

# NAVIGATOR

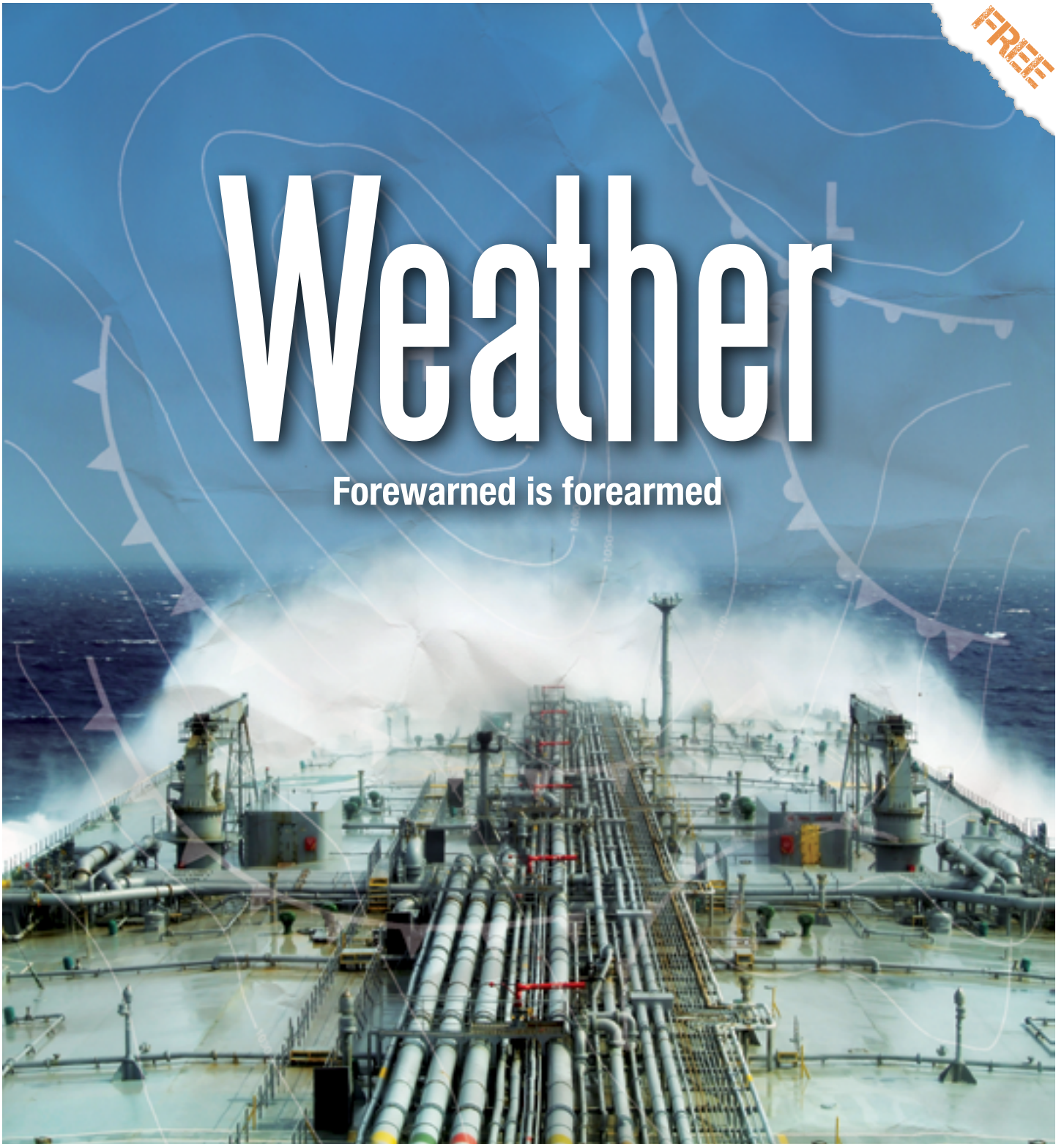
THE

Inspiring professionalism in marine navigators

FREE

# Weather

Forewarned is forearmed



A free publication by **The Nautical Institute** in association with the **Royal Institute of Navigation**

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## Forewarned is forearmed

“The storm is safely out at sea,” is the report most loathed by my fellow mariners when listening to shore-based weather reports.

Weather at sea is deadly serious and always relevant. The weather can make the difference between a prosperous or loss-making voyage, can cause injury to crew and passengers and can even lead to the loss of a ship. Awareness of the weather and accurate predictions are both vitally important.

The old saying that ‘forewarned is forearmed’ is absolutely true when it comes to weather. Professional navigators should always passage plan with the best forecast they can and develop contingency plans based on different predicted scenarios. Fortunately, today’s navigators have some very advanced tools and services to help this process.

In her article on page 5, Petty Leung FNI explores how advanced weather services are providing increasingly accurate

forecasts over longer periods of time to help ensure safety and even commercial and environmental efficiency. Complex algorithms and computer power can regularly assess huge amounts of weather data. These results are augmented by meteorologists to give unprecedented advantages in weather prediction and voyage advice.

Huw Davis, in his article on page 4, advises to never stop looking and feeling the environment at sea. Learning to accurately identify the causes of waves and swells, recognising cloud formations and their meaning and, of course, being able to compare actual weather with forecasted weather for situational awareness are all essential. Huw further explains the importance of keeping accurate weather logs as a point of good seamanship and commercial accountability.

Keep an eye on the weather as it affects ship operations, as well as the general passage. If you have people working on deck

and the sea starts to build you need to notify the deck crew immediately. Unexpected spray and seas can have unfortunate consequences. Although ships are required to be at all times ‘seaworthy’, the prospect of heavy weather should be an alarm to check all the hatches and vents and to ensure that all loose items on deck and inside the ship are adequately secured. I learned early to always leave my desk clear and PC lashed before I took watch because so much could change during those four hours.

Being able to predict weather from sight, feel and smell is a special talent for professional navigators and one that can be honed throughout a long career at sea. It is not only a great source of pride but may someday save the lives of you and your shipmates. The sophistication of new weather services that use satellites, sensors and computers offers unprecedented commercial advantages when used correctly and tested against good, traditional skills.

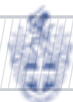
At sea you are in a unique environment to learn to read the weather. Enjoy it, share it with your shipmates and help mentor others in this deadly serious skill.

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#### Published by

The Nautical Institute  
*The Navigator* (Print) – ISSN 2058-6043  
*The Navigator* (Online) – ISSN 2058-6051

#### Printed in the UK by

Stephens & George,  
Merthyr Tydfil, UK

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I write as an ancient mariner, some 28 years ashore and in my 70s. Having served for two years as Chief Executive of the UK Hydrographic at the key stages of ECDIS development, I have since kept a close eye on what its impact has been. It is easy for folk like me to claim that, before all this electronic wizardry was around, then we were real seamen navigating with sextant, chronometer and nautical tables.

Nevertheless, with the combination of multiple GPS inputs into ECDIS systems in integrated bridges, overlaid with ARPA and AIS, it is easy to see why officers who have no experience of how things ran before reach the conclusion that what they see on the screen is how it is. I certainly do not advocate that this readily available information should be ignored. However, it is worth remembering that the smartest computer on the bridge is the one in the OOW's head. Looking out of the bridge windows, checking the bearing movement of other ships, observing wind and weather and, critically, taking a hard look at what the electronic aids to navigation are telling you, remain vital skills.

My plea as one whose involvement in maritime business spans an exciting half century of change, is that some of these traditional practices that served us well should not be forgotten. Used selectively, they are the ideal complement to the excellent systems that technological advances are providing.

**Admiral Sir Nigel Essenhigh FNI  
Former First Sea Lord, Former  
Hydrographer of the Navy**

Nineteen years ago, I wanted to enter nautical school, but my father didn't allow me to. So, I ended up studying computer engineering and got a degree in 2005. I worked as an IT specialist for a year or so, but in 2007, guess what? I finally pursued my dream to become a sailor and ended up working as a Ship's Clerk – a role that I have been in for 11 years now. I may be too old to enter nautical school at 35 years but that didn't stop me dreaming of a career at sea!

**Jerame Besas  
Ship's Clerk, LNG/C Asia Excellence**

Please look at the topics of working overside during preparation of the pilot ladder and rigging the combination ladder. There are a lot of safety issues involved, and the seafarer's and pilot's life are at risk. We are currently seeing a lot of material about bridge resources, oil pollution control and many other important issues... but this one seems to be lagging behind. Proper training and information are required for working overside.

**Pankaj Gautam, 2nd Officer**

*Dear Pankaj,*

*Thank you for highlighting this very important topic. The International Maritime Pilot's Association have a lot of useful information on their website [www.impahq.org](http://www.impahq.org), including a poster on how to correctly rig a pilot ladder – <https://bit.ly/2VxOK3J> The April 2019 MARS reports from The Nautical Institute include several that focus on the risks of working overside, taking draughts etc. You can find these at [www.nautinst.org/MARS](http://www.nautinst.org/MARS) We hope these links are useful, and hope to post more information soon.*

**The Navigator team**



Life onboard, more often than not, can be very tough. In order to be resilient, we must take care of our mental well-being through recreation. I find that *The Navigator* is a good read when I want to relax!

**Gil Gerarcas, Songa Dream**

We welcome your news, comments and opinions on the topics covered in *The Navigator*. We reserve the right to edit letters for space reasons if necessary. Views expressed by letter contributors do not necessarily reflect those held by The Nautical Institute

Find us on social media and let us know what you think **#NautInst**

# Writing down the weather

**Huw Davies**, Principal of Meteorology at Stratum Five Ltd., a British company supplying vessel monitoring and fleet tracking technology, examines how and why to accurately record weather conditions at sea

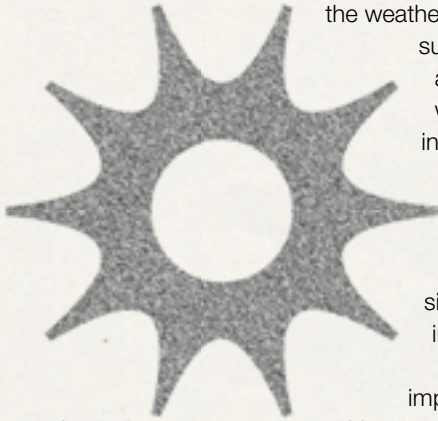
*“Some are weather wise, some are otherwise” – Benjamin Franklin*

Seafarers are generally very ‘weather wise’. All Masters are required by SOLAS to issue a danger message when extreme weather conditions are encountered, namely ice accretion, icebergs, storm force winds and tropical cyclones. More generally, the weather is recorded at each watch in the ship’s log. Some vessels, known as Voluntary Observing Ships (VOS), also report their observations to the World Meteorological Organization (WMO) network of forecasting centres.

It is good seamanship to be aware of the major pressure patterns, METAREA forecast and expected conditions and to constantly compare what is predicted with what you are experiencing. Rising or falling barometric pressure and wind speed and direction give an indication of the location and movement of the major weather systems. The sequence of clouds can indicate the approach of a frontal system. Increasing and lowering stratiform (layered) clouds herald the approach of a warm front.

## Logging the weather

Despite the increasing prevalence of onboard sensors and data streaming to handling centres ashore for analysis, humans still play a critical role in observing



the weather. Some phenomena, such as ice accretion and visibility, are not well captured by instruments. Sensors, particularly anemometers, can be inaccurate due to poorly sighted or un-calibrated instruments.

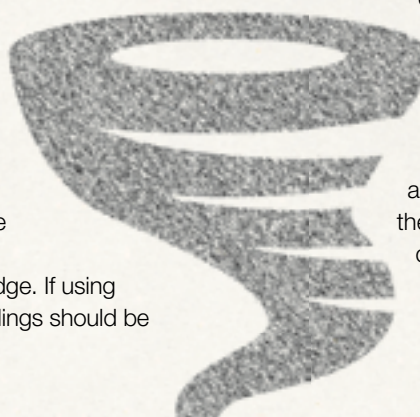
Perhaps the most important reason for taking weather observations on board is that the ship’s log is still the preferred source of information in the case of any disputes or accidents.

## What to include?

A good log entry should include:

**Pressure** – If possible, record the barometric pressure and whether pressure is increasing, steady or decreasing. Note that if the sensor is in a fairly airtight space, e.g. the bridge, this may affect the reading.

**Wind** – The true wind speed and direction should be recorded, as opposed to the relative wind passing over the deck. Wind can be estimated by studying the sea state. It is good practice to keep a Beaufort scale with associated sea conditions on the bridge. If using an anemometer, readings should be



averaged over ten minutes. Take care if doing this by watching the dial of the anemometer, as it is not uncommon to overestimate wind speed by more than ten percent.

**Weather** – Note relevant conditions, such as precipitation and lightning.

**Visibility** – Estimate and record visibility using the internationally agreed definitions:

Very poor or fog	Visibility less than 1,000 m
Poor	Visibility between 1,000 m and two nautical miles
Moderate	Visibility between two and five nautical miles
Good	Visibility more than five nautical miles

If other shipping is present, radar ranges can be used to accurately assess visibility.

**Sea state and swell** – Waves generated by a wind that is blowing are referred to as ‘sea’ or ‘sea state’. When the wind stops or changes direction, waves that continue on without relation to local winds are called ‘swell’.



Swell is of particular interest to seafarers because it can affect the ship's intact stability and lead to broaching, parametric or synchronous rolling.

When recording sea state, it is advised to use the terminology in the following table:

Smooth	Wave height less than 0.5 m
Slight	Wave height of 0.5 to 1.25 m
Moderate	Wave height of 1.25 to 2.5 m
Rough	Wave height of 2.5 to 4.0 m
Very rough	Wave height of 4.0 to 6.0 m
High	Wave height of 6.0 to 9.0 m
Very high	Wave height of 9.0 to 14.0 m
Phenomenal	Wave height more than 14.0 m

For sea swell, record the length ('short' 0-100m, 'average' 100-200m, 'long' over 200m), height ('low' 0-2m, 'moderate' 2-4m, 'heavy' over 4m) and the true direction.

More guidance on the observation of waves and swell, as well as the observation of sea ice, can be found in the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8) Part II, Chapter 4, Marine Observations.

**Anything else that is noteworthy** for example, ship-handling characteristics.

# Taking away the guess work

**Petty Leung FNI**, Managing Director APAC of weather forecasting service provider, StormGeo Ltd., reveals how modern shore-based weather services are helping mariners predict the weather more accurately than ever before

Shore-based weather services have been available to mariners since the early 1950s. They have come a long way since their initial form of route recommendation which was often met with scepticism and dismissal as no more than a 'rent-a-storm' service. Today, services are far more sophisticated with a wide range of critical weather-related data available to help mariners prepare for all eventualities during their voyage.

On the meteorological and environmental data front, forecast performance has certainly improved. Modern forecasting technology tracks tropical cyclones and typhoons, giving mariners a much clearer window on the possible hazards that could arise during a forthcoming journey. Another significant advance is the use of ensemble forecasting. Instead of giving a single forecast at a given time, a 'set' of forecasts is produced, aiming to give an indication of the possible future status of the atmosphere. In addition, the availability of dynamic ocean current forecasts that offer up to three days of predicted data are a significant aid to fuel efficiency by allowing the fine-tuning of routes to take advantage of predicted ocean currents. 'Catching the current' has become more of a science than simple guess work.

## Technology today

Today's availability and improvement in accuracy of weather data is enhanced by technological advances. Satellite communication has become more efficient and affordable. Computers are widely available to vessels. On-board weather routing systems with sophisticated speed-down algorithms

have been developed. Interactive tools simulate the best route, based on up to 16 days weather forecasting, along with relevant navigation constraints and commercial requirements for the voyage.

Mariners can have a day-by-day view of the weather conditions for their passage ahead, which enables them to calculate realistic estimates of passage time and fuel consumption. Not only does this help place vessels strategically in the best part of the ocean, mariners can also plan tactically how to achieve safe navigation with optimum fuel efficiency.

Most recently, electronic chart planning is being combined with on-board weather routing systems on a single platform. This enables mariners to optimise passage plans to take account of weather routing with the ease of matching electronic charts. This integration ensures the voyage is safe, navigationally sound and fuel efficient.

## Taking back control

The importance of the top-quality weather services now available to mariners is highlighted by the huge impact that improved weather forecasting performance, technology and the quest for efficiency can have on a voyage. Whether there is a raging storm on the horizon or a fleeting encounter with a monsoon, timely information and smart tools that assess the effect of predicted weather can help navigators plan a calm voyage, plot an alternative and prepare the ship and her crew to brave any heavy weather ahead.

The wide range of modern weather services that are now available not only enable mariners to be informed and pre-emptive, but they give back that all-important element of control.

# Mastering the weather

**Captain Nikos Chalaris AFNI**, an experienced Master, reveals some of the basic checks and practices that help him forecast heavy weather ahead and act accordingly to maintain a safe and efficient passage for ship, cargo and crew

**D**espite the introduction of complex technology and increasing automation at sea, the weather is and will remain a factor of vital importance for safe passage. You cannot command the weather, but you can control how you manage it – and that is directly connected to the care and caution of the Master and the bridge team. Weather evaluation, planning and monitoring is of major importance. This is a vast and complex subject, but I will try to outline some of the basics that help me, as Master, in dealing with it.

The weather changes constantly and we cannot control it. Nevertheless, we can monitor and forecast it to quite a wide extent. This allows us to prepare accordingly to ensure a safe passage – the main reason for our presence onboard as crew. My favourite mantra on the matter can be summed up as, 'Isn't it better to be welcomed in the next port of call, rather than asked, 'How did this happen to you?''

So, what considerations should the Master bear in mind? First, the ship and its capabilities. The starting point should be that no ship is unsinkable and no human or machine can battle nature. A prudent Master should understand the strength and behaviour of their ship at sea, along with its limitations – both from their own experience and from what is stated in the manuals and certificates.

Then comes the cargo – for example containers, vehicles, dry or liquid bulk and so forth. Humans are said to be the most difficult type of 'cargo' to transport, for obvious reasons. The preservation of their intact state and wellbeing is of paramount importance, but unlike containers, they cannot be secured in fixed positions. Once the condition of the ship and the state of the cargo have been taken into account, the prudent Master must bear in mind the terms of the charterparty, the commercial impact of any extra fuel



consumption, physical restrictions that may prevent the ship from entering various geographical areas and time limitations.

### Weather warnings

The weather itself is a tremendously broad field of knowledge. I doubt if anyone can fully master it, so caution has to prevail when considering weather and its consequences to the ship on passage. Weather patterns vary between different geographical areas and can be affected by seasonal or daily phases, long-term phenomena, specific local characteristics and much more.

Fortunately, there are resources on hand to help us. Historic data of almost every kind is available for careful study. Weather charts consolidate years of observation and provide a useful source of information in terms of statistics. Weather forecast providers can inform us about area statistics, as well as give a huge range of information that may help us to understand the patterns better.

Actual observations on the spot are vital too, as they can indicate upcoming changes, even if only in the short term. Sea temperature compared to air temperature can warn us of upcoming fog, while a sudden barometer drop will warn us of deterioration in the weather. Heavy or low cloud cover can foretell an imminent

squall. Of course, all of that comes long after the actual forecast for the time and place, and the more reliable resources we can access, the better it is for our decisions and plans.

### Know your enemy

Once we know our capabilities and limitations, we can proceed in plan-execute-monitor mode, considering the weather element in finer detail. For longer-term planning, such as crossing an ocean, we should be aware that no-one can guarantee that all will go to plan. We cannot know what will happen in two weeks time when we will be in the middle of the ocean. What we can bear in mind, however, is that seasonally there are high chances of encountering certain weather conditions in wider areas. Winter in the North Pacific and Atlantic will produce storms, while trade winds prevail around the equator. The roaring forties will not make passage easy for a low-powered vessel in the Southern Ocean around Cape Horn, and Mistral season will definitely build high seas in the middle to south of the Gulf of Lion. Again, consolidated knowledge is available and careful study in advance will pay dividends. Where possible, it is good practice to observe what the locals are doing and better still to discuss it with them; they probably know far more than we do as visitors.

Our long-term planning should bear in mind how strong, fast, reliable and vulnerable our ship

and cargo are (ourselves as well) and where we are heading.

### An observant eye

It is accepted military wisdom that no plan survives first contact with the enemy. Once underway, it is highly likely that our plan will not meet reality. Consequently, we have to evaluate the facts and adjust our intentions accordingly. The decision whether to remain on passage or deviate if heavy weather seems inevitable is a difficult one. Sometimes it is of vital importance in terms of survivability or maintaining an intact vessel.

An efficient bridge team should deal with the weather element just as it does with its other tasks. Communication in advance and a common understanding of the factors that will affect the passage assist the whole team. When the Master is not on the bridge, the team should keep an observant eye on actual, anticipated and forecasted weather conditions. Like elsewhere, you should never be afraid to speak up and express your concerns – generally to the Master – if something obviously doesn't match with what should be happening.

When encountering severe weather, precaution and preparation will definitely have an effect on the overall outcome. However, decisions based on good seamanship, vigilance and the ability to adjust to actual conditions will decide whether the voyage will end in yet another accident report or a successful passage that will remain a story to share with your fellow seafarers on your own terms.



# ! WATCHOUT

In this series, we take a look at maritime accident reports and the lessons that can be learned

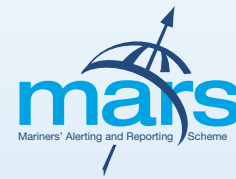
## Weather in the news

Heavy weather can cause issues on vessels even when you have prepared for it – and those issues may not be the ones you are expecting. In March 2019, an incident affecting the cruise ship *Viking Sky* attracted the attention of the world media.

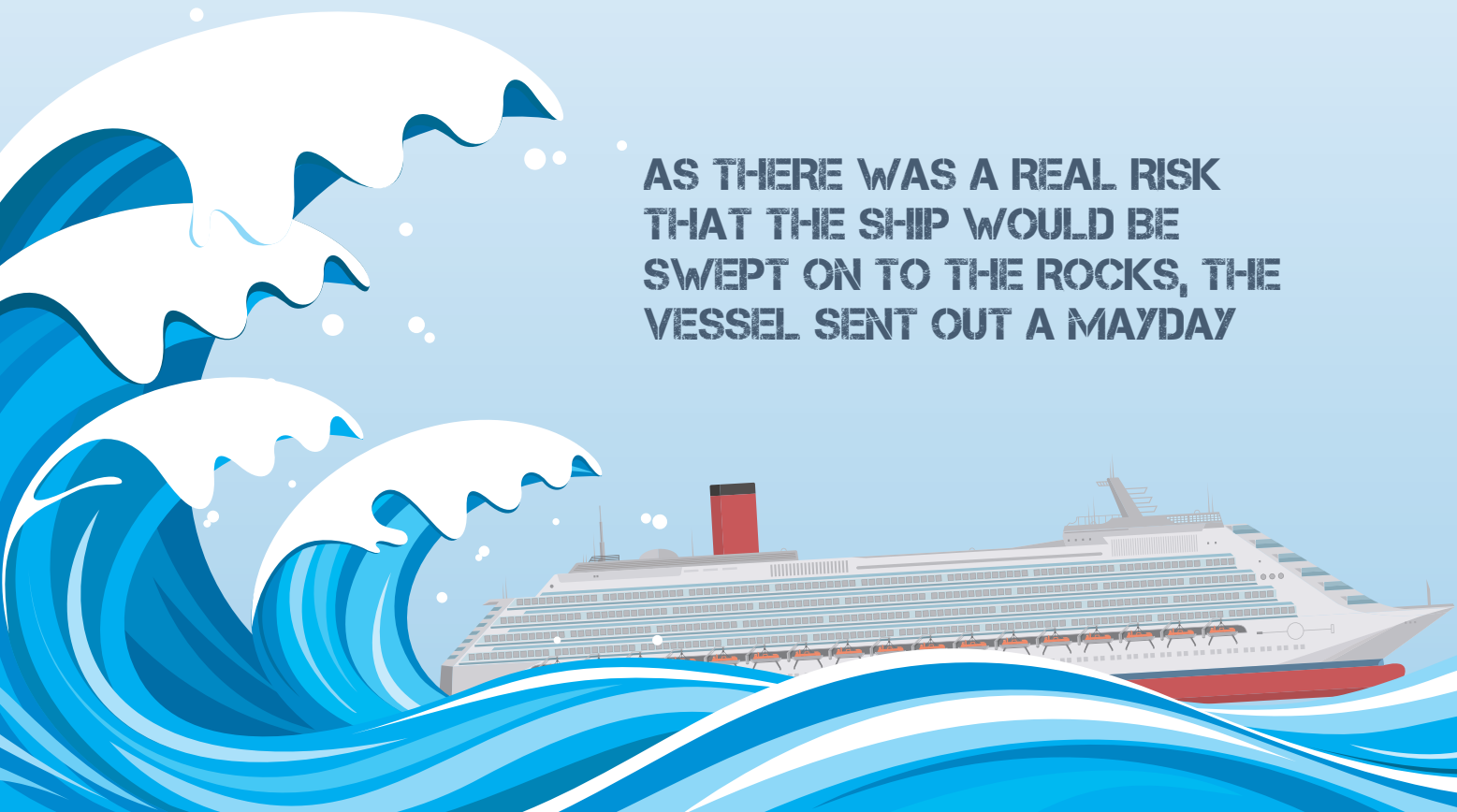
The ship sailed from Tromsø, and was bound for Stavanger, down the Western coast of Norway, when all four engines failed in heavy seas. Winds were gusting up to 38 knots, and the *Viking Sky* was drifting without power just 100 metres from shore in eight-metre waves. As there was a real risk that the ship would be swept on to the rocks, the vessel sent out a Mayday. Rescue services began to evacuate the passengers by helicopter, as it was too rough to use rescue boats. More than 400 passengers were taken off by five helicopters before one of the engines could be restarted, a tow was secured and the vessel was taken into port.

But what caused the *Viking Sky* to lose power? According to a preliminary report from the Norwegian Maritime Authority, the engine failure was directly caused by low lubricating oil pressure. Although the level of lubricating oil in the tanks was within set limits the movement caused by the heavy seas were thought to have caused movements in the tanks sufficiently large to interrupt supply to the lubricating oil pumps. That triggered an alarm indicating a low level of lubricating oil, which in turn caused an automatic shutdown of the engines.

If you find our accident reports useful, check out The Nautical Institute's Mariners' Alerting and Reporting Scheme (MARS). A fully searchable database of incident reports and lessons, updated every month. Seen a problem yourself? Email the editor at [mars@nautinst.org](mailto:mars@nautinst.org) and help others learn from your experience. All reports are confidential – we will never identify you or your ship.



**AS THERE WAS A REAL RISK  
THAT THE SHIP WOULD BE  
SWEPT ON TO THE ROCKS, THE  
VESSEL SENT OUT A MAYDAY**





## Weathering the storm

**Ailsa Nelson MNI** faced more than her fair share of adverse weather during her time working on cruise ships and navigating supply vessels through the unpredictable waters of the North Sea. Here, she talks about battling the elements and offers advice for others in a similar position

### What interested you in a career at sea?

Ever since I was young, I had always enjoyed being on water and hearing my Dad's stories of working on the tug boats on the Clyde and around Scotland. When I was around 15 years old, Dad got me interested in kayaking. Through this, I progressed and developed my skills which led me to qualify as a kayak instructor. I knew I wanted to do an active job when I left school. At the time, Dad was renewing some of the qualifications required for working on tug boats at Glasgow Nautical College. Whilst there, he learned about sponsored cadetships and suggested that I apply.

### What career path has led to your current position?

I accepted a cadetship with a cruise ship company, where I learned a lot of useful skills, such as how to interact and deal with different people and cultures and how to complete safety drills and training. One of the things I enjoyed most, though, was boat handling, from driving the fast rescue boat or twin-screw lifeboats used as passenger tenders when the vessel was at anchor. After completing my cadetship, I heard about job opportunities in the North Sea working on DP2 supply boats, applied for a position and was lucky enough to be accepted.

I worked offshore in the North Sea as a second officer for seven years, sailing as Chief Mate for the last year-and-a-half. However, I had always wanted to work on tug boats after hearing Dad's stories. In January 2019, I gained my unlimited qualifications and made the move to my current role working onboard the *Svitzer Meridian* in Sheerness.

### How do you like to gather your information about weather when on the bridge?

Over the years, I have used several methods of gathering weather information.



**Name:** Ailsa Nelson

**Current Position:**  
Mate onboard *Svitzer Meridian*

**How I got started:**  
Cruise ship company cadetship

### IF YOU KNOW THAT THERE IS A POSSIBILITY OF BAD WEATHER, DON'T RISK IT AND ALWAYS MAKE TIME TO TAKE PRECAUTIONS

The main one in my previous job was a specific forecast compiled by an external source for the locations we were working in the North Sea. This was pretty accurate and focused mostly on wind direction, swell and wave heights. Other useful sources included surface pressure charts, along with forecasts provided by the coastguard via radio. We were lucky that the installations owned by the company had weather sensors on them that were accessible via a password-protected website. This showed us live-feed wind and wave data which were really helpful.

### Have there been any times when weather seriously affected your planned passage?

Yes, numerous times, especially when I was working on the cruise ship and offshore. How it was corrected for depended on the type of vessel I was in and the commercial side of the operation. When we had to re-route for weather on the cruise ship, our top priority was always the safety of the vessel, with the next consideration being how to have the least amount of impact on ETA at the next port of call as we were always on a tight schedule. If we could navigate around weather, that was always preferable than taking a vessel full of passengers through bad weather.

On the supply vessels, due to their location, we were constantly encountering heavy weather during winter months. Dealing with it meant making sure the vessel was properly secured and then riding it out, checking if it was possible to seek shelter either near land or in port, so as to reduce the effects that it would have on both vessel and cargo.

### What advice would you give someone faced with unexpected or adverse weather conditions ahead?

Keep everything secure at all times. If you know there is a possibility of bad weather ahead, don't risk it and always take precautions. It's better to make the crew lash cargo and secure accommodation during good weather than look back in hindsight and wish you had done it before the nasty weather hit. If weather does get bad, then nine times out of ten it will be when everyone is resting, or at night with minimum crew around. So, it's better to have prepared beforehand, rather than be faced with having to sort everything out in rough conditions.



# WAYPOINT

Dr Andy Norris FRIN FNI

## Tomorrow's weather

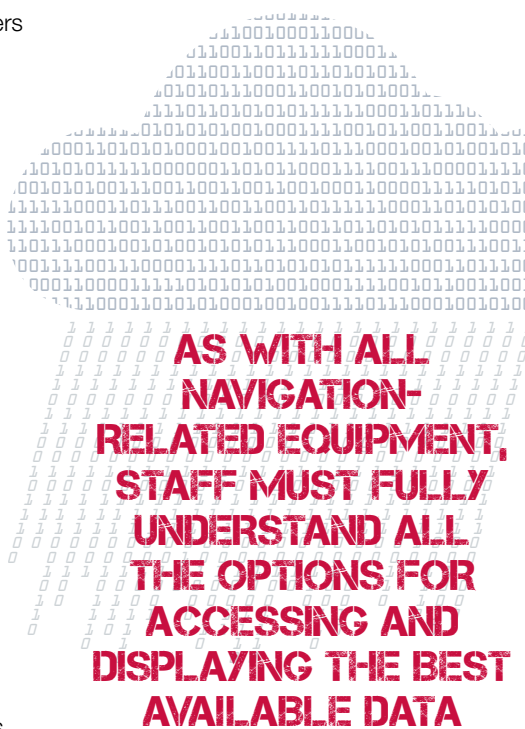
Dr Andy Norris, an active Fellow of the Nautical Institute and the Royal Institute of Navigation, forecasts the future of sourcing weather data

Maritime numerical weather data providers make good use of the ever-increasing availability of broadband systems on ships at sea. In particular, the far higher data capacity of broadband means information that is received can be much more specific to the requirements of the vessel. As we have seen in this issue of *The Navigator*, this type of data can significantly assist the safe and efficient navigation of the vessel.

Looking to the future, it is clear that most externally sourced navigational data will be centred on broadband communication. This evolution will, however, need to provide improved benefits to the safe passage of vessels if it is ever to get full approval. In the more distant future, this could include detailed, real-time navigational information 'broad-banded' between vessels. However, conventional methods of data interchange will also need to be maintained – and developed – to provide back-up services at the very least. Satellite-based broadband functionality, like all other systems, can never be 100% reliable.

### The human touch

Of course, the immediate local situation will still be sensed independently by both humans and the systems onboard the vessel. Constant comparison of this information with all externally communicated data will remain essential. We have been doing this for hundreds of years for charted and other printed data and over a hundred years for radio data, including vital weather-related information. In particular, continued comparison of the actual weather situation with predictions gives a good, working



experience of the integrity of the service (how reliable it is).

Broadband development potentially gives the possibility for all ships to directly send weather-related data from onboard sensors directly to forecasting bodies. These would measure local parameters, such as air pressure and wind strength/direction, whilst appropriately taking into account vessel movement. The much increased, real-time availability of such data to forecasters would have huge potential to improve their services even further.

### Plan to fail

It is always important to understand how to react when an item of bridge equipment develops a fault, not least

that used for displaying weather-related data. If someone notices a failure, the first action from a less-experienced staff member should be to communicate the problem rapidly to the more senior staff on the bridge. As with all navigation-related equipment, staff must fully understand all the options for accessing and displaying the best available data.

They must also be able to decide whether an equipment failure should influence the current or near-future navigational plan of the vessel.

Likewise, junior staff should make sure they understand alternative methods of accessing essential data, including weather data. This means knowing how to use both from alternative external data sources and from onboard, temporarily-stored data.

### Constant appraisal

The value of reverting to more traditional techniques is often promoted for backup purposes and should not be ignored. Unfortunately, because bridge systems are becoming increasingly sophisticated and reliable, an emergency reversion to rarely-used traditional techniques can be extremely difficult to undertake safely. Constant appraisal should be given by all, not least bridge equipment providers, on how to maintain the electronic display and use of data when individual pieces of bridge equipment fails – including the display of up-to-date, weather-related data.

Fortunately, weather data is far less time-critical than some other navigational data such as the visual, depth, speed, positional, radar and AIS situation. However, poor understanding of developing weather continues to lead to accidents.

# TAKE 10

By taking in these ten top tips about observing and coping with weather at sea, we predict that your outlook will be fair

## 1

### Keep a weather eye

Always be aware of the current weather, any changes and the best forecast. Lives may depend on it.

## 2

### By all available means

Use all your senses to monitor the weather – sight, touch, smell – as well as the barometer, coastal and port reports and weather prediction services.

## 3

### It's behind you!

Always watch what's happening behind and all around you. If you are running before the wind and seas all might seem well, but if you need to change the direction of the ship, things could look very different. You must be prepared at all times.

## 4

### Safety and efficiency

Being aware of the weather and acting accordingly is important for both safety and efficiency.

## 5

### Beware of change

If you sense a change in the weather, alert others. If you are in port, your moorings may be at risk, while at sea, extra securing may be needed.

## 6

### Predictive planning

Every port stay or passage plan should include an element of weather prediction. Always have contingency plans for known and unknown weather patterns.

## 7

### Keep records

It is important to keep weather recordings both to identify change and patterns and to ensure commercial accountability.

## 8

### New tools, traditional observations

Modern technology provides unprecedented opportunities for predicting weather – but always test these predictions against your observations.

## 9

### Share and share alike

Predicting the weather can be subjective, so share your observations and predictions with your fellow navigators. Learn from each other and take up the opportunity to mentor.

## 10

### Take pride

Take pride in your ability to read the environment and predict the weather. It is a proud tradition of mariners and can save the day or even someone's life.

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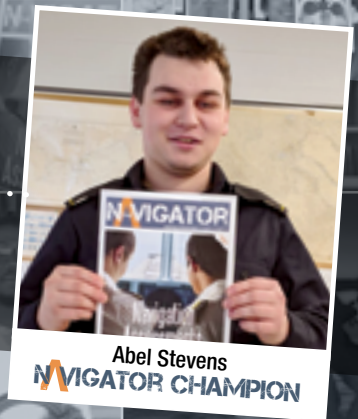


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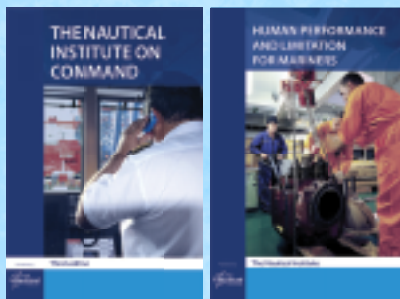
## AND THE WINNER THIS ISSUE IS...

Congratulations to Abel Stevens, a 2nd year navigation cadet at NSCC in Port Hawkesbury, Nova Scotia, Canada, the winner of our latest NavSnap competition.



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