

Annex VI Vessel Movement Risk Analysis: Extreme Weather Case Studies

The IWRAP MkII application for conducting probability analyses is based on the Samson Model, a model that utilizes a database of incidents up to 2012. During our research and the time we spent with the operational services, we observed that not all incidents and near-misses were being recorded outside the 12 NM zone. The foundation for an accurate quantitative analysis therefore called for an empirical investigation, where we manually searched for cases that could positively or negatively influence the model and its associated probability calculations. Below we discuss a few of the most significant cases.

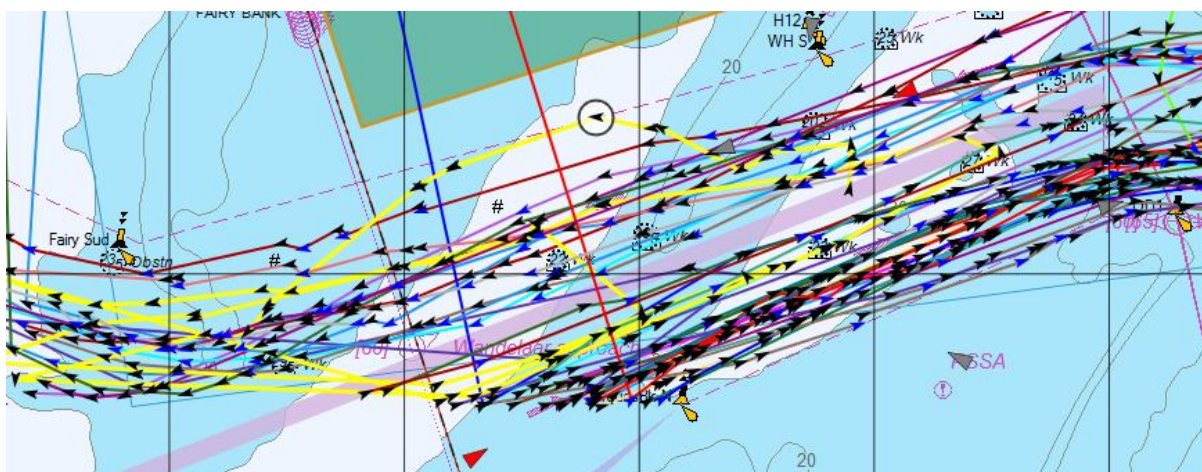


Figure 1 Suspicious behaviour Atlantis on February 6th, 2022

When a ship leaves Belgian waters, it navigates through the Traffic Separation Scheme (TSS) south of the future Fairy Bank wind farms enroute to the open sea. During our study, a case was encountered where a ship chose to use the TSS for drifting. This situation is an example of instances where adherence to the TSS may be violated, and the boundaries towards the wind farms could be encroached upon.

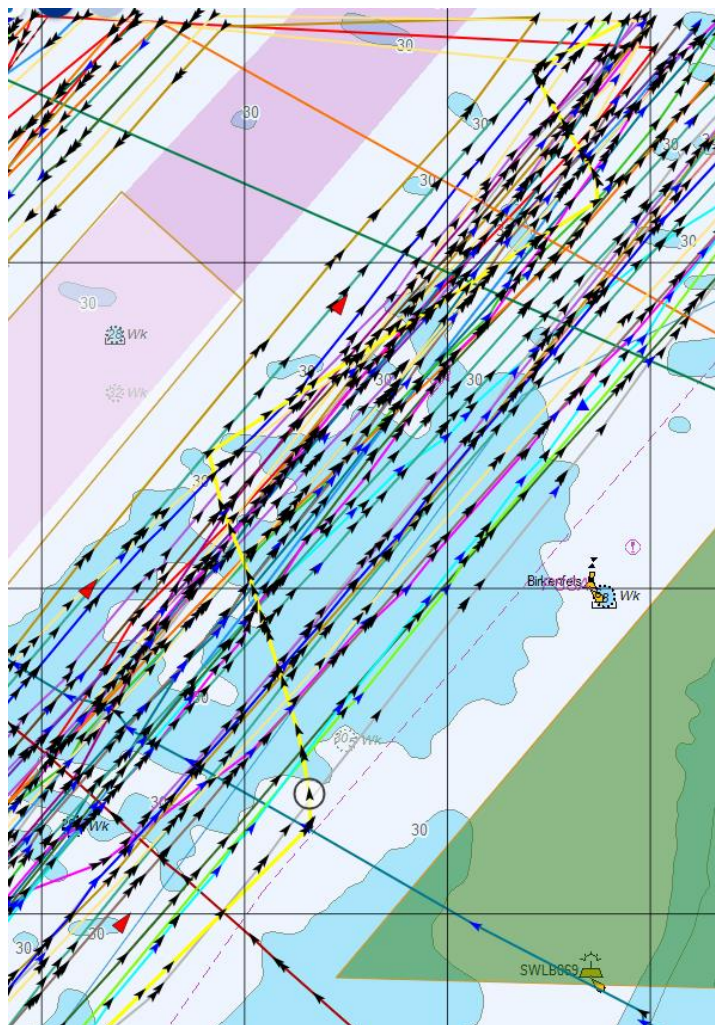


Figure 2 Suspicious behaviour Harun 6 feb 2022

Another situation we observed on different occasions occurs when ships in bad weather conditions follow the TSS in a Northerly direction and perform a sort of zigzag manoeuvre. It is notable that only one ship executes this manoeuvre. There is little background information on why the particular ship performs this manoeuvre, as there is no monitoring of the shipping traffic. Note that it is on several occasions that the ship initiates a course towards the outer bounds of the TSS in the direction of the wind farms.

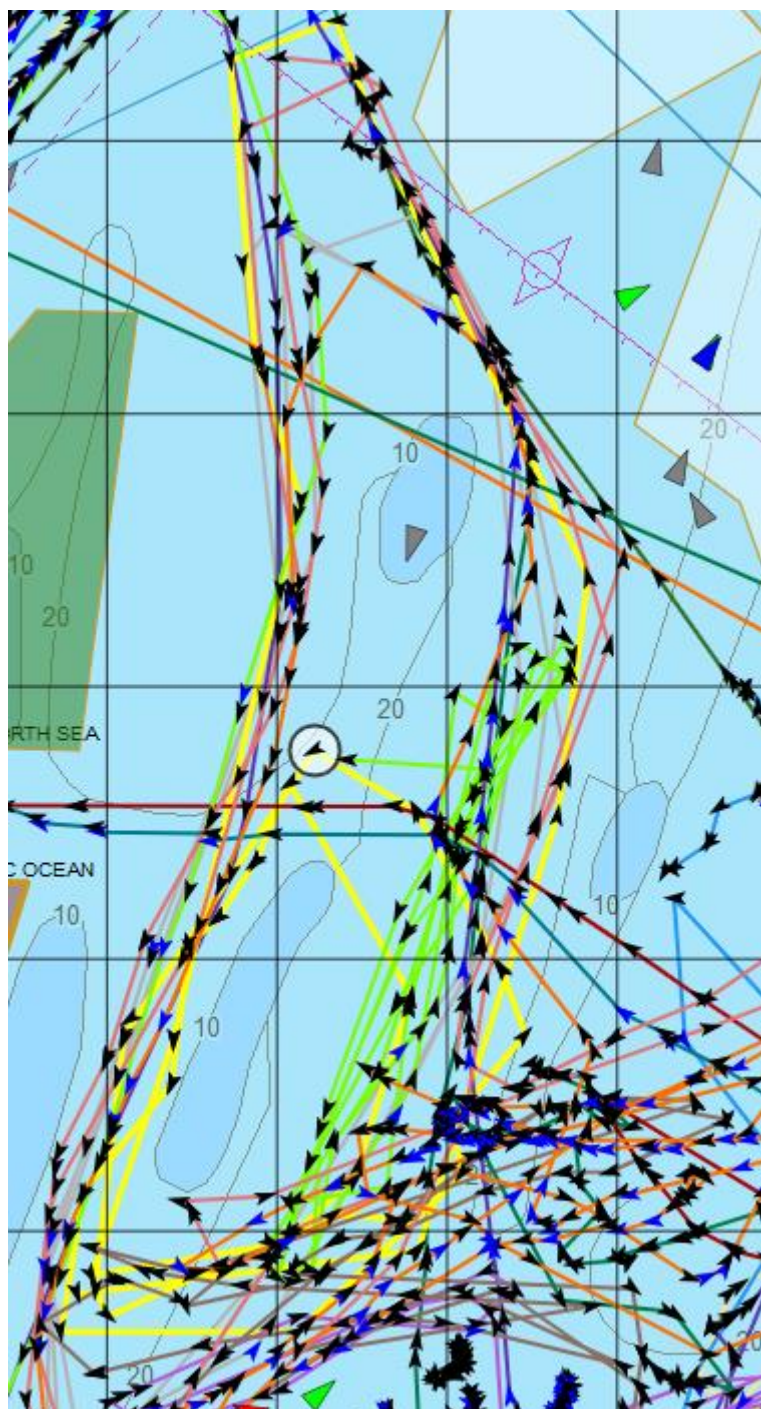


Figure 3 Drifting pattern Thalea Schulte February 6th, 2022

The above sailing pattern demonstrates that certain ships opt to follow an existing traffic pattern and adjust their drifting pattern accordingly. It provides a clear contrast in terms of the predictability of a ship's sailing behaviour compared to the random drifting patterns that we can observe at the bottom right of the figure.

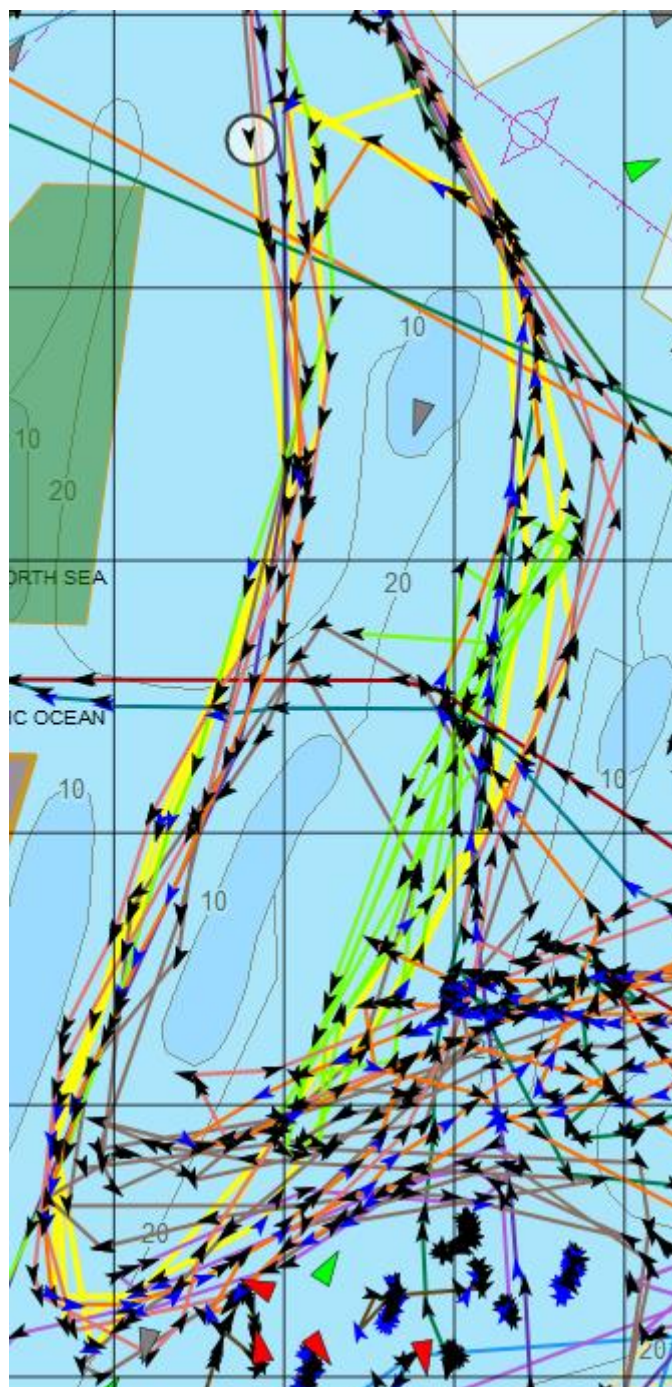


Figure 4 Drifting Pattern AM Shraddha February 6th, 2022

A similar pattern of a ship that chose to follow existing traffic routes while drifting and avoiding the open zone where random drifting occurs.

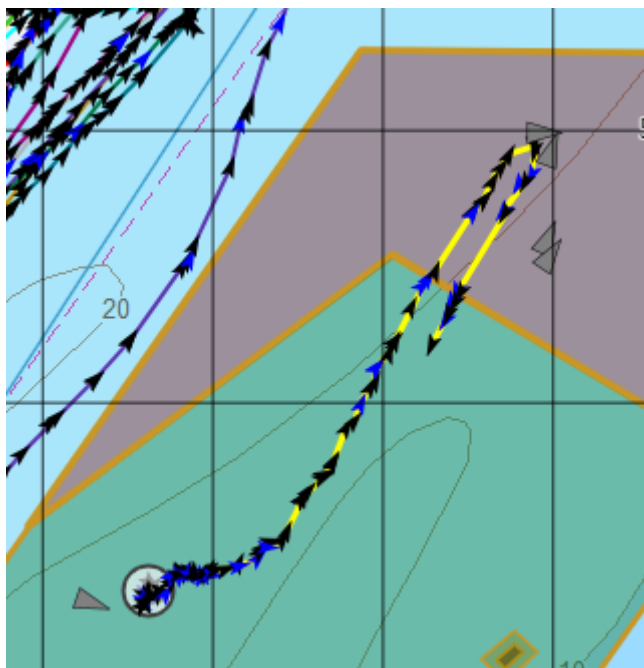


Figure 5 Drifting in future PEZ by Fehn Cape small bulk carrier 1 April 2022

In the future scenario considered in this study, the wind farm in the Princess Elisabeth Zone will be established. Currently, we note that there are also ships that choose to use this area as a drift zone. An area where, over 7 miles and 3 miles wide, there is also a zone of 20 meters depth available and surrounded by soft sandbanks instead of wind farms.

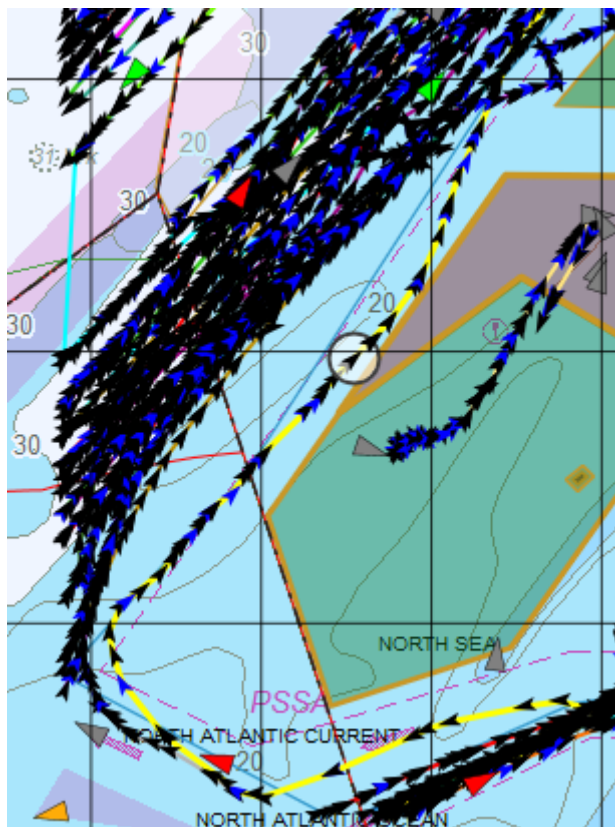


Figure 6 Suspicious behaviour NOCC Atlantic Car Carrier having difficulties making the right approach to enter TSS 1 April 2022

The above case shows several situations, but the most notable is the case where a departing Car Carrier from the Wandelaar Pilot Station attempts to join the TSS in a northerly direction. The ship, due to traffic conditions, weather, or technical issues, may not have been able to join the TSS under normal circumstances. We observe that the ship touches the future outer boundary of the wind farm, then switches to a zigzag pattern and once again leaves the TSS, reaching the future Princess Elisabeth zone. On the map, the two West Cardinal buoys are not clearly shown and are ignored.

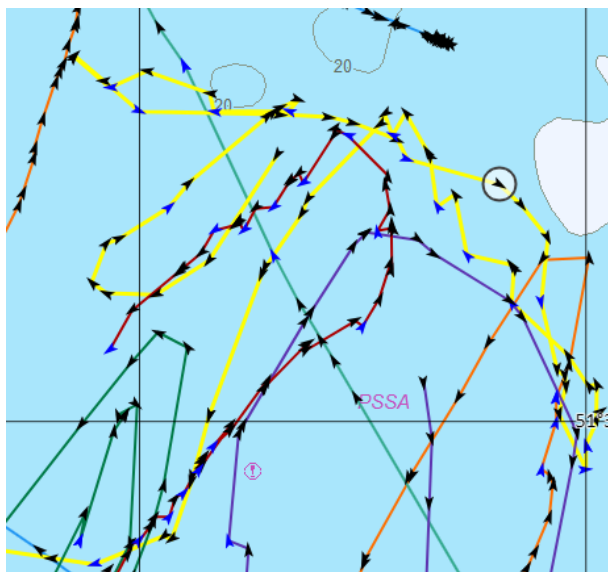


Figure 7 Suspicious behaviour Container Vessel MSC Tuxpan only vessel turning with the wind from behind April 1st, 2022

Anomalies are not always a reason to increase the level of risk for a certain vessel, but they are worth analysing. Container vessels are not often active within the drift zone. We only observed one storm that wasn't predicted well in advance, which caused container ships to seek safe water in the drift zone until they were allowed to enter the port. In the above case, we see the container ship MSC Tuxpan's sailing pattern. The case occurred with a northeasterly wind, and we note that she repeatedly sails before the wind to make her turns and chooses very wide sections for her upwind parts. As a result, she stays closer to the wind farms for a longer period.

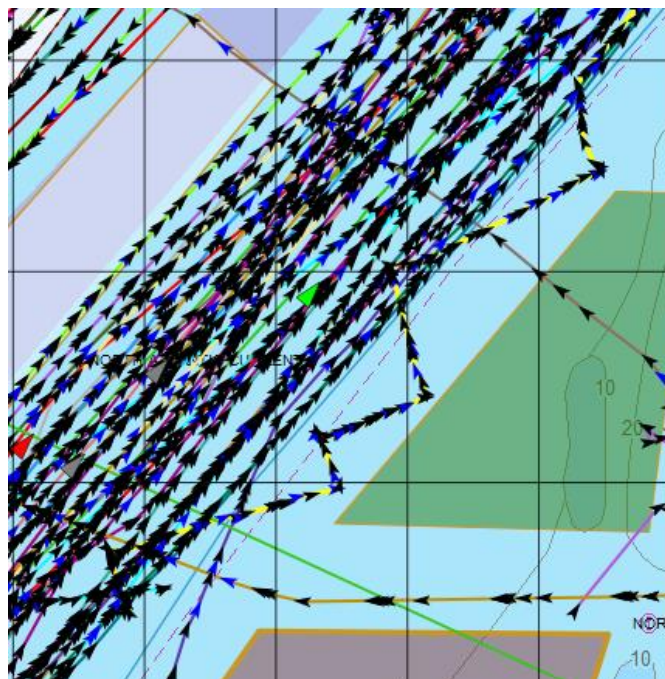


Figure 8 Suspicious behaviour Container vessel Elbfeeder tacking in TSS 1 april 2022

A repetition of a phenomenon that we see more often and always leads to breaching the outer barriers of the TSS up to touching the outside region of the future wind farms. It is clear when we see this kind of movements that there is a higher risk present.

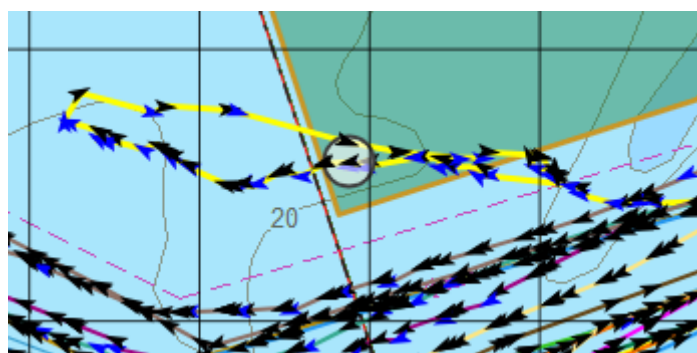


Figure 9 Suspicious behaviour Epic St Croix drifting south of the PEZ with destination UK 7 april 2022

Earlier in this study, we indicated that the area west of the Princess Elizabeth Zone was outside the scope of the study, but we strongly recommend further investigation of this area. In the above example, we see a vessel leaving the TSS and using this region as a safe drift zone.

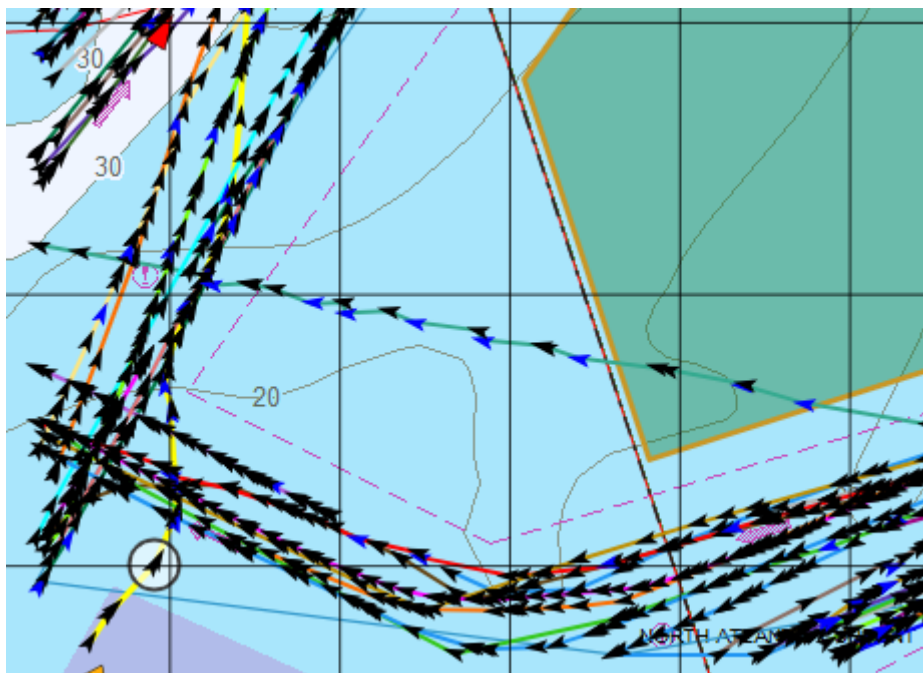


Figure 1 Suspicious Behaviour Xing Hai Wan not executing turn for TSS in time November 25th, 2023

Economic route planning is a hot topic, but leaving a TSS and crossing another TSS at an unexpected location brings increased risk, especially when the ship is a product tanker.

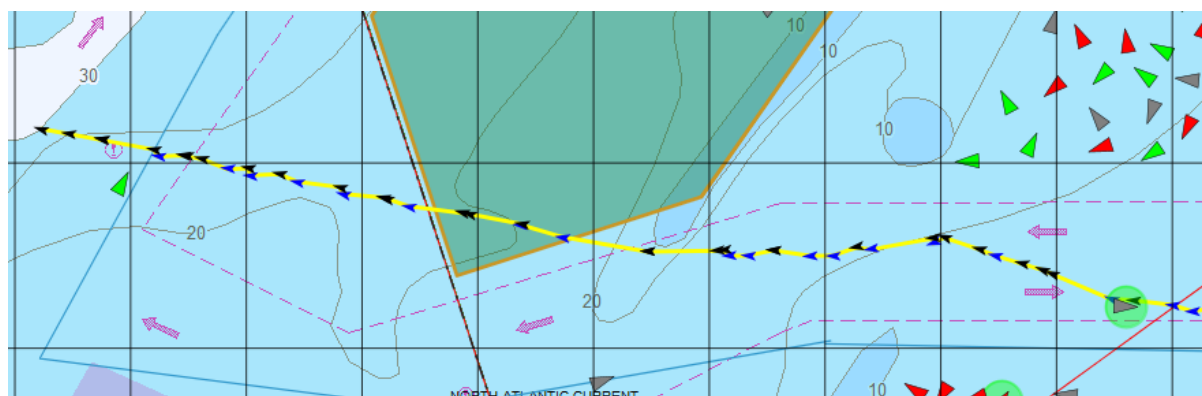


Figure 2 Suspicious behaviour Sea Charente outside of TSS Small Bulk Carrier 25 November 2023

A similar case to the previous situation. A small bulk carrier that deviates from the prescribed shipping routes.

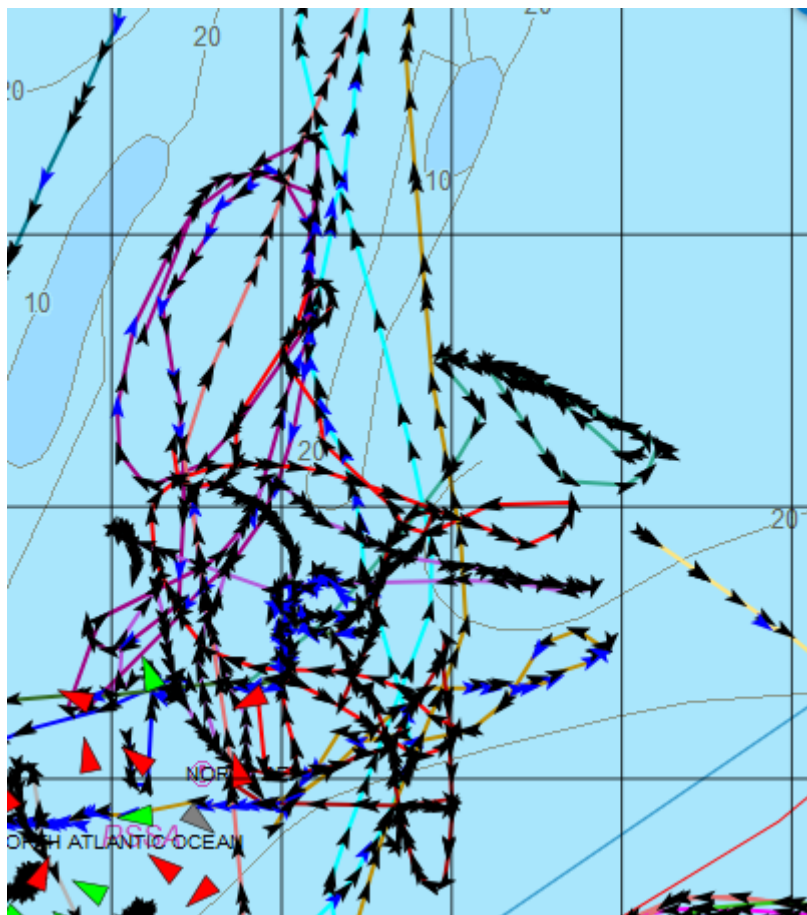


Figure 3 Anomaly on 25 November 2023 5 out of 9 drifting vessels were large containerships

Another interesting casus that was clearly an anomaly was the situation on the 25th of November. The number of container ships in the drift zone was 5, which is particularly notable because normally there are only 1 or no container ships using the drift area. From the reports of the pilot services, we read that from the 24th to the 25th of November, the pilot services were unable to operate for 36 hours.