The Marine Observer

Met Office

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The Marine Observer is a quarterly journal produced by the Met Office. All correspondence should be addressed to:

The Editor 'The Marine Observer'
Met Office Beaufort Park
Easthampstead Wokingham
Berkshire RG40 3DN

Fax: +44 (0)1344 855873
E-mail: obsmar@metoffice.com
www.metoffice.com

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Observations Supply (Marine Networks) Annual Report for 2001

1 — Voluntary Observing Fleet (VOF)

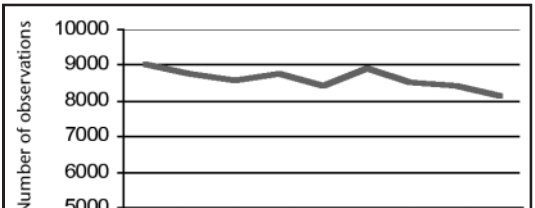
At the close of 2001 the numbers of voluntary observing ships and rigs recruited by the UK and reporting in the Ship's International Meteorological Code (FM13-XI SHIP Code) were as follows:

- 445 'Selected' ships which transmit weather messages using the full code and are equipped with complete sets of meteorological instruments and stationery. These vessels are currently operating in all ocean regions.
- 34 'MARID' ships which transmit information on sea-water temperature together with non-instrumental weather observations, and which operate in UK coastal or near continental areas.
- 24 'Auxiliary' ships which are requested to transmit limited observations. Such ships will normally be equipped with their own instruments and generally operate in areas where observation data are in short supply.
- 40 Offshore units comprising 16 fixed and 22 mobile installations, and two FPSOs. These units report in the SHIP Code and operate in the North Sea oil fields as well as other areas of exploration on the UK continental shelf.

2 — Ships

The UK voluntary fleet continued to make an important contribution to the WMO Voluntary Observing Ships scheme.

Observations received from the UK fleet of 'Selected' observing ships currently amount to between 8,000 and 9,000 observations each month. Figure 1 shows that the number of observations received from selected ships between April and December 2001 declined slightly.



Apr	May	Jul	Aug	Sep	Oct	Dec
9035	8794	8753	8436	8944	8549	8124

Figure 1. *Monthly totals of marine observations*

The timeliness of observations received during this period from Selected ships is indicated in Figure 2. On average, for all ocean areas, 96.7 per cent of observations were received within the mesoscale cut-off time of 115 minutes, whilst 43 per cent were received within 20 minutes of the observation. All our observation timeliness targets were therefore met throughout the period.

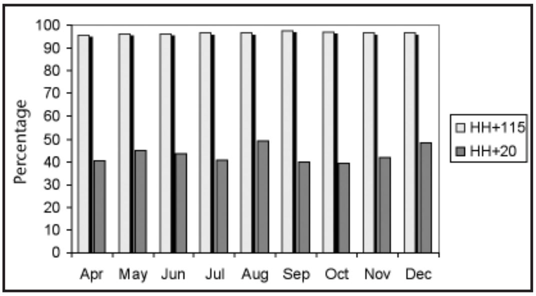


Figure 2. *Timeliness of marine observations*

Ships recruited to work in the Selected category carry a precision aneroid barometer, a marine barograph and a marine screen containing dry- and wet-bulb thermometers. For recording sea-water temperature they also carry a sea-water bucket with thermometer, or are fitted with distant reading equipment. 'MARID' ships are equipped with the necessary tested thermometers and their contribution is vital for the prediction of fog and, in appropriate meteorological conditions, icing.

Anemometers are not normally used for observations made by the UK voluntary fleet, the surface wind speed and direction being estimated from the sea state.

In the course of the year 28 Selected ships were recruited and 30 withdrawn; one 'MARID' ship was recruited and seven withdrawn; and three 'Auxiliary' ships recruited and three withdrawn.

3 — Offshore oil and gas installations

At the close of 2001 the number of offshore installations contributing to the VOF was 56. In addition to the aforementioned 40 offshore units reporting in ship code, a further 16 platforms were hosts to automatic weather stations which provide data every 10 minutes to the Met Office weather consultants in Aberdeen.

The number of observations received from offshore installations that have been made using TurboWin software (see also Paragraph 5) has increased every year since its introduction. In 1999 the Met Office received 17,160 observations. By the end of 2000 this annual figure had grown to 20,417, and at the end of 2001 the total had reached 21,758.

4 — PMO Network

At the beginning of 2001, voluntary observing ships were serviced by a team of seven Port Met. Officers (PMOs) and one Port Met. Assistant based at principal ports around the country. The offshore units were co-ordinated by the Offshore Adviser, based in Aberdeen.

During the year further changes were made to the UK PMO structure with the closure of the Port Met. Office for Scotland and Northern Ireland (based in Greenock) following the retirement of Captain Peter Barratt, and the transfer of services to the Met Office at Edinburgh. Following the retirement of the Port Met. Officer at Middlesbrough, that office was closed and its services were transferred to Captain John Steel at the Port Met. Office in Hull

The PMOs and the Offshore Adviser regularly visit ships and installations to offer advice and to check instruments. The PMOs also liaise with their counterparts around the world through the Manager, Marine Networks, so strengthening international co-operation and encouraging more ships to become involved with observing. PMOs also visit ships of other countries' fleets, if required, to assist observing personnel.

In total, during the year the Port Met. Officers performed 621 UK VOS ship inspections and 182 visits to UK VOS.

5 — TurboWin

The number of Selected ships equipped with 'notebook' computers loaded with the Royal Dutch Meteorological Institute's (KNMI) TurboWin program rose to 51 by the end of 2001, whilst a further 26 ships had access to TurboWin, or the earlier Turbo1 version of this software, through their own ship computers. This rise was largely due to recruitment of ships to the VOS Climate Project (see also Paragraph 11).

It was observers on platforms and rigs who pioneered the introduction of Turbo programs in the UK and, at the end of 2001, there were 34 installations using TurboWin software to code their observations.

The continued improvement of TurboWin relies on feedback from the users and the latest version (2.12) takes account of input provided by UK observers and from Marine Networks staff. Further suggestions are being considered by KNMI for the next issue. One possibility being considered is the addition of facilities whereby observers could include details of non-meteorological sightings which would otherwise have been entered in the 'Additional Observations' pages of ships' logbooks.

With its built-in quality control checks, TurboWin automatically codes each observation from the data entered by observers. The observation can then be downloaded to floppy disks for subsequent transmission ashore to Bracknell via Inmarsat-C and the Global Telecommunication System. The computerised logs of coded observations are routinely downloaded by the visiting PMOs so that the information may be utilised for climatological purposes.

6 — Logbooks

The number of ships' meteorological logbooks received during 2001 was 504 compared to the previous year's total of 573, a continued reduction owed, in part, to the increased use of TurboWin computer programs for coding ship observations. The logbook data undergo a series of quality control checks before they are stored on a database for uses such as marine climatology and climate research. The logbooks themselves are destined to become permanent public records held in the National Meteorological Archive, at Bracknell.

Observations noted on the 'Additional Observations' pages of ships' meteorological logbooks (or alternatively sent direct to our group e-mail box*) continue to be welcomed and as many as possible are published in *The Marine Observer*. Additional observations are copied to consulting experts who voluntarily give their time and knowledge to comment upon sightings made at sea.

7 — MOSS

In view of the increased use and reliability of ships' observations transmitted via Inmarsat Sat–C, it was decided in 2001 to discontinue the use of the Meteorological Observing System for Ships (MOSS) on board UK observing ships. Most existing systems have now been removed and any remaining units will be removed during 2002.

8 — Automatic Weather Stations

The performance of the first Automatic Weather Station to be installed on a UK voluntary observing ship (fitted on board the *OOCL Belgium* in November 2000 [†]) was monitored during the year. Although the system is presently only capable of measuring atmospheric pressure and air temperature, preliminary results show that the system may have potential for use on certain ship routes.

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*Group e-mail address: obsmar@metoffice.com

[†] See 'Automet' — pressure and temperature sensor unit', *The Marine Observer*, 2001, 89.

9 — Inmarsat Sat–C

The number of dedicated Inmarsat Sat-C systems fitted by Marine Networks staff on UK observing ships currently remains at five. The ships concerned are *Baltic Tern*, *European Seafarer*, *European Envoy*, *Tor Baltica* and the UK ASAP ship *CanMar Pride*.

The system, which is linked to a dedicated notebook computer, provides one of the solutions to the problem of transmitting observations from ships that are not required, owing to their service areas, to be fitted with their own Inmarsat terminals.

10 — ASAP

The UK Automated Shipboard Aerological Programme (ASAP) is installed on the container ship *CanMar Pride* which operates on the North Atlantic (Thamesport–Antwerp–Le Havre–Montreal) route. It comprises a dedicated 10-ft container housing the radiosonde balloon launcher whilst the necessary equipment for processing and transmitting the sounding in TEMP SHIP code (FM36-XI) is installed on the bridge.

Trials were undertaken during the course of the year using a portable launcher located on the starboard side of the funnel deck. Although it had been hoped that the use of this launcher would avoid some of the problems being experienced when launching sonde balloons under adverse wind conditions, this was not the case. The deck launcher was therefore removed in January 2002. In the course of the year a total of 174 sondes had been successfully launched reaching an average terminal sounding height of 26,684 km. Additionally, 20 ascents were made from a deck launcher on the R.R.S. *Charles Darwin*.

Marine Networks staff were also actively involved in the installation of the ASAP system used in connection with the Worldwide Recurring ASAP Project (WRAP). The system was installed on the UK observing ship *Palliser Bay* in March 2001* and the first successful launches took place, as planned, on 20 April as the ship cleared the South African coast.

11 — VOS Climate Project

Recruitment of UK observing ships for participation in the VOSClim project began in August 2001 and, by the close of the year, 20 UK ships had agreed to be recruited. A detailed article describing the aims and scope of this ambitious project appeared in the April 2001 issue of this publication and an update on its current status is included on page 84 of this issue.

12 — Drifting and Moored buoys

Following the reorganisation of the marine section within the Observation Supply branch, Marine Networks staff became increasingly involved in the co-ordination of the Met Office's moored and drifting buoy networks. The section was particularly involved with the seeding of the North Atlantic with drifting buoys, which is an ongoing process.

Deployment normally takes place from Icelandic ships of opportunity operating between Reykjavik and Newfoundland or, alternatively, are air deployed on our behalf by the Naval Meteorology and Oceanography Command. However, a drifter was also successfully deployed from the UK observing ship *CanMar Pride* in October (see page 78 of this edition).

At the end of the year the Met Office had 25 fully operational and five partially operational drifting buoys in the North Atlantic.

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* See 'It's a WRAP!', *The Marine Observer*, 2001, 124

13 — International activities

Throughout the course of the year the office was closely involved in a wide range of international matters related to marine observations.

In particular, section staff were actively involved in the work of the European Group on Ocean Stations (EGOS) attending meetings held in Dublin in June 2001 and in Paris in December 2001. The EGOS programme provides a valuable forum for European drifting and moored buoy operators, and for co-ordinating the deployment of drifters in the North Atlantic.*

In addition, in March 2001, the Manager Marine Networks attended the US Port Meteorological Officers' Conference held at the National Data Buoy Centre, in Stennis Space Center, Mississippi.

14 — National activities

The section was closely involved in making the necessary arrangements to implement the changes to the Shipping Forecast sea area boundaries, for commencement on Monday 4 February 2002.†

A number of meetings were attended at the offices of the Maritime and Coastguard Agency (MCA) to assist in developing UK positions on radio communications and navigational issues which relate to meteorological issues.

15 — Branch activities

In January 2001 a conference for UK Port Met. Officers was held at the Met Office College to consider wide-ranging issues affecting the future operation of the Port Met Officer network.

Following its relocation in April 2001 to new premises at Beaufort Park, near Wokingham, the Marine Networks section underwent a period of substantial restructuring and now falls within the remit of the Met Office's Observations Supply branch.

Throughout the year staff continued to field a variety of enquiries from the general public and shipping company representatives. The volume of such enquiries has increased since the introduction of the section's group e-mail box which is now also routinely used for communicating with observing ships.

Substantial efforts have also been involved in preparing relevant work instructions and quality documentation to assist the Met Office in achieving ISO 9000 quality accreditation.

16 — Marine publications

The *Ships' Code Card* was revised to take into account changes to the Ships' code that had come into force since the previous edition. The revised card was published on durable paper and copies distributed to all participating UK voluntary observing ships.

Copies of *The Marine Observer* were prepared and published quarterly in accordance with the print schedule. The enabling agreement with the publishers, The Stationery Office, was extended for a further year. The style and layout of the publication was further updated and revised to incorporate corporate branding requirements.

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* See 'European Group on Ocean Stations', *The Marine Observer*, 2002, 28.

† See 'Revised sea areas for Metareas I and II', *The Marine Observer*, 2001, 193.

Sufficient copies of the *Marine Observer's Handbook* and *Meteorology for Mariners* were reprinted to meet the section's requirements until such time as revised copies of both publications are prepared.

A map indicating the new Shipping Forecast areas (see Paragraph 14) was also produced and made available to relevant shipping interests and other marine-related organisations. A BBC Radio 4 plotter for the Shipping Forecast and coastal station reports was included on the reverse side to assist mariners in recording forecast information for the individual areas.

17 — Awards

Special long-service awards were presented to five shipmasters who were invited to the Met Office on 30 July to receive their specially inscribed marine barographs from Peter Ewins, the Chief Executive. Following normal practice concerning those with shorter observing careers, 300 nominations for Excellent Awards for 2000 were drawn from the names of Masters, Principal Observing Officers and Radio Officers contributing to meteorological logbooks received in that year, the contents of which were assessed as being of the highest quality.

Book titles selected for this round of awards were *Philips Concise World Atlas, 10th Edition* and *Lighthouses of the North Atlantic* supplemented by unclaimed titles carried over from the previous award year (1999). At the end of 2001 just over half of the awards had been processed.*

In addition to the book awards made to shipborne observers, 16 observers working on offshore installations also received book awards this year in recognition of their contributions.

An initial review of the current awards scheme was undertaken with a view to increasing the emphasis given to rewarding the timeliness and quality of the observations, and at the same time reducing the administration cost involved in operating the scheme. Whilst this work is still ongoing it is hoped that recently introduced software programs will allow the operation of the scheme to be simplified, at the same time ensuring that those officers and Masters most deserving continue to be rewarded for their efforts.

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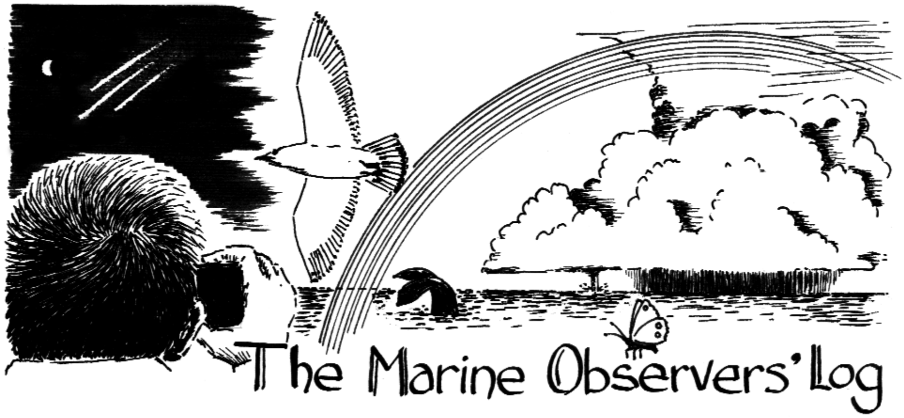
* See 'Excellent Awards — unclaimed prizes for 2000' on page 104 of this edition.



This section of *The Marine Observer* comprises reports of interest and scientific value contributed by individual observers or as part of a ship's meteorological logbook. All reports are welcome in the Observations Supply section and, wherever possible, they are forwarded to relevant sources of expertise for comment and analysis.

Responsibility for the content of any item offered for publication rests with the contributor, although texts may be subject to amendment at the discretion of the Editor.

All temperatures in this publication are given in degrees Celsius unless otherwise stated, and the barometric pressure is given in millibars (mb) although the standard international unit is the hectopascal (hPa) which is the numerical equivalent. Where mentioned, 'mile' and 'miles' are to be taken as the nautical mile.

Passage of front
North Atlantic Ocean
15 April 2001

- **m.v. *Alliance***
- **La Spezia to Washington, D.C.**
- **Captain J. Holst**
- **Observers: R. Wegner (Chief Officer), D. Carus and J. Davison (2nd Officers)**

The vessel was crossing the North Atlantic via position 32° 30′ N, 55° 00′ W as recommended by the Norfolk Navy Meteorology Office in order to steer clear of a depression. Before long, however, the effects of a deeper depression were starting to show.

At 1400 UTC the wind was S×W'ly, force 8 whilst the temperature was 18°, and the pressure at this time was 1008.9 mb, decreasing steadily. Two hours later, with the wind veering slightly to SSW'ly, a front was clearly visible on the 3-cm radar with a range of 10 miles, and the barograph indicated a rapid decrease in pressure.

By 1845, by which time the ship's position was 34° 26′ N, 45° 00′ W, the wind suddenly increased to SSW'ly and reached a speed of 69 knots according to the ship's anemometer. The air was filled with foam and spray while the sea was completely white, and heavy showers seriously affected visibility. These conditions continued for approximately 10 minutes before the vessel finally passed through the front. The wind then moderated and veered to SW'ly, force 6, and the visibility improved vastly. A sharp increase in pressure was also noted on the barograph.

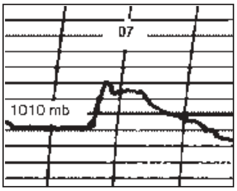
Thunderstorm
North Atlantic Ocean
7 June 2001

- **m.v. *Berlin Express***
- **Rotterdam to Cape Town**
- **Captain I.M. Hill**
- **Observers: Captain Hill, K.R. Smith (3rd Officer), C. Casil (AB), P. Moxon (Cadet) and members of ship's company**

At 0945 UTC in position 09° 37′ N, 16° 41′ W a tropical thunderstorm crossed paths with the vessel which was consequently treated to a liberal dousing of fresh water. Prior to the storm's arrival the air temperature and wet bulb were recorded as 23.2° and 22.4°, respectively, whilst the sea temperature was 29.2°.

Torrential rain at the vessel then reduced the visibility to one mile, and the wind veered from W'ly, force 4 to NNW'ly, force 5. Lightning was also seen at this point although thunder was not heard for approximately five seconds — the storm itself was still at some distance. The rain eased to slight showers at 1000 but the visibility was generally poor, and a few minutes later the rain became moderate. At this time the visibility was still good to the west of the vessel, the wind was steady but the sea was beaten down by the rain. On looking over the port quarter it was evident that the vessel was in for more!

At 1010 the vessel was hit by near gale-force NNW'ly winds. Violently heavy rain reduced the visibility to no more than 25 m while thunder and lightning now occurred more frequently. The barograph (below) indicated a sharp increase in pressure. By this time the rain (more like flying buckets of water) was horizontal and pooling 50 cm deep on the decks — the lifeboats were filling faster than they could drain — there was a lot of water!



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By 1030 thunder and lightning were striking overhead simultaneously, very loud and very bright. The secondary MF/HF aerial was then lost, though whether to lightning or strong winds was not known. The wind veered to E'ly, force 5/6 at 1034; heavy rain continued but the thunder and lightning had passed.

Static electricity was heard on the bridge wings within the next few minutes and by 1050 conditions were improving. The missing part of the aerial was found and returned by the refrigeration engineer whilst the crew were put into wellingtons and wet gear to make much use of the abundant fresh water.

Waterspouts
Indian Ocean
5 April 2001

- **m.v. *British Purpose***
- **Kharg Island to Tabango**
- **Captain K.E. Peacock**
- **Observers: J. Oakley (3rd Officer), S. Moffat and A. Read (Cadets)**

The vessel was about 60 miles south-west of Great Nicobar Island, in position 06° 06′ N, 93° 03.5′ E at 0200 UTC, when a series of three waterspouts formed at 2.5 miles on the starboard beam. The vessel's course was 088° at 16 knots, and the visibility was around 18 miles, but only six miles in the direction of a large cumulonimbus cloud (Cb) and its rain. The sea was calm with a long, low, southerly swell while the wind was minimal, classifiable as 'light airs'.

The first waterspout began as a narrow open-ended funnel extending from the base of the Cb for 200 m towards the sea. After roughly five minutes it had widened at its base and also tapered to a point at its lower end, finishing about 200 m from the surface. It was nearly vertical and showed a dark-grey outer ‘covering’ that paled towards the centre. The formation and decay of this waterspout took about 13 minutes, but two others had been gathering intensity although lasting for a considerably shorter time than the first one. These minor spouts formed within half a mile of the main one, and moved west-south-west. They appeared to be affected by wind shear and were not always vertical.

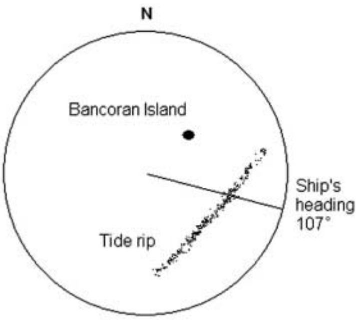
The base of the Cb was about 1,500 feet, and the tips of all three waterspouts did not get closer than 200 m to the surface. Lifted spray could be seen circulating to a height of about 30 m directly beneath each one where there was also an area of localised confused sea.

The air temperature was 29.1° at the time, the wet bulb was 25.8° while the sea temperature read 30°. During the preceding three hours the pressure had been generally steady but had increased gradually by 2.3 mb to reach 1011.3 mb at 0200. The Cb cloud accounted for two oktas of the cloud cover, the remainder of the sky being occupied by chaotic altocumulus.

Tide rip
Sulu Sea
11 April 2001

- **m.v. *Talca***
- **Kuwait to Davavo**
- **Captain R.J. Kendall**
- **Observers: U.B.G.S. Somachandra (2nd Officer) and D.J.A. Korala (Cadet)**

At 0700 UTC whilst in position 07° 53.4′ N, 118° 37.8′ E four miles south-south-west of Bancoran Island, a stationary line six miles long, lying north-east to south-west, was noted on the radar. As the vessel got closer it could be seen that what was being detected was a ribbon of disturbed water about 300 m wide. When the vessel entered this area its speed was observed to fall quite noticeably — from 19.6 knots to 17.5 knots, in the space of three minutes although the engine speed was unchanged at 105.5 r.p.m. The auto-pilot course was also unchanged at 107°. The sketch indicates what was seen. Some 10 minutes later, the ship’s speed through the water had increased to 19.3 knots, the vessel having passed through a very noticeable tide rip.



The sea temperature one hour before meeting the tide rip had been 31°, whereas just after passing though it at 0710 it was 29.5°. An island and reef could be seen four miles away on the vessel’s beam (both sides), and the depth of water at the ship was 3,000 m. Weather conditions at the time were: air temperature 30°, wet bulb 26.3°, no wind to speak of (light airs of force 1 or less), visibility 20 miles. There was no swell.

Haloes
North Atlantic Ocean
23/24 May 2001

- **m.v. *Maersk Sussex***
- **Dunkirk to Altamira**
- **Captain S. Gallaway**
- **Observers: Captain Gallaway and J. Rodrigues (2nd Officer)**

Whilst on passage to Altamira the vessel was being routed by Danmarks Meteorologiske and had altered course to pass south of the island of Flores, in the Azores, in order to skirt an area of potentially bad weather. On the morning of the 23rd further advice was received which recommended another slight deviation so as to avoid yet another low-pressure area and developing gale. A swell of 3–4 m was coming in from the north-north-west, i.e. just abaft the beam which, on this vessel, meant that it started to roll heavily enough to make life 'interesting' and admin work almost impossible — the paperless desk became a reality when one particularly energetic role deposited it all on the deck!

The breeze was pretty fresh and had a chilly edge to it, and the approaching weather systems were creating interesting cloud patterns and formations. At approximately 1430 UTC in position 35° 21.3′ N, 38° 31.1′ W, one particular patch of cirrus cloud drifted across the sky and a colourful 22-degree halo could be seen in it. Red and yellow colours were visible, with red nearest the sun.

At this time the pressure was 1015.8 mb while the wind was W'ly, force 4, but the wind started to increase and, by late evening had reached a solid force 7 with isolated rain showers. This continued overnight, but by 0700 on the 24th the wind was decreasing; however, by 0900 it was veering slightly to WNW'ly and starting to increase again.

Two swells were evident, one from the north-north-west with the other from slightly north of west; both were about 3 m high and of a quite short period. This combination of wind, swell direction and swell height gave the ship an ungainly motion — something like a lurching stagger.

The cloud cover was reasonably dense and the sun could be seen through it although not clearly. Even so, another 22-degree halo was observed. It was nowhere near as clearly defined as the one seen earlier, more like a bright ring with a slightly darker appearance to the sky within it.

In brief: A waterspout was sighted from the *Foylebank* on 1 April 2001 at 2055 UTC. A large cumulonimbus cloud (with anvil) based at 1,000 feet was about five miles from the ship at the time, and the spout formed at one edge of it. The waterspout lasted for approximately 15 minutes before becoming obscured by showers of rain at the vessel. Temperatures at the time of observation were: air 29.5°, wet bulb 27.5°, sea 26.5°, while the wind was SSE'ly, force 3. The ship's position was 05° 28′ N, 85° 00′ W.

Rainbow

North Pacific Ocean

6 June 2001

- **m.v. *Pacific Islander***
- **Honiara to Hong Kong**
- **Captain B.S. Tanwar**
- **Observers: A. Pereira (3rd Officer) and N. Hyder (Chief Officer)**

At 1105 UTC in position 10° 18′ N, 135° 30′ E the ship was on a heading of 303° when a rainbow was observed at three points on the port bow. There was a full moon, bright moonlight and the cloud cover was about 6 oktas of cumulus and altostratus, with patches of nimbostratus in the vicinity. Slight but continuous precipitation was present.

The rainbow occurred where a patch of nimbostratus was passing about 1.5 miles from the ship, and there was also drizzle at the ship at the same time. Although the colours were not brilliant, the green band was the most noticeable, and the phenomenon lasted for 12 minutes during which time the moon was partly obscured by altostratus. The wind direction at the time was N'ly, force 3 while the air temperature was 28°, and the wet bulb read 26°.

Editor's note 1. Rainbows are the result of the same process whether they occur by day or at night, the requirements in nature for a vivid rainbow being a luminary (sun or moon) and water droplets. These droplets are usually provided by rain or drizzle, although the very fine droplets found in fog can sometimes produce a 'fog-bow'. If the luminary is behind the observer, then a rainbow can often be seen ahead, as in the above observation. The altitude of the luminary, the size of the water droplets involved and the observer's height above the surface further affect the visual qualities of rainbow phenomena.

Rays of sunlight or moonlight are refracted (bent inwards away from their normally straight path) on entering the water droplet. When they meet the droplet's concave, mirror-like interior surface they are reflected internally and pass out of it again, refracted once more as they leave. Natural light is perceived as white by the human eye but is in fact a combination of different wavelengths of light each occupying its own position in the light spectrum. The way in which the constituents of white light behave when passing in and out of water droplets gives rise to the well-known 'colours of the rainbow'.

Lunar rainbows are not rare, but are reported less frequently than their day-time counterparts. They usually appear as white bows because the human eye is not designed to detect colour in low light levels.

Editor's note 2. The *Pacific Islander* is a member of the Hong Kong voluntary observing fleet.

In brief: On the morning of 13 June 2001 the *British Enterprise* experienced several passing showers in position 16° 39′ N, 70° 43′ W. During one, at 1100 UTC, a rainbow formed a large arch over the main deck, developing from sea level roughly 10 m off the port and starboard sides. The observers were Second Officer A. Wheatley and J. Espendido (OS), and the rainbow lasted for 10–15 minutes.

Whales

North Atlantic Ocean

17 April 2001

- **m.v. *Chrismir***
- **Richards Bay to Hadera**
- **Captain P.C. Harris**
- **Observers: S. Clyde (2rd Officer) and P. Janson (Cadet)**

At 1100 UTC in position 07° 28′ N, 15° 18′ W a pod of whales was sighted approaching the vessel from the north-east (while the vessel was heading north-west). The whales then changed direction to pass by on the starboard side, heading south-east at a distance of about eight cables. In all, about 30 whales were observed. They were dark — almost black — in appearance and had blunt rounded foreheads, while their dorsal fins were large and angular, as indicated in the sketch. The whales were 5–6 m long and broke the surface continually. It was thought that they might possibly have been Southern Fourtooth whales.

Editor's note. Dr Kelly MacLeod, of the Natural Resources Institute, University of Greenwich, said:

"The southern fourtooth whale, *Beradius arnuxii*, is more commonly known as Arnoux's beaked whale. There are two main reasons why I believe the animals described were not this species. First, Arnoux's beaked whale is a southern hemisphere species and inhabits sub-Antarctic and Antarctic waters. Secondly, it is larger, averaging lengths of 9 m to a maximum of 12 m, and the dorsal fin is small, low and gently sloping. The head of Arnoux's does have a well-rounded melon and a prominent beak, but the latter was not noted by the observers. Generally, most beaked whales surface at an angle and the beak and head come clear of the water. Without further clarification of whether a beak was seen I would suggest that the observers saw a pod of 'blackfish', which is a general name given to pilot whales, pygmy and false killer whales, killer whales and melon-headed whales. From the uniform dark colouration, length, dorsal fin and group size, I would propose that they were false killer whales (*Pseudorca crassidens*)."

Whale
Tasman Sea
16 April 2001

- **m.v. *Grafton***
- **Dalrymple Bay to Suez**
- **Captain P.S. Ghuman**
- **Observer: D. Thapa (3rd Officer)**

A single whale was sighted very close to the vessel's port bow at 0030 UTC when the ship's position was 37° 50′ S, 150° 05′ E (approximately 25 miles south-east of Gabo Island). Only one fin and the tail was in sight for a short while, but it was believed that the underside of both the tail and the rear portion of the whale was white, and that there may have been some black dots or patches too in these areas too. The whale dived but by the time it had resurfaced it had passed the stern and was too far off for any further observation.

Sperm whales
Bismarck Sea
23 April 2001

- **m.v. *Teignbank***
- **Kimbe PNG to Panjang**
- **Captain W. Campbell**
- **Observer: Captain Campbell and G. Pollock (Cadet)**

Whilst in position 03° 36.2′ S, 144° 21.6′ E about 10 miles off the coast of Papua New Guinea in waters of 600 m depth, a blow was spotted at 2200 UTC fine to starboard a few miles ahead. As the vessel drew closer a single whale was seen lolling on the surface, blowing forward intermittently. It allowed an approach to within 30 m before casually diving, and was closely observed. With a large squarish head, small bump about two-thirds of the length back from the head, and distinctive blow, it was assumed to be a Sperm whale. After diving it did not resurface, but an hour later when the vessel was a further 17 miles along the coast, two more whales were seen. They lacked the boldness of the first one, but had the same defining bushy blow and so too were reckoned to be Sperm whales.

Assorted cetaceans
Arabian Sea
23 April – 29 May 2001

- **m.v. *British Purpose***
- **Tabango to Khawr Fakkan**
- **Captain K. Peacock**
- **Observers: Captain Peacock, J.P. Rumsby (Chief Officer) and A.J. Read (Cadet)**

In position 23° 04′ N, 59° 42′ E a large school of about 100 dolphins was observed passing the port side of the vessel between 1345 and 1400 UTC on 23 April. At the time of observation the vessel was steering a course of 308° at 16. 5 knots. The sea was slight, and there was a low swell.

The unidentified dolphins were about 1.5 m long and a darkish-grey colour; their dorsal fins appeared to be very well defined with a pointed peak, while their beaks were a much lighter tone of grey compared with their bodies. Large tuna fish were also seen leaping out of the water near the dolphins and it became apparent that the dolphins were actually feeding on them. As the vessel passed, the dolphins approached and swam alongside the accommodation area whilst also performing acrobatics in the wake and wash. One dolphin in particular jumped through the air in a vertical position before swiftly flicking its tail and landing heavily with a large splash and 'belly-flop'. As the vessel moved further from the area, the dolphins were seen swimming in a southerly direction, continuing to jump clear of the sea surface and pursuing the tuna.

A few days later whilst on passage from Das Island to Singapore, what were thought to be two Dwarf Sperm whales were spotted in position 08° 38′ N, 74° 44′ E at 0155 on 8 May. They were of moderate size and passed down the port side, swimming slowly at the surface in a south-westerly direction, blowing frequently. Through binoculars, their dorsal fins were easily visible, having a pointed tip and concave trailing edge. At the time of this observation the vessel was on a heading of 117° at 16.5 knots in slight seas and long low swell.

On 29 May the vessel's position, course and speed were 24° 44′ N, 57° 10′ E, 130° and 15.5 knots, respectively, during a voyage from Fujairah to Mina' al Fahl. Between 0635 and 0650 about 20 dolphins were seen on the starboard bow at a range of roughly half a mile. They seemed to be heading for the bow where they then rode the bow wave for a few minutes before passing down the starboard side to 'play' in the wake. Around five young or juvenile dolphins were seen, always next to an adult or else 'sandwiched' between two adults.

Estimated to be about 2 m long (the juveniles being half this size), the adults had 'pointed' noses, grey upper bodies with white below and a lighter stripe of grey leading from the head to the base of the dorsal fin. Some had a spotted 'mottling' on their undersides. It was believed that these were Striped dolphins. Two larger and darker cetaceans were also seen jumping though the ship's wake. Although sighted twice only, they were definitely much bigger — about double the dolphins' size — with round heads and a similar dorsal profile. They were also a much darker colour and were thought to be Pygmy Killer whales.

Editor's note. Dr MacLeod said:

"There are two species of dolphin in the mouth of the Gulf of Oman/Arabian Sea which are known to associate with tuna fish. These are the common dolphin (*Delphinus tropicalis*) and the pantropical spotted dolphin (*Stenella attenuata*). Both are similar sizes, averaging around 2 m in length. Common dolphins have a very distinctive 'hour-glass' pattern with a yellowish colour on the flanks forward of the dorsal fin. The fact that the observers do not mention this leads me to believe that the sighting was not of this species. The spotted dolphin is a slate-grey colour dorsally and the 'lips' of the beak are trimmed with white, which may give the appearance of a pale-coloured beak as described. Spotted dolphins are not necessarily spotty and the colouration of this species can vary enormously. Spotted dolphins are very active swimmers and frequently breach. This species is also commonly associated with tuna fish. The association exists because the dolphins and tuna have similar prey preferences including various species of pelagic, shoaling fish and squid. The spotted dolphins of the eastern tropical Pacific have been well studied since some populations in this region have suffered declines in excess of 50 per cent due to incidental catches in Yellowfin Tuna fishing nets.

"Common dolphins are perhaps one of the most recognisable dolphins at sea because of the distinctive 'hour-glass' pattern along the flank. The group size of 20 described on 29 May is common for this species, although groups of up to several thousand individuals have been recorded. Common dolphins are within the genus *Delphinus* and the exact number of species within this genus is still debated. It is known at least, that there is a short-beaked common dolphin (*Delphinus delphis*) which tends to occur more offshore and a long-beaked common dolphin (*D. capensis*) which prefers coastal waters. Common dolphins are widely distributed, but discontinuously, in all oceans of the world. However, their abundance is perhaps lowest in the Indian Ocean. The species of common dolphin which resides in the tropical Indian Ocean is unclear. In the north a form of common dolphin with an even longer beak has been named as *D. tropicalis* but is only known from the Arabian coast to the Malabar coast of India."

Whale
North Sea
15 June 2001

- **m.v. *Elk***
- **Gothenburg to Immingham**
- **Captain N.M. Hardy**
- **Observers: S.C. Holding (Chief Officer)**

At 1650 UTC the vessel was steering 254° at 19.2 knots in position 53° 51.5′ N, 01° 07′ E when heavy splashing was noticed off the port bow at a distance of approximately one mile. No course change was necessary as the solitary whale (the cause of the splashing) continued to breach the surface, almost throwing its entire length clear of the water and landing on its left side. The vessel passed it at a distance of about five cables.

The whale was estimated to be 7–8 m long, and had a very light-grey upper body with a white, almost light-pink, underbelly. According to the wheelhouse chart of marine life, the identification of a juvenile Fin whale seemed likely. After breaching three times the whale then swam close to the surface a few times, breaking the surface, but at no time was a blow apparent. Contact with the whale was lost soon afterwards.

Whale
North Atlantic Ocean
10 April 2001

- **m.v. *Newport Bay***
- **Malta to Halifax**
- **Captain R.B. Gurney**
- **Observers: Captain Gurney and M.K. Hill (2nd Officer)**

A whale was seen at 1315 UTC to starboard of the vessel, it was on a heading of approximately 100°, and passed about 70 m off. The whale was swimming just below the surface and broke the surface at intervals of about 10 seconds in order to blow. Even though it was very close to the ship it did not appear to be disturbed at all.

Its length was estimated to be between 15 m and 18 m, and there was a very small fin set well back on its body; there was a light patch on its underside. The flukes were not seen out of the water although they could be seen beneath the surface. Reference to a whale identification book on board suggested that it was either a Fin whale or a Blue whale.

At the time of observation the ship was in position 37° 38.1′ N, 16° 28.8′ W, and was on a heading of 281° at 20.5 knots. The sea temperature was 16.3° and the sea was slight with a low swell.

Bioluminescence
North Atlantic Ocean
22 April 2001

- **m.v. *British Harrier***
- **Finnart to Bonny**
- **Captain M.R. Etherington**
- **Observers: Captain Etherington, A. Short (2nd Officer) and J. Solito (AB)**

Bioluminescence in the form of patches or spots was noted at the ship's side at 0230 UTC, also occurring in the surrounding sea. They appeared then quickly disappeared, therefore giving the impression of 'flashes' just below the sea surface. The majority of the flashes were seen where waves broke on the surface, or else along the ship's sides. After 20–30 minutes the luminescence faded. At the time of observation the ship's heading was 180° with a following N'ly wind of force 5. Temperatures at the position of the sighting (17° 06′ N, 18° 15′ W) were: air 19.8°, wet bulb 19.4°, sea 19.7°.

Fish
Indian Ocean
9 May 2001

- **R.R.S. *Charles Darwin***
- **Research cruise**
- **Captain K. Avery**
- **Observers: Captain Avery and members of ship's company**

The vessel had been towing over the sea bed while carrying out an instrument survey in position 20° 22′ S, 67° 55′ E, heading 140° at a speed of 1 knot, but had now stopped.

Three fish were then observed. They were eel-like in shape and movement but were thought to be small sharks, possibly. About 1.5 m long, the fish were slender and had prominent pectoral fins and a large tail fin only. Their bodies were blue on top while their tails were yellow. The swimming motion was also eel-like, the fish mostly using their tails for propulsion. The sea temperature was noted as 25.3°.

In brief: On 14 May 2001 a turtle was sighted by S. Baker, Third Officer on the R.R.S. *James Clark Ross*, in position 15° 43.2′ N, 43° 56.6′ W. The turtle was 60–70 cm long and travelled at a leisurely pace in a north-south direction. At the time, the vessel was conducting dredging operations on the Mid-Atlantic Ridge. The turtle swam towards the vessel, calmly navigated its way around the stern and carried on.

Refraction
Red Sea
20 June 2001

- **m.v. *Foylebank***
- **Port Klang to Suez**
- **Captain A.D. MacPherson**
- **Observers: E.D Guy (Chief Officer), P. Medvedkov (3rd Officer) and members of ship's company**

During the change of watch at 1700 UTC the visibility was determined as only 8 miles owing to surface haze; however, three pieces of land were observable on the port beam. The vessel was 45 miles from the nearest land at the time, in position 25° 55.6′ N, 35° 22′ E, and so the sighting was a little unexpected.

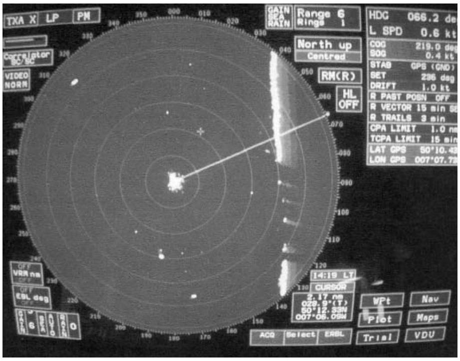
Upon inspection of the chart the observers suspected that the mountains Gebel Umm Naqqat to Gebel el Sibâ'i were visible even though they were 66 miles away. Because this phenomena was observed around dusk and taking into account that the setting sun had been very distorted, it was assumed that the sighting was caused by refraction.

An attempt to sight the opposite side of the Red Sea was made, without success even when binoculars were used. The ship's heading was 325° at 16.5 knots, while the air temperature was 29.3° with a wet bulb-reading of 24.2°.

In brief: Two gannet-like birds were observed from the *Mairangi Bay* on 15 April 2001 in position 05° 24′ S, 27° 37′ W, and Captain A. Ellis and First Officer J.G. Swindlehurst believed them to be Masked boobies. The birds appeared to make the usual preparations for diving (shaping themselves into a 'dart') but one of them then took up a posture similar to that of Concord when landing — that is, its head and neck were lowered, with the body inclined at 20°–30° to the horizontal, but its wings were arched. In this position it made a controlled descent of perhaps 25 m before rejoining its partner and continuing to cruise together until darkness fell and they were no longer visible.

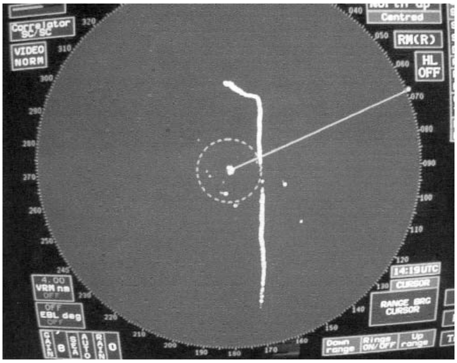
Hook and lines caught by radar

The *Toisa Conqueror* (operated by Sealion Shipping Ltd) was engaged in underwater survey operations in the approaches to the Bristol Channel on 21 December 2001. At around 1430 UTC Captain C. Ungoed-Thomas, C. Chapman (Chief Engineer) and their client's representative were to be found studying both radars in a concerned manner since the indications were that a line-squall was to be expected, see Figure 1.



T. Walls

Figure 1: *Radar at 1419 UTC 21 December 2001*



T. Walls

Figure 2(a): *The trace at 1419 UTC, up range*

T. Walls

Figure 2(b): *Sky at 1419 UTC*

The trace was picked up at 4 miles, showing a north-south orientation while travelling from east to west; however, after checking both radars again and searching for visual evidence of precipitation (or anything that might produce the trace) nothing was found. After going up range on the radars, attempts were made to decipher a pattern or shape that would match the observed cloud characteristics but nothing more than a slight change in the cloud height could be found (see Figure 2 (a) and (b) below).

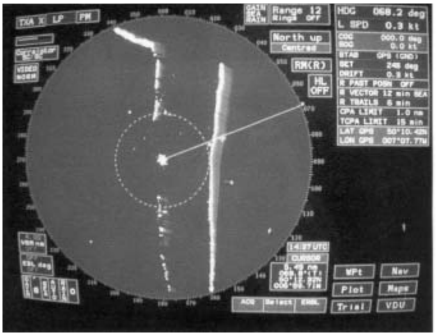
By 1430 the trace had travelled to within 2.5 miles of the vessel but there was still no sign of any explanation for it. The vessel was in DP and remained on position while the phenomenon continued to track westwards. No signs of change could be seen in either the wind, sea state or pressure reading, but the temperatures had decreased slightly from 9.5° to 9.3° (air), and from 8.5° to 8.3° (wet bulb).

As the clouds were the only apparent visual sign of a change, it was agreed by the observers that, whilst clouds may well be connected with the anomaly, they were not the cause of it.

On full gain at 48-mile range, the full shape of the trace was at last seen, and showed an interesting 'hook' at its lower end (Figure 3, overleaf). A second 'ridge' appeared just before the first arrived directly above the vessel (Figure 4(a) and (b)). Again no cause for this could be determined as conditions had remained unchanged during the period in which the ship was between them.

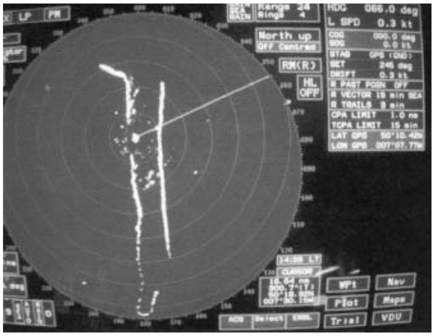
T. Walls

Figure 3: *The first trace is finally revealed.*



T. Walls

Figure 4 (a): *The second 'ridge' at 1437 UTC*



T. Walls

Figure 4(b): *Radar display at 1439 UTC*

The second trace passed over the vessel at 1459 after which both traces continued to travel west until, at five miles off, they became weaker and started to lose definition. By the time they were eight miles off they looked very similar to the signature of a bank of passing showers. During this period, Second Officer Z. Berry recorded all meteorological information and confirmed that no changes had occurred to the details noted earlier.

After some discussion it was agreed that the most likely explanation for these events was that a bank of dust particles or/and moisture had been picked up by an air mass moving from land to sea. Whilst invisible to the eye, it was sufficient to reflect a strong radar pulse.

Acknowledgement

We would like to thank Captain Ungoed-Thomas and those on board *Toisa Conqueror* for contributing the information and pictures on which this article has been based.

Volcanoes — how can they affect the weather?

E.N. Lawrence

In weather lore the colour of the sun and moon is often associated with predictions of extreme conditions, and a link between storminess and a reddish discoloration of the moon was in existence as early as 1250. The *Greater Chronicle* incorporating a weather chronology, under the name of Matthew Paris, a monk at St Albans in Hertfordshire, observes for 1 October 1250 that "...there appeared a new moon, swollen and red in appearance, as a sign of coming tempests."

Then follows a vivid account of this portent's fulfilment at an unnamed coastal area in England:

> "The sky then, in the first week of the increase of the moon, was covered with a thick mist, and began to be much disturbed by the violence of the winds...the disturbed sea transgressed its usual bounds, the tide flowing twice without any ebb, and emitted such a frightful roaring sound, that, even in parts remote from it, it created amazement in those who heard it, even in old men; and no one in modern times remembered ever to have seen the like before. In the darkness of the night too the sea appeared to burn like a fire, and the billows seemed to crowd together, as though fighting with one another, in such fury, that the skill of sailors could not save their sinking ships, and large and firmly-built vessels were sunk and lost... In this year (1250), the land as well as the sea was affected by unusual and dreadful commotions...". (Rothwell, 1975)

Tentative associations between weather and volcanic eruptions

Centuries later, Gilbert White (1906), in his journal for 1783 at Selborne, Hampshire, describes an equally strange "red louring aspect of the sun" together with a "peculiar haze, or smoke fog...in every part of Europe and even beyond" with an "extraordinary appearance unlike anything known...from June 23 to July 20 inclusive". He mentioned incidentally that, "a volcano sprang out of the sea on the coast of Norway".

Benjamin Franklin, who was in Paris in 1783, also commented on the widespread "dry fog...of a permanent nature...all over Europe and a great part of North America during several of the summer months", and he ventured to suggest contemporary Icelandic volcanoes as a possible cause. (Hoyt and Schatten, 1997)

Significantly, volcanoes were erupting world-wide in 1782 and 1783, including Iceland in May and June 1783 (Simkin *et al*, 1981). Comparably, the red moon of 1250, which in the *Greater Chronicle* was connected with tempests, could have been associated with one or more of the volcanoes in Italy — Mount Etna erupted in 1250.

Historical meteorological records examined

In twentieth-century research, Alistair Dawson and Kieran Hickey compared wind records for Edinburgh between 1770 and 1988 with volcanic activity around the world, and found corroboratively "that Edinburgh (experienced) most gales in the winters that followed three of the biggest world eruptions...at Tambora in April 1815 and Krakatoa in August 1883, both in Indonesia...(and) El Chichon in Mexico during March and April 1982...". (Reported by Edwards, 1997)

Volcanic influences and global warming

Modern research into volcanoes and storminess acknowledges temperature as a major factor. As the Edwards report continues: "Scientists on the UN's Intergovernmental Panel on Climate Change have suggested that global warming might bring increased storminess in the North Atlantic. Dawson argues that the impact of large volcanic eruptions should...also be taken into consideration."

In the report, Alan Robock of Maryland University is said to agree with Dawson, stating that "What he is seeing is a manifestation of the warming pattern we have discovered after major tropical eruptions."

The effect of *moderate* volcanic activity on surface temperature will naturally depend on the reductive effect of the volcanic veil on insolation and outgoing radiation. Reductive effects will be governed by qualities of the veil such as its dimensions, density, height above sea level, persistence and geographical location, etc. Other factors are climatic conditions before and after the eruption and, very importantly, the time of year of the eruption.

However, a *major* eruption may produce a veil that is sufficiently high and dense — and consequently enduring enough — to cause a temperature lag through the seasons. For example, a lag in surface air temperature from prolonged *cooling* may occur as a result of reflection of sunlight by millions of tons of dust ejected explosively into the stratosphere, above the convective layer, where a volcanic veil is less likely to be washed out by rain. [Volcano images on pages 73 and 74 refer.]

Such a persistent high-level volcanic veil could also, on the other hand, result in the winter *warming* of the North Atlantic following *major* tropical eruptions (as reported by Edwards, 1997). This warming could be caused by the veil's restriction of outgoing radiation that had accumulated during the previous summer, but more especially by the inflow, below the persistent high-level volcanic veil, of *warm* south-westerly air masses, along with the warming effects of the Gulf Stream drift.

Summary

There is no simple rule relating volcanic activity to subsequent surface-layer temperatures. They are dependent on the physical characteristics of the volcanic veil and on regional climate.

The time of year of an eruption also can be an important factor in determining temperature change in the surface layer. Nevertheless, *major* eruptions, by producing thick and persistent volcanic veils above the convective layer, can cause temperature lag and so produce prolonged cooling or prolonged warming. This process can reinforce the effect of regional climatic factors. One noteworthy result of major tropical eruptions is the tendency for warming of the North Atlantic during the following winter, with increased storminess.

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Volcanoes that have injected dust and aerosols into the higher atmosphere (See page 71)

Left: *Dormant for 500 years, Mount Pinatubo (Philippines) erupted in June 1991 during which fine ash and gases were pumped high into the stratosphere. An estimated 22 million tons of sulphur dioxide in the cloud combined with water to form droplets of sulphuric acid which prevented some sunlight from reaching the earth. Slightly cooler than usual temperatures were reported world wide, and spectacular sunsets and sunrises were also attributed to the eruption.*

USGS Photo by D. Harlow, June 12 1991

Right: *Mount Etna (Sicily) in action during 2001 as volcanic ash and gases stream away from the crater.*

Eruptions occurring early in recorded history may have accounted for sightings in more northern regions of Europe of coloured suns, moons and skies.

Image EtnaISS0022E8683 courtesy of Earth Sciences & Image Analysis Laboratory, NASA Johnson Space Center (http://eol.jsc.nasa.gov)

Left: *Tambora (Sumbawa Island, Indonesia) erupted with cataclysmic violence in 1815. Prior to the eruption, the volcano's peak stood approximately 4,600 m above sea level, but the current height of the new rim is around 3,000 m, and the diameter of the caldera is slightly more than 1.8 km. This event is rated among the 'top ten' most explosive eruptions of the modern era, and is believed to be the cause of 'the year without a summer' in 1816 in North America and parts of Europe. Tambora's ash cloud lowered global temperatures by as much as 3°.*

Image STS049-097-054 courtesy of Earth Sciences & Image Analysis Laboratory, NASA Johnson Space Center (http://eol.jsc.nasa.gov)

Volcanoes that have injected dust and aerosols into the higher atmosphere (See page 71)

Left: *Mount St Helens (US) pictured during the eruption of 1980. This explosive eruption blew away the side of the volcano and sent ash 15 miles into the atmosphere. Carried by upper winds, some ash reached the US eastern coast in three days, while small particles circled the globe in three weeks.*

The total volume of ash erupted by the volcano was estimated to be 1.01 cubic kilometres (before compaction by rainfall).

USGS Photo by Austin Post, May 18 1980

Right: *Volcanoes on the Kamchatka Peninsula form part of the 'Rim of Fire' that encircles the entire Pacific. In October 1994 Klyuchevskaya, one of the most active volcanoes on the peninsula erupted. The summit of the volcano reaches nearly 5,300 m, and the ash plume from this eruption reached 60,000 feet. Winds subsequently carried the ash 640 miles south-east into the North Pacific Ocean.*

Image STS068-150-045 courtesy of Earth Sciences & Image Analysis Laboratory, NASA Johnson Space Center (http://eol.jsc.nasa.gov)

Left: *A view from the US Space Shuttle of the earth's limb — the astronauts were watching the dark outlines of thunderstorms at sunset. This image was taken on 30 August 1984, and it can be seen that the atmosphere above the clouds is relatively clear.*

Image STS041D-32-14 courtesy of Earth Sciences & Image Analysis Laboratory, NASA Johnson Space Center (http://eol.jsc.nasa.gov)

Right: *This image was taken by Space Shuttle astronauts on 8 August 1991, less than two months after the eruption of Mount Pinatubo. Two dark layers of volcanic aerosols make distinct boundaries in the atmosphere. The estimated altitude of these layers is 20–25 km.*

Image STS043-22-23 courtesy of Earth Sciences & Image Analysis Laboratory, NASA Johnson Space Center (http://eol.jsc.nasa.gov)

Adventures of the 'open ocean boys'

Brian Miller

The Met Office operates a network of Marine Automatic Weather Stations (MAWS) around the coast of the British Isles. These stations are deployed on open-ocean moored buoys, inshore moored buoys, light-vessels and remote Scottish islands (see Figure 1) by the Meteorological Engineering Service Marine Group team. There is a commitment to maintain these stations on a regular basis and this is the record of one such visit that turned out to be quite eventful.

A moored buoy accidentally becomes a 'drifter'

Wherever the requirement for a servicing visit by the team arises, that particular area is kept under constant surveillance in the search for a suitable weather 'window' which will allow the work to proceed safely in optimum conditions. The team must then be ready to go to sea at 24 hours' notice to undertake the work, but waiting can be very trying at times. For example, the open ocean moored buoy 'K3' (WMO Station Number 62108, positioned at 53° N, 20° W) had been accidentally cut from its 2.5-km mooring early in 2001 by fishermen who, apparently threw this particular catch back, so K3 roamed the North Atlantic for two months before being finally captured during a calm spell near K5.

It became imperative to replace this buoy in its prime location (meteorologically speaking), but the availability of suitable conditions to re-deploy it eluded the team for the next eight months.

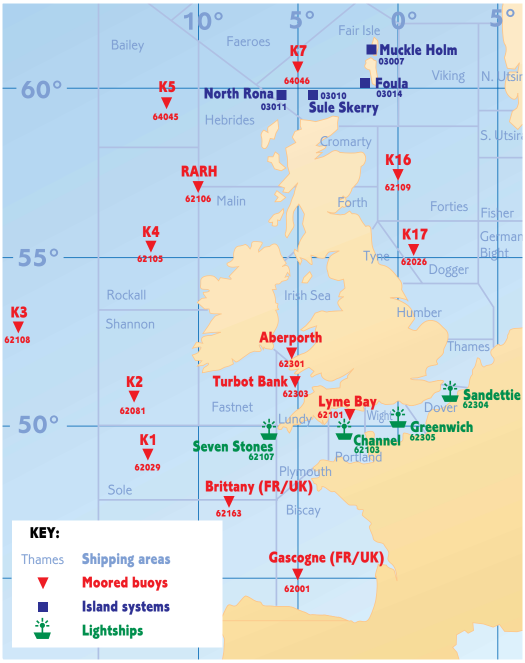


Figure 1. *Met Office Marine Automatic Weather Station network*

A weather window at last

Eventually, forecasts supplied by the National Meteorological Centre (NMC) at Bracknell for the week of 11 November 2001 indicated a suitable weather window. Re-deploying K3 had become a strong possibility, and if the sensors on K1 (WMO Station Number 62029 at 49° N, 12° W) and K2 (WMO Station Number 62081 at 51° N, 13° W) could also be changed on the same trip, then this would be a bonus.

The first requirement was to transport the 4.5-ton buoy and its mooring to the deployment vessel. At 1000 UTC on 7 November the RMAS *Salmaid*, a suitable vessel for the task, was berthed at Portsmouth — unfortunately the buoy at this time was at storage facilities in Pembroke.

Local staff there arranged the hire of a lorry and took the buoy and mooring to Portsmouth on an overnight drive. It was then necessary to reassemble and test the equipment on 8 November prior to loading the vessel. On 9 November the forecasts were still favourable, and at 0800 the *Salmaid* departed Portsmouth to then find N'ly winds of force 7, not a good omen when the preference was for calm cruises!

Target — K1

While heading for K1 (ETA 0700 on 11 November) to change its sensors, and when just four hours out of Portsmouth, the team learned the 'good news' that the mooring on K1 had parted — obviously it had tired of sitting in one place. A 2.5-km mooring was on board destined for the K3 buoy, but with another now required the team had no choice but to divert to Plymouth and await its delivery from Pembroke.

The mooring duly arrived, and as the wind had now eased considerably — as forecast — a pleasant day on 10 November was spent cruising down to K1. Comparison observations were carried out against the buoy's sensors every hour during the day to check for any problems with the system, and in between these there were opportunities to record sightings of the marine life (dolphins and whales being in abundance during this day).

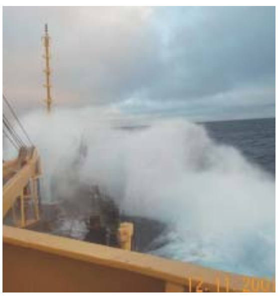
The NMC supplied forecasts to the RMAS *Salmaid* and the Met Office team every 12 hours, and without their assistance the task would have been impossible. They were also a communications link which allowed the team to receive updates on the locations of K1 during the evening of 10 November. During the next 12 hours the vessel steered a course planned to coincide with the buoy's position at first light the following morning — and was right on target, meeting it some 30 miles south of its official location. This was a record recovery time from learning that a buoy was adrift to actually having it back on board a vessel.

Having recovered the buoy RMAS *Salmaid* steamed north and K1 was re-deployed, complete with a new mooring and sensor suite, in its correct location by 1700 on 11 November. Unfortunately, there was no time to recover the old mooring as the team needed to meet a deadline of 13 November for re-deploying K3, but this could be attempted during the return journey. A flock of pigeons had flown past a little earlier, obviously blown off course; did they know something the team did not?

Re-deploying K3

At 1715 K1 was left to its lonely existence, the buoys may look large at close quarters, but they soon become a mere dot in the distance. At 0130 on12 November a rather loud 'crash' and a rough rolling motion woke most people. The rougher conditions forecast for that day had arrived with a vengeance. The buoy on the deck of the ship was recording 5-m seas, and waves were crashing over the bow. The ship's speed was reduced to just 3 knots, and thoughts of a visit to service K2 in passing were quickly forgotten.

The conditions were far worse than expected, but the team was reassured by NMC that all would be well at 53° N, 20° W (the location of K3) by first light on 13 November, the Captain increased speed to 10 knots and RMAS *Salmaid* battled on for another nine hours. Sure enough the conditions slowly improved and, by first light the next morning, work was underway by the RMAS crew



B. Miller

***Above**: The RMAS* Salmaid *heads towards the K3 location* in preparing the new mooring for K3. While the mooring was being deployed, check observations were again compared with those from the buoy's sensors.

In between these observations, a World Ocean Climate Experiment (WOCE) drifting buoy was deployed over the stern of the RMAS *Salmaid* for Météo-France who had requested its deployment on their behalf while at K3.

The deployment of K3 was fairly straightforward but the weather and sea conditions slowly deteriorated throughout the day. What began as a gentle swell of less than one metre with force 3 winds, gradually increased to a 2.35-m sea at 7.2 seconds period, with a wind of force 4 and gusts to force 5 by the time of the launch.

B. Miller

Above: *Deployment of a WOCE buoy on behalf of Météo-France, by Bob Price, with Mooring Officer Roger Perry helping out.*

These were probably the worst conditions in which an open ocean buoy had been deployed. However, it was achieved with success but for the fact that a wind vane became entangled with a handling rope, causing the partial loss of the sensor. Two team members and two of RMAS *Salmaid*'s crew then needed the 'Gemini' work boat to replace this sensor. If the conditions had been any worse, then this task would have been abandoned. As the work boat returned to the vessel, a pod of pilot whales approached the stern of the vessel from the other direction. Those on board RMAS *Salmaid* had visions of the whales surfacing under the Gemini but, thankfully, this was not the case.

Back to Plymouth via K2 and K1

By 1715 on the 13th the Met Office team was heading back to K2. What a contrast to being in that area just 48 hours earlier. Now they were greeted by a long lazy swell, and absolutely calm winds, with whales blowing not that far away.

B. Miller

Above: *A peaceful sensor change at K2. The task of effecting a sensor change is relatively simple, and the buoy technicians tend to ignore the thought of deep water just below them!*

Within three hours the team was on its way again, sailing back to K1 to try and recover the old mooring. All moorings have a sub-surface float and an acoustic release attached in order that a detached mooring can be recovered. The acoustic release was fired and, within 10 minutes, the sub-surface float was back on the surface; once brought inboard the rest of the mooring could be recovered.

Then it was time to return to Plymouth as quickly as possible. That night was very clear, and the Milky Way displayed its majesty; an extra display was also evident in the bow wave of the vessel where flashes of light from bioluminescent organisms rounded off a successful voyage.

CanMar Pride deploys a drifting buoy

On 28 October 2001 at 1400 UTC a drifting buoy was deployed from the *CanMar Pride* during a crossing of the North Atlantic. It was made possible through the kind co-operation of the Master, Captain J.P. Simcox, who had kindly agreed to deploy the buoy on behalf of the Met Office as part of the latter's contribution to the EGOS programme.*

The sequence of pictures shows the following:

***Top left**: Captain Simcox with the SVP-B type drifting buoy (sensors for pressure are contained in the white 'tubular' extension).*

***Top right**: The 'holey sock' drogue lies over the side rails. It connects with the buoy and sits approximately 3 m below the surface in a vertical position once deployed.*

***Bottom right**: The drogue is lowered by hand over the ship's side by Captain Simcox, with Chief Officer R. Verma holding the buoy.*

***Bottom left**: with the drogue on the sea surface, the cable is paid out and the buoy is finally released in position 53° 55.5′ N, 37° 39.8′ W.*

Photos courtesy of N. Wadhwa

* See 'European Group on Ocean Stations', *The Marine Observer*, 2002, 28.

The Shearwater Project — a heavyweight application for Numerical Weather Prediction

Brian Davey

The exploitation of the Earth's oil and gas fields has evolved over recent decades into a very advanced technology-driven industry especially in the spheres of offshore engineering and project management. The Met Office is closely involved with oil companies, aviation companies and marine contractors in supplying required specialised weather information for their operations. An integral part of services to the offshore industry is a team of weather consultants, based at the Met Office in Aberdeen, who work offshore in very weather sensitive installation projects. The Shearwater Project demonstrates how skilled interpretation of Met Office numerical forecast products contributed to the success of a major installation project in the North Sea — and, incidentally, a world record for the largest and heaviest construction placed in one piece on a substructure.

Background to the project

Technology required for the extraction of oil and gas has evolved and grown exponentially in terms of the equipment, methods and scale of implementation. Additionally, increasing demands for energy have driven oil and gas exploration into less accessible, inhospitable deep-water seas. Meanwhile marine contractors have increased the scale of their equipment and have become more efficient with respect to installation work by reducing the time needed for expensive offshore hook-up activities. Thus came the construction of the Shearwater Processing, Utilities and Quarters deck (PUQ) by AMEC at Wallsend, Newcastle upon Tyne.

B. Davey

***Above:** The twin cranes of the* Thialf *await the arrival of the Shearwater PUQ for installation on the waiting support jacket (shown in the middle-distance).*

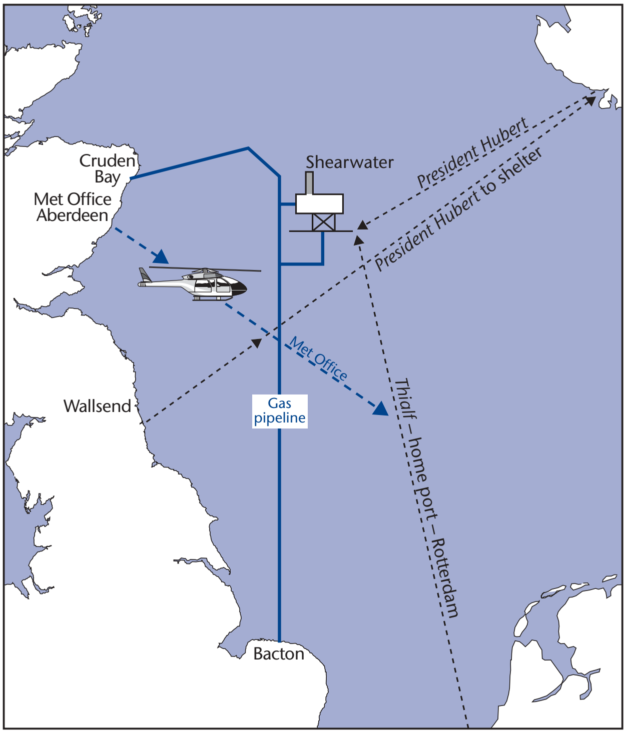
Heerema Marine Contractors are specialists in offshore installation projects. They operate the largest semi-submersible crane vessels (SSCV) in the world, a distinction shared with Saipem. The SSCV *Thialf*, selected for this project, has a lifting capacity of up to 14,200 tonnes and a lifting height of 100 m. The scale and crane technology of this vessel is impressive by any standards. With its giant twin cranes mounted on the stern, it has deck space the size of a football field, accommodation for a possible crew of 736 plus a helicopter deck suitable for the largest helicopters.

That this lift would be accomplished at sea by a SSCV made it all the more extraordinary. These vessels are self-propelled by powerful thrusters with computer controlled Dynamic Positioning. They are constructed on pontoons that can be submerged to some 20 m or so by sea-water ballast, resulting in a relatively stable upper deck even in strong wind and rough sea conditions. However, they are still limited in their crane operations by the colossal forces generated by adverse weather and by long period swell-waves which approach the natural resonance period of the vessel. Another important factor in their utilisation is the stability of the transportation barge with its installation cargo.

The immense costs involved in this project left no room for error either in the amazing engineering technology deployed or in the Met Office forecast products which ultimately controlled the entire operation.

Forecasting the weather 'window'

The evening of Tuesday 4 April 2000 saw my arrival by helicopter at the *Thialf* in the teeth of a northerly gale. The briefing pack collected that morning from the Met Office at Aberdeen indicated a possible weather window starting during the early hours of 6 April. A brief hand-over from fellow team member Robin Steel was just possible before he had to depart on the return flight to Aberdeen. From him I discovered that the *Thialf* was approximately 30 miles from the Shearwater field, and that the PUQ deck on the *President Hubert* barge was somewhere to the south of Norway, sheltering from the northerly gales.



Above: *The location of the* Shearwater *field in the North Sea, and the routes taken by participants in the installation of the PUQ.*

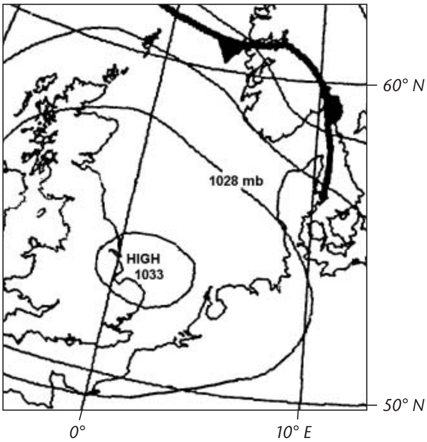
The 1200 UTC model run on the 4th confirmed the possible lifting window from 6–7 April. At the weather briefing that evening were Captain Erik Van Hintum of the *Thialf* and Superintendent Jos Van der Horst, both old acquaintances from previous assignments on the *Thialf*; also present were Phil Shanahan (Chief Shell Structural Engineer), Peter Riley (Shell Designate Operation Installation Manager for the Shearwater Platform) and Chris Collins (Marine Warranty Engineer). My announcement of a possible weather window for Thursday (6th) to Friday (7th) was greeted with some scepticism in view of the current gale-force winds and four marginal windows that had occurred during preceding weeks. Nevertheless, the advice to get back on the Shearwater location as quickly as possible and to recall the 'topside' from southern Norway was taken seriously.

Sea state at Shearwater verifies the forecast

The northerly winds continued to ease during the morning of 5 April. The 0001 Unified Model run was consistent with the previous day's run for a window from Thursday to Friday morning. The Captain, Superintendent and other personnel were briefed to this effect during the morning. The *Thialf* returned to within transmitting range of the Shearwater wave-rider buoy at 0900 which, to my relief and delight, gave a significant wave height reading of 2.7 m with a period of 6 seconds — exactly as forecast for that time. By early afternoon the *Thialf* had arrived back at the Shearwater field and the anchoring process then began while winds continued to ease in line with the forecast. With 12 anchors to lay this task was not completed until late in the evening. The midday Wednesday model run was still consistent for a weather window, albeit with minor time changes. Happily, I was able to express high confidence about this at the evening briefing. The Wednesday morning forecast, based on Tuesday midnight data, continued to verify to within 0.3 or less of one metre.

Synoptic situation expected for the lift

The synoptic situation showed an anticyclone over Northern Ireland forecast to drift east-south-east across northern England on the night of 5/6 April, then across the North Sea to be over The Netherlands early on the 7th. A frontal trough was expected to follow from the west later on the 7th before pressure rebuilt over the North Sea during the next day or two.



Left: *Surface synoptic analysis for 1200 UTC on 6 April 2000 showing high pressure controlling the movement of weather fronts to the north and east of the North Sea.*

Right*: A satellite image verifies the forecast weather 'window' over the North Sea on the afternoon of 6 April 2000. (The UK can be seen towards the left of the image.)*

(Pseudo-colour satellite image courtesy of Dundee Satellite Receiving Station, Dundee University, Scotland: www.sat.dundee.ac.uk)

A route forecast was then prepared for the *President Hubert*'s route back from southern Norway to the Shearwater field. A north to north-north-east swell at Shearwater slowly decayed throughout the day, with a mean wave period of 6 seconds reducing to 5 seconds by late evening. The peak swell period was 7 seconds, but spectral analysis and enhanced swell prediction graphs showed a very small (less than 0.2 m) swell component in the range of 10 to 13 seconds. The response of the PUQ deck barge to this long period swell could only be tested when it was back in position alongside *Thialf*'s stern.

Slightly stronger winds than forecast were recorded overnight on 5 April into the early hours of the 6th as the wind direction backed to westerly. This meant that wind and wave model data for midnight needed a slight adjustment but raw model data were consistent with previous general guidance. I was still able to express high confidence in my forecast at the early morning briefings on the 6th.

The installation of the Shearwater production platform

The *President Hubert* with PUQ (below) arrived back in the Shearwater field during the morning of the 6th. It was then manoeuvred into position along the *Thialf's* stern and observed for a few hours to ascertain pitch, heave and roll.


B. Davey

At a select meeting with the Captain, Superintendent, Senior Marine Engineer and Warranty Engineer around 1430 I remained highly confident in my forecast, the verification curve was within 0.1 m of my Thursday morning significant wave forecast. At this time the wave-rider buoy recorded a significant wave of 1.3 m with 5-second period and was forecast to fall to 0.7 m overnight.

Since the latest test heave readings were already within lifting tolerances, the decision was taken to proceed with the lift and installation. This went very smoothly and only a slight shuddering was felt on the Bridge when the cranes took the full strain of the world-record 11,683-tonne PUQ topside. Once raised, the PUQ then had to be lowered with great precision onto four load-bearing points of its support jacket which was a steel structure 115.5 m high standing in 90 m of water.

B. Davey

***Above:** The installation of the Shearwater PUQ in progress on the evening of 6 April 2000.*

For safety reasons, all personnel not directly involved were required to assemble on the Grand Deck of the *Thialf* during the operation. In my experience this was not a routine procedure for previous big lifts. However, this was a new world-record for a heavy lift and somewhat unknown territory, but by 2030 the installation was successfully completed. A jubilant Superintendent Jos Van der Horst came up to the Bridge and I was the first to be congratulated for my accurate forecast. In truth I was only a small cog in an immense operation involving the Met Office as an entity. However, special credit has to be given to the wave modellers at Bracknell whose very accurate products required very little intervention on my part, also the support given by my colleagues at the Met Office, including Bill Mathieson, who was involved in the first offshore detachment of this lift project.

The heavens celebrate

The greatest surprise occurred soon after the lift when I went outside to complete the 2100 observation * and was greeted by an amazing display of the aurora borealis in vivid colours of white, red and green. It seemed a fitting conclusion to a very successful operation.

The next morning, Friday 7 April 2000, before my helicopter flight back to Aberdeen I read a message from Pieter Heerema, the owner of Heerema Marine Contractors and the *Thialf*, thanking and congratulating everyone involved for their part in this magnificent engineering achievement.

* *Editor's note.* Met Office weather consultants working at offshore locations during weather sensitive projects compile weather observations at three-hourly intervals in order to verify forecasts for the site.

Scene at sea

***Left**: On the evening of 21 December 2001 the P&O freight ferry* Norbay *was scheduled for an overnight voyage from Rotterdam to Hull. Prior to departure, the vessel was visited by* 'The Birds'*. (See page 96 of this edition.)*

One species that contributed to the massed flock was the Redwing, its chestnut-coloured underwings being a diagnostic feature.

A casualty among these is shown below.

Photographs by L. Uden

P. Laycock

***Left**: On 17 October 2001 the* Sulisker *was in position 60° 20′ N, 01° 58′ E, and was in the vicinity of the Dunbar oil platform when a Long-eared owl was seen flying close by.*

Captain P. Laycock and the ship's company watched as Herring gulls mobbed it, forcing the owl to take refuge on the vessel.

VOS Climate project — third project meeting

The third meeting of the project team co-ordinating the VOS Climate (VOSClim) project was held at the Southampton Oceanography Centre from 21–23 January 2002. Captain Gordon V. Mackie (former Met Office Marine Superintendent) chaired the meeting which was attended by delegates from Australia, Canada, Germany, India, Poland, the US and the UK.

1 — Ship recruitment

Recruitment of ships to the project is now gathering pace with ships having been recruited by India, Canada, Australia, and the UK. Although the UK has now recruited 20 ships, and is fast approaching its target of 30 participating ships, the depressed market conditions means that, unfortunately, some of the container ships which have been recruited may be taken out of service or laid up in the coming months.

Canada has recruited 13 ships operating in data-sparse Arctic waters. These ships are all fitted with automatic observing systems* which are compliant with the IMMT-2 Code format developed for the project. Australia has also commenced recruitment with four vessels (*Arafura*, *Australian Pride*, *Al Messilah* and *Kimberley*) being recruited by mid-December 2001 and further recruitments under way. Germany, Poland and the US have also selected ships for future recruitment, whilst Japan initially plans to recruit its five research ships which operate on dedicated routes in the western Pacific.

During the meeting delegates were invited to visit two UK voluntary observing ships which were in port during the meeting — the container ship *P&O Nedlloyd Shackleton* and the Royal Research Ship *Discovery*. The visits were arranged by the Southampton Port Met. Officer, Captain James Roe, but could not have taken place without the kind agreement and co-operation of the shipping companies and ships' officers concerned. Initial steps were taken to recruit both ships to the project.

S. North

S. North

Above: *The* R.R.S. Discovery *(top) and the* P&O Nedlloyd Shackleton*, two of the latest UK recruits to the VOSClim project.*

2 — Project website

The project site has now been uploaded to **http://wf.ncdc.noaa.gov/oa/climate/vosclim/vosclim.html** and will be populated with searchable project metadata† in the near future. The observed data received from project ships together with the co-located forecast model data will be accessible to users via the website. Ship monitoring statistics, the project newsletter, ship inspection forms and relevant project documents will also be made available through the website.

*Automatic Voluntary Observing System

† A large database containing observations-related data, practices and storage details.

3 — Project promotion

A certificate of participation has been developed and will be awarded to all ships that are selected and agree to participate in the project. To encourage recruitment, copies of the VOSClim promotional brochure have now been made available in French and Spanish, and a Japanese version is being developed.

4 — Delayed mode Observation data

Depending on ships' trading patterns, it is planned to download ships' delayed mode observational data at three-monthly intervals. This data will be downloaded, by visiting Port Met. Officers (PMOs), from computers running electronic coding programs such as TurboWin (or from automatic systems in the case of the ships recruited by Canada).

Some ships have been recruited for a sufficient time to start downloading this data (which is stored in IMMT-2 format). The data will subsequently be submitted to the Global [Collecting] Centres (based in the UK and Germany) and thence to the Data Assembly Centre (DAC) based in the National Climate Data Center in Asheville, US, on a quarterly basis.

5 — Real Time Data transmission

Observed variables (i.e. pressure, wind speed, wind direction, air temperature, relative humidity and sea surface temperature) and the co-located forecast model data will be transmitted from the Met Office (the project's Real Time Monitoring Centre) to the DAC on a daily basis. The data will be transferred in BUFR* code.

6 — Recruitment and Inspection forms

Amendments to the recruitment/inspection forms used by PMOs for recording project ships' particulars were agreed, and revised forms will be available in the near future. Electronic versions are also being developed which will automatically arrange the ships' data into the required format for submission to the DAC. The project database can then be populated with project ships' metadata which will be available to users via the project web-site.

Forms being developed for the VOSClim project ships could, in due course, become the basis of a standardised form for use in recruiting and surveying all voluntary observing ships.

7 — Monitoring statistics

The criteria for monitoring project ships' real time observations have now been agreed, but may need further refinement once sufficient numbers of observations have been received from participating ships to determine whether they have been set at an appropriate level.

The format of the monitoring statistics that will be sent by the Met Office to the DAC (for posting on the project website) has also been agreed. The statistics will be sent each month commencing at the end of March. Lists of suspect project ships will be sent to national focal points on a monthly and weekly basis in order that action can be taken to repair, recalibrate, replace or relocate faulty instruments where necessary. It is intended that in due course it will be possible to include on the project website the details of such remedial actions, thereby avoiding duplication of inspections by PMOs in different countries.

* Binary Universal Form for the Representation of meteorological data (FM94-XI Ext. BUFR)

8 — Project Newsletter

The scope of contents for the project newsletter was agreed and the WMO Secretariat has been tasked with preparing a first issue by September 2002. The newsletter will be downloadable via the project website; printed copies will also be made available to participating ships through PMOs and may also be distributed with publications such as *The Marine Observer*. It is anticipated that the newsletter will be issued on a six-monthly basis. All participating ships are invited to submit articles relating to the project or to observing practices for inclusion in the newsletter.

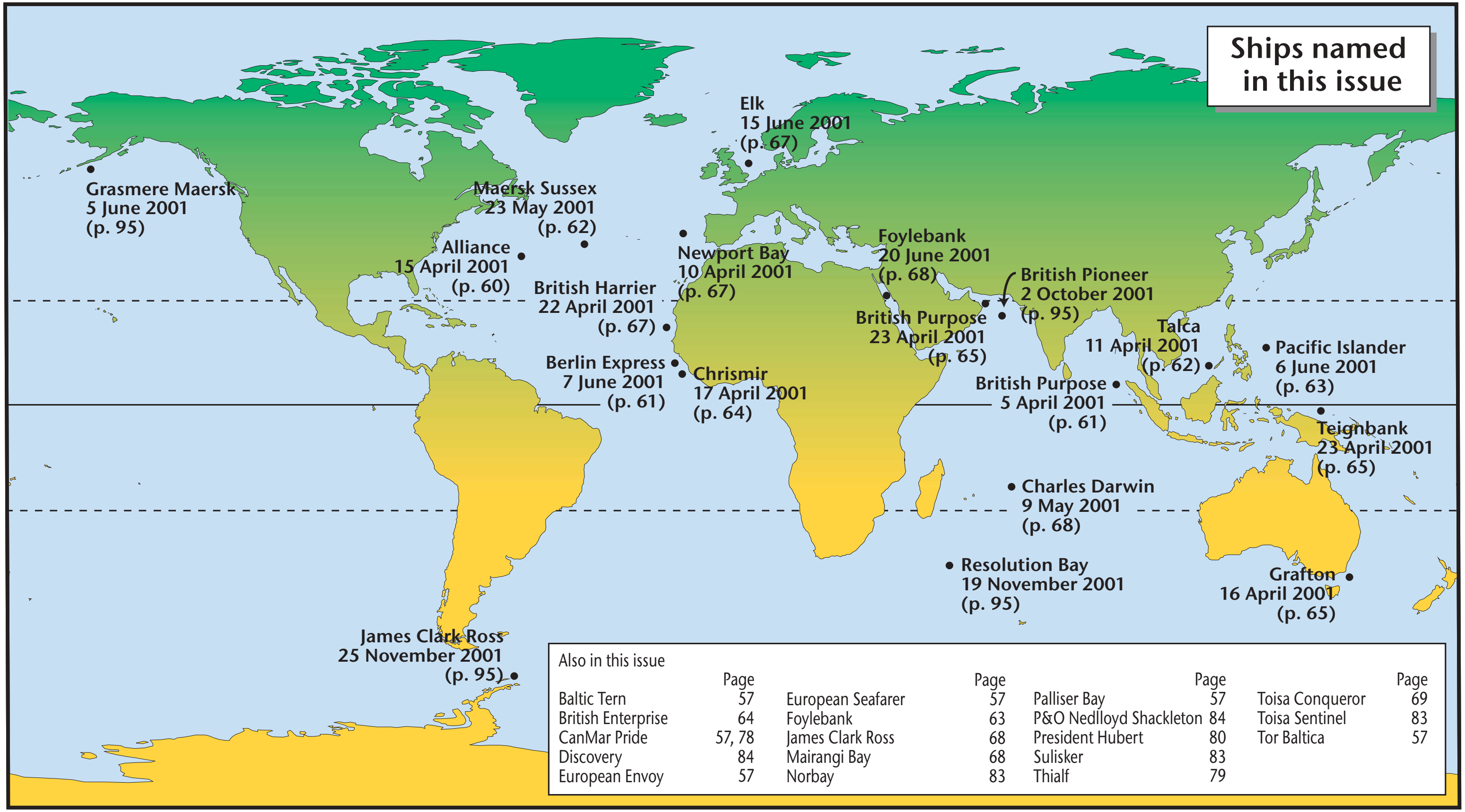
9 — Data uses

It was pointed out at the meeting that VOSClim data will form an important resource for initiatives such as the World Climate Research Programme Surface Flux Analysis Project (SURFA) which aims to provide validation of NWP meteorological and flux fields. In addition, as the dataset grows, analysis will be undertaken within other activities such as those sponsored by the Atmospheric Observations Panel for Climate (AOPC) and the Climate Variability and Predictability (CLIVAR) project.

S. North

Left: *Captain Gordon V. Mackie (centre) with delegates to the third VOSClim meeting. (Captain james M. Roe, UK Port Met. Officer for South-west England stands third from the right.) In the background is* P&O Nedlloyd Shackleton.

Ships named in this issue



Also in this issue

International Ice Patrol*

MST3 R. Kenwood and Lt C. Strong

R.M.S. *Titanic* left on her maiden voyage from the port of Southampton, en route for New York City with the fame of being the unsinkable ship. On the night of April 14, 1912 the *Titanic* struck an iceberg just south of the Grand Banks of Newfoundland and within two and a half hours she sank, taking the lives of over 1,500 passengers and crew. This devastating accident generated a public outcry demanding safe passage across the North Atlantic Ocean. However, this was not the only tragedy that had occurred in this region. Between 1880 and 1890, 40 vessels were seriously damaged and 14 were lost due to ice. The need for safe passage through these ice-infested waters was immediately addressed by many maritime nations and as a result, the precursor of the International Ice Patrol was established. For the remainder of 1912, the US Navy sent cruisers to serve as sentry on the Grand Banks of Newfoundland, but the Navy could not spare the ships to perform this mission for long. Therefore, in 1913 the Revenue Cutter Service (now the US Coast Guard) assumed the patrol.

The *Titanic* disaster spurred many maritime nations to examine the safety of their vessels on the open ocean. The first international conference on the safety of vessels at sea was convened in London on November 12, 1913, during which the subject of patrolling the ice regions was thoroughly discussed. On January 30, 1914, the delegates signed an international convention called the Safety of Life at Sea (SOLAS), but it would not go into effect until July 1, 1915. Among the many maritime issues addressed in SOLAS is patrolling the vicinity of the Grand Banks and informing passing vessels of the extent of iceberg danger. To deal with this specific issue, SOLAS mandated the creation of the International Ice Patrol with funding from the international signatories. With the *Titanic* incident still very fresh in everyone's minds, there was some concern that waiting until July 1915 would not be sufficient. Therefore, on January 31, the government of Great Britain, on behalf of the several nations interested, made inquiry as to whether the United States would undertake the patrol at once under the provisions stipulated in the convention. The proposition was favourably considered by President Wilson and on February 7, 1914, he directed that the (then) Revenue Cutter Service begin the International Ice Patrol as soon as possible. Since then, the US Coast Guard (Revenue Cutter Service) has conducted the patrol each year, with the exception of a brief period during World War II.

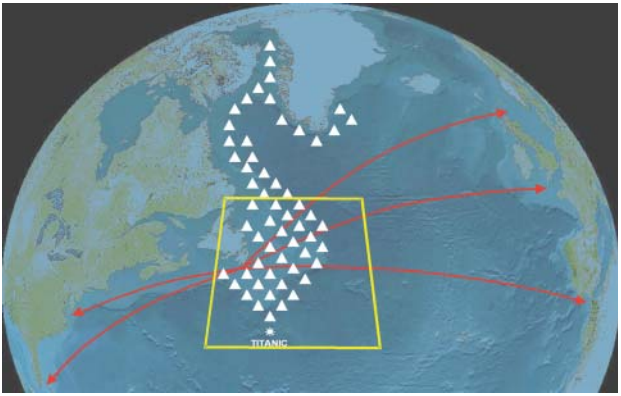


Figure 1: *Great circle routes from Europe to North America*

The region known as the Grand Banks of Newfoundland is of particular interest for several reasons. First, the great circle route, the shortest distance between two ports, connecting the US and Canada with Europe crosses right through this area (Figure 1).

* Reproduced from *Mariners Weather Log*, April 2001, 4–8, courtesy National Oceanic and Atmospheric Administration

This means that there is a high volume of merchant vessels that need to cross this treacherous region. Second, the Grand Banks are home to very productive fishing grounds, which makes it especially attractive to commercial fishermen, which only serves to compound the high traffic density. Finally, the adverse environmental conditions (high winds, rough seas, and dense fog) makes this locale even more dangerous. Probably the most important environmental factor to consider is the dense fog that often occurs on and near the Grand Banks. This occurs when the southern flow of the Labrador Current joins the warm Gulf Stream waters at the tail of the Banks. As warm winds flow over the Gulf Stream and then over the cold Labrador Current, an advective fog forms which can last for many days. This dense blanket of fog severely limits visibility and restricts a vessel's ability to manoeuvre. Furthermore, the upper level jet stream frequently flows right over this region. As a result, (mid-latitude) low-pressure systems often move right through, bringing severe weather with high winds and seas.

The oceanographic structures in this region also contribute to the danger around the Grand Banks of Newfoundland. The principal contributors are the Labrador Current and the bathymetry. The Labrador Current is the main ocean current responsible for transporting icebergs into this region. It is a relatively fast-moving current that stays cold enough to carry icebergs all the way from the Labrador Sea and Baffin Bay to southern temperate waters. In fact, the *Titanic* sank at the latitude of Providence, Rhode Island. The bathymetry is also responsible for the transport of icebergs, but it has more impact on where icebergs flow rather than how fast. Due to the fact that the majority of an iceberg's mass lies below the water, its track is greatly governed by the sub-surface currents. The depths of these currents, like the Labrador, often indicate that they follow the 1,000-metre curve. The result of this is that icebergs commonly track through the gap between the Grand Banks and the Flemish Cap, affectionately termed 'iceberg alley'.

Due to the constant dangers in this area the International Ice Patrol (IIP), operating out of Groton, Connecticut, maintains an ever vigilant watch over the North Atlantic and reports the Limit of All Known Ice (LAKI) for the Grand Banks of Newfoundland and the surrounding area. Seasonal patrol dates have remained largely unchanged from year to year. Reconnaissance usually begins in late February and continues through July, but the exact dates vary from year to year as dictated by the distribution of icebergs. The longest season on record was in 1992, which lasted from February 7 to September 26, for a total of 203 days. Conversely, in 1999 the season never opened due to the fact that most icebergs were pushed west rather than south. Except during extreme years, the Grand Banks are generally clear of ice from August to February, with the exception of a few stray icebergs.

Today the IIP uses HC-130H Hercules aircraft, which can cover over 2,000 nautical miles and fly for more than 12 hours. However, the IIP typically flies five- to seven-hour patrols. They use planes out of Elizabeth City, North Carolina, that are equipped with forward and side looking airborne radar for iceberg detection. Each flight covers an average of 30,000 square miles of ocean. Visual observations are conducted when conditions allow, but due to low cloud ceilings and the dense fog described earlier, good visibility conditions only exist about 30 per cent of the time. During the ice season, IIP's reconnaissance detachments deploy to St. John's, Newfoundland, every other week and complete about five patrols over a nine-day period. As explained earlier, the patrol was initially conducted using Coast Guard cutters, but this method of operation proved very expensive and time-consuming. After World War II the Coast Guard began using aircraft to fly reconnaissance.

How to report icebergs

Due to the high number of vessels that transit through this region, the Ice Patrol encourages commercial vessels to immediately report ice sightings to COMINTICEPAT GROTON CT through Inmarsat-A or C, using Code 42; to US Coast Guard Communication stations; or to Canadian Coast Guard marine radio stations. Even when no ice is sighted, regular weather and sea surface temperature reports provide valuable information. Commercial vessels are an important source of iceberg information. During the 2000 ice season, 257 ships sent the IIP 1,415 reports, 79.1 per cent of all reports received. Of all the reports, 444 contained information concerning icebergs, accounting for 60.7 per cent of all iceberg reports. Additionally, this population also provided the Ice Patrol with information on 28.9 per cent of the icebergs that were used to set the Limit of All Known Ice.

Sightings may be reported on guarded frequencies as listed in the annual *Announcement of Services*. Copies of the annual *Announcement of Services* are available through several methods:

1. World Wide Web — www.uscg.mil/lantarea/iip/data/ann_ser.html
2. E-mail request to — iipcomms@rdc.uscg.mil
3. Mail request to — Commander, International Ice Patrol, 1082 Shennecossett Road, Groton, CT 06340-6095. (Attention: Ice Information Officer)
4. Phone request to: +1 (860) 441-2626

What to include in an Ice Report

When reporting icebergs, certain information should be included:

- Ship's name and call sign
- Date/Time (UTC) ice was sighted.
- Iceberg position (latitude, longitude)
- Method of observation (radar, visual, both)
- Number of icebergs
- Size and shape (see Tables 1 and 2)

Table 1 — Sizing guidelines

Size	*Height*		*Length*	
	(ft)	*(m)*	*(ft)*	*(m)*
Growler	<17	<5	<50	<15
Small berg	17–50	5–15	50–200	15–60
Medium berg	51–150	16–45	201–400	61–122
Large berg	151–240	46–75	401–670	123–213
Very large berg	>240	>75	>670	>213

Table 2 — Shape guidelines

Shape	*Description*
Non-tabular	This category covers all icebergs that are not tabular shaped as described below. This includes icebergs that are dome-shaped, sloping, blocky and pinnacle.
Tabular	Flat-topped iceberg with length-height ratio greater than 5:1

Ice data is constantly analysed at the International Ice Patrol operations centre at Groton, Connecticut, and added to a computer model. This model incorporates environmental factors such as winds, waves, currents, and sea surface temperatures with iceberg reports to predict drift and deterioration. The processed information from the model is used to estimate the Limit of All Known Ice every 12 hours. The LAKI, sea ice limit, and an area of many bergs are broadcast in two daily text bulletins and a graphic fax chart. The broadcast times and frequencies are available in the *Annual Announcement of Services*. They are also posted daily in the Products section of the IIP webpage at: www.uscg.mil/lantarea/iip/home.html.

The Ice Patrol

The crew of 16 ice observers or 'Ice Picks' from Groton, Connecticut, includes a civilian oceanographer and computer specialist, four officers, one yeoman, and nine marine science technicians. The Ice Picks work closely with expert aviation technicians and aircrew from Coast Guard Air Station Elizabeth City, North Carolina. The small crew of the International Ice Patrol is dedicated to serving the North Atlantic mariner and protecting seafarers of all nations from the dangers of icebergs. Since the US Coast Guard began monitoring ice conditions in 1913, they have amassed an enviable safety record: There have been no reported losses of life or property for vessels that have heeded published warnings.

The International Ice Patrol is grateful to all mariners who have contributed to this record and hopes to have your support in the future. Should you have any questions or comments, please contact the International Ice Patrol by e-mail, through the World Wide Web or call: +1 (860) 441-2626.

Who needs ships' weather observations?

J. Nelson

PMO Houston (Retired)

When I went aboard ships for a routine visit and asked Captains if they would like to join the weather observing program, I often heard comments such as, "I don't have time because I'm short-handed", "I don't have a radio operator", or, "I go coastwise so you don't need any weather from me". But the best one of all was: "You don't need any weather observations, you have satellites".

Satellites show where the sky is clear and cloudy and provide a thermal profile, but *only you know the weather at your position!* Satellites can't look through cloud cover to tell us how hard the wind is blowing, what the pressure is, how high the seas are, or what type of precipitation is falling. Forecasters, worldwide look for the synoptic ship report, which might give them a clue as to whether a low is getting stronger or weaker. Whether you are on the high seas or going coastal, your reports are vital in preparing the weather forecast. *And weather forecasts are prepared for your safety!!* That is why I don't understand a ship master saying "No" when asked to help us in preparing the weather forecasts. So let me pass on some facts and dispel some myths.

Observations are important

Over land, a great number of hourly observations are received at computer centers around the world and are exchanged with other countries by way of the Global Telecommunication System (GTS). These hourly observations are used extensively by civil aviation and meteorologists to keep up with ever-changing trends in weather. In addition, there are six-hourly synoptic observations taken by thousands of land sites around the world for use in the surface analysis. The generated weather analysis maps are then broadcast over landline computer and/or facsimile circuits, and radio facsimile.

Over water areas we have a limited response. Even though water covers much of the earth's surface, we still have a problem convincing ship personnel that their weather reports are valuable. It is not unusual to have an analysis over the ocean based on 100 ship reports. While 100 may seem large, if you put that many dots on a large base map they get lost. Also more than half of those 100 observations are usually along a regular trade route, leaving a vast expanse of uncovered ocean.

Historical significance

Prior to World War II, oceanic analysis was not done routinely, in real time, like it is done today. Even over land it took hours for the weather to be received and plotted by hand. The Japanese used bad weather to successfully cloak their movements prior to, and during, their approach to the Hawaiian Islands for their attack on Pearl Harbor on December 7, 1941. They received special broadcasts with synoptic data and vital ship reports from their task force, which enabled them to move undetected across the Pacific.

The Allies began to realise the importance of weather and many campaigns commenced on the basis of a weather forecast. The landings made on the beaches of Normandy on June 6, 1944, were successful, in part, because of a forecasted, brief lull in storm conditions. As Allies moved across the Pacific Ocean, a network of observation sites was established and maintained. Military and merchant marine vessels played a critical role in this overall scheme. Ships underway had to record weather observations for the deck log, but it wasn't until late in the war that most ships started transmitting weather. Compared to the sophisticated computer systems of today, this was somewhat crude, but served its purpose.

This system continued after the war. Beginning in the fifties and sixties, computers started doing some of the data processing needed to build forecast models. It was soon realized that the lack of ship reports often hampered this effort. Through the seventies and eighties, merchant fleets shrank as ship size increased, so that the number of observations decreased. Even with this decrease, an adequate number is theoretically available if everyone co-operates. Many tramp ships do not use regular routes and their observations are especially vital.

Today's Program

Recruiting is the most important role of the Port Meteorologist. We talk to many ships' Captains who realize the value of taking and sending weather observations. Some believe that US PMOs work strictly for their own program. In reality, all nations benefit when we enlist a ship in the Voluntary Observing Ship program, since this is actually a World Meteorological Organization program. All ship data are passed around the world via GTS, which is unique in that it has been in operation for many years. Within minutes of receipt, a weather observation is available for use at forecast centers worldwide. Ship observations are not only used to make forecasts. They are used to verify forecasts and also in climatological studies. Researchers use observations for a particular area, or a particular storm to understand why a system behaved in a certain manner.

Tomorrow's Program

While advances in observation techniques and practices have taken place over the past 50 years, the basic structure has remained the same. However, with increasing automation of shipboard operations, weather services are looking for better ways to receive observations in the future. One idea is the automatic transmission of weather data direct to satellite. The US has software called Shipboard Environmental Data Acquisition System (SEAS) which can now be installed on either a DOS® computer or a Windows® computer. This software was designed in conjunction with the United States Coast Guard AMVER Center and allows a ship to use it with both AMVER reports and weather observations. When a ship is ready to leave port, they need to send a sail plan to AMVER. Once at sea, all the mate on watch needs to do is send the weather every six hours, which alleviates the need to send AMVER position reports. The weather observation becomes the AMVER position report. AMVER will automatically get your call sign, position and course and speed every time you transmit a weather observation. Currently the US has 329 ships transmitting weather observations, oceanographic observations and AMVER reports. This number grows monthly and it is our hope all merchant ships in the US VOS program will send us their weather observations using SEAS. *Is your ship included in the 329 SEAS ships?* By using SEAS software, you will be adding to the safety of all men and women at sea. If you wish a copy of our AMVER/SEAS 2000 (currently Version 5.3), contact any [US] Port Meteorological Officer (PMO). All you will need is a Windows® based computer on the bridge near the Standard 'C'.

Editor's note. AMVER. Automated Mutual-assistance VEssel Rescue (originally known as the Atlantic Merchant Vessel Emergency Reporting system upon inauguration in July 1958).

Your friendly PMO

Remember, when you see a PMO from any country coming aboard for a visit, he's there to help you. He's not trying to get something for free. The things he wants you to do will pay you back by providing more accurate weather maps and forecasts. He will also provide a barometer check to help ensure a safe voyage. If you are in the Voluntary Observing Ship (VOS) program, the PMO will also make sure your supplies are up to operating levels. US PMOs will also provide you, as available, with the latest literature that pertains to some aspect of the VOS program.

How can you go wrong? Not only are you provided with everything you need to do the job, but you get a more accurate end result. Even if you have a weather routing service, they too benefit from your observations. Most of the largest weather routing services receive all the weather observations we receive. So if you don't belong please think about joining the next time a PMO comes aboard.

Postscript

The position of Port Met. Officer for Houston/Galveston was vacated by James (Jim) Nelson following his retirement on 29 March 2002.

E. Nelson

Jim Nelson began his 47-year career with the US Government in October 1954 when he joined the Navy. During his early training he saw his first tornado, which prompted him to apply for a place in the Weather School, at Lakehurst NJ.

Graduating in 1955 he was assigned to the USS *Antietam* and, in 1957, to the Naval Air Station at Quonset Point RI. Experience of NATO excersises followed and, in 1959, he was assigned to the USS *Otterstetter* having first undergone radiosonde training. While on patrol in 1960, the *Otterstetter* was caught up in what history calls the 'Ash Wednesday Storm' that caused considerable damage in The Netherlands. The *Otterstetter* also broke her back in that storm and so Jim was transferred to the USS *Edisto*. Reporting for duty in March that year, he then headed north to Thule and other 'exotic' northern locations. In October, he was heading towards Antarctica, arriving in the southern summer.

After Antarctica, held by Jim to be "absolutely the quietest place in the world", he transferred in 1961 to the USS *Independence* for six months in the Mediterranean. Weather forecasting then started to feature in his career when he was assigned to forecaster training back at Lakehurst. This led to three years at Fleet Weather Central, in Norfolk VA, and a further three years at Rota (Spain) where Jim worked in forecasting, operations and communications. In 1969 he returned to Lakehurst as an instructor in aviation and synoptic surface observations, meteorology, plotting and upper-air soundings. He left in 1972 as supervisor in the weather laboratory, guiding students as they put theory into practice. In 1973 he transferred to the Naval Weather Service Detachment, in Charleston SC, retiring from the Navy in the following year.

A second career, with the National Oceanic and Atmospheric Administration, began in 1975 when he joined what is now the National Climatic Data Center, in Ashville NC. Here, he worked in surface and upper-air data, and also dealt with queries from the Technical Data Section. April 1984 saw his selection for work in Galveston as a radar operator, and it was from there that he moved in 1987 to become the Port Met. Officer for Galveston/Houston.

His support to the UK Voluntary Observing Fleet and to the Bracknell-based Met Office staff has been much appreciated, and we wish Jim and his wife Elizabeth all the best for the future.

E-mailed reports from UK observing ships

Readers are reminded that additional observations can be e-mailed direct to the Editor at: obsmar@metoffice.com

m.v. *Resolution Bay.* Captain A.M. Tweedie. Observers: J.J. Southam (3rd Officer) and D.M. Pettimore (Supernumerary)

On 19 November at 0540 UTC as many as seven albatrosses were seen circling the vessel. Upon closer inspection one of them appeared to be an Amsterdam albatross — apparently a rare species. This bird stood out from the others owing to the fact that it was different. It had a dark body and the wings were dark on top, but its undersides appeared white with a dark collar while there were also dark tips to the underwings. It appeared to be shorter in both length and wing-span than the Royal albatross. The vessel at this time was approximately 1,350 miles west-by-south of Amsterdam Island (where these birds originate), in position 39° 58.2′ S, 49° 33.1′ E.

R.R.S. *James Clark Ross.* Observers: R. Paterson (Chief Officer) and L. Hawker, (Scientist, Southampton Oceanography Centre).

On 25 November 2001 at 0730 UTC the vessel was in Drake Passage about 85 miles north of Elephant Island. In fairly calm conditions the ship was keeping station on dynamic positioning for the deployment of a CTD to a depth of about 3,500 m when a leopard seal was spotted near the stern. The seal remained in the vicinity of the port side of the ship, mainly basking on the surface, for well over an hour. At times it approached within about 20 m, appearing to be very interested in the activity on deck and apparently unconcerned with the noise generated by the vessel's thrusters, propulsion and echo sounders. There was no ice in the vicinity of the ship at the time.

m.v. *British Pioneer.* Captain K. Howlett. Observers: P. Kuskowski (2nd Officer) and J. Reodique (AB)

On 2 October 2001 when the vessel was in position 19° 17′ N, 63° 42′ E in the Arabian Sea, whilst on passage from Oman to Malaysia, a bird was sighted resting on the port side bridge wing shortly after sunrise at 0200 UTC.

It was approximately 25 cm long over all. Its chest was a red colour but the top of its head was blue-black, its bill was thin and long in comparison to the rest of the body, and the wings were navy-blue with black ends; its tail was quite long and slight. After drinking from fresh water provided, it was seen on deck several times during the day. The bird was identified as a Southern Carmine bee-eater, most likely coming on board in east Oman the previous day. At the time of observation the wind was SSW'ly, force 4 with moderate sea and a cloudless sky.

m.v. *Grasmere Maersk.* Captain P. Doyle. Observers: Captain Doyle, T. Bowker (Chief Officer) and L. Price (Cadet)

On 5 June 2001 the vessel was navigating in the Gulf of Alaska, approximately 70 miles from Unimak Passage on a course of 279° at a speed of 22 knots. At around 1700 UTC distinct plumes of water were spotted at a distance of about one mile on the starboard side. As the vessel passed, a pod of whales thought to be Humpbacks was sighted. Over a period of about 30 minutes four more groups of whales were seen blowing on both sides of the vessel. In the areas where the whales were surfacing there were also large numbers of unidentified seabirds sitting on the water.

Postbag

Birds mass on North Sea ferry

On the evening of Saturday 20 October, the P&O freight ferry *Norbay* left Rotterdam on her scheduled overnight run to Hull.

As well as the booked drivers, several thousand extra passengers joined as the vessel departed Benelux Haven for the Maas Centre Buoy. The air space over the ship's accommodation was thick with wheeling and swooping birds all vying for a first-class perch. Every available railing (four rungs deep), wire, lifeboat and deck fitting was occupied with chattering, squawking, feathered stowaways jostling and fighting for a space to roost. The VHF whip aerial was bent over 90° with the weight of its occupants.

Upon going outside on the bridge deck, the noise of bird chatter and the air being filled with birds still looking for a slot, made a scene reminiscent of Alfred Hitchcock's film *The Birds*.

The birds had the size, shape and behaviour of starlings, but on inspection of a couple of casualties the next morning, it was seen that their markings were rather different, with red undersides to their wings.

Despite passing other vessels during the course of the voyage, and the Norfolk coast being within easy flying distance at times, the entire flock stayed with us until the Humber. Once in the Humber, some left as we passed Grimsby but the bulk of them remained until the vessel berthed at the River Terminal, King George Dock.

Needless to say, there was a fair amount of bird lime to clear up, but the worst mess was caused by millions of little feet landing on the well-greased wires of the lifeboat and then tramping over the white handrails. We hope they did not visit the housewives of Hull's washing lines before cleaning their feet!

Without any exaggeration there must have been upward of a million birds travelling from the continent to the UK.

L. Uden. Second Officer, *m.v. Norbay*

Editor's note. A picture showing some of the birdlife travelling with the *Norbay* appears on page 83.

Observations from an Atlantic oil field

Editor's note. The following is an extract from correspondence received from the *Toisa Sentinel*, and is reproduced as a note of general interest to seafarers.

The *Toisa Sentinel* is a Dive Support Vessel and you may be interested to know something about our location. We have been, and will continue to work for the foreseeable future, in the Campos Basin oil fields which are at the continental shelf of Brazil and beyond. We support divers down to 300 metres but ROVs go down to 2,000 metres.

The Falkland and Brazil currents flowing in opposite directions, together with eddies at their margins, cause wide differences in current direction and speed at the surface, both on a day-to-day basis and across the geographical range of the field (50 miles north-east to south-west). We also experience at times a surface drift from the south-east and, by observing the descent of the ROV, discern currents at different depths in the water column — it is not unusual for the current at depth to be 180 degrees different to that at some intermediate depth. We have seen up to three noticeably different currents even in depths of less than 300 metres.

The local variant of the South-east Trades is the predominant wind especially in summer, although here it actually comes from the north-east. In the last two or three years it seems to me that the 'unbent' south-easterly direction has increased in frequency. We experience a rapid backing of wind to the south-west as pressure drops and, from this direction, we can expect strong winds, a heavy swell and rain. Pressure rises as wind backs further towards the north-east from which direction the cycle repeats itself.

A swell from the south-east underlies others, but bad weather to the south brings south-westerly seas and swells which can (as when we experienced a SW'ly at our location) give waves of up to eight metres. The NE'ly wind, although it reaches 30 knots at times, brings a short and short-lived sea sometimes reaching five metres.

Captain R.O. Chaplin. Master, Dive Support Vessel *Toisa Sentinel* (Sealion Shipping Ltd)

Noticeboard

Amendments to SOLAS Chapter V

On 1 July 2002 amendments to Chapter V ('Safety of Navigation') of the International Convention for the Safety Of Life at Sea (SOLAS), 1974 will come into force. The amendments have been agreed by the International Maritime Organisations' Maritime Safety Committee, and will be implemented in the UK by the Merchant Shipping (Safety of Navigation) Regulations 2002* which are due to come into force on the same date.

These regulations will, in turn, refer to a Maritime and Coastguard Agency (MCA) publication entitled *Safety of Navigation Implementing SOLAS Chapter V 2002* containing the full text of Chapter V together with associated guidance on the application of the new requirements.

The new regulations will be available in both electronic and paper format, and will include new carriage requirements for shipborne navigational systems and equipment. In general the new carriage requirements will be applicable to new ships; existing ships can continue to comply with the previous Chapter V requirements.

However, there are three items of equipment which will be required to be carried by specified existing ship types by specified dates — namely a global navigation satellite system, a 'black box' voyage data recorder and an automatic identification system (which will permit coastal authorities to identify ships and track their progress).

The main requirements of significance for UK Voluntary Observing Ships are contained in the following new SOLAS Regulations:

■ *Regulation 5 — Meteorological service and warnings*

The previous SOLAS Convention requirements (in Regulation 4) will be updated and expanded to take account of developments in communications and the availability of forecasts. It emphasises to national administrations, shipping companies and ship Masters that although there have been significant developments in weather forecasting, weather reports from ships still play an essential role in providing accurate forecasts.

■ *Regulation 32 — Information required in danger messages*

This Regulation replaces previous SOLAS Regulation 3 and details the information that is required to be included in messages concerning dangers to navigation.

As Regulations 5 and 32 will form the basis for future observational practices on UK ships, they are reproduced in full on pages 99 to 101, while examples of danger messages relating to meteorological and ice hazards are also given on page 101.

In addition to the above, SOLAS Regulation 31 (which replaces the previous requirements in Regulation 2), requires Masters to report information on navigational and meteorological hazards to ships in the vicinity and to the competent authorities. These requirements are largely unchanged from those currently in force. Hazards that should be reported include dangerous floating ice, tropical storms, sub-freezing air temperatures associated with gale force winds causing sever ice accretion on superstructures, and winds of force 10 or above for which no storm warning has been received.

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*The draft UK Regulations have been widely circulated to shipping related organisations for final comment. Following analysis of the comments received from consultees it is planned to lay the new legislation before Parliament in April 2002.

Extracts from SOLAS Chapter V (Safety of Navigation) 2002

Regulation 5

1 Contracting Governments undertake to encourage the collection of meteorological data by ships at sea and to arrange for their examination, dissemination and exchange in the manner most suitable for the purpose of aiding navigation.* Administrations shall encourage the use of meteorological instruments of a high degree of accuracy, and shall facilitate the checking of such instruments upon request. Arrangements may be made by appropriate national meteorological services for this checking to be undertaken, free of charge to the ship.

2 In particular, Contracting Governments undertake to carry out, in co-operation, the following meteorological arrangements:

.1 to warn ships of gales, storms and tropical cyclones by the issue of information in text and, as far as practicable graphic form, using the appropriate facilities for terrestrial and space radiocommunications services.

.2 to issue, at least twice daily, by terrestrial and space radiocommunications services†, as appropriate, weather information suitable for shipping containing data, analyses, warnings and forecasts of weather, waves and ice. Such information shall be transmitted in text and, as far as practicable, graphic form including meteorological analysis and prognosis charts transmitted by facsimile or in digital form for reconstitution on board the ship's data processing system.

.3 to prepare and issue such publications as may be necessary for the efficient conduct of meteorological work at sea, and to arrange, if practicable, for the publication and making available of daily weather charts for the information of departing ships.

.4 to arrange for a selection of ships to be equipped with tested meteorological instruments (such as a barometer, a barograph, a psychrometer, and suitable apparatus for measuring sea temperature) for use in this service, and to take, record and transmit meteorological observations at the main standard times for surface synoptic observations (i.e., at least four times daily; whenever circumstances permit) and to encourage other ships to take, record and transmit observations in a modified form, particularly when in areas where shipping is sparse.

.5 to encourage companies to involve as many of their ships as practicable in the making and recording of weather observations; these observations to be transmitted using the ship's terrestrial or space radiocommunications facilities for the benefit of the various national meteorological services.

.6 the transmission of these weather observations is free of charge to the ships concerned.

.7 when in the vicinity of a tropical cyclone, (or of a suspected tropical cyclone), ships should be encouraged to make and transmit their observations at more frequent intervals whenever practicable, bearing in mind navigational preoccupations of ships' officers during storm conditions.

.8 to arrange for the reception and transmission of weather messages from and to ships, using the appropriate shore-based facilities for terrestrial and space radiocommunications services.

*Refer to Recommendation on weather routeing adopted by the Organisation by Resolution A. 528(13)

† Refer to regulations IV/7.1.4 and IV/7.1.5

Regulation 5 (contd)

.9 to encourage Masters to inform ships in the vicinity, and also shore stations whenever they experience a wind speed of 50 knots or more (force 10 on the Beaufort scale).

.10 to endeavour to obtain a uniform procedure in regard to the *international* meteorological services already specified, and as far as practicable, to conform to the technical regulations and recommendations made by the World Meteorological Organization, to which Contracting Governments may refer, for study and advice, any meteorological question which may arise in carrying out the present Convention.

3 The information provided for this regulation shall be furnished in a form for transmission and be transmitted in the order of priority prescribed by the Radio Regulations. During transmission "to all stations" of meteorological information, forecasts and warnings, all ships stations must conform to the provisions of the Radio Regulations.

4 Forecasts, warnings, synoptic and other meteorological data intended for ships shall be issued and disseminated by the national meteorological service in the best position to serve various coastal and high seas areas, in accordance with mutual arrangements made by Contracting Governments, in particular as defined by the World Meteorological Organization's System for the Preparation and Dissemination of Meteorological Forecasts and Warnings for the High Seas under the Global Maritime Distress and Safety System (GMDSS).

Regulation 32

The following information is required in danger messages:

1 Ice, derelicts and other dangers to navigation:

.1 The kind of ice, derelict or danger observed.

.2 The position of the ice, derelict or danger when last observed.

.3 The time and date (Universal Co-ordinated Time) when the danger was last observed.

2 Tropical cyclones (storms)*

.1 A statement that a tropical cyclone has been encountered. This obligation should be interpreted in a broad spirit, and, information transmitted whenever the Master has good reason to believe that a tropical cyclone is developing or exists in the neighbourhood.

.2 Time, date (Universal Co-ordinated Time) and position of ship when the observation was taken.

.3 As much of the following information as is practicable should be included in the message:

- barometric pressure†, preferably corrected (stating millibars, millimetres or inches, and whether corrected or uncorrected);
- barometric tendency (the change in barometric pressure during the past three hours);
- true wind direction;
- wind force (Beaufort scale);
- state of the sea (smooth, moderate, rough, high);
- swell (slight, moderate, heavy) and the true direction from which it comes. Period or length of swell (short, average, long would also be of value);
- true course and speed of ship.

* The term tropical cyclone is the generic term used by national meteorological services of the World Meteorological Organization. The term hurricane, typhoon, cyclone, severe tropical storm, etc, may also be used, depending upon the geographic location.

† The standard international unit for barometric pressure is the hectopascal (hPa) which is numerically equivalent to the millibar (mb).

Regulation 32 (contd)

Subsequent observations

3 When a Master has reported a tropical cyclone or other dangerous storm, it is desirable but not obligatory, that further observations be made and transmitted hourly, if practicable, but in any case at intervals of not more than 3 hours, so long as the ship remains under the influence of the storm.

4 Winds of force 10 or above on the Beaufort scale for which no storm warning has been received. This is intended to deal with storms other than the tropical cyclones referred to in paragraph 2; when such a storm is encountered, the message should contain similar information to that listed under the paragraph but excluding the details concerning sea and swell.

5 Sub-freezing air temperatures associated with gale force winds causing severe ice accretion on superstructures:

.1 Time and date (Universal Co-ordinated Time).

.2 Air temperature

.3 Sea temperature (where practicable).

.4 Wind force and direction.

Examples of messages detailing meteorological hazards:

TTT STORM. 0030 UTC. AUGUST 18. 2004 N, 11354 E. BAROMETER CORRECTED 994 MILLIBARS, TENDENCY DOWN 6 MILLIBARS. WIND NW, FORCE 9, HEAVY SQUALLS. HEAVY EASTERLY SWELL. COURSE 067, 5 KNOTS.

TTT STORM. TYPHOON TO SOUTHEAST. 0300 UTC. JUNE 12. 1812 N, 12605 E. BAROMETER FALLING RAPIDLY. WIND INCREASING FROM N.

TTT STORM. WIND FORCE 11, NO STORM WARNING RECEIVED. 0300 UTC. MAY 4. 4830 N, 30 W. BAROMETER CORRECTED 983 MILLIBARS, TENDENCY DOWN 4 MILLIBARS. WIND SW, FORCE 11 VEERING. COURSE 260, 6 KNOTS.

Examples of messages detailing ice hazards:

TTT ICE. LARGE BERG SIGHTED IN 4506 N, 4410 W, AT 0800 UTC. MAY 15.

TTT EXPERIENCING SEVERE ICING. 1400 UTC. MARCH 2. 69 N, 10 W. AIR TEMPERATURE 18° F (-7.1° C). SEA TEMPERATURE 29° F (-1.7° C). WIND NE, FORCE 8.

Noticeboard (*contd*)

UK Port Met. Offices — contact details

South-east England

Captain Harry H. Gale
Met Office
Trident House
21 Berth Tilbury Dock
Tilbury Essex RM18 7HL

E-mail: pmolondon@metoffice.com
Tel: +44 (0)1375 859970
Fax: +44 (0)1375 859972

Bristol Channel

Captain Austin P. Maytham
Met Office
Titan House, Rm 107
Cardiff Bay Business Centre
Lewis Road
Ocean Park
Cardiff CF24 5BS

E-mail: pmocardiff@metoffice.com
Tel: +44 (0)29 2045 1323
Fax: +44 (0)29 2045 1326

South-west England

Captain James M. Roe
Met Office
8 Viceroy House
Mountbatten Business Centre
Millbrook Road East
Southampton SO15 1HY

E-mail: pmosouthampton@metoffice.com
Tel: +44(0)23 8022 0632
Fax: +44(0)23 8033 7341

East England

Captain John Steel
Met Office
Crosskill House
Mill Lane
Beverley HU17 9JB

E-mail: pmohull@metoffice.com
Tel: +44 (0)1482 867226
Fax: +44 (0)1482 868116

North-west England

Colin B. Attfield
Met Office
8 Tower Quays
Tower Road
Birkenhead CH41 1BP

E-mail: pmoliverpool@metoffice.com
Tel: +44 (0)151 6490541
Fax: +44 (0)151 6490547

Scotland and Northern Ireland

Port Met Office
Met Office
Saughton House
Broomhouse Drive
Edinburgh EH11 3XG

E-mail: pmoedinburgh@metoffice.com
Tel: +44 (0)131 528 7305
Fax: +44(0)131 528 7345

Offshore Adviser (Aberdeen)

Iain J. Hendry
Davidson House, Campus 1
Aberdeen Science & Technology Park
Bridge of Don
Aberdeen AB22 8GT

E-mail: ihendry@metoffice.com
Tel: +44(0)1224 407557
Fax: +44(0)1224 407568

Noticeboard *(contd)*

Inmarsat-C Land Earth Stations accepting 'Code 41' messages (ships' weather observations)

Atlantic Ocean Region — East

Station name	Country	ID No.
Aussaguel	France	121
Station 12	The Netherlands	112
Goonhilly	United Kingdom	102
Raisting	Germany	115
Southbury	United States	101
Thermopylae	Greece	120

Atlantic Ocean Region — West

Station name	Country	ID No.
Station 12	The Netherlands	012
Goonhilly	United Kingdom	002
Southbury	United States	001

Indian Ocean Region

Station name	Country	ID No.
Arvi	India	n/a (within Metarea VIII (N) only.)
Aussaguel	France	321
Station 12	The Netherlands	312
Perth	Australia	322
Raisting	Germany	333
Thermopylae	Greece	305
Sentosa	Singapore	328
Yamaguchi	Japan	303

Pacific Ocean Region

Station name	Country	ID No.
Perth	Australia	222
Santa Paula	United States	201
Sentosa	Singapore	210
Yamaguchi	Japan	203
Netley	New Zealand	n/a

Noticeboard (*contd*)

Excellent Awards — unclaimed prizes for 2000

As readers of *The Marine Observer* will know, each October edition carries listings of ships' Masters and Officers nominated to receive an award in recognition of the high standard of marine meteorological observations achieved during the previous year.

In August 2001, letters of notification were posted to 300 nominees. At the time of going to press with this edition of the journal, 179 claims in respect of Excellent Awards for the year 2000 had been processed. The list below contains the names of those from whom, according to our records, claims have not yet been received (Masters are shown in bold type). With the deadline of 30 April fast approaching — receipts beyond which are not guaranteed to be honoured by a book prize — the observers named below are invited to contact the Observations Supply (Marine Networks) section of the Met Office, either direct or through any UK Port Met Officer, with details of the address to which their awards should be sent.

Ahmed, S
Al Enezi, A
Al Sulaihem, A
Alagon, DR
Alcazar, F
Amatos, GC
Anthony, MAGS
Appiah, JN
Arachchige, AUKL
Berry, Z
Bhadkamkar, V
Bhathena, SD
Bismonte, EJ
Blaza, E
Bolton, R
Bore J
Brooks, P
Bustamante, P
Canete, N
Canete, RM
Canon, NR
Catanyag, M
Chipperfield, BV
Clemente, JB
Codera, NF
Cooke, MJ
Cox, R
Craddock, D
Davies, CJ
Davies, L
Dawson, J
Desai, AP
Duncan, W
Eleria, WC
Ellsmoor, RM
Enriquez, C
Evans, DG
Fennell, M
Ferguson, IGC
Fernandez, E
Fletcher, LJ
Fuller, KE
Gen, ZX
Go, F
Goswell, WB
Gravatt, IC
Gulati, G
Harrell, C
Hart, KT
Hartigan, D
Hatto, AG
Hubbard, CJB
Hubers, D
Hughes, CJA
Irani, ZS
Jabay, N
Jalos, HJ
Jones, DJ
Julao, RS
Krishnan, KRA
Lahiri, AA
Lapitan, LC
Liden, T
Lowcock
MacCauley, J
MacLeod, DM
Malik, MA
Mannath, A
Medrano, P
Mehendale, AV
Mendis, DA
Mercado, FF
Miley, PA
Misiek, D
Monton, JS
Morrice, DNA
Morton, AJ
Mottram, CA
Nacu, NC
Nair, RS
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