Achieve safer, cheaper shipping with optimized weather routing

Remko Vermeer, one of the former seafarers employed in the continuous shift service at DTN, is more than familiar with weather information and routing from experience.

Before he joined the company, Vermeer was a first mate for Spliethoff. He turned down a master's position due to the administrative workload and the responsibility it entails.

DTN has undoubtedly benefited from adding experienced seafarers, like Vermeer, in its weather room. Before, for example, maps did not always have enough detail. Masters would say things like, "Your advice guides me past an island, but there's a big sandbank in front of it. What do I do?" It was ample reason to improve the maps and buy an electronic chart display and information system (ECDIS).

> "One master might be almost too compliant while another won't have anything to do with us and works it out all by himself."
>
> Remko Vermeer

A global view

Vermeer is in the weather room. In front of him, three screens display views of global weather conditions. They show air pressures, wind forces and trajectories, currents, and details about waves and swells. To see out 12, 24, 48, or 72 hours — and if necessary, as many as nine days ahead — he only needs to press a few keys.

On the screen is a new stratum, predicted to develop wind speeds of 55 knots over the next few days. It displays the expected trajectory (80 to 180 degrees) and speed (7 to 11 knots). It will probably not reach the 63 knots or 117 km/h required for a hurricane, but others have developed from similar systems over warm water. "Breeding grounds for hurricanes include the ocean between Africa and the Caribbean, the area of ocean west of Panama, and the region of sea between Japan and Papua New Guinea. We can recognize those systems because they don't have fronts as normal strata do. They are drains, sucking in everything," Vermeer explained.

A safe distance of 300 miles

Routing around tropical systems assumes a safe distance of 300 miles to the eye of the storm. "We need to consider the type of ship when recommending a route because our advice depends on the mutual velocities and the ship's destination. We might advise sailing dead slow for half a day, stop sailing entirely, or the exact opposite — shift from eco speed to greater velocity. The first or second case may delay a ship for days. In the last, it will reach its port sooner but will use more fuel. The client's response depends on the sort of ship. For some, stopping for a short while might be an option, but it's a different story for vessels with a tight ETA."

An average five-day forecast in normal circumstances can be reasonably accurate. But Vermeer sticks to 48 to 72 hours when dealing with hurricanes. "You can't always predict what such systems will do the next day, so we send the masters extra updates every six to 12 hours," he said.

What is the best option?

"Many shipping companies use SPOS, but not all ships buy our route advice," Vermeer continued. "However, the most recent data might not always be available to them due to the limitations of their onboard satellite communications. Our product RouteGuard always uses the most up-to-date datasets."

Vermeer is fully aware it's challenging to prove the advantages of routing, including lower fuel consumption. "Try and prove that a certain loxodrome or a different passage is better or worse. There are so many variables, which makes it hard to compare two journeys, and the choice of route can make a huge difference on an ocean crossing," he said. "If the ship arrives at a point earlier or later on a route, how will the wind and swell be then?"

Masters passing Skagerrak on their way to the U.S. East Coast sometimes ask for advice on the next part of the route. "They can pass just above the British Isles or sail through the English Channel," Vermeer said. "In theory, a master can knock 35 hours off their journey if they don't go through the English Channel — but the weather can be worse on the alternative route, so we expect a slower speed, cutting the time saved down to 16 hours."

DTN

Work it out yourself or get skilled advice

The standard shipping solution at DTN is SPOS, which masters can use to collect weather information themselves. The shipowners decide which functions are available onboard. SPOS has more than 5,000 daily users. "Worldwide, there are several sources for weather information, and DTN combines them in our model," Vermeer reported. "We give a certain weight to areas in which separate models perform better after verification. It involves a few percentage points of difference."

Other DTN products are RouteGuard, onshore weather routing, and FleetGuard, with the ships reporting to the shipping companies' and charterers' headquarters via a website. "All of the data is recorded and used in their own performance systems, if they have them, to optimize each ship's operation costs," explained Vermeer. "It helps them decide when a hull needs cleaning, or a propeller needs a polish, for instance. To do that, a ship's performance must be gauged in calm weather. Nonetheless, theory and reality don't often match because the weather is always a major variable."

Penny wise and pound foolish?

The main driver behind weather routing is reducing costs, such as ETA, laycan, and fuel consumption. Shipowners understand the importance of safety, but everything is becoming more and more competitive. Shipowners typically know how far they can push their ship. Charterers are more inclined to rely on routing advice.

However, competition still affects routing choices, particularly in the bulk carrier market. Sometimes, there is only a facsimile on board, and the master is entirely dependent on the DTN seafarers for routing advice. At times like that, they wonder why the charterer doesn't ask the shipping company for SPOS so the master can do their own routing. At current SPOS subscription prices, a container ship using 15 to 25 tons a day will typically cover the costs by saving 10 tons of heavy oil.

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The calculation is based on a seven-day voyage for container ships that sail at more than 20 knots for 14 to 15 days at a cruising speed of 10 to 11 knots on an ocean crossing from Rotterdam to New York. The vessel type will impact the savings timeline. Ocean-going tugs only do 5 knots at most and make huge detours for the sake of the tow's safety. A strong tailwind might be favorable for a freighter, but a tug captain can't allow their tow to overtake them.

DTN checks its weather forecasts retrospectively. In the weather room, there is a screen the reveals the accuracy of onshore-weather reports. This information is added to historical data to improve the weather models further. Globally, there are plenty of data buoys that pass on details. Satellites monitor the oceans, and offshore construction and ships are often equipped

with automatic weather stations. Masters also still send weather information to the Royal Netherlands Meteorological Institute (KNMI). But even so, there are still large parts of the oceans that are not covered.

Measuring and reporting at two heights

Masters often asked, "Why are we measuring stronger winds here than the forces you mentioned?" In response, DTN has started presenting wind forecasts in a new way. "We only used to report wind at 10 meters up at the average for 10 minutes — but often on board, the wind sensors are installed much higher — so now we make forecasts for 50 meters up too," Vermeer explained. "Wind to a height of up to 10 meters has the most impact on the condition of the sea, but 50 meters is more recognizable for SPOS users and provides a more detailed picture. Moreover, we can also forecast gusts at 10 and 50 meters up and produce risk predictions."

The forecasts are even more specific if the orographic effects are taken into account. "At the Strait of Gibraltar, the Strait of Dover, and in the Norwegian fjords, winds accelerate due to geographic narrows," said Vermeer. "The effect is not as obvious in model data, so if it predicts a force seven or eight for Gibraltar, we add; bear in mind, it could be eight or nine."

There are scarcely any clients who ask for forecasts for the polar regions. "Very occasionally, someone will ask for a route, but in reality, the Russian pilots and government decide on the routes — and they are more or less fixed," he said. "We can supply weather data to latitudes of 85 degrees north and south in SPOS, but the market does not usually want anything farther north than the north of Norway, or sometimes Hudson Bay or the Bering Sea. The behavior of ice is very hard to incorporate into models. Local authorities, such as port authorities and pilot agencies, have much better information about the current situation and the condition of the passages."

Learn more about SPOS 9

Click here to discover how you can reduce voyage costs and ensuring safety with real-time, on-board route optimization.

To learn how your company can utilize the expertise of our master mariners, please click here.

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