



Correlation between vessel movement and weather

Analysis of remote pitch and roll sensor data against
reported historic weather conditions



INTRODUCTION

Clearwater Dynamics has more than 2,500 Raptor IoT tracking devices deployed globally. Installed on each Raptor is an accelerometer for monitoring vessel movement. Clearwater utilise Raptor accelerometer data for monitoring of vessel pitch and roll (P&R) behaviour.

↑ 2,500+
Raptors installed globally



METHODOLOGY

Using a sample of fifteen vessels for a period of one month, Clearwater analysts compared Raptor P&R data with actual historic weather conditions. Vessel coordinates combined with the reported timestamp from Raptor were used for extracting weather values to ensure geospatial and temporal accuracy across the two datasets. The sea state has been calculated from known wave heights in weather data. Finally, any position reports in sea state less than one have been filtered out. Figures for the resulting dataset are indicated below.

15
vessels

31
days

9,253
P&R reports

9,316
Weather reports

Clearwater Dynamics

= DATA POINTS

Data used for this analysis is taken from two separate and unrelated sources.



HISTORIC WEATHER

Weather data is from Spire's historic weather API.

[Read more](#)



LIVE PITCH & ROLL

Vessel movement data is recorded live from a sample of Clearwater Dynamic's globally deployed Raptor's.

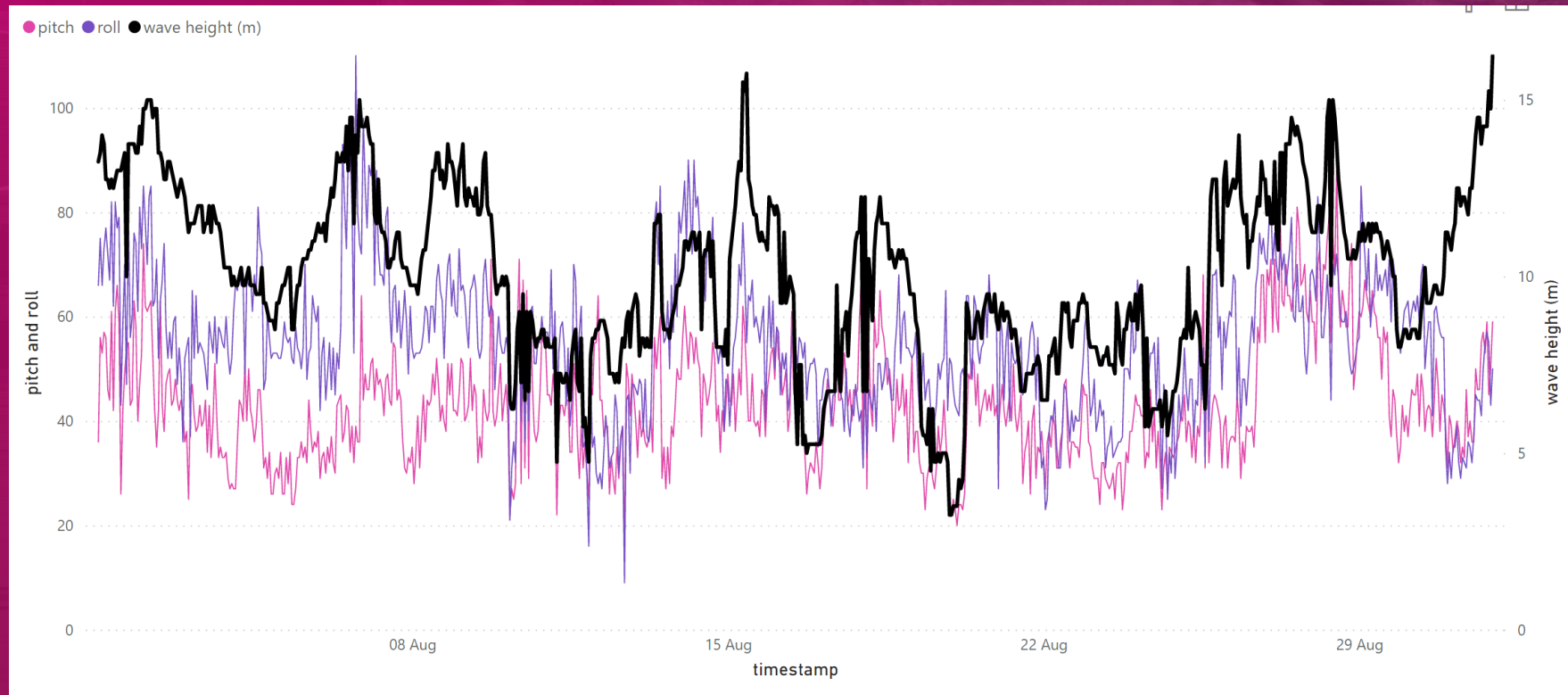
[Read more](#)

Clearwater Dynamics

ALL VESSELS



The graph below illustrates hourly reports for all vessels included in the final dataset. Purple and pink lines illustrate pitch and roll values respectively and are represented by the left-side Y-axis. The black line illustrates wave height in metres and is represented by the right-side Y-axis. Note that the Y-axis is a combination of all values for every vessel. Therefore, values may appear excessive. Detailed analysis on a by vessel basis is available in the pages that follow. The X-axis represents the timestamp for each report. Results indicate a clear correlation between vessel pitch and roll as reported by the Raptor and actual wave height.



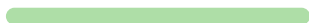
Clearwater Dynamics

WORLD MAP

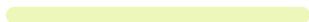


Spire Sea States

Sea State 2



Sea State 3



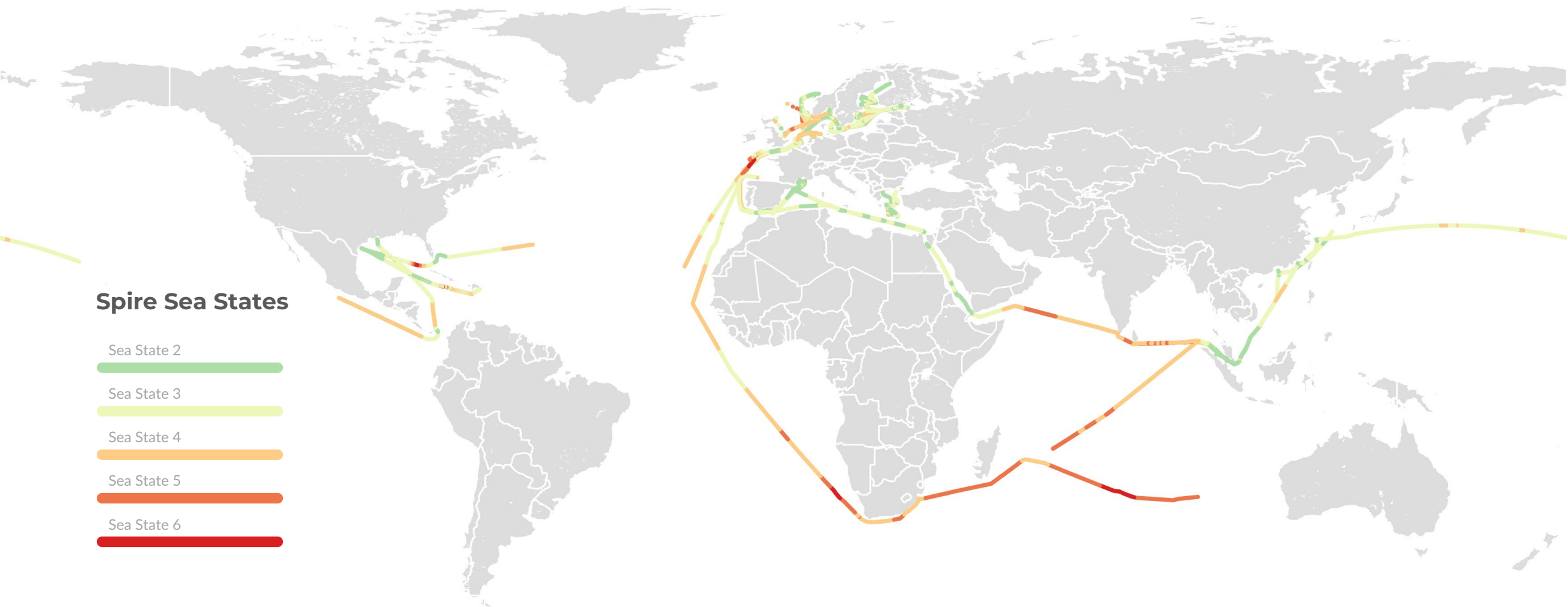
Sea State 4



Sea State 5



Sea State 6



SAMPLES

The background of the slide is a photograph of a large red and blue ship, likely a wind turbine transport vessel, being towed by several tugboats. The ship is red on the upper half and blue on the lower half. It is being towed by at least four tugboats, which are smaller vessels with cranes and other equipment. The scene is set on a body of water, and the overall image has a reddish tint.

A shortlist of five vessels have been selected to demonstrate the correlation between weather data and P&R. The following pages provide illustrations of the data for the selected samples with one vessel per page. Datetime's are filtered in some samples to highlight the vessels most active period. Vessel names are omitted to maintain anonymity.

AUGUST 2021

Spire Sea States

Sea State 2

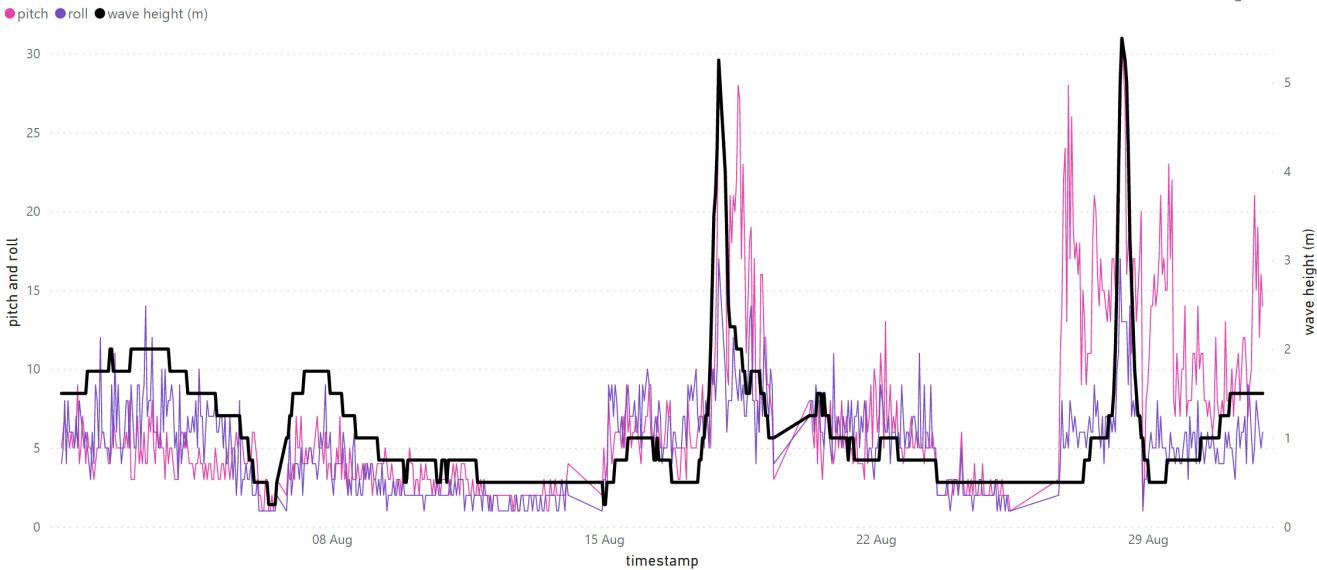
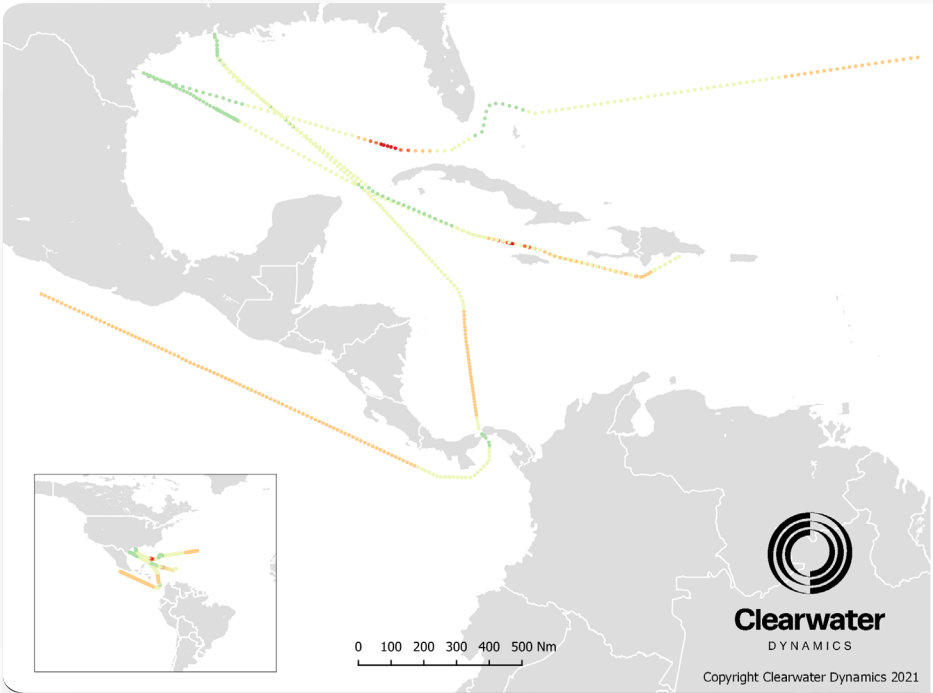
Sea State 3

Sea State 4

Sea State 5

Sea State 6

VESSEL ONE



www.cwdynamics.com

AUGUST 2021

Spire Sea States

Sea State 2

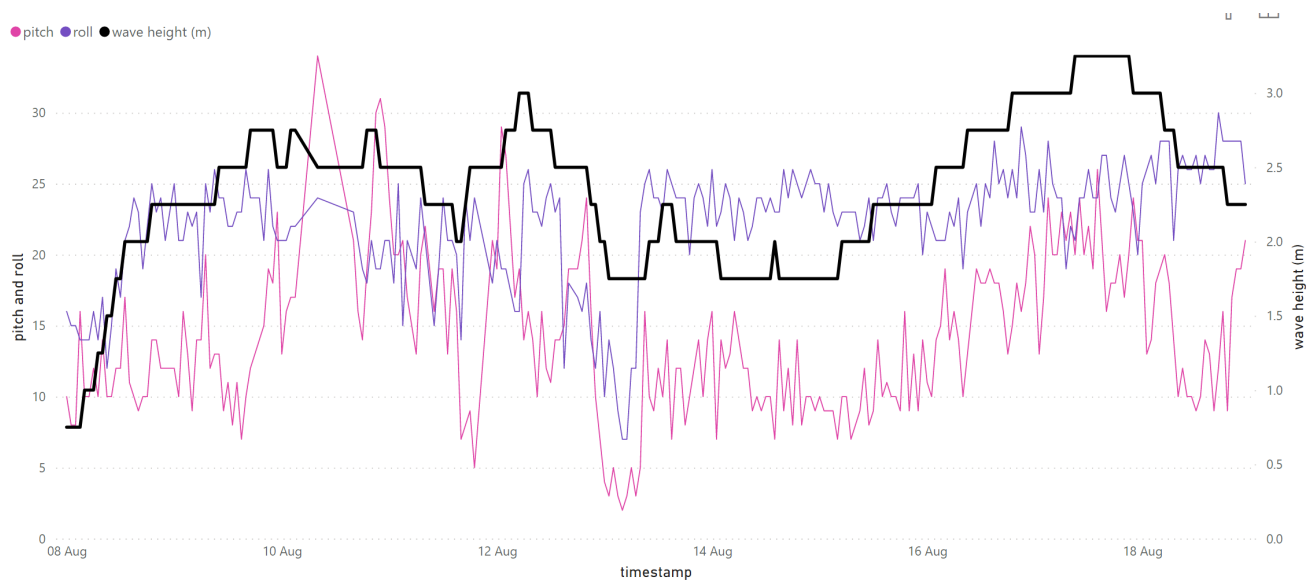
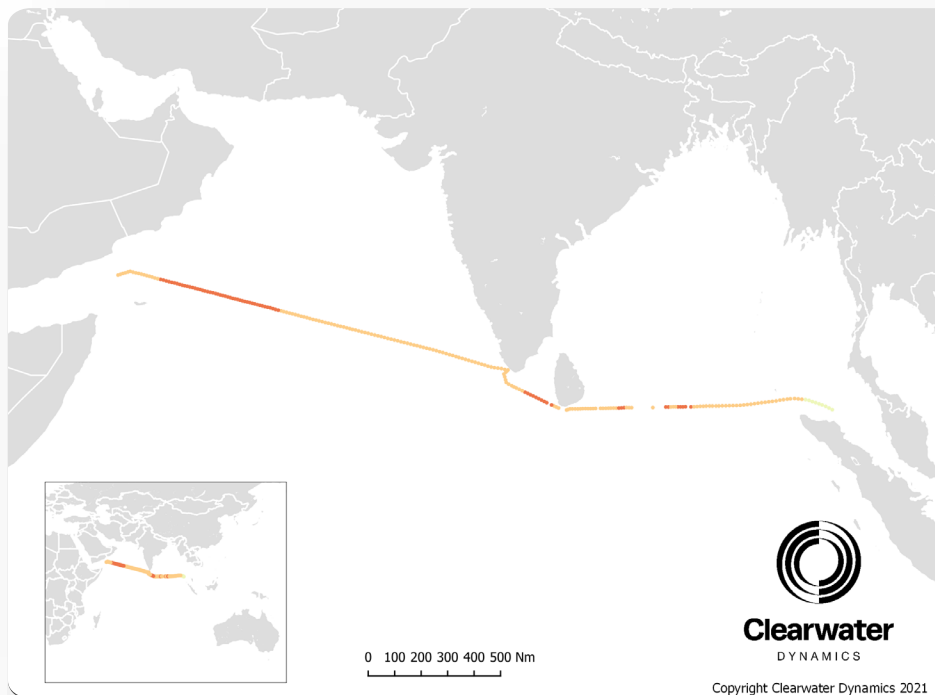
Sea State 3

Sea State 4

Sea State 5

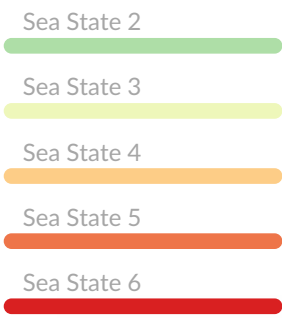
Sea State 6

VESSEL TWO

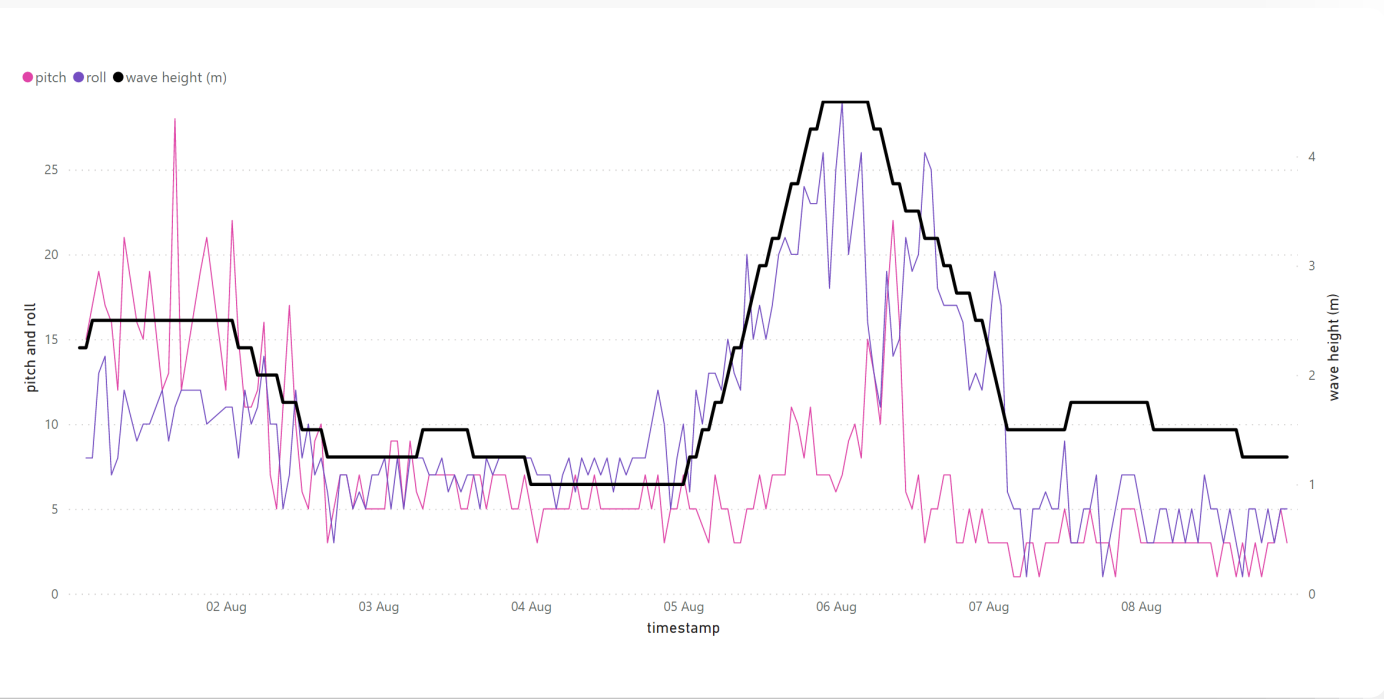
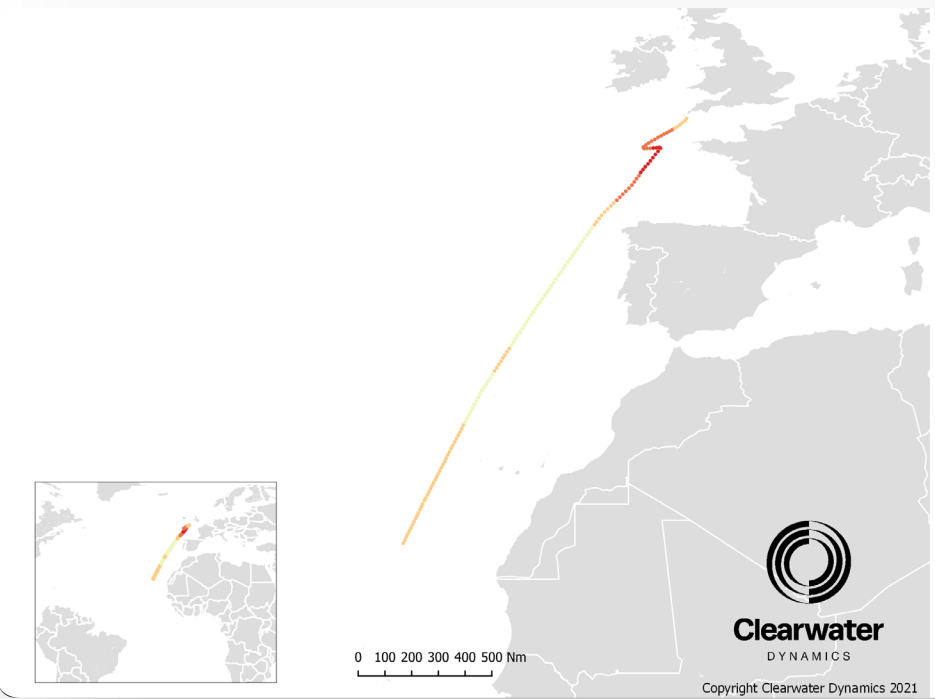


AUGUST 2021

Spire Sea States



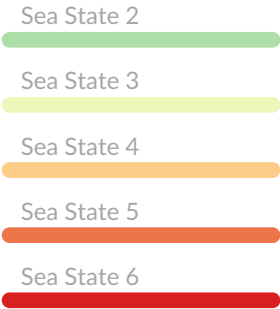
VESSEL THREE



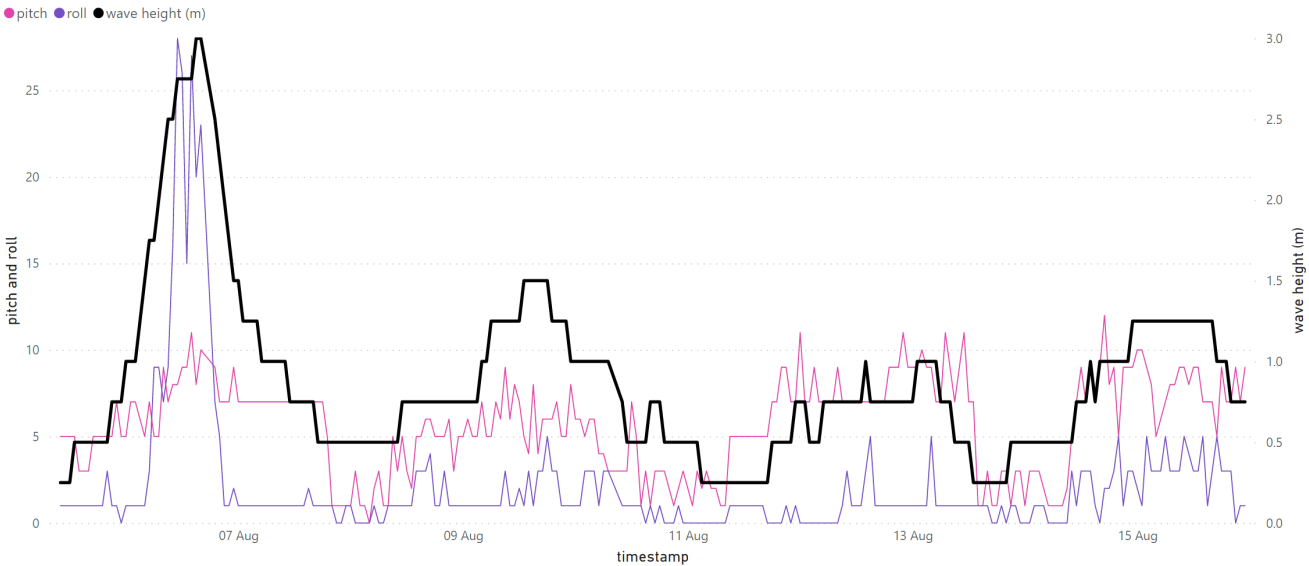
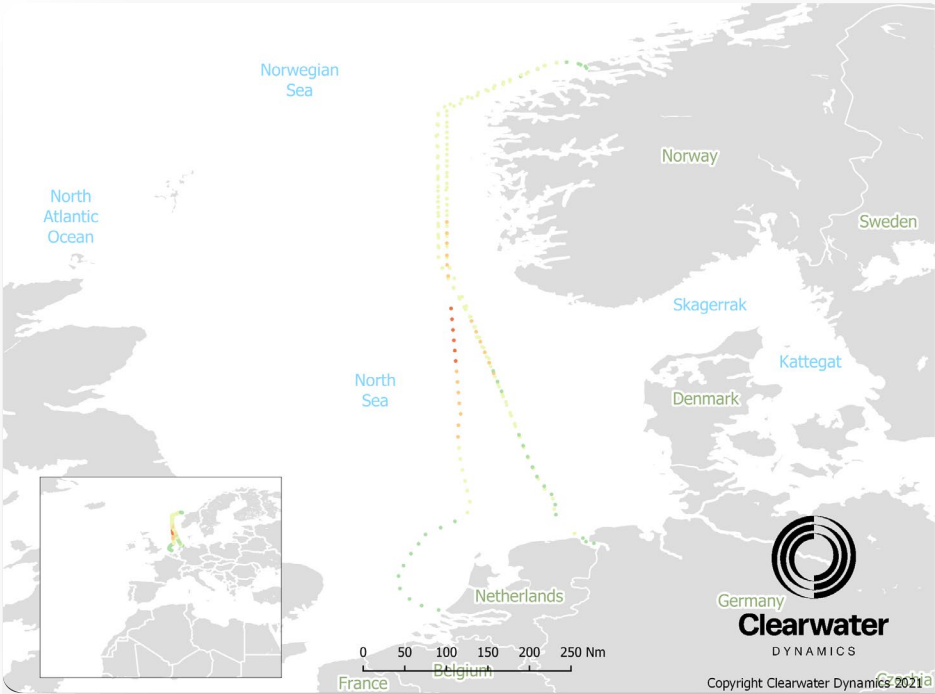
www.cwodynamics.com

AUGUST 2021

Spire Sea States



VESSEL FOUR

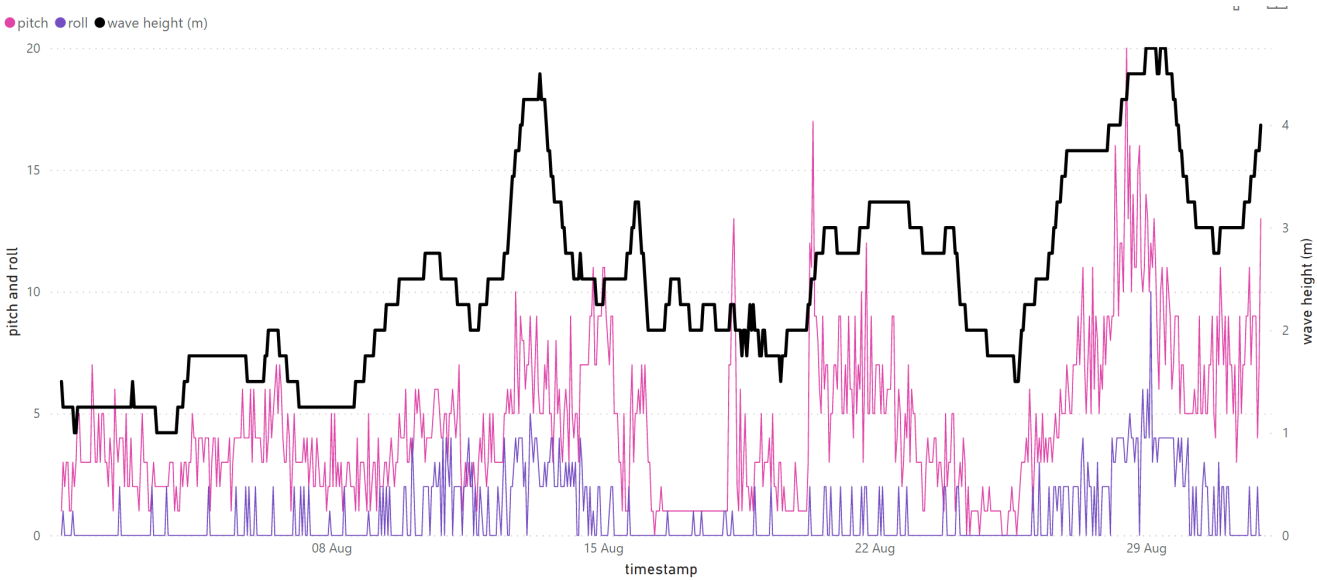
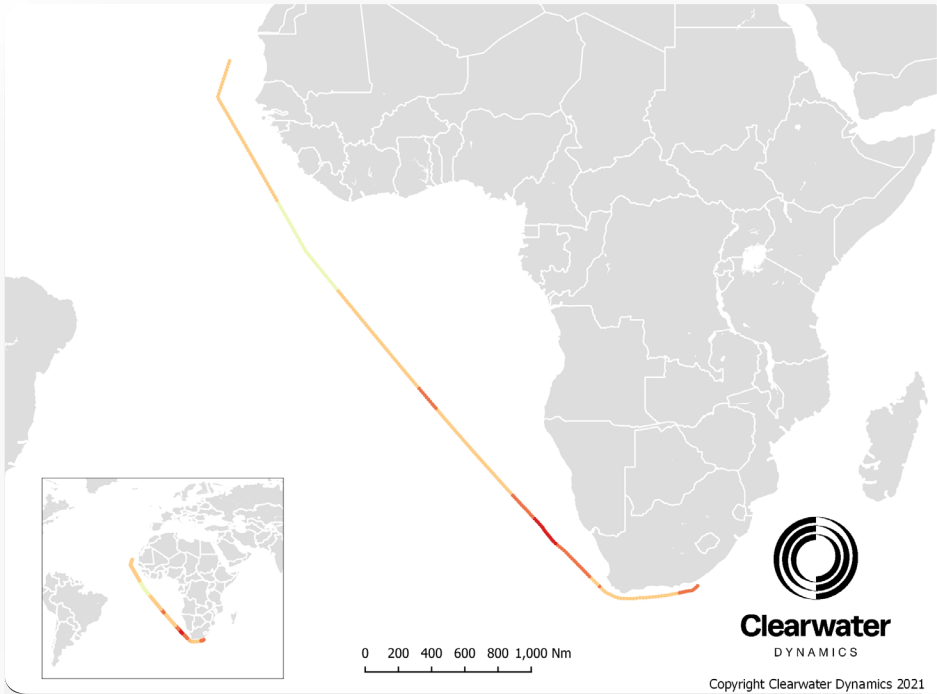


AUGUST 2021

Spire Sea States

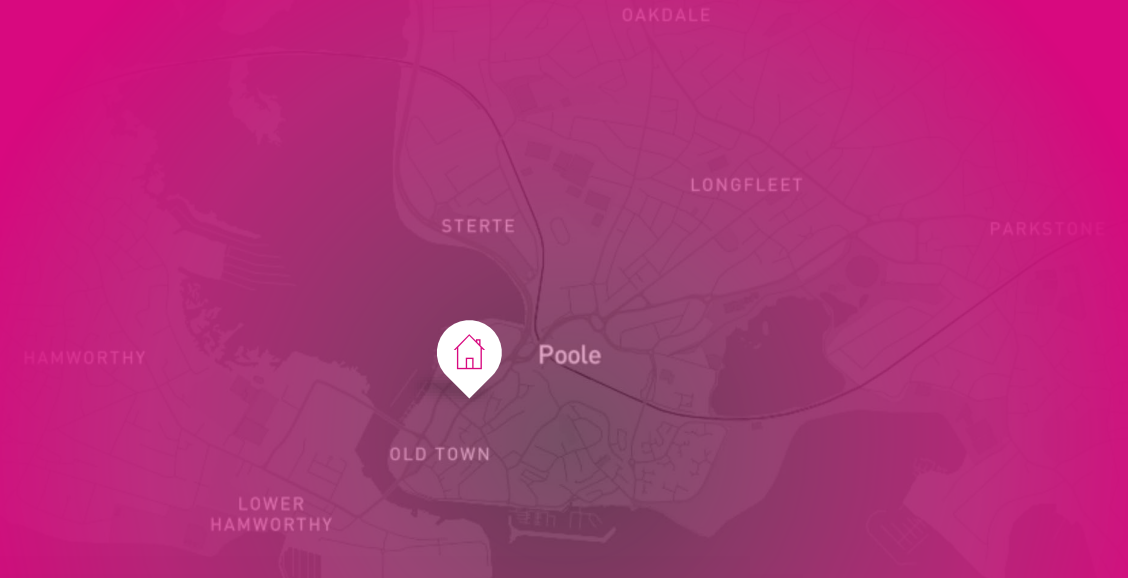
- Sea State 2
- Sea State 3
- Sea State 4
- Sea State 5
- Sea State 6

VESSEL FIVE





= GET IN TOUCH


Please contact Clearwater Dynamics for more information or any questions.




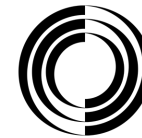
Contact Information

 Link House, 25 West Street,
Poole, BH15 3RE

 +44 (0) 1202 804140

 info@cwodynamics.com

 www.cwodynamics.com



Clearwater
DYNAMICS

Harnessing the power of space to inspire our clients and partners with
down to earth solutions

Visit Us