this pattern was for dry docking at Milford Haven in the summer. On passage to and from station, towing of the Continuous Plankton Recorder (CPR) continued as before. The CPR project, to regularly collect and monitor plankton captured by volunteer ships over the North Atlantic and North Sea, has been established for sixty years, and up to April 1991 was financed by the Ministry of Agriculture, Fisheries and Food in a contract with the Natural Environment Research Council. Since that date, the project has taken on a more International flavour and, in the interest of long-term monitoring and health of the oceans, is now financed by a group comprising several interested countries.

From 2–5 October *Cumulus* assisted Clyde MRCC (the Coastguard station at Greenock) in their search for 16 missing crewmen from FV *Frank C* which sank 35 n.mile northeast of Rockall, by relaying additional observations.

From 15 October the Ocean Weather Ship participated in the trials of the Enhanced Group Call SafetyNET broadcasts of Maritime Safety Information in Navarea I, monitoring the broadcasts in the lead-up to commencement of the Global Maritime Distress and Safety System (GMDSS) operations on 1

February this year. Satellite communication was established using INMARSAT Standard-C equipment, via the Coast Earth Station at Blåvand in Denmark, pending Goonhilly's entry into operation with Standard-C, due in early 1992.

Offers of organized instruction programmes resulted in tentative enquiries for training at sea in marine meteorology and oceanography aboard *Cumulus* being received from the meteorological departments of Colombia, Costa Rica, Ecuador, Ethiopia, Tanzania and Zaire. They were each referred via OWS managers J. Marr & Son of Hull, to apply through the World Meteorological Organization for short-term fellowship support grants. Attempts were made through Marr's associate managing this scheme, Oceanscan Master Services, to bring all the applicants together on one voyage for the same course. Twenty berths are available on *Cumulus* for this training, on the basis of one five-week tour of duty at station Lima for a fee of about £600 per head.

### **3. Marine Products Group**

There was an increase of business for the Ship Routeing Service, METROUTE, although there was also some reduction of work for a time, caused by the effects of the Gulf conflict and changes to the United States tanker regulations. However, as result of hostilities in the Persian Gulf, forecasts of wind direction were provided as necessary to help monitor the movements of the large oil slick remaining off Kuwait.

Among notable contracts was the renewal of work for Shell International for all their chartered ships, a new agreement with a British-based company to provide weather routeing for their fleet of bulk carriers and continued routeing of Cunard's *Queen Elizabeth 2* on her scheduled North Atlantic crossings. *QE2* was also supplied with forecasts during her winter world cruise to augment weather information, particularly where local forecasting was considered inadequate.

Increased marketing activity, as well as the publication of a new METROUTE brochure, introduced other new clients to the service, including greater interest from European companies: the Marine Superintendent also obtained major new business from a Swiss company during one of his regular visits to World Met. Organization headquarters in Geneva.

Following the appearance of an article in the journal *Yachting World*, there has been increased interest in routeing of yachts on sea passages.

The METROUTE team of five Master Mariners with command experience also provided advice on weather and tidal conditions for the towage of the Honourable Company of Master Mariners' Headquarters Ship *Wellington*, from her mooring on Victoria Embankment, London, to drydock on the River Medway and return in the autumn.

Special contracts included the routeing of a Ro-Ro ferry from Europe to Vancouver to safeguard bow and stern door integrity; valuable forecasts were provided for a lengthy salvage operation in the Mediterranean and for ocean cable-laying ships in the Atlantic and Pacific. Complementary advice was also supplied for the maiden North Atlantic crossing in August of John Walker's prototype Wingsail craft *Blue Nova*, and during the demonstration voyages around the U.S. coasts.

The Tropical Storm advisory service expanded with additional clients and a wider sphere of interest expressed. In June major changes were made to the Met. Office new CRAY YMP8 super computer, which consists of eight processors and 64 million words of main memory, giving improved products for METROUTE use.



The Sea Ice bench received an increased number of enquiries for ice data, including considerable interest in the giant iceberg (approx. 40 n.mile × 45 n.mile) in the South Atlantic which separated from its usual track circuiting Antarctica and headed towards Southern Ocean shipping routes. It is now possible for the Sea Ice bench to receive by telex, facsimile or computer modem, ice condition messages and maps from the Canadian Atmospheric Environment Service terminal at Ottawa, by AES's new dial-in facility. Ice information was routinely received from various other organized bodies for the North Atlantic, Baffin Bay, Baltic Sea and White Sea.

METROUTE continues to offer voyage analysis work to clients' requirements on a single or group basis, and in common with the majority of their work, this is achieved with the help of computer programming.

The Marine Advisory Service continued to receive a large number of enquiries from marine surveyors, underwriters, loss adjusters and solicitors. The requirements were mainly in connection with litigation concerning loss or damage to ships or cargo as a result of weather conditions.

#### **4. Services to Shipping**

There was a general increase of interest from the public in shipping forecast areas and their titles following various articles on Met. Office marine services which appeared in national newspapers such as the *Independent* and *The Times Supplement*, *Which?* magazine, and the *Northern Echo*. Improved presentation of national weather forecasts resulted from the establishment of the BBC Weather Centre in August. In June, inshore forecast station reports from Blackpool were transferred to Crosby, near Liverpool. Preparations were made for the introduction of the new Global Maritime Distress and Safety System. The Chairman of the International NAVTEX Panel, based at the Hydrographic Office, liaised with various countries, including Iran and Malta, on the establishment of NAVTEX services generally

#### **5. Port Meteorological Officers' Conference**

The Marine Superintendent invited Port Met. Officers from several other countries to join with their seven U.K. counterparts to the biennial gathering at Bracknell HQ in September. Representatives from Brussels, Fremantle (representing all Australia), Hamburg, Le Havre, and Rotterdam were present but unfortunately the United States Marine Observation Program Leader could not attend due to pressure of other business. It was hoped to be able to return his hospitality extended to the Marine Superintendent when he attended the equivalent U.S. gathering in the previous year.

The U.K. conference was attended by all Marine Division staff with an overview by the Met. Office Divisional Director (Observations). Short presentations were given by all Port Met. Officers present, including those from overseas, giving a useful pen-picture of their individual operations. Other agenda items discussed included monitoring, quality and remedial action for improvement of Voluntary Observing Ship reports and a summary of the results of the VSOP-NA project. The Marine Superintendent gave a clear review of the coming GMDSS effects and responsibilities, augmented by a report from the Australian member on pre-GMDSS experience in his country.

There was a useful review of WMO policy and future plans, also communications aspects. Equipment and publications aspects were also on the agenda.



*Crown Copyright*

Port Met. Officers' Conference, Bracknell, September 1991. Front row, left to right: Captain A. Pickles, Fremantle; Captain E. O'Sullivan, Hull; Captain C. Downes, Grays; Captain G. Mackie, Marine Superintendent; Captain R. Cameron, Deputy Marine Superintendent; Captain A. Britain, Liverpool; Miss J. Mitchell, Publications, including The Marine Observer. Back row: Mr Y. Prigent, Le Havre; Captain D. McWhan, Southampton; Captain J. Houghton, Headquarters; Captain A. Ashton, Cardiff; Captain M. Coombs, Headquarters; Mr G. Allen, ASAP and Technical support; Dr E. De Dycker, Brussels; Captain S. Norwell, Greenock; Captain D. Rutherford, Middlesbrough; Mr J. Ghüne, Hamburg; Mr P. Schnitker, Rotterdam.

Ship visits and liaison on supplementary issues were discussed by Port Met. Officers, and there was a full presentation by the ship routing and sea ice team, to bring to a close a conference which covered all the vital aspects leading to Port Met. Officers' understanding of the needs and assistance required globally to help volunteer observers carry on their vital co-operation.

## **6. International activities**

The Marine Superintendent, who is also the Branch Director of the Observations (Marine) Branch of the Met. Office, had a full year as far as external affairs were concerned. In January he took part in the Japan Met. Agency's International Conference on Improvement of Met. Information Services for Mariners in Tokyo, where he presented three papers, with the accent on GMDSS preparations applicable to Japan and neighbouring countries. (See photograph on page 58.)

The following month he was at WMO headquarters in Geneva to chair his Sub Group on Observations and Telecommunications, part of the Commission for Marine Meteorology's Working Group on Basic Marine Meteorological Services. In March, Captain Mackie represented the Met. Office at the important joint conference of the WMO and International Oceanographic Commission (IOC) held in Geneva to decide on the future course of the Integrated Global Ocean Services System (IGOSS). Following evaluation of present and future trends in the ability of scientists to describe and predict ocean processes, the Assembly agreed to set up a global ocean observing system to supply enough data to support the evaluation of climate changes. There was a follow-up to this meeting in November when the IOC/WMO committee for IGOSS met again to review progress.

In Geneva in July and August, WMO's World Weather Watch (WWW) Co-ordinating Group on the Composite Observing System for the North Atlantic (COSNA) was attended by the Marine Superintendent in his capacity as consultant to the Ocean Affairs Division of WWW on GMDSS planning and ship routing prospects.

Maritime Safety Committees and Radio Communication Sub-committees at IMO were attended; inspections of OWS *Cumulus* at home port of Greenock and annual drydocking at Milford Haven were also undertaken.

Overseas visitors to the Observations (Marine) Branch during the year included a member of the Mauritius Met. Service who was interested in marine climatology in particular, a delegation from the Chinese State Meteorological Administration, during a general tour of the whole Office, and the Director of the Department of Marine Meteorology, State of Israel.

## **7. General**

Four inscribed barographs were again presented to four shipmasters at Bracknell for their worthy long-term efforts in the field of marine observing. A total of 320 book awards were presented to Masters, Deck Officers and Radio Officers as Excellent Awards for individual merit in maintaining observing records on ships of the U.K. VOF. Besides the *Concise English Dictionary* and *Collins Atlas of the World*, the special book chosen for awards was *Whales, Dolphins and Porpoises*, compiled by Sir Richard Harrison and Dr M.M. Bryden.

One of many projects undertaken by the Marine Superintendent involves co-operation with INMARSAT and British Telecom International on the



*Photo courtesy of JMA*

Representatives at the Japanese Meteorological Agency's International Conference, January 1991 (see page 57). Front row, left to right: Mr Fernando Guzman, WMO; Mr Michael Moore, Australia; Mr Dennis Sigris, U.S.A.; Dr Ryoza Tatehira, Director-General, JMA; Captain Gordon Mackie, U.K.; Mr Fang Weimo, Chinese State Met. Administration; Mr Pierre Lemée, France; Mr C.Y. Lam, Hong Kong. Back row: Directors and staff members of JMA's Marine, Forecast and Administration Departments.

creation of a time- and cost-saving format for a shortened observational data report for transmission by Standard-C satellite radio equipment.

Papers were presented by three members of staff at a November afternoon meeting on the subject of marine and aviation meteorology, hosted jointly by the Royal Institute of Navigation, The Honourable Company of Master Mariners and the Nautical Institute, London Branch, and held in the Library of Trinity House, London.

Towards the end of the year, the Marine Branch received copies of the second edition of the *WMO Handbook on Marine Meteorological Services*, serial No. WMO/TD-No. 348. This publication is intended primarily for existing or potential users of the services described, and is a condensation of the detailed information to be found in WMO Publication No. 9, Volume D — *Information for shipping*, which is not always readily accessible to users of marine services.

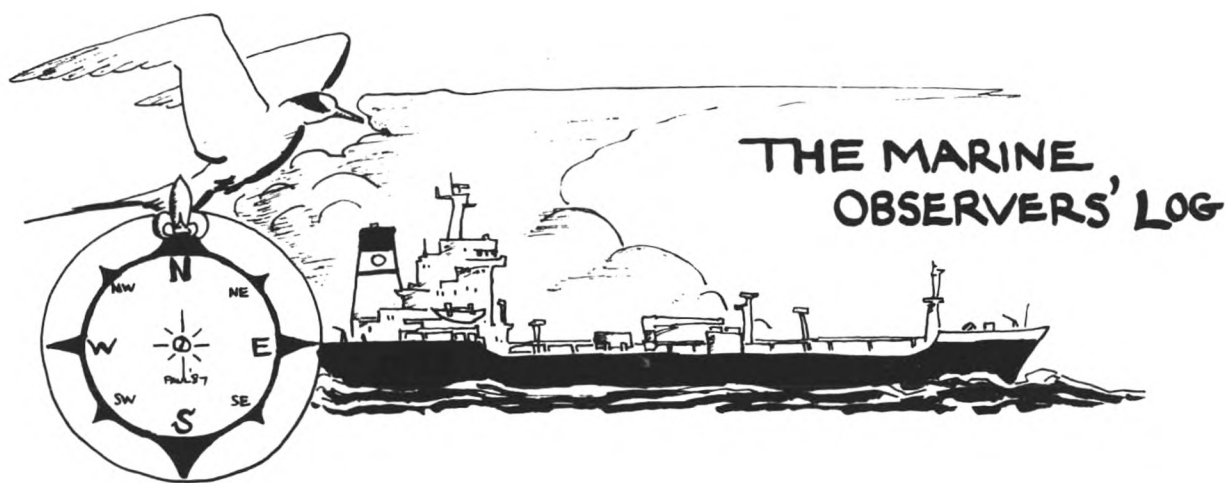
The handbook has been prepared to provide prospective clients for specialized marine services with information on the availability of such services throughout the world. These services include marine bulletin areas, times of issue and validity; services for ship routing, offshore oil and gas operations, marine pollution incidents, yacht races and deep sea fishing; and special forecasts for particular types of small craft, taking into account their sensitivity to wind, waves and visibility. The handbook is issued in loose-leaf form for ease of adding supplements at a later date, and copies can be obtained, free of charge, from Port Met. Officers or direct from The Secretary-General, WMO, P.O. Box No. 2300, CH-1211 Geneva 2, Switzerland. WMO request that corporate requirements are ordered in bulk, rather than on a ship by ship basis, to help conserve their resources.

At the end of November the Marine Branch main office was relocated in refurbished quarters on the first floor of a comparatively new building at a small business site called the Sterling Centre, not far from the previous offices. The new address is: Meteorological Office, Met O (OM), Scott Building, Eastern Road, Bracknell, Berks RG12 2PW. Direct telephone lines remain unchanged, but the new facsimile number is (0344) 855921.

The naming of the building, which also contains the Met. Office Archive on the ground floor, follows in the tradition of naming our buildings after former Met. Office scientists. Robert Henry Scott was a Director of the Office from 1867 to 1900, being only the second head after Rear-Admiral FitzRoy. In 1877 he became known as the Secretary of the Meteorological Council and from 1874 to 1900 he was additionally appointed Secretary of the International Meteorological Committee.

It was Robert Scott who set up a formal system of recording and publishing records from Kew Observatory. He introduced the policy of keeping met. records for posterity, and Sir John Houghton thought it appropriate that the new home for Archives and Marine Branch should be named the Scott Building.





## 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.

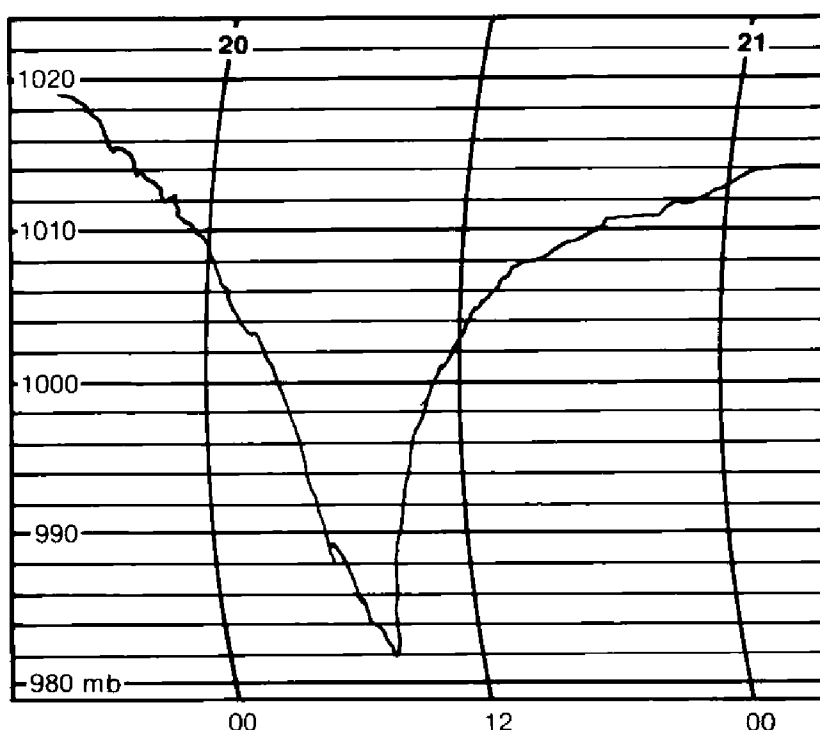
### CYCLONE 'FIFI'

#### Indian Ocean

m.v. *Resolution Bay*. Captain D.P. Worsnop. Lyttleton to Fremantle. Observers: the Master and ship's company.

21 April 1991. Whilst the vessel was slow steaming for a timed arrival at Rottneest Island Pilot Station and when rounding the coast of south-western Australia, she experienced the tail-end of cyclone Fifi. The following observations were made during the period and the barograph trace shows the associated pressure changes.

Time (UTC)	Wind Dir'n Force	Temperature (°C)		Pressure (mb)	Remarks
		Air	Wet		
0200	E×N 6	—	—	1004.9	Moderate following sea.
0400	E×N 7	22.6	18.4	999.5	Moderate following sea; cloudy with showers.
0500	NE×N 10	25.8	19.5	994.8	Very rough sea. Visibility reduced by spray.
0543	—	—	—	—	Alter course to 270° to ease motion. Revs increased.
0600	NNE 10	22.6	20.1	990.9	
0700	N×E 10/11	21.2	19.6	987.4	
0724	—	—	—	—	Alter course to 250°.
0800	N×W 9/10	20.5	19.1	983.4	Alter course to 270°.
0810	—	—	—	—	Wind backs to W'ly as eye of cyclone passes to port.
0816	—	—	—	—	Alter course to 020°; resume passage.
0900	W×N 9/10	—	—	993.6	
1000	W×N 8/9	19.1	17.6	999.2	



The pressure continued to rise while the wind slowly abated and at 1200 the wind was W×N'y, force 6-7 and the sea was rough with a heavy, confused swell. The sky remained overcast, but conditions were generally clear.

Position of ship at 0200 UTC: 34° 49'S, 115° 35'E.

## CURRENTS

### North Pacific Ocean

m.v. *Pacific Swan*. Captain J.M. Miller. Onogawa to Balboa. Observers: the Master and Mr W.R. Durrans, 3rd Officer.

25 June 1991. Having been diverted to the south by Metroute to pass well clear of hurricane 'Delores', the vessel finally resumed a rhumbline course of 108°, from position 15° 24'N, 109° 18'W to 08° 30'N, 88° 00'W. During this leg of the voyage it was expected that the vessel would be slowed down by the normally west-north-westerly setting North Equatorial Current. However, the opposite effect was encountered and observations taken showed the current to be setting between east and south-east. Taking account of every error in the ship's log speed, the ground speed was easily increased by at least 1-1.5 knots during this period.

The sea temperature was observed to rise, gradually at first, from 26.9 °C shortly after the vessel altered course, to 27.6° twenty-four hours later; it then jumped to 29.8° within the space of six hours where it remained for the next twelve hours. By 27 June the current was beginning to veer round to the south and then to the west where it retained its normal flow and direction, the sea temperature remaining fairly constant at this time.

Position of ship: 19° 54'N, 110° 18'W.

## CETACEA

### Indian Ocean

m.v. *Oriental Bay*. Captain L.E. Howell. Singapore to Suez. Observers: the Master, Mr D. Bailey, Chief Officer, Mr N. Barrington, 3rd Officer.

26 May 1991. In the space of half an hour the vessel passed about fifteen Sperm whales, their distinctive off-centre blow being clearly evident. All were lying quietly on the surface and they were mainly in pairs.

One individual which passed very close beneath the bridge wing was surrounded by a large, dark-brown, rust-coloured stain, perhaps blood as the whale made little effort to sound. Later during the forenoon watch a further twenty or so whales were observed, all seemingly lying quietly as before.

Generally, whales are seen at this time of year near Dondra Head and off Cape Guardafui. The large number observed on this occasion may simply have been due to the remarkably calm weather being experienced.

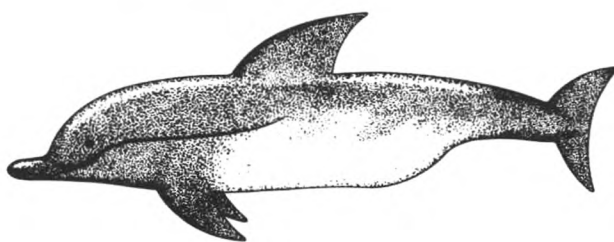
Position of ship: 12° 20'N, 47° 10'E.

### Arabian Sea

s.s. *ACT 1*. Captain J. Rowe. Fremantle to Jeddah. Observers: the Master and ship's company.

26 June 1991. At 0630 UTC a school of approximately 40 dolphins was sighted 2 points on the port bow. It remained on a reciprocal course to the vessel, passing down the port side at a distance of about 1 n.mile and, when 2 n.mile astern, the school altered course to 180°. The dolphins were leaping and spinning when passing the vessel, but none paid any attention to it or tried to ride the bow wave.

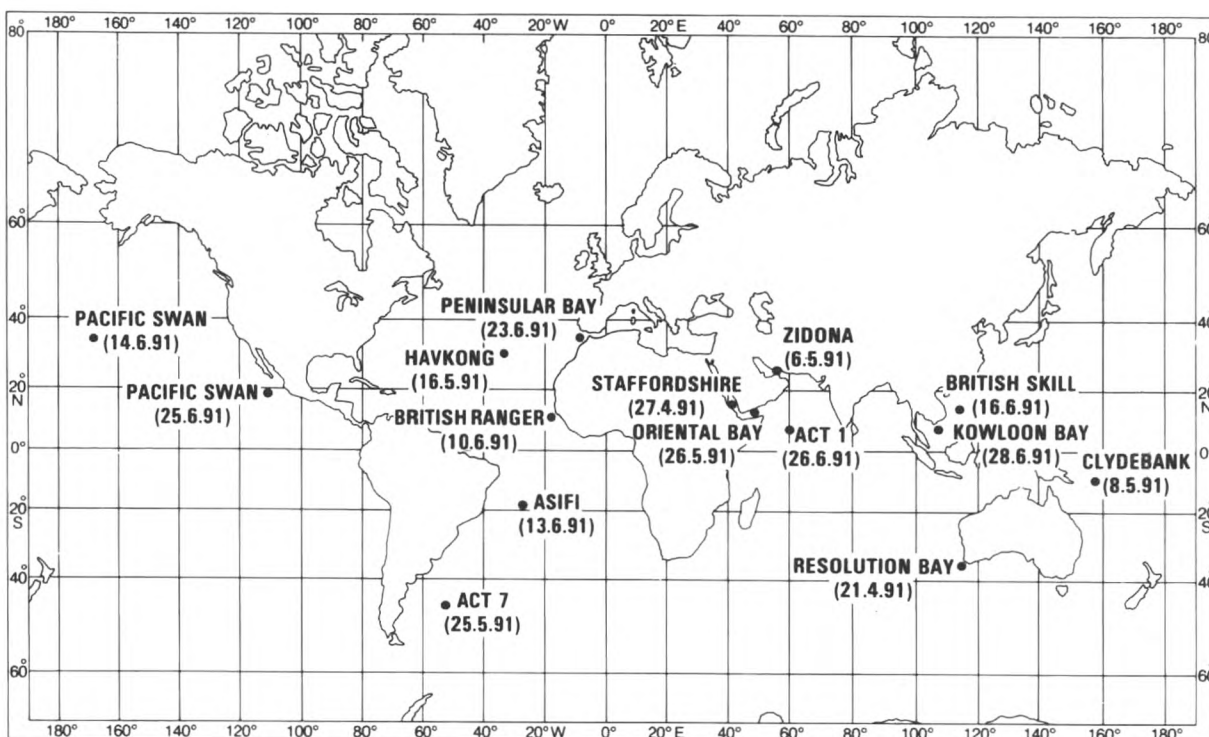
All the dolphins were approximately the same size, being 1.8–2.4 m long and there did not appear to be any juveniles. As shown in the sketch, the dolphins had



dark-grey or black upper bodies whereas the undersides were cream in colour turning to a cream/beige 'flame' pattern higher on the sides. There was a high dorsal fin in the centre of the back and the body depth (exclusive of fin) was noted to be approximately one-quarter of the body length.

After consulting the *Field Guide of Whales and Dolphins* by Captain W.F.J. Märzer Bruyne, it was decided that the school could perhaps be identified as *Euphrosyne* dolphins.

Position of ship: 03° 50'N, 60° 11'E.



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

## BIRDS

### South Atlantic Ocean

m.v. *ACT 7*. Captain A.J. Cheshire. Dunedin to Lisbon. Observers: the Master, Mr A. Brown, Chief Officer and Mr R. Moore, 3rd Officer.

25 June 1991. On the commencement of the morning 8–12 watch, a medium-sized bird, like a pigeon or dove in appearance, was seen to alight on a container on the forward deck. It proceeded to peck at the small accumulation of snow to obtain fresh drinking water. After having its fill, the bird took to the air and flew around the ship for approximately half an hour before disappearing.

Identification proved difficult. At first, it was thought that the bird may have been a variety of Snow Petrel, but further investigation ruled this out. The bird was of medium size with white plumage overall while the beak had a distinctive yellow streak to it; some webbing was noted between the toes. After consulting various bird books on board, identification of the mysterious visitor was made as a Yellow-billed Sheathbill. According to *A Field Guide to the Seabirds of Britain and the World*, by Tuck and Heinzel, this bird is confined to the Falkland Islands and the Antarctic Peninsula.

It was thought that the bird may have been blown out to sea with the strong and persistent S'yly winds of the time. Other birds around the vessel at the time were three Pintado Petrels, two Wandering Albatrosses and one Royal Albatross.

Weather conditions were: air temperature 13.0 °C, wet bulb 10.4°, pressure 999.6 mb, wind SW'yly, force 6.

Position of ship: 46° 00'S, 53° 00'W.

## Red Sea

m.v. *Staffordshire*. Captain R.A.F. Edwards. Aomori to Yanbu. Observers: the Master and Mr I.G. Macneil, 3rd Officer.

27 April 1991. At 0645 UTC the bird shown in the sketch was observed flying around the vessel for approximately an hour. It was about 20 cm in height with a wing-span of about 25 cm and was rather plump for its size.



The most noticeable feature about it was the sharp contrast of colours in the plumage. The bird had a long, slender bright-orange beak whereas the main area of the head, breast and, from what could be seen, under the wings, was a soft pigeon-grey colour while its eyes were like black beads surrounded by a tapering dark area. The underside of the bird was a rich, clayish-red colour which merged sharply into the deep sapphire blue of the tail feathers, and the wings were jet black with a white 'slash' about 5 cm long.

With reference to *A Field Guide to the Seabirds of Britain and the World* by Gerald Tuck and Herman Heinzel, no similar birds could be found, or any with such a majestic contrast of colours.

Position of ship: 14° 00'N, 42° 50'E.

## BIOLUMINESCENCE

### Straits of Hormuz

m.v. *Zidona*. Captain P. Bowden. Muscat to Ruwais. Observers: the Master, Mr I. Bacon, 3rd Officer and members of ship's company.

6 May 1991. During the night the vessel was transitting the Straits of Hormuz on a course of 257° at 14.5 knots, having spent approximately three months as a floating storage unit off Muscat. The following account describes what was seen.

At 1805 UTC a blue/white pattern of fast-moving light was seen around the ship. Initially, it was thought to be a reflection in the bridge windows of the Didimar lighthouse, but on going to the bridge wing, the observers saw an amazing display of flashing lights taking place over 80–90 per cent of the surface of the water. The whole ship was surrounded by a mass of blue and white light forming complex patterns that were visible in all directions as far as the eye could see. Looking almost like an 'electric mist', it moved with such speed and ease, as if it were alive.



At the peak of the activity, there appeared to be two central points of spiralling, each about 150 m off either side of the ship about midships. From these points there seemed to be emerging highly confusing patterns of spiralling spokes moving in an anticlockwise direction on the port side and clockwise on the starboard side of the ship. It was difficult to estimate accurately how many spokes were present in each circle, but it was thought that there were three or four at any one time, moving very fast and curving to produce what could only be described as a 'whirlpool' effect.

At the same time, there were pulsating rings expanding from the centres at intervals of about three-quarters of a second. They moved extremely fast, each circle taking about one second to reach a diameter of about 200 m before being lost in the mass of flashing blue and white lights. The thickness of each ring remained constant at about 2 m as the diameter of the circle increased; the formation was always a perfect circle.

About 300 m off the ship's side, large irregular shapes were observed. They were all about 3–4 m in diameter and changed both size and shape while flashing intensely. By 1817 the effect had completely stopped on the starboard side and only the pulsating rings were left on the port side and, with these, the intensity of the light reduced until 1822 when there was nothing more to observe.

No one who saw the phenomenon had ever seen anything like it before, including the Master, who had over 30 years experience at sea. During the display the wind was SW'ly, force 6 and visibility was about 8 n.mile; no adverse effects were noted on the radars (3-cm and 10-cm).

Position of ship: 26° 35'N, 56° 25'E.

## **ABNORMAL REFRACTION**

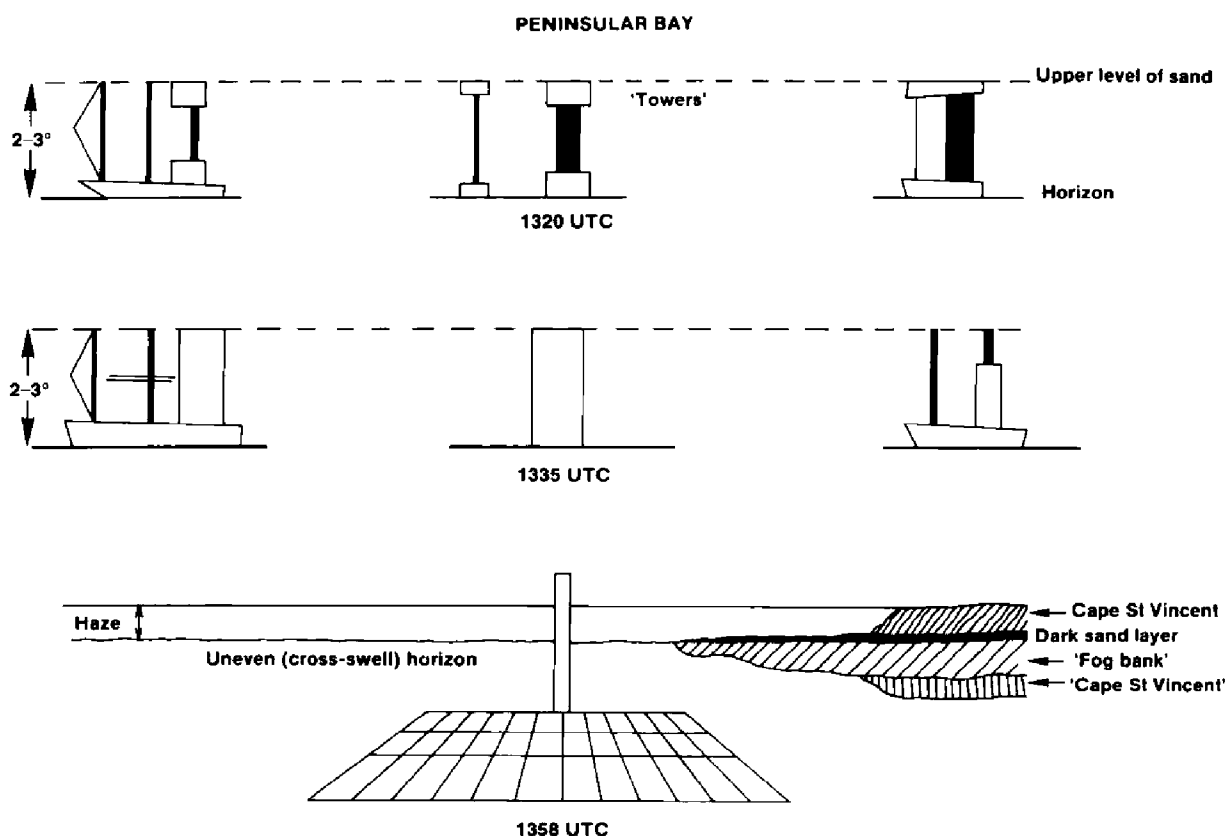
### **Eastern North Atlantic**

m.v. *Peninsular Bay*. Captain J.H. Hutson. Port Said to Southampton. Observers: Mr N.E. Gardiner, 2nd Officer, Mr W.H. Coventry, 2nd Radio Officer and Mr J. Hopley, SM1.

23 June 1991. At 1320 UTC when the vessel was approximately 20 n.mile south of Albufeira, what appeared to be two towers were seen on the port bow; the only targets on the radar on that bearing were 4.2 n.mile distant and no towers or beacons were expected. For the previous few hours a sand haze had been present with a layer of sand 2°–3° above the horizon and a temperature inversion noticed at this level. It was soon noted that 'the towers' reached to the top of the sand and were joined by the other two ships that were seen on radar. These ships were stretched and inverted, as shown in the first set of sketches. The towers were now thought to be a tug and tow.

By 1335 the 'tug and tow' had merged into one block; the left-hand ship was almost completely inverted on itself while the right-hand one was somewhat stretched vertically, as in the second sketch. All three targets were now at a distance of about 10 n.mile. As the vessel drew closer, the distortion diminished, finally dissipating at 7.5 n.mile. The tug and tow was revealed to be a cargo vessel, well down!

The Portuguese coast was present to the north for the duration, at a distance of about 20 n.mile and a 'sweaty foot' smell had been lingering throughout the observation. At 1355 Cape St Vincent could be seen at 26.5 n.mile with the first



smell having been replaced by a 'leathery' one. Cape St Vincent appeared to be above a 'fog-bank'; the horizon was irregular to port, giving the impression of a large cross-swell, while to starboard a 'fog-bank' was below the horizon.

At 1358 Cape St Vincent became duplicated, being inverted below itself, see third sketch. This image appeared 2°-3° below a murky, dark layer of 'sand' and lasted for about two minutes. By 1405 all was back to normal, the wind had increased to NW'ly, force 3 and the horizon once more was sharp and clearly defined.

Weather conditions were: air temperature 21.6 °C, wet bulb 17.3°, pressure 1022.0 mb, wind variable, force 1-2.

Position of ship: 36° 40'N, 08° 19'W.

*Note.* The smells experienced off the Algarve coasts generally emanate from the sardine canning factories established there. Close to, the experience has sometimes been described as 'the worst smell in the world'.

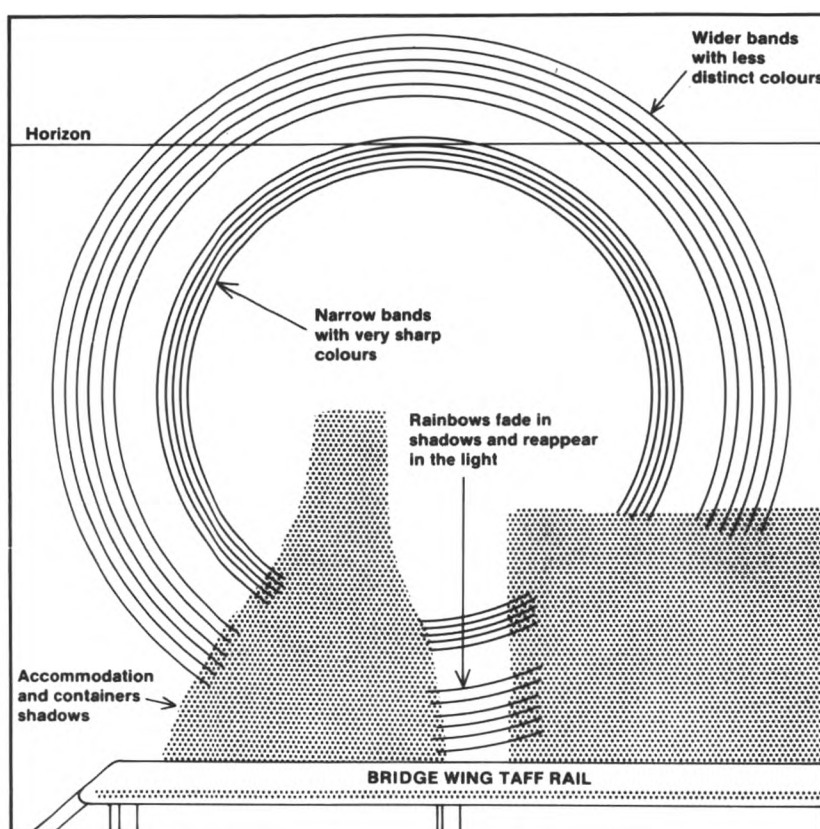
## RAINBOWS

### South Atlantic Ocean

m.v. *Asifi*. Captain J. Hallmark. Ascension Island to Falkland Islands.  
Observer: Mr M.R. Courtney, 2nd Officer.

13 June 1991. At 1730 UTC the rainbows shown in the sketch were seen, the sun being at an altitude of 24° at the time.

The vessel was on a course of 230° and had just skirted an isolated heavy shower of rain on the port side and there was slight precipitation at the vessel. Of the two bows, which were on a bearing of 310°, one was wider and less distinct. If it had been possible to view the rainbows from the side, they would have seemed to be angled away from the ship with their centres being about 50 m off.



The duration of the rainbows was about 25 minutes, and as their colours faded it was not possible to see all of them. When the inner bow finally faded it was coloured mainly purple and deep red.

Weather conditions were: air temperature 23.1 °C, wet bulb 21.2°, pressure 1018.0 mb, wind SE'ly, force 3.

## BLUE FLASH North Atlantic Ocean

m.v. *Havkong*. Captain A.D.G. Bell. Bethioua to Plaquemine. Observers: the Master, Mr C.M.J. Paxton, Chief Officer and Mr P. Howarth, Cadet.

16 May 1991. At 2210 UTC the Master, who was evidently the more experienced, observed the blue flash from his cabin at sunset. The cadet, who was being instructed in the taking of amplitude, had been advised by the Chief Officer to remain in the bridge wing and watch the sun go down because conditions were apparently good for the 'flash' phenomenon.

The cadet and Chief Officer did not actually recognise the phenomenon, never having seen one before, although the sun did appear to go down with a 'blip'. However, moments later the Master telephoned to say that it was probably one of the best he had ever seen!

The Chief Officer was somewhat peeved, as after 18 years at sea he had still not observed a blue flash (and recognised it as such) while the cadet was still wondering what it was all about.

It just goes to show that it helps if the observer knows what it is he's looking for!

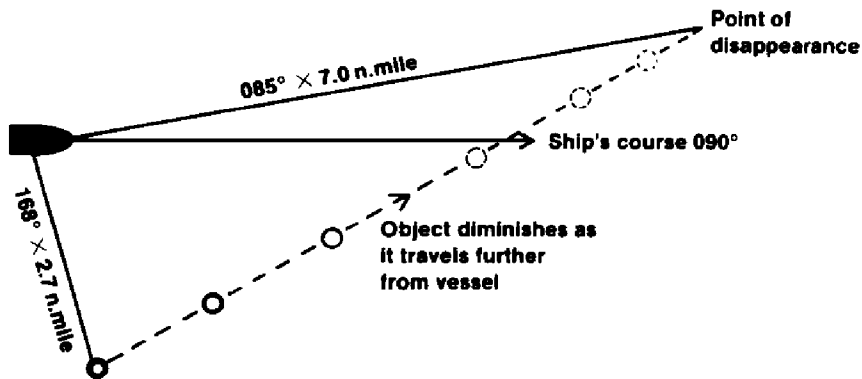
Position of ship: 31° 48'N, 34° 16'W.

## UNIDENTIFIED LIGHT

### North Pacific Ocean

m.v. *Pacific Swan*. Captain J.M. Miller. Onagawa to Balboa. Observers: Mr W.R. Durrans, 3rd Officer and Mr P.J. Butterworth, SI.

14 June 1991. At 1515 UTC the phenomenon shown in the sketch was observed. It was a large, circular orange light in the air, bearing  $158^\circ$  at a distance of around 2.5 n.mile from the vessel. As it appeared just above the lowest cloud, its height was estimated to be 2000 feet.



The object was travelling at a very rapid rate in an east-north-easterly direction and had disappeared into cloud bearing  $085^\circ$  and distance roughly 7 n.mile within 35 seconds. Its diameter was around twice that of Venus and it was equally as bright, only glowing bright orange instead of white. It was also observed that no trail was left by the object as it shot past.

Position of ship:  $34^\circ 18'N$ ,  $169^\circ 36'W$ .

*Note.* Mr H. Miles, Director of the Artificial Satellite Section of the British Astronomical Association comments:

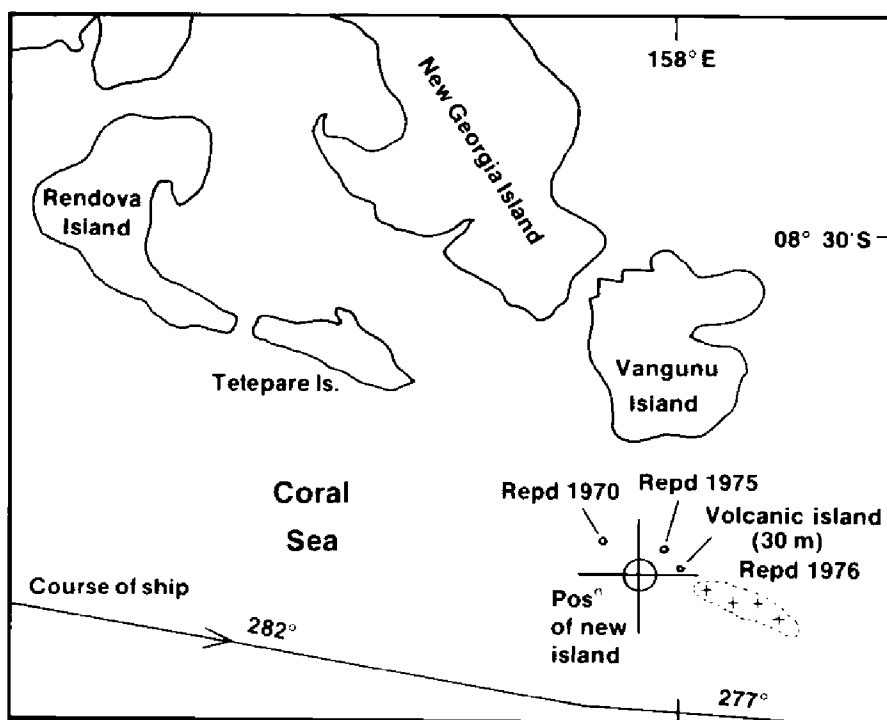
'This was without doubt the decay of a natural fragment of rock as it moved through the upper atmosphere. Because the object was very bright, this produced an optical illusion because the eye, when recording an object of unknown size, measures distance by noting the brightness. The brighter the light, the nearer it is. This produces the effect of thinking that the distances of bright objects are only just a few miles when in actual fact, the distance could be 100 miles or even more. A figure of about 80–100 miles is considered to be near the mark on this occasion.'

## VOLCANO

### Solomon Sea

m.v. *Clydebank*. Captain D.L. Jones. Honiara to Lae. Observers: the Master, Mr P.M. Frost, Chief Officer, Mr A.W. Robertson, 3rd Officer and ship's company.

8 May 1991. Between 1930 and 2200 UTC volumes of smoke were seen coming from a small island just off the New Georgia group. On closer inspection the smoke was being emitted from a small island whose existence was not recorded on the chart in use (BA 3995). The smoke was light-grey in colour and was coming from a dark cone the top of which was less than 30 m above sea level. Steam and smoke obscured the lower part of the island and also the sea surface in the area.



As there had been volcanic activity reported in this area on three previous occasions in the 1970s, it was thought that the event was the birth of a new island.  
Position of island: 08° 59.6'S, 157° 57.5'E.

### **VOLCANIC DUST**

#### **South China Sea**

m.v. *British Skill*. Captain P.F. Robinson. Kerteh to Ulsan. Observers: the Master, Mr L.N. Paul, 2nd Officer and ship's company.

16/17 June 1991. The visibility since leaving Kerteh had been good and the wind was SW'ly, force 2-3. At about 1200 UTC on the 16th the wind veered to W'ly and increased to force 6. At the same time, heavy rain began to fall and this continued until about 1900 when the wind backed to SW'ly, remaining at force 6. During the heavy rain and associated line squalls the wind speed was 35-40 knots in gusts and the visibility was reduced to 5 n.mile. At 1900 the visibility was approximately 8 n.mile.

Over the previous few days, radio reports had been heard of the eruption of Mount Pinatubo in the Philippines; at daybreak on the 17th the ship was found to be covered in a fine layer of pale-grey powder and it was assumed that this had come from the eruption and, due to the change in wind direction, was now being blown back towards the Philippines. The ship was on a course of 037° and was about 456 n.mile west-south-west of Mount Pinatubo.

At 0700 on the 17th the wind was SW'ly, force 6 and the sky had a heavy-looking appearance, as if a snow shower was imminent, and the visibility was 7 n.mile.

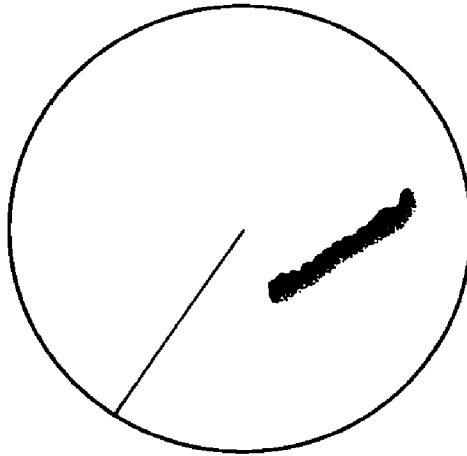
Position of ship: 12° 30'N, 113° 05'E.



### South China Sea

m.v. *Kowloon Bay*. Captain J.L. Peterson. Hong Kong to Singapore. Observers: Mr R. Moxon, Chief Officer and Mr E. Esinoy, Cadet.

28 June 1991. A large echo was observed on both the 3-cm and 10-cm radars and was calculated to measure 15 n.mile by 0.6 n.mile, see sketch.



24-n.mile range

It was originally thought to be a second trace echo from a low cloud but it was so intense that the observers wondered whether it could possibly have been the dust cloud from the volcanic eruptions in the Philippines. No cloud was observed visibly.

Weather conditions were air temperature 30 °C, wet bulb 25.6°, pressure 1008.5 mb, wind SW'ly, force 3.

Position of ship: 08° 20'N, 108° 52'E.

## **Towards a Global Ocean Observing System\***

By D. JAMES BAKER

We all admire nightly television weather forecasts with their striking graphics and predictions of global, regional, and local weather. The scope and immediacy of the weather patterns sweeping across the screen reveal the power of the international World Weather Watch and its associated data delivery system. The predictions are not always accurate, but this is a problem outside the capabilities of those who report the weather. In any case, the global data collected from this system are used for much more than just weather prediction, and the nightly forecasts are a good example of the advanced nature of the observing system in place for the atmosphere.

Why don't we have such a system for the ocean? Mainly because we live in the atmosphere and are subject to its changes. But today we know that the ocean plays a key role in global change, and to understand that role we must have global data collected over long time-periods. From its very beginning oceanography has been global in scope. Still, our knowledge of the ocean and its coupling to atmosphere and land is rudimentary. Moreover, we do not yet have the necessary operational technology for and we have not yet brought the necessary resources to bear on developing and supporting long-term ocean measurements.

What would a global ocean observing system do? It would collect global, long-term systematic measurements of physical, chemical, and biological data to provide ocean nowcasts. The data would then be used to update and provide initial conditions for coupled global climate models. In a paper dated August 1990, Henry Stommel noted that by the year 2000 we could hope to maintain an updated 'state of the dynamics of the ocean model' that could be used for predicting eddy events, El Niño, deep and intermediate water-formation anomalies, and pollutant spreading, as well as providing climate-model boundary conditions.

These days, while there is much talk about the greenhouse effect and long-term global warming, a global ocean observing system would provide measures at the full range of seasonal, interannual, decadal, and longer time-scales. The variability is due to both natural fluctuations and anthropogenic effects from greenhouse gases. But because the Earth system dynamics are nonlinear, that is, effects are not simply additive, increasing greenhouse gases may have subtle effects beyond slow temperature change, for example, increasing the near-term variability of the system. The overriding objective is not only to detect the greenhouse effect, but also to understand how the coupled ocean-atmosphere system works in general. The specific greenhouse warming issue, only one of many important questions, can then be studied using the understanding of the coupled system and how it responds when perturbed.

Since the fluctuations in the ocean and the Earth system occur at a wide variety of time and space scales, designing a global observing system is not simple. Research to understand how the ocean works and new technology to provide

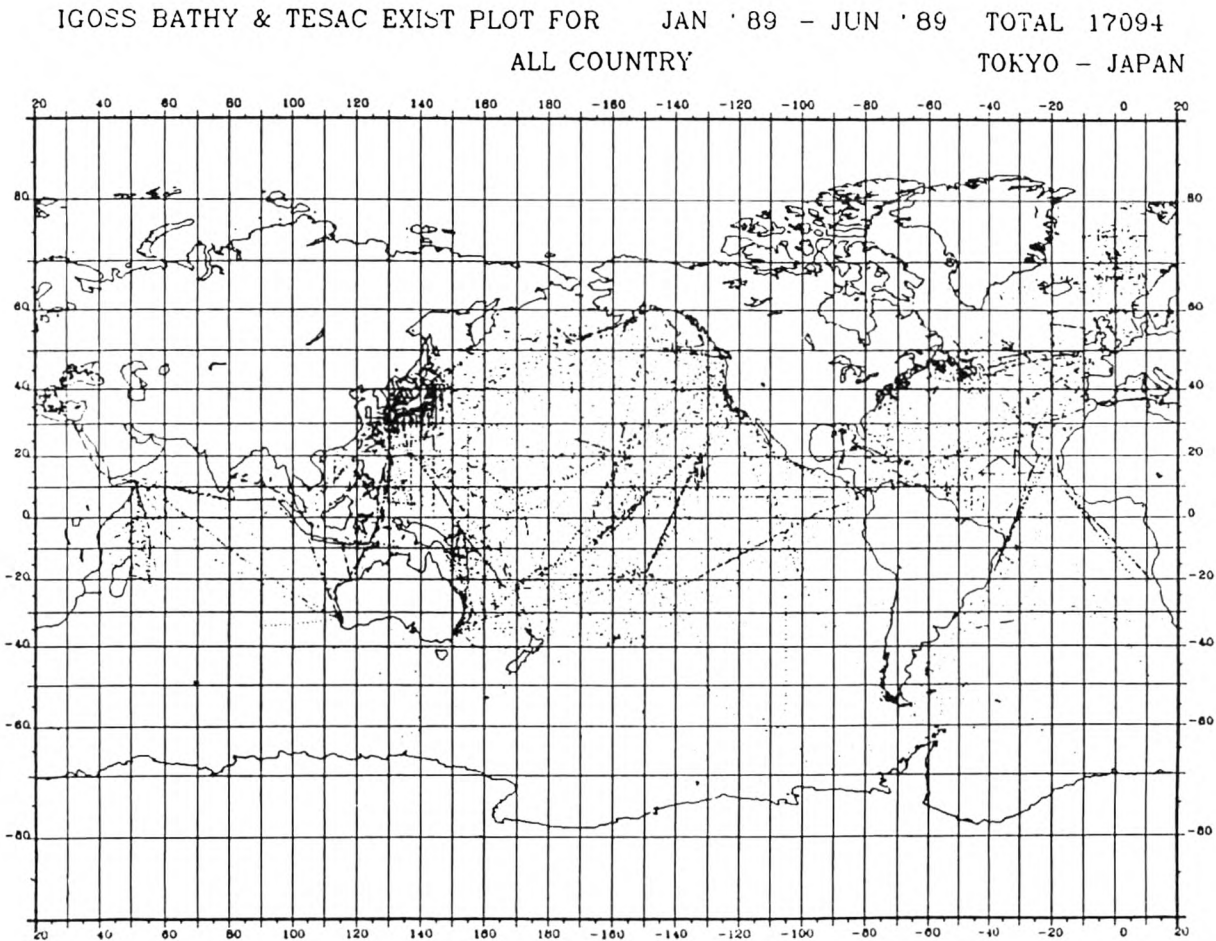
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cost-effective long-term measurements are both required for progress. Until we know how the Earth system works and how to measure relevant parameters accurately, there are important aspects of climate that we will not be able to document.

For observing the climate system, we will need to look at all the relevant parts: the atmosphere, the ocean, and the land. Probably the most viable part of existing systems is that for the atmosphere; the World Weather Watch (WWW). It has been in place since 1963 and provides an observation (satellite and *in situ* measurements) and data distribution system for global monitoring of the atmosphere. We are still far from having an equivalent of the World Weather Watch for the oceans, and, in fact, it is not clear that an exact analogy is appropriate. A global ocean observing system will contribute to and be driven by much more than any analog to weather, both in terms of science requirements and in funding. This additional complexity is one of the reasons that we do not yet have a global ocean observing system. (We do not have such a system for the land either, but that is a subject for a different article.)

There are some operational programs (that is, programs with an on-going commitment to providing data for users on a regular basis) already in place for the ocean. The operational programs sponsored by NOAA and the U.S. Navy, for example, provide global data sets for prediction of surface temperatures and ocean eddies. The Soviet 'Sections' program, with massive deployment of ships



These XBT and upper layer measurements of temperature, salinity and currents were reported by the volunteer observing ship network of the IOC/ WMO Integrated Global Ocean Station System for the first six months of 1989. Note the gaps in the southern hemisphere. (Courtesy of WMO.)

for hydrographic measurements, has a similar goal: application of large-scale measurements to provide data for operational predictions. A coarse network of global scale operational measurements (sea level, expendable bathythermographs or XBTs, drifting buoys, etc.) is co-ordinated through the Intergovernmental Oceanographic Commission and the World Meteorological Organization (IOC/WMO) to provide real-time data to users.

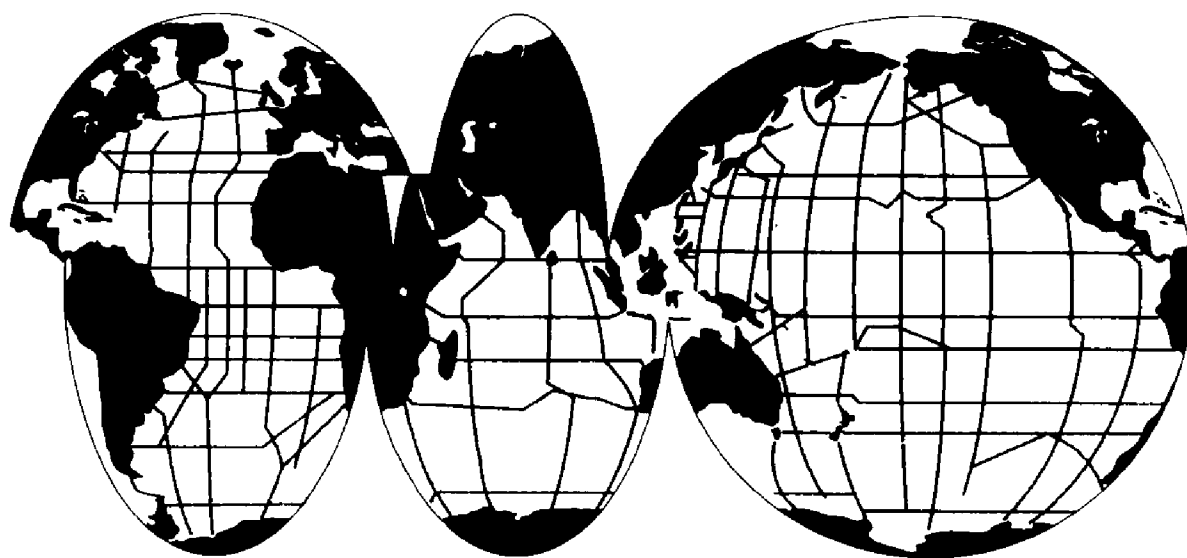
Current operational programs do not produce an adequate global data base for monitoring and understanding the ocean, partly due to a lack of resources and partly because we do not yet know enough about the physics, chemistry, or biology of the ocean to deploy our resources sufficiently. To make progress, we need to define the major elements of a global observing system and implement them as soon as possible. This requires adequate funding of existing programs designed to describe and understand how the system works. We need to develop new technology for cost-effective observing. And we need to enhance the existing patchwork of measurements to a true global system by providing adequate funding and national commitments for long-term measurements.

In the long term we look to a system that will provide real-time observations coupled to an information system that provides easy access and wide distribution. The data can then be used for real-time operations and predictive modeling.

### **Developing the Scientific Basis**

A number of research programs and operational activities are working toward providing the information that we will need to decide where and what to measure. The large-scale research programs, Tropical Ocean and Global Atmosphere Program (TOGA), World Ocean Circulation Experiment (WOCE), and Joint Global Ocean Flux Study (JGOFS), are aimed at providing much of the understanding and development of new measurements technology required on a global scale.

TOGA, WOCE, and JGOFS results will lead to identification of parameters for long-term monitoring. The first priority toward a global observing system must be to ensure full support for these research programs. Without the scientific



The World Ocean Circulation Experiment plans hydrographic, nutrient, and chemical tracer measurements along these track lines during 1990 to 1997. (Courtesy of WOCE International Programme Office.)

basis they can provide, it makes little sense to try to build a global observing system. TOGA will tell us where in the upper layers of the tropics we should concentrate resources for improving interannual climate predictions. WOCE will give us the first quasi-synoptic satellite/*in situ* description of the global ocean.

WOCE results will, for example, tell us the importance of indices such as basin-scale heat flux and how it can be monitored through western boundary currents and broad gyre flow. Chemical tracers will be used to monitor broad-scale flow, and the significance of eddies in transport of all kinds will be studied. JGOFS is carrying out a series of regional studies to identify the significant parameters of chemical and biological systems, global ocean color measurements by satellite will be an important part of JGOFS in the mid-1990s.

Based on the scientific information we have today and the results anticipated from these research programs, it seems that a global ocean observing system would focus on measurements of surface fluxes, hydrography, heat and chemical fluxes, and biological processes such as primary production. The measurement categories would include upper-ocean monitoring, systematic deep-ocean measurements, and satellite observations of several types. The major coordinating elements would include numerical operational models, data and



This is an artist's conception of the US/ French TOPEX/ Poseidon satellite designed for precision (to an accuracy of several centimetres) measurements of ocean surface topography during the period 1992 to 1995, and possibly longer. (Courtesy of NASA.)



information management, and international co-ordination and oversight. Above all, the system must be capable of evolving as understanding improves and technical developments show new ways to accomplish the goals.

### **New Technology for Observations**

Global studies of the ocean require techniques that adapt well to global measurements, but, in fact, most of our instruments are designed for local property measurements. Some techniques, however, such as sea level measurements or accurate tracer chemistry, do provide local measurements that represent both local and global processes. The collective information from such data help to document global change in the ocean.

A global ocean observing system must consist of these local measurements but will also need devices that can provide either global synoptic (comprehensive at a point in time) pictures, or long-term data, or a combination of the two. New techniques are required. In 1982, Walter Munk and Carl Wunsch, writing about observing the ocean in the 1990s, pointed out the importance of acoustic tomography and satellite observations of sea surface topography and wind stress. Today, a number of missions are planned for providing satellite altimetry, scatterometry, and ocean colour; an acoustic tomography program has been carried out in the Greenland Sea; and a pilot global acoustic-travel-time study was recently carried out with a sound source located at Heard Island in the Indian Ocean. Other new techniques include floats, autonomous vehicles, long-term moorings, and expendable temperature and salinity devices. Applying these new techniques is essential for a global observing system.

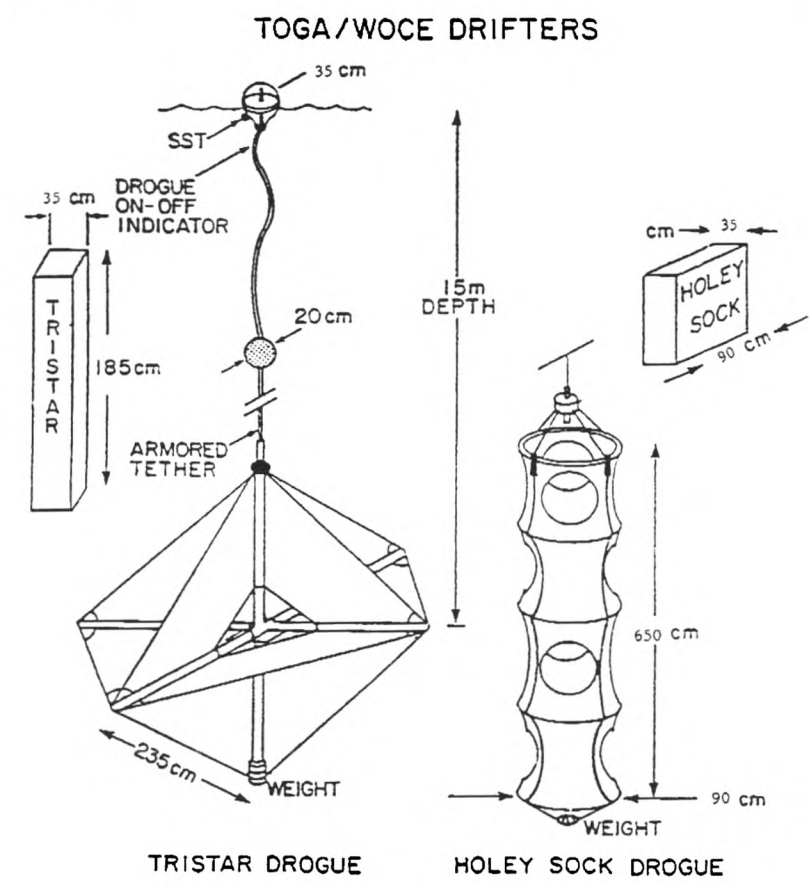
Floats and their next stage, autonomous vehicles, can carry instruments, make measurements, report data back through acoustics or satellites, and operate for a long time; they are a key element of any long-term ocean observing system. In 1989, Henry Stommel wrote evocatively about 'The Slocum Mission' (see *Oceanus*, Winter 1989) in which he envisaged a time when unmanned vehicles in great numbers would roam the ocean making hydrographic and other measurements, reporting into a Mission Control on Nonamesset Island in Woods Hole. In 1990, the forerunner of such a system, Scripps' Autonomous Lagrangian Circulation Explorer (ALACE), began providing such measurements in the South Atlantic for WOCE (see below), British scientists are working on the Autosub Project, an unmanned-ship concept. Two missions are currently planned; the first uses DOLPHIN (Deep Ocean Long Path Hydrographic Instrument) and will also contribute to WOCE.

As John Woods\*\* has argued, it seems clear that a global ocean observing system, in order to be cost-effective, must rely on robotic observing systems, and the role of ships must be greatly diminished in any global long-term data collection system. Slow-moving and expensive in terms of cost per unit of data collected, today's oceanographic ships are best suited for research projects rather than as part of a global observing system. However, ships do play a key role as volunteer observing platforms and for periodic high-accuracy surveys. For example, periodic surveys of hydrographic, nutrient, chemical tracer, and biological properties of the ocean probably will continue to require precise shipboard instrumentation and teams of experts.

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\*\*John Woods is Director, Marine and Atmospheric Sciences Directorate, Natural Environment Research Council, U.K.

The main point is that we need to move our data collection from a predominantly research mode to a more operational mode. We need technology for collecting and transmitting data for long periods of time with minimal human interaction that also maintains adequate quality-control procedures. This requires operational rather than research agencies for long-term commitment and development of new *in situ* and satellite techniques. Internationally, there are few agencies with operational oceanographic responsibilities; this is part of the problem we face.



These surface drifters were developed for WOCE and TOGA. (Courtesy of Peter Niiler.) Each Tristar Drogue is compactly packaged in a cardboard box to be assembled on board the ship before being released into the ocean.

Currently, our data is not easily transmitted among user groups that range from the research community to operational users. In general, any new schemes must provide information in real time; otherwise the operational use in models is diminished. New technology requires about a decade to progress from initial design to operational system, so technology development must proceed in parallel with research programs.

In TOGA a start has been made with sea level measurements with real-time satellite links, XBTs on voluntary observing ships, surface drifters, and the TOGA Tropical Atmosphere and Ocean (TAO) array that provides meteorological and upper-ocean real-time data. These techniques could well be the forerunners of a long-term observing scheme for tropical ocean predictive models.

In WOCE there has been a concerted effort to support development and testing of new technology for long-term global measurements. Satellite measurements together with *in situ* observations are key to meeting WOCE objectives: it is the only way we know to achieve global synoptic measurements of sea level, surface currents, and wind stress. Autonomous vehicles are another important element. As mentioned above, the WOCE program supported development of the ALACEs now working successfully in the South Atlantic Ocean. The ALACE floats are the first step toward a set of operational unpowered and powered floats that we hope will be able to replace ships for much data collection. The WOCE program also supports the development of improved meteorological packages for ships of opportunity and buoys. The new packages provide increased accuracy and reliability, and are another step toward a system that will provide global data for predictive models.

Sediment traps for measurements of chemical and biological fluxes and productivity have been developed for JGOFS. This program also aims at better understanding and quantitative interpretation of global satellite ocean colour measurements. These developments will be important for the chemical and biological aspects of a global observing system.

### **Planning: The Next Steps**

There is world-wide public interest in global change and increasing governmental support for global change research programs. The Second World Climate Conference, held in Geneva, Switzerland, in November 1990, formally called for the creation of a global climate observing system, including a global ocean observing system.

The first steps have been taken towards an operational predictive system, using data and models, with the TOGA predictions. We need to continue these with a series of operational oceanography pilot studies. The first of these could be considered to be the TOGA TAO array and modeling. Other candidates include the Heard Island global acoustic monitoring project, follow-ons to the Kuroshio and Gulf Stream monitoring of the 1980s and use of voluntary observing ships to collect physical and biogeochemical data to study large-scale, long-term physical/chemical interactions.

The key element in a global observing system is the commitment of national agencies: this is the success of the World Weather Watch, and must be a part of the global ocean observing system. National agencies such as NOAA and its National Ocean Service in the U.S., play a key role. The responsibilities for such measurements, including the co-ordination of satellite measurements, are

focused on such agencies; otherwise, we will not have a set of viable national programs on which to build an international system.

Some immediate steps could be taken now, particularly in regard to the existing operational programs. We need to evaluate the existing mechanisms of oversight and control to find a better mechanism for defining the operational goals in response to the scientific requirements of national and international research and operational programs. Existing mechanisms do not provide for adequate client or customer input and evaluation of the process. IOC should undertake an evaluation of the existing mechanisms of oversight and control with a view to improving the lines of communication between these programs and their customers.

An Ocean Observing System Development Panel (OOSDP) has been established to 'formulate the design of a long-term systematic observing system to order to monitor, describe, and understand the physical and biogeochemical properties that determine ocean circulation and the seasonal to decadal climatic changes in the ocean, and to provide the observations needed for climate predictions'. The Panel, chaired by Worth Nowlin (Texas A & M University), is fully engaged in that process now, and a final report is planned for 1994. Interim reports will also be issued. The Panel is co-sponsored by the Committee on Climate Changes and the Ocean, and the Joint Scientific Committee for the World Climate Research Program.

The OOSDP is being supported in that activity by the Committee on Ocean Processes and Climate (OPC) of the Intergovernmental Oceanographic Commission. The Ad Hoc Group of Experts on a Global Ocean Observing System of the OPC chaired by Geoffrey Holland, has prepared a statement entitled 'Toward a Global Ocean Observing System: A Strategy' that identifies a number of important immediate action items. Together, the OOSDP and the Ad Hoc Group will develop the necessary long-term action items.

It is clear, however, that committees can only go so far in designing and implementing a system. In order to ensure that adequate attention is given to this process, a planning office should be established, preferably at the IOC, where the ocean focus is paramount. However, close links should be maintained with WMO operations.

### **Support from a Broad Base**

To-day's patchwork observing system is funded with a series of different rationales: marine weather (e.g. sea surface temperature), local harbor and beach conditions (e.g. sea level and beach erosion), and biological and chemical effects (e.g. local pollution). In the end, we must find a way to synthesize the funding for an operational observing system based on these user needs. The funding support in oceanography for a global system will be different from that of atmospheric sciences because it will be more broadly based.

In my view, the funding for a global ocean observing system based on climate needs cannot be fundamentally decoupled from the system based on local needs — beaches, harbor tides, pollution and fisheries. This means that the general views of coastal oceanography fisheries, and the health of the ocean must be folded into the funding and rationale. Climate-related measurements might be piggy-backed onto fisheries, coastal, and pollution measurement systems, since that is where the local interest will be for many countries, developed and developing.

Since the scope of a global ocean observing system is international, the expertise and resources of international organizations such as the Intergovernmental Oceanographic Commission, the World Meteorological Organization, the United Nations Environment Programme, the Food and Agriculture Organization, and the International Maritime Organization will be essential to the success of the system.

### **The Opportunity**

With a global ocean observing system we could do some very important things: update global weather and climate models on a periodic basis, monitor the health of the oceans, provide information for routing of ships and sea, and carrying out scientific research. We should look to no less than this. Henry Stommel put it best when he said: 'What a magnificent opportunity it can be for an enterprising nation to present a world ocean observing system to an environmentally distracted world'.

### **Acknowledgements:**

Thanks to R. Allyn Clarke, Worth Nowlin, Henry Stommel, John Woods, and Carl Wunch for discussions on this subject.

D. James Baker is President of Joint Oceanographic Institutions Incorporated in Washington, DC, Chairman of the Committee on Ocean Processes and Climate of the Intergovernmental Oceanographic Commission, Co-chairman of the Scientific Steering Group of the World Ocean Circulation Experiment, and a member of the Joint Scientific Committee of the World Climate Research Program.

## **Bottled Messages from R.M.S. *St Helena***

By ROBERT WILSON

Over the past thirty years at sea as a Radio Officer, I have periodically thrown bottles containing return messages into the sea, but up to three years ago I had never received a reply. Inspired by reading in *The Marine Observer*\* of the experiences of a retired Master from my previous company, Cayzer Irvine, I realised that Captain Basil Biggs' method of offering a simple reward for a response was essential to success.

My wife Christine began jettisoning bottle messages from the original R.M.S. *St Helena* about three years ago, and after completing four return voyages with me from Avonmouth to Cape Town via the island of St Helena, she received at least one reply per voyage, sometimes more.

The rewards which we sent were varied according to who picked up the bottle and sent us replies. The standard contents of the reward were a photograph of the ship, a ship's descriptive brochure and a map showing where the bottle was thrown in and picked up, together with details of length of time the bottle was at sea and the ship's track. When a bottle was recovered by someone obviously not amongst the better off, we also included a five-dollar U.S. banknote to cover their expenses.

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\*1986, page 29, *Epic Voyages of Messages in Bottles*.

Probably our most interesting reply was received from Mrs Nils O. Seim of Lone Palm Plantation on Grand Turk Island, she having found our bottle one year almost to the day after it was thrown overboard. Her reply is reproduced below, together with the text of our original message slipped into the bottle.

This message was cast into the sea from the British Cargo Passenger Liner R.M.S. *St Helena* by Mrs Christine Wilson, wife of the ship's Radio Officer. The ship is 3,150 Gross Tons and carries 800 tons of cargo and 76 passengers on a run from Avonmouth (England) to Tenerife, Ascension Island, St Helena Island and Cape Town. Once a year we call at Tristan da Cunha in February. The ship was built in Canada in 1963.

Date bottle cast into the sea: 9 March 1989.

Ship's position: 36° 23'N 12° 47'W. Number 20.

Wind: Northeasterly 7 to Severe Gale 9.

When replying please give date, position and number as shown above and place where bottle found so that the bottle's voyage may be calculated. Please reply to:

Mr & Mrs R.A. Wilson, c/o Curnow Shipping, The Shipyard, Porthleven, Helston, Cornwall, England.

A souvenir of the ship will be sent to you. Please dispose of the bottle correctly if you do not want to keep it.

Best wishes, Robert & Christine Wilson.

P.O. Box 53  
Grand Turk Island  
Turks & Caicos Is  
West Indies

March 10 1990

#### LONE PALM PLANTATION

Dear Mr & Mrs Wilson

I found your bottlemessage No. 521 today at 2130 GMT on the East Beach of Grand Turk Island, Turks & Caicos Islands, West Indies, at Lat. 21° 30'N Long. 71° 08'W. It had come in on this morning's high tide and your bottle was my bottlemessage find No. 48.

I have collected bottles on this beach for many years and if I had not had experience in opening bottles with messages inside I would not have been able to decipher yours, as the piece of paper was completely soaked and one tight mass. The only way to get the message out was to break the bottle inside a plastic bag with a hammer. Finally I got it unravelled in about an hour and was of course delighted to read its contents.

You surely had written in ship's position, but that spot is completely blank and must have washed out. Please let me know where it was put in the sea, as I am as interested as you to learn how it drifted. I have several bottles that must have drifted across the Atlantic eastward and then west again to have ended up at this beach, and the other day I found one that had been dropped from a fishing trawler between Labrador and Greenland and had used about two years and seven months to reach here. Have you received answers from the Turks and Caicos before?

Please let me hear from you, best regards.

(Mrs NILS O. SEIM)

P.S. Some years ago a friend of mine on Parrot Cay in the Turks & Caicos Islands found a bottle thrown from your vessel off Dakar, by the then resident dentist at St Helena.



After a further exchange of correspondence we were able to provide Mrs Seim with the information about origins of our message.

During children's bridge visits on R.M.S. *St Helena* we encouraged them to throw bottles overboard containing their own messages, first showing them some of our replies to heighten their enthusiasm. A sample of the map we send as part of our reward [with bottle recovery points added] is shown in Figure 1. We also sometimes send ship photographs such as the one shown. There follows a record of some successful bottle message returns we received. A bottle launched on 20 February 1988 when we were anchored at St Helena Island was picked up on the following 1 August by Carlos Justin Iora, an agricultural engineer, at Aracaju, north-eastern Brasil, about 2000 n.mile distant. We managed to make an intelligible translation ourselves of his letter in Portuguese.

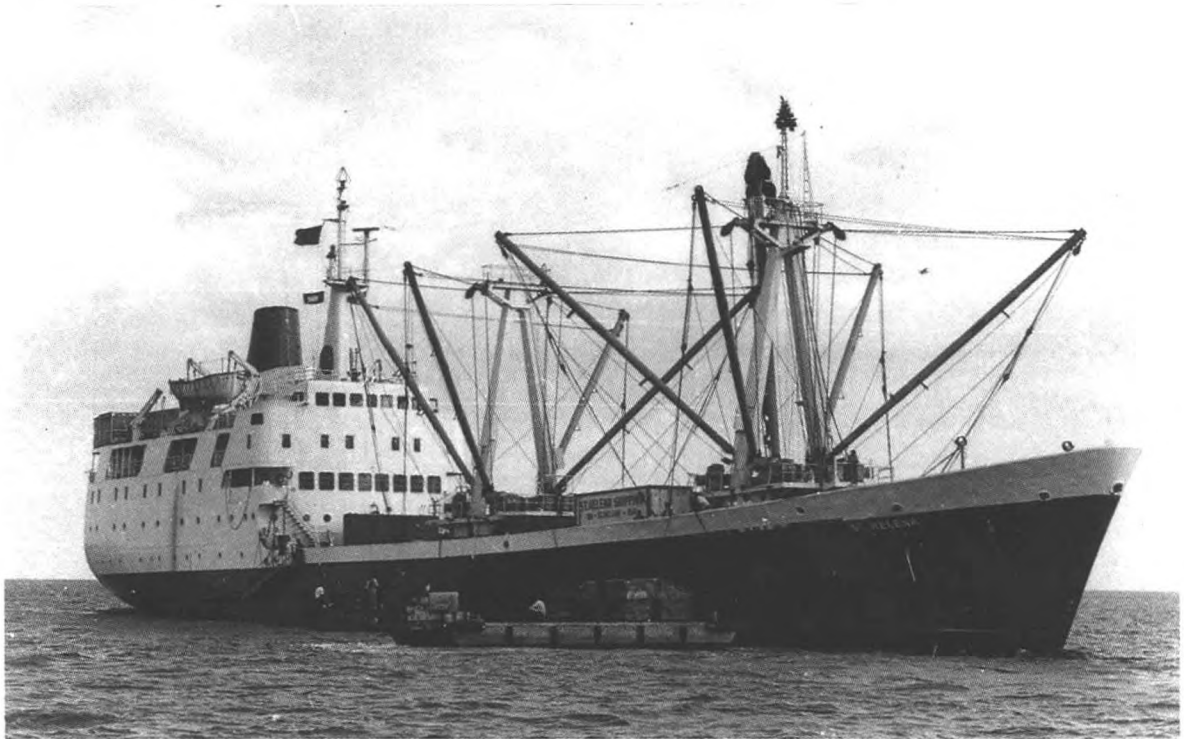


Photo by R. Wilson

R.M.S. *St Helena* lying at Ascension Island prior to 1982.

Northbound on the same voyage, Christine launched a bottle on 27 February as we were crossing the Equator in 16° W, and this was found on the shore at Old Edobo, western Ghana, about 800 n.mile away, on 13 May the same year by Benedict Akpanyi of Takoradi. An anonymous Moroccan beachcomber was the next to return a message thrown overboard on 5 March 1988 in position 38° N 12° W, the finder having drawn a map on the back showing Akhfenir, Morocco, north of Laayoune, as the place of recovery on 22 June.

James Howfordo Agbanavour of RC Middle School, Ada-Foah, Ghana, was next to reply to a bottle message jettisoned in 2° N 15° W on 23 January 1989. He wrote that he had discovered it on 23 April at the beach by the village of Azizanya near his home in the Greater Accra region of Ghana. He explained that the name Azizanya was a word from one of the tribal languages in Ghana, meaning the mouth of a river, and this village was where the Volta River entered the sea.

Another of Christine's launches made on 11 March 1989 in 46° 50'N, 07° 27'W was recovered nine months later, on 19 December, at Albufeira in the Portuguese Algarve, by a woman from the Netherlands, Bep Bussching of Spijkenisse,

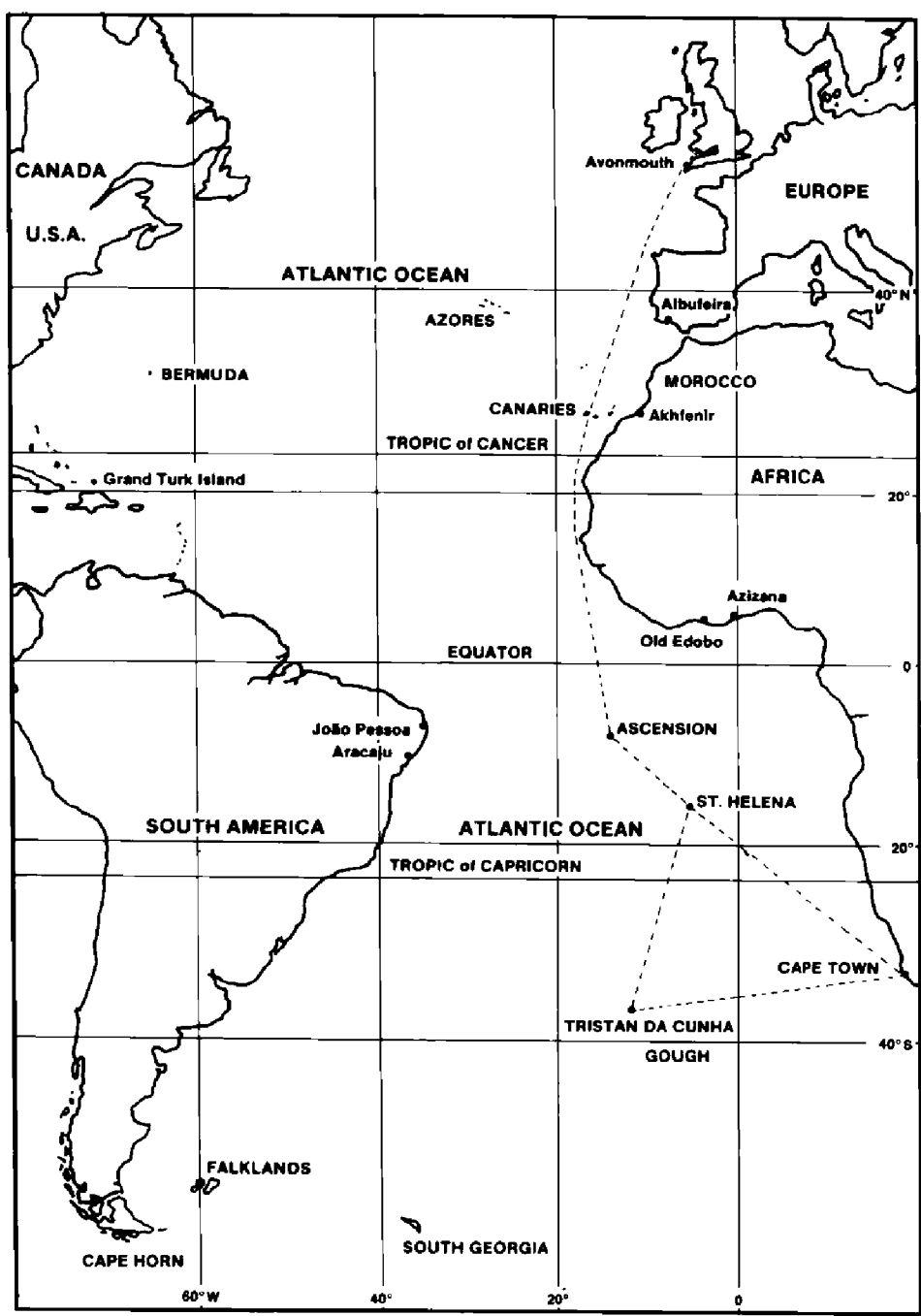


Figure 1. Example of a map sent to finders of bottles thrown overboard.

Rotterdam. On Christmas Day of that year, Christine launched six bottles containing the usual messages. One of these was recovered on 15 May 1990 by Aladanir Souto Cruz at Tambaba Beach near Paraiba in Brasil, whilst he was doing some spare-time fishing with friends. He replied in four languages with good wishes for a Merry Christmas and a Happy New Year.

Christine is a keen artist and takes a great interest in *The Marine Observer*. She once varnished the wings of a flying fish that had died when it landed on deck in a fresh breeze, attached them to her portrait of the fish and took a photo-copy of the result. She also drew a sketch of the new ship of the same name from a builder's model.

Probably everyone who has been to sea has thrown a message in a bottle over the side at some time. It is only rarely that such messages are recovered, although some turn up after intervals varying from weeks to many years. The following

poem was written by Frank Hodson of Bacup, Lancashire, in 1890. He was a passenger on the Clipper Ship *Golden Horn* when his work was sealed and thrown over the side on 29 August in 35° 45'S, 24° 25'W: as far as I know it was never recovered.

*Bottled Messages*

Whoever shall pick up this bottle, I pray  
That they note the year, the month and the day  
So then at a glance 'twill be easily seen  
How long in the water this message has been.  
Now, why should all messages saved from the deep,  
Be such as to make a man shudder and weep,  
Why should they of cruel disaster relate,  
Of hope all abandoned and terrible fate?

Then let me for once from this custom depart,  
And launch a few words which may gladden the heart.  
So, if the wild ocean this bottle may send,  
To some troubled Captain, who's at his wits end,  
To escape from his danger, or see his way through,  
Let him from this bottle his spirits renew.

Or should some good seaman pick up these few lines,  
Whose voyage is peaceful, on whom the sun shines,  
With whom all is well on the ship he commands,  
'Twill do him no harm if with us he shakes hands.  
Or perhaps the poor bottle on some sandy beach,  
Of some honest landsman may come within reach,  
Let him think as he reads this poor jingle at home  
Of the sailor whose lot is the ocean to roam.

Be thanking when fondling the bairn on his knee,  
He is safe from the perils attending the sea:  
The sun's shining brightly and free is the wind,  
We've long left our port of departure behind.  
Fine weather we've passed through, no dangers have met;  
We've rounded Cape Horn with the royals all set;  
No sickness aboard us, no death do we mourn,  
We're thankful 'all's well' on the ship *Golden Horn*  
And, though not forgetting that trouble may come,  
Rejoice that we're sailing for England — and home.

We trust no disaster by us unforeseen,  
May now betwixt us and our hopes intervene,  
That pleasant our future may be as the past,  
And our voyage may have a bright ending at last.  
So may we all sail on this voyage of life,  
O'ercoming all perils and dangers and strife,  
In cloud or in sunshine, in calm or in gale,  
Secure from disaster as homeward we sail.

Then when the last harbour bar — death — shall draw near,  
'All's well', may we meet it, devoid of all fear;  
The Heavenly Pilot aboard us to guide  
Our vessel, as into smooth waters we glide.  
Naught carried away, upstanding each mast,  
Forgetting with joy, all the ills that have passed;  
May we, through His mercy, as Peter expressed,  
Abundantly enter the Haven of Rest.

**Extract from the meteorological logbook of barque  
*Hermine*, Captain S. Griff Jones, Liverpool to  
Esquimalt and Victoria.**

(Received in the Marine Division on 13 April, 1886)

March 5th, 1885, noon position 16° 32'S, 35° 01'W. At 8 p.m. the crew, having evidently breached the cargo and, under the influence of drink, attempted a revolt or mutiny, threatening and declaring that they will throw the First Officer overboard and confine the Master in the coal locker. John Hope was in the act of attempting to stab the Master with a sheath knife when the Master's wife saw it and warned him of his danger. The man finding himself unable to accomplish his purpose, swore that the Master will not see the morning light unless he will give him what he wants.

March 6th: At 6 a.m. Crew drunk.

March 7th: Noon position 18° 32'S, 34° 07'W. At 8 a.m. the mutineers returned to work.

March 9th: Noon position 22° 38'S, 39° 27'W. Several of the sailors drunk and mutinous. During a.m. have thrown the log reel and other things overboard.

March 12th: Noon position 26° 13'S, 41° 28'W. Clark, A.B. (the ring leader of the mutineers) doing all he can to frustrate all work done.

March 21st: Noon position 37° 10'S, 53° 16'W. Crew drunk, notwithstanding that the hatches have been secured from the inside.

March 22nd: Noon position 37° 36'S, 53° 53'W. It would be my great pleasure to take four-hourly specific gravity of the sea to find the extent of the fresh water from the Rio de la Plata, but the insubordinate conduct of our mutineers keeps me in constant watch.

March 28th: Noon position 42° 05'S, 59° 05'W. Passed a barque bound north in a.m. If she was near enough I would ask his assistance to put the customers in irons.

March 29th: Noon position 43° 50'S, 60° 46'W. At 11.40 a.m. ship pitched very heavily, carrying away dead eye straps of fore top mast back stays, wore ship at once on port tack. The mutineers were 18 minutes before they came on deck and then tried to retard the work as much as they could.

March 30th: Noon position 42° 26'S, 62° 13'W. At 2 a.m. port back stay gave way, had the appearance of having been cut. One of the mutineers, I. Hope refused to furl sails. Considering the conduct of the mutineers, Clark, Hope, Hargreaves and Panore, who showed by their movements and certain conversation overheard that they want to get the ship disabled, then leave in the boats, we have determined to send royal yards down and get the vessel in as handy a condition that we can work her without the aid of the mutineers.

March 31st: Noon position 42° 46'S, 62° 53'W. Mutineers under the influence of liquor and trying to quarrel without any cause. I.H. tearing the fore topgallant sail which he was bending. We find that the mutineers have got possession of one of the ship's pistols and, having broken open an iron tank (cargo), think it to contain powder.

- April 1st: Noon position 45° 21'S, 63° 30'W. I. Hope maliciously tore the fore topgallant sail. Someone threw the draw bucket overboard during the night. Gaskets and reef earring are continually missed. Clark and Hope came to the cabin and demanded some clothes.
- April 7th: Noon position 49° 13'S, 63° 27'W. Some of the crew drunk, others more sober, but tried to start a serious quarrel.
- April 8th: Noon position 50° 02'S, 62° 58'W. Mutineers seldom seen, work done by officers and apprentices.
- April 10th: Noon position 51° 02'S, 64° 07'W (longitude by D.R.). This morning we find that our two remaining fowls were taken and eaten in the fo'c'sle. Puddings were made from raisins, currants and brandy taken from the cargo.
- April 11th: Noon position 51° 24'S, 66° 20'W (longitude by D.R.). In the morning, squalls of force 9 from SSE lasting 30 minutes. The mutineers drove the old man Dalton out of the fo'c'sle, evidently for better discussion of their piratical intentions. Considering the condition of the crew and our weakness in not being able to suppress their revolting and insubordinate conduct, we have determined to bear up for the Falkland Islands. At 5 p.m. we were warned by Hodson, a faithful A.B., that the mutineers were drinking and preparing for an immediate assault and that we had better be prepared. At 6.30 p.m. the A.B., Clark, Hope and Hargreaves came stealthily on the poop and demanded what they knew we did not have. Clark grabbed the Master and searched for his revolver; at the same time, Hope did the same to the Mate. The Master got loose and got inside of the companion door then fired a shot to warn the mutineers to keep off. Clark at first retreated; but made another charge at the Master who fired and shot him.
- April 12th: Noon position by D.R. 53° 27'S, 64° 54'W. At 6 a.m. Clark died from the wound; directly afterwards Hope and Hargreaves threw overboard a bag of burglar's tools, a secret book and a quantity of stolen articles belonging to the above.
- April 15th: At 3 a.m., finding the sea getting smoother, sounded and found in 25 fathoms. Land and breakers seen at 3.50 a.m.; wore ship and stood out to sea to wait for daylight. The land proved to be the south coast of Lively Island. At 1 p.m. passed Wolf and Seal Rocks and entered Port William (Falkland Islands).

When the logbook was assessed the following comments were made. 'In 1885, observations were made six times daily, at the end of each watch. It is interesting to note that during the above period not one observation was missed, the wind was entered every two hours and the remarks column is full of interesting information, both meteorological and non-meteorological. For instance, there are many observations of birds and fish, a sample of the sea bed from 60 fathoms when a sounding was taken on 26 March, moths and dragon-flies observed on 28 March, penguins and patches of kelp on 7 April in 49° S.'

The logbook was, not surprisingly, assessed as 'Excellent'. The next entry is for 14 May, when the *Hermine* left Port William. During the intervening month she had no doubt landed her mutineers although the book is silent on this point.

## **Retirement of the Chief Executive of the Meteorological Office**

Sir John Houghton, CBE, D PHIL., FRS retired on 31 December 1991 and was succeeded as Chief Executive by Professor Julian Hunt MA, PhD, FIMA, FRMetS, FRS.

Sir John Houghton was appointed as Director-General of the Met. Office on 1 October 1983, in succession to Sir John Mason. Prior to this, he was Deputy Director of the Rutherford Appleton Laboratory, Oxford.

Sir John was born in 1931 and educated at Rhyl Grammar School and Jesus College, Oxford, where he took a double first in mathematics and physics. As a research student in the Department of Meteorology at Clarendon Laboratory from 1951 to 1954, he took his D. Phil. in 1955. Since 1983 he has been a member of the Executive Committee of the World Met. Organization (WMO) and since 1987, one of WMO's Vice-Presidents.

In a written tribute to Sir John his Deputy, Dr Peter Ryder, Director of Operations, says: 'Elsewhere ... he quite understates his achievements and the outstanding leadership which he has given us.

'His time has not been marked by exuberant funding for public services or for scientific endeavour generally, but we begin the '90s not with one state-of-the-art computer, but two, with our major research facilities, represented by the Met. Research Flight and Cardington balloon system intact — and expanded by the addition of the Hadley Centre for World Climatology, the Hooke Institute at Oxford and the Joint Mesoscale Research Centre at Reading. We will effectively complete the national weather radar network before he retires; we have just secured our share of funding for a future European polar satellite. We have retained our weather ship, whilst almost all others have been decommissioned. We are at the forefront of National Meteorological Services in automating our observing networks — on land and sea. Automated reporting from civil aircraft is now an operational reality.

'One of his earliest directives was to replace our ageing low-speed analogue telecommunications and obsolescent teleprinters; Outstation Display Systems, digital communications and modern fax systems are now in widespread use. He also had an early ambition to provide us with a new lecture theatre; that will be realised in 1992.

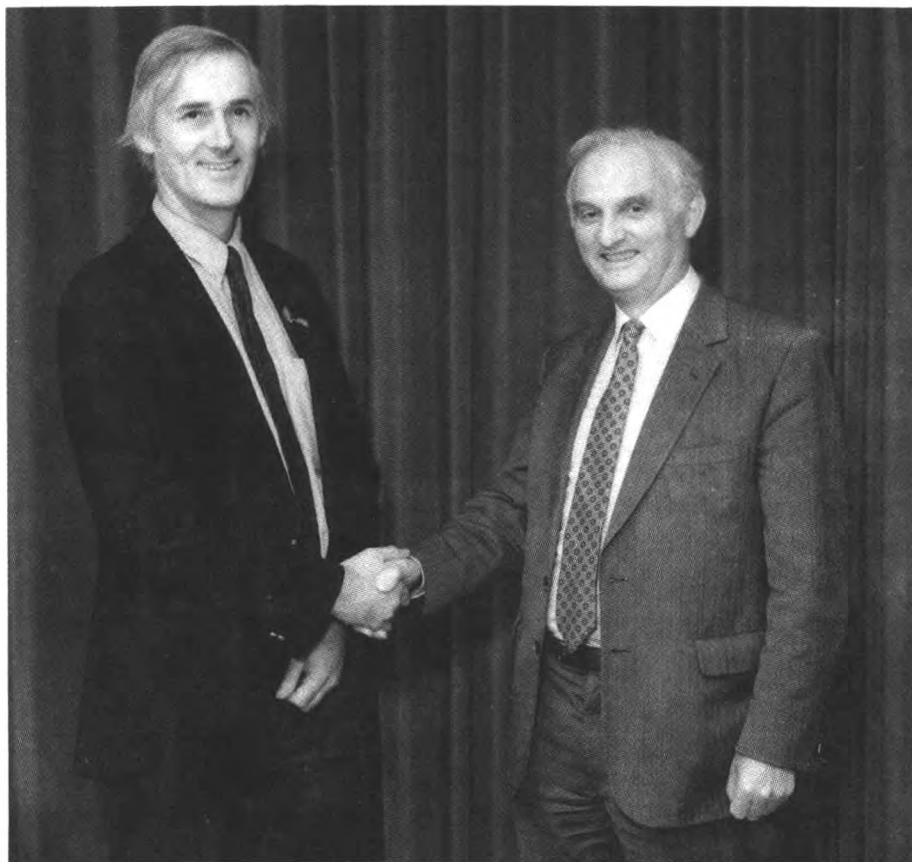
'Sir John's time has been marked by profound organisational changes, designed to achieve a better customer focus and adopt a much more commercial stance. He led us successfully through the difficult transition to Agency Status, whilst almost simultaneously dragging a worthwhile consensus and useful prediction out of the world's scientists engaged in climate research. This latter is no great surprise to those of us who have attended meetings under his chairmanship, but is an achievement almost unparalleled in modern science and has properly attracted universal acclaim. During the last years he has brought these same organisational abilities and leadership to bear in promoting greater European co-operation in the supply of commercial services, to a point where we are on the verge of a significant breakthrough.

'However, he will wish to be judged not by his achievements in securing resources or in organisational matters but by the quality and scientific results of those efforts. And here again there is much to be proud of in the resilience of our response to crises, such as the Gulf War, in the improved accuracy of our



forecasts and the tremendously expanded range of services now on offer. He .. has also succeeded in publishing the second edition of his book *The Physics of Atmospheres* and stimulating us all with his monograph *Does God play dice?* He shared the Rank prize for opto-electronics in 1988, gave the Royal Society's Bakerian Lecture in 1989, and was awarded the Glazebrook Medal in 1990 and the Symons Memorial Gold Medal in 1991. His Knighthood in the Queen's 1991 Birthday Honours list was a fitting accolade to an outstanding public servant and scientist.'

Sir John is well known internationally for his outstanding research in remote sensing of the atmosphere from space. His interests in space activities continue: he is currently a member of the Board of the British National Space Centre.



*Crown Copyright*

Sir John Houghton welcoming Professor Julian Hunt, the CE designate.

## **Appointment of Chief Executive of the Meteorological Office**

Professor Julian Hunt was appointed Chief Executive in succession to Sir John Houghton on 1 January 1992.

Professor Hunt was lately Professor of Fluid Dynamics with the University of Cambridge's Department of Applied Maths and Theoretical Physics. Over the past two and a half years he has been involved in a project with his University, the Met. Office and National Power, sponsored by eight major U.K. government industrial agencies, to develop an advanced method of calculating dispersion in the atmosphere and also making more use of the advances in meteorological

understanding. He held a Readership there from 1978 to 1990, when he was promoted to a Personal Chair. He was elected a Fellow of the Royal Society in 1989.

Professor Hunt, now 50, was a pupil at Westminster School and then gained First Class Honours in Mechanical Sciences at the University of Cambridge where he was a member of Trinity College. He undertook postgraduate study at the same university and the University of Warwick and was awarded his Ph.D. from Cambridge for his work on Aspects of Magnetohydrodynamics. Since then, he has enjoyed a varied academic career, in the U.K. and abroad, with fluid mechanics predominating. His research work began in 1968 with the Central Electricity Generating Board, on the problems with high winds that led to the collapse of three large cooling towers at Ferrybridge in 1965.

Professor Hunt is particularly keen to build on the trend of the last few years that the Met. Office researchers have been collaborating closely with other research groups in universities and commercial organizations, as the way to benefit really effectively from the Office's own and other peoples work. He is married with three children and his home is in London.

## **A Coat of Arms for the Met. Office**

On 13 November last, the Chief Executive, Sir John Houghton, received a coat of arms for the Met. Office at a short presentation ceremony held in his office and attended by members of the directorate.

The procedure to enable this privilege to be granted was started in 1989 by staff in the Office's International and Planning Branch, and approval obtained from the Office's controlling Ministry, the Ministry of Defence (Air), and after Garter King of Arms was satisfied that the Office would have the appropriate degree of corporate identity and independence. Discussions then took place between the Office and Rouge Croix which led eventually to the Earl Marshal of England, the Duke of Norfolk, granting approval.

The design of the coat of arms incorporates the RAF eagle holding the Met. Office weathercock in its claw. Our marine and aviation connections are amalgamated into a combined Naval and Astral crown, and matters meteorological by white raindrops on green earth, topped by white clouds. The star in the pale blue sky is the compass rose of the World Meteorological Organization, whilst the colours in the mantle are murrey (mulberry) and blue, the colours used by the Met. Office for some years on ties, scarves and Christmas cards. The motto translated is *To predict the weather through knowledge*.

On the parchment scroll presented to the Chief Executive, the coat of arms appears in the upper left corner; at the top are the arms of the three Kings of Arms of England, whose signatures appear at the bottom of the scroll, accompanied by three wax seals, each enclosed in a brass box.



Crown Copyright

A coat of arms for the Met. Office.





Photo by Captain A. Blackham

Sun pillar (see page 94.)



Butterfly pictured on board the *Havkong* by Captain A.D.G. Bell. (Mr G.R. Else, of the Department of Entomology, Natural History Museum, identified it as *Pachiopta hector* (L), an oriental species occurring in Sri Lanka and along the southern and eastern coasts of India to Calcutta. It may also possibly occur on the Myanmar coast of the Bay of Bengal and the Andaman Islands.)

# AURORA NOTES APRIL TO JUNE 1991

By R.J. LIVESEY

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

In Table 1 are listed observations of the aurora that we have received from ships at sea.

**Table 1 — Marine Aurora Observations April to June 1991**

DATE	SHIP	GEOGRAPHIC POSITION	TIME (GMT)	FORMS IN SEQUENCE
4/5 Apr. ..	<i>Cumulus</i>	.. .. 57° 31'N, 20° 04'W	0342	pHN.
7/8 ..	<i>Cumulus</i>	.. .. 57° 20'N, 20° 27'W	0245	qHN
9/10 ..	<i>Cumulus</i>	.. .. 57° 48'N, 20° 54'W	0335	qHN
11/12 ..	<i>Cumulus</i>	.. .. 56° 53'N, 18° 29'W	2227-0244	qHN, qHN
1/2 May ..	<i>Cumulus</i>	.. .. 56° 41'N, 19° 51'W	0240	qN, Alt. 30°
17/18 Jun. ..	<i>Canmar Triumph</i>	.. .. 46° 36'N, 55° 15'W	0210	HA (Yellow, blue), RA, HA, RR.G.

KEY: q = quiet, p = pulsating, G = glow, HA = homogeneous arc, HN = homogeneous (unspecified form), RA = rayed arc, RR = ray bundle.

The observation of yellow and blue colours in the aurora from the m.v. *Canmar Europe* is noted. Blue and violet colours have been observed on a number of occasions this summer, especially from America and some very good photographs taken. Yellow has been noted on a number of nights in the U.K.; when the aurora is strong, yellow and white colourations may be found due to the mixing of the correct proportions of the greens, reds and blues owing to the reactions taking place respectively in atomic oxygen and ionised molecular nitrogen at auroral altitudes in the high atmosphere.

Blue colours may be found during or after very active auroral displays and derive from reactions with ionised molecular nitrogen. Mixtures of this colour with the red atomic oxygen reactions may cause the colour to appear purple in hue. Blue and purple are associated with the upper layers of the aurora. In appropriate conditions the observer may find himself or herself in the dark of the Earth's shadow under a black sky while the upper part of the aurora may be above the shadow and in sunlight. The result is that auroral activity is strengthened by ultraviolet radiation and the brightness enhanced. It has been recorded that rays extending from the shadow zone up into the sunlit zone have been broken in two with a dark band at the edge of the shadow. This effect is illustrated in Figure 1.

On the night of 10/11 June when active aurora was reported around the U.K. with coronal structures in Nova Scotia and the mid-western United States, we received a reliable report from an observer in the Clyde area of the presence of noctilucent clouds (NLC) in the same sky as the active aurora. There have been further dual sightings recorded and these are of particular interest to upper atmosphere research. NLC are only seen in summertime between geographic latitudes approximately 50 to 65 degrees north and south, when the sun with reference to the observer is between 6 and 16 degrees below the horizon. Strange as it may seem it is in the summertime of each hemisphere that the upper

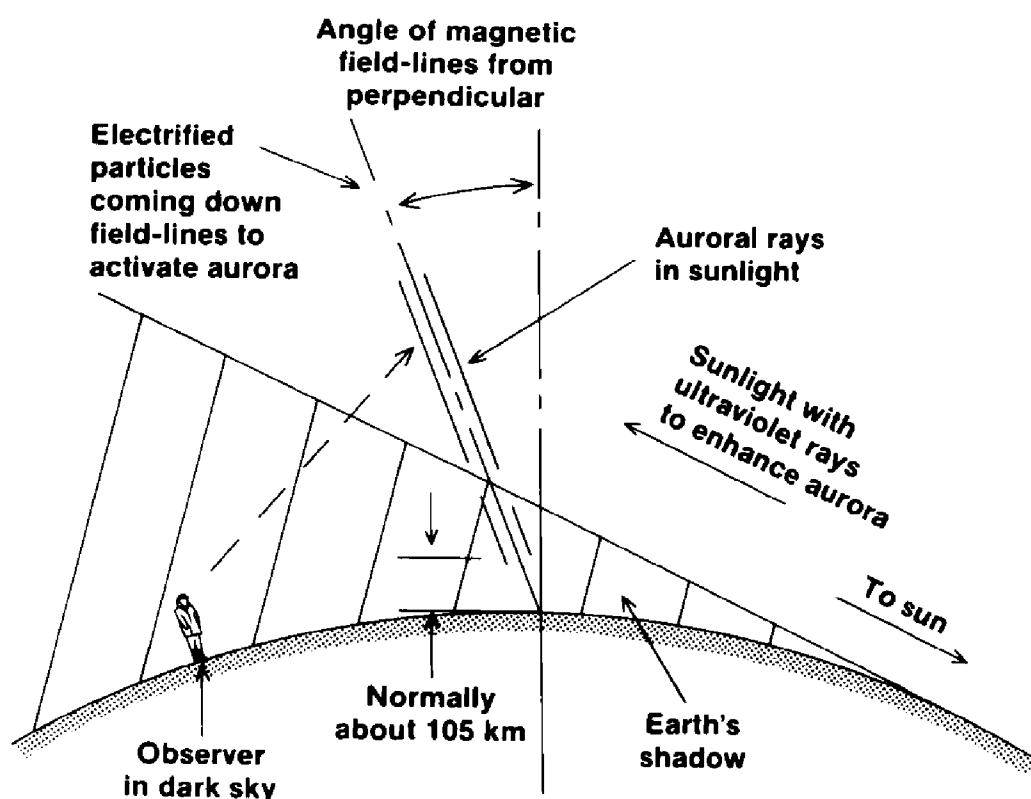


Figure 1. Sunlit aurora.

atmosphere, at a height of about 60 km above the Earth's surface where the NLC form, becomes cold. As the action of the auroral activity is to warm the upper atmosphere then the presence of NLC during auroral activity is of considerable importance.

During the period under review, measurements of the sun's effects upon the Earth's magnetic field indicated the presence of sustained areas of disturbance in the sun that caused repetitive activity with every solar rotation. The periods 20–23 March, 16–19 April and 13–17 May reached a crescendo of activity with the period 8–13 June. The periods of 1–5 April, 27 April–3 May, 24–29 May and 21–26 June were active but more stable. The return period of the big magnetic and auroral storm of 24–26 March comprised, in contrast, quiet and inactive conditions on 20–23 April. In fact, from 6–24 April, things were fairly quiet but from there onwards activity really took off and from 31 May until 17 June the magnetic field was subjected to storm after storm. Magnetic and auroral storms have been appearing ever since up until the writing of this report in mid-November.

Aurora was reported from the Northern Hemisphere mid-latitudes on sixteen nights in April, fifteen nights in May and nineteen nights in June. The event nights in British waters are represented in Figure 2. Note how the northern observers drop out as the summer twilight develops. Note also that the visibility of the aurora in the more southerly latitudes of southern England is not rare, as some people suppose. In the Southern Hemisphere the Royal New Zealand Astronomical Society Aurora Section collates the Australasian auroral observations, and report provisionally that there were twelve auroral events in April, eleven in May and sixteen in June as observed. Naturally, in both hemispheres, reference is to observed events, affected as they are by the location of observers, their availability and the local weather conditions.



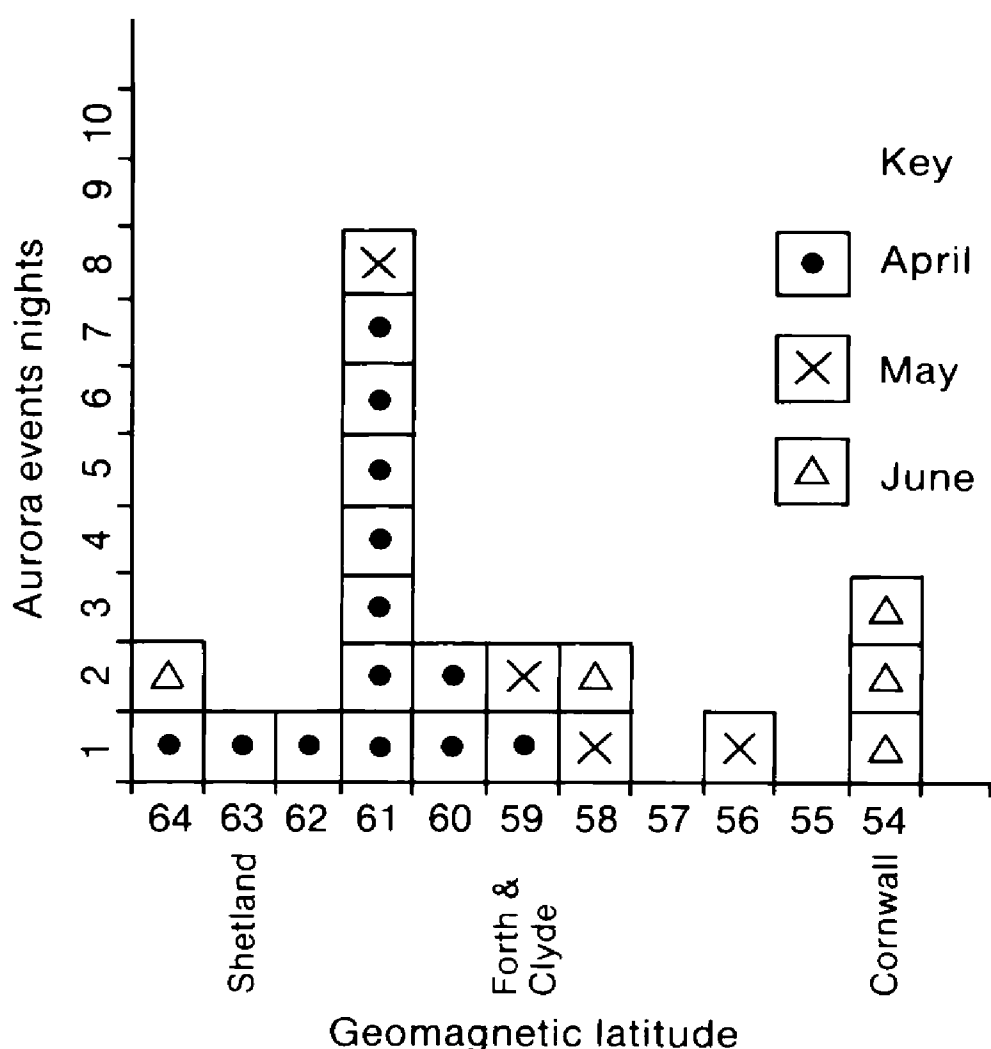


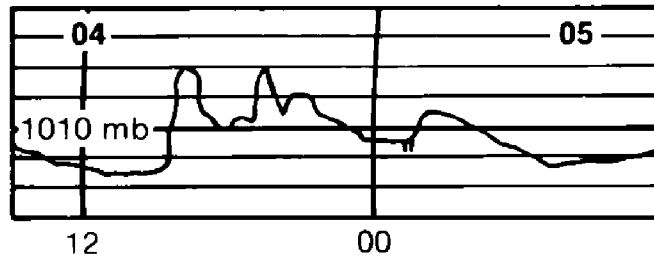
Figure 2. Lowest latitude at which aurora was seen during April to June 1991.

The supposed maximum of the current sunspot cycle was calculated to be in 1989; since then, the magnetic disturbances and auroral activity have declined, a not unusual event, with the prospect of a second auroral maximum later in the cycle. There have been earlier predictions that this cycle might prove to be unusual in some ways. In 1991 the sunspots have increased again and the aurora has also switched into higher gear with the production of a number of spectacular auroral storms, and it would appear that there are highly disturbed regions on the surface of the sun. Radio operators have also been reporting a good number of radio aurora nights when long distances were possible to work using auroral ionisation backscatter on 144 and 50 MHz bands. This is all very exciting, and all we can recommend to observers is to keep a watch on the skies, for anything can happen in the next year or so. Good sailing and clear skies.

## LETTERS TO THE EDITOR

(Letters to the Editor, and books for review, should be sent to the Editor, *The Marine Observer*, Meteorological Office, Eastern Road, Bracknell, Berkshire RG12 2PW, U.K.)

I thought I would send this barograph chart for your perusal. The wind had been blowing from the south during Thursday, Friday and for most of Saturday due, I believe, to low pressure over Algeria.



The atmosphere was completely dust-laden, with poor visibility. Early on Saturday afternoon there was an eerie calm for about an hour, then the wind came away from the north-west, reaching 50–55 knots in gusts within a few minutes.

A heavy shower of sand-laden rain passed through and the wind gradually died away. At 2100 (LT) the wind resumed blowing from the south-south-east at 20–25 knots.

N.A. Ross, Mooring Master, Marsa el Brega.

### Sun pillar

The enclosed photograph of a sun pillar seen at sunset was taken by myself on board the Netherlands tug *Njord*, on passage from Glasgow to Amethyst Field off the River Humber, and towing a barge containing the jacket and deck section of the *Amethyst II* gas platform. Having signed the 'Certificate of Approval' on behalf of the Underwriters to say that the venture was sound and seaworthy, I completed the voyage as representative of the owners, BP.

The photograph was taken at 1925 UTC on 15 April 1991 with a 210 mm telephoto lens. The low landmass seen under the sun pillar is the Mull of Kintyre, as we steamed south-west of Ailsa Craig. The weather conditions from the Surveyor's log were: wind W'ly, force 3, slight sea, low south-west swell, fine and clear. (See page 90.)

P.S. Of course, the tow arrived at destination intact.

P.P.S. My best regards to all former colleagues in the Marine Division. If you saw my letter in last December's issue of *Seaways*, complimenting Metroute on their operations, you may like to ask them if they will buy me a beer next time around.

Captain Arthur Blackham FNI, Alton, Hampshire.

## Book Reviews

*Larousse Français/ Anglais, English/ French Dictionary (Apollo collection)* by Jean Mergault. 150 mm × 105 mm, 478 pp. Larousse, 17, rue du Montparnasse, 75298 Paris Cedex 06. Obtainable in the U.K. from Cassell PLC, Stanley House, 3 Fleets Lane, Poole, Dorset BH15 3AJ, and bookshops. List price: £6.95.

The latest edition of this popular dictionary, published in 1989, has been extensively revised and is said to contain over 3,000 new words and meanings in everyday vocabulary, modern technical terms in current use and Americanisms.

Considering its compact format, it contains a very useful selection of technical words and phrases, of general benefit to the scientist, including meteorologists, and to the practising mariner, but is clearly not intended to be exhaustive in this technical sense. It has been extensively revised, giving a clear presentation of translations. This makes it easier to consult than many such dictionaries which often give several different meanings for a single word without giving clear indication of the subject concerned for each meaning. Larousse has solved this by indicating each new discipline in CAPITALS and separating each section by || and placing variations on the standard word in **bold**.

Being a French publication, there is naturally more editorial advice in that language than in English, but there is a comprehensive section on French grammar, conjugation tables and lists of irregular verbs and weights and measures. The guide to using the dictionary is also helpful. Common abbreviations and acronyms in both languages are given and 32 extra pages are included with over 400 sayings and proverbs current in both languages, with their equivalent in the other tongue.

The Larousse dictionary appears good value for the large amount of information it contains, including the many useful technical words and phrases.

J.F.T.H.

## Personalities

(Readers are invited to notify the Editor of co-operating officers from the Navigating and Radio Departments about to retire.)

**OBITUARY** — MR B.W. PICKAVER died in 1991 as a result of an accident on board m.v. *Esso Mersey*.

Brian William Pickaver was born in August 1944 and educated at Corby Grammar School. He joined his first ship, *Esso Windsor*, in May 1962 and subsequently served for 29 years with Esso Petroleum Company to the time of his death. Soon after he passed for Second Mate's Certificate in May 1966, we received the first of 14 meteorological logbooks containing his name from *Esso Hampshire*, in March 1967. His co-operation continued on the 'MARID' coastal ships, although records for these are not included here.

In April 1977 Brian Pickaver obtained his Master's Certificate and he was sailing as Relieving Master in June 1989.

Brian was single and lived with his father at Stanion, near Kettering, where his funeral and cremation took place. His ashes were scattered upon the Solent, where he so often sailed his ships, in a family service conducted by Canon Roberts, Southampton Port Chaplain.









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