INNOVATION

SMART INTEGRATED PARAMETRIC ROLL EARLY WARNING DECISION TOOL

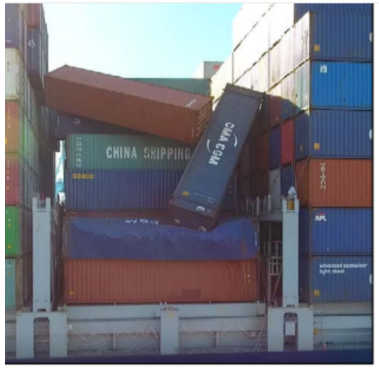
BETTER WAYS CMA CGM

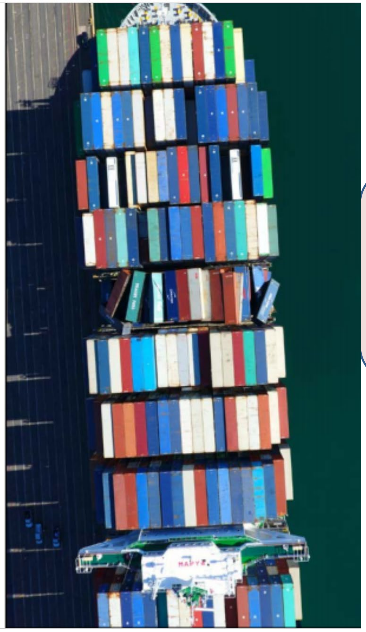
- Since 2007, CMA CGM fitted its owned vessels with capacity over 3000 Teus with Octopus on board.
- In 2018 in cooperation with ABB, we introduced the first tool to predict parametric roll in real time, based on the ratio of the roll period over the pitch period reflecting the well-known physical condition required for parametric roll to appear. Usually, the roll period is compared to the wave encountered period, since it is assumed that the pitch period is equal to the encounter period (IMO, 2007a)

- 2020/2023 CMA CGM FLEET CENTER INITIATE a Doctoral Thésis **Probability of occurrence of parametric roll on a predefined sea state**

- A DMAIB investigation on parametric roll event on MAERKS ESSEN , the Marine report state :

“Detecting risk of parametric resonance rolling based on forecasted sea conditions can be problematic as forecasts are encumbered by uncertainty. No matter how automatized and detailed the onboard tools for monitoring parametric resonance are, they are prone to the uncertainty of the forecasts which make them unreliable as tools, unless a broad risk margin is applied. ***DMAIB encourages companies and authorities to explore and test options for predicting resonance effects that are based on real-time conditions rather than forecasts,”***





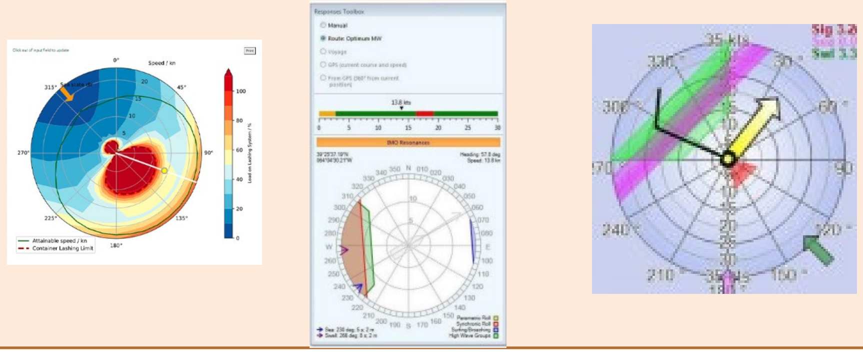
2018
CMA CGM G. Washington lost 137 containers in North Pacific

A new Dashboard to recognize in real time parametric roll and prevent it

- Thanks to the work carried out during the thesis, CMA-CGM and ABB co-operate in the development and design of a new tool. A new alert integrated in Octopus with following innovative characteristics :

-unlike any other existing solution that are based solely on calculation with forecast data, it is a **real-time measurement tool,**
-It **informs** the crew in real-time of the risk, allowing them to **react quickly** to avoid the parametric roll,
-It helps to **prevent false alarms.**

Moreover,
It helps to avoid weather forecasting errors and the necessity to input manual observations, as these may be erroneous or difficult to obtain, and there is no need to install a new system as it is perfectly integrated with Octopus already on board.



Forecast☒

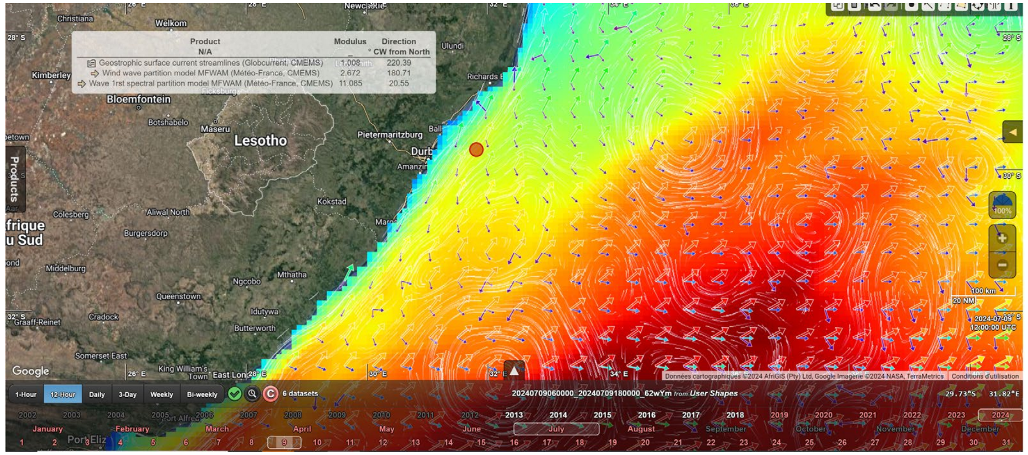
Realtime measurement☑

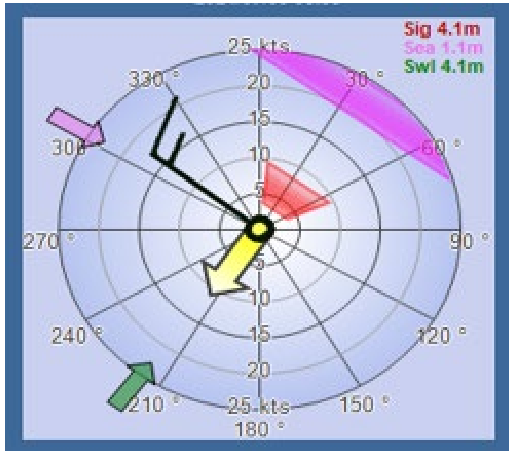
Parametric Roll – context

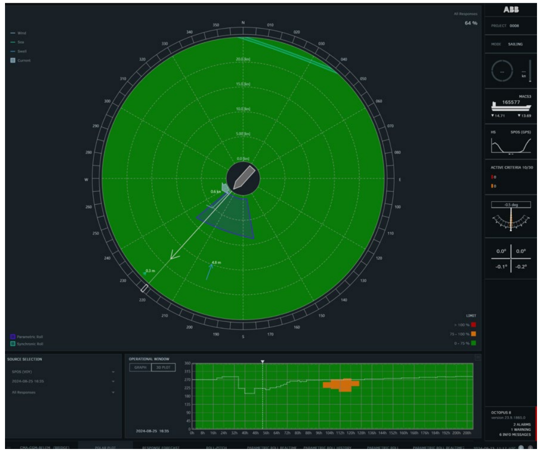
Cape Good Hope Incidents– summer 2024

- In July and August 2024 , two vessel CMA CGM vessels suffered container lost near CGH , and in the South East Durban , both were West bound . The two vessels were diverted close to the East Coast of South Africa and sheltered before their transit south CGH due to the bad weather and strong storm forecasted and resume their voyage according voyage assessment made with Classic weather FCST & threshold for wind and waves conditions

On board Tools used to for Parametric roll assesment (IMO MSC.1/Circ.1228):





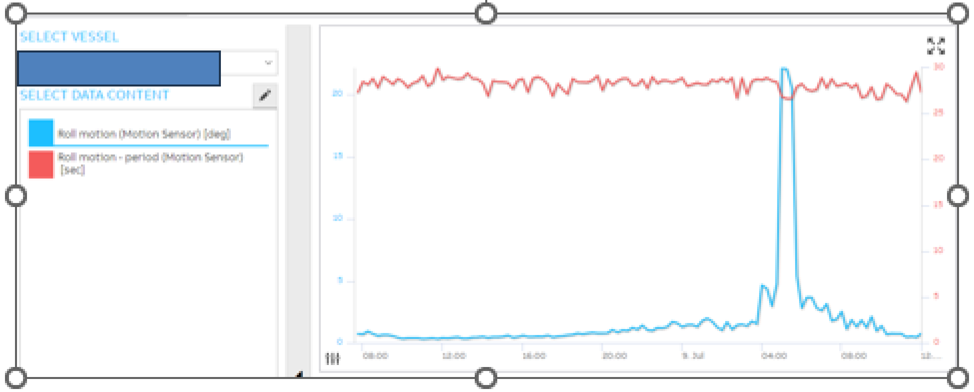


FORECAST parametric roll @ time and planned position with weather software onboard on Octopus . There was no Parametric roll forecasted for the both

Parametric roll assesment with Roll Risk Estimator (TOP TIER 2024) with Hindcast Weather (METOC) data and on board measured roll period @ time and planned position.

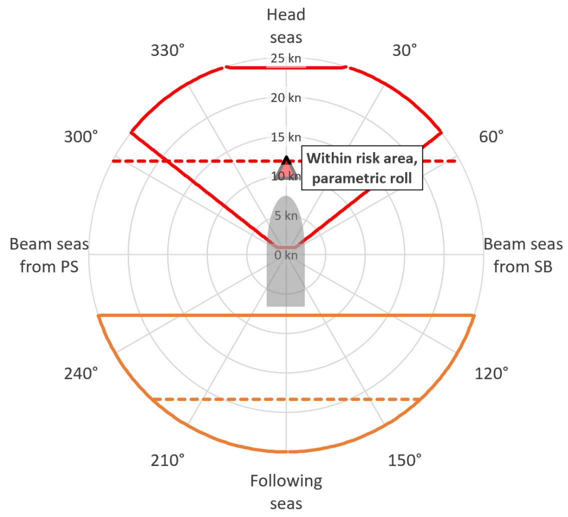
- It has been found a big discripancy between Lashing software on calculated roll period and the measuerd roll period
- It has been found discrepenncies with Hindcast (copernicus marine) versus forecast (private Cie provider) with the direction , the period and height of the waves . Some of these discrencies are due to the spatial and temporal resolution

- Conclusion :
  - for the both cases , it could not been forecasted
  - Analyes with Hindcast and Troll period measured using Tier Roll estimator excell show we faced on two parametric events.



Results

Ship fixed wave direction in [degrees]	0	Effective wave length in [meter]	408
Peak wave period in seconds	16,2	Rolling period / Encounter period ratio	2,0
Wave encounter period in [seconds]	13,0	Wave length / Ship length ratio	1,2



Innovations thanks to the thesis

DEVELOPMENT I Parametric rolling identification

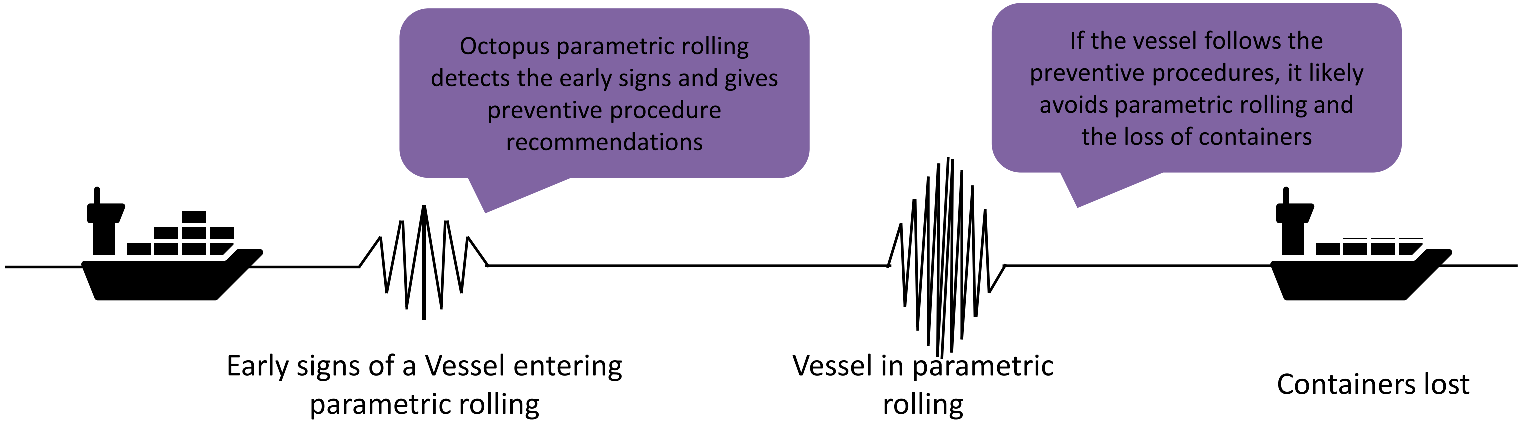
- ABB and CMA CGM to tackle significant industry challenge together

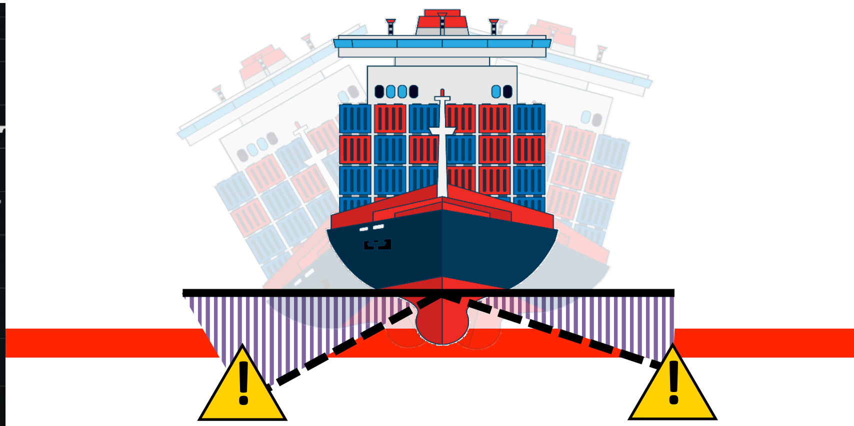
Parametric rolling identification software developed as a partnership

ABB

CMA CGM

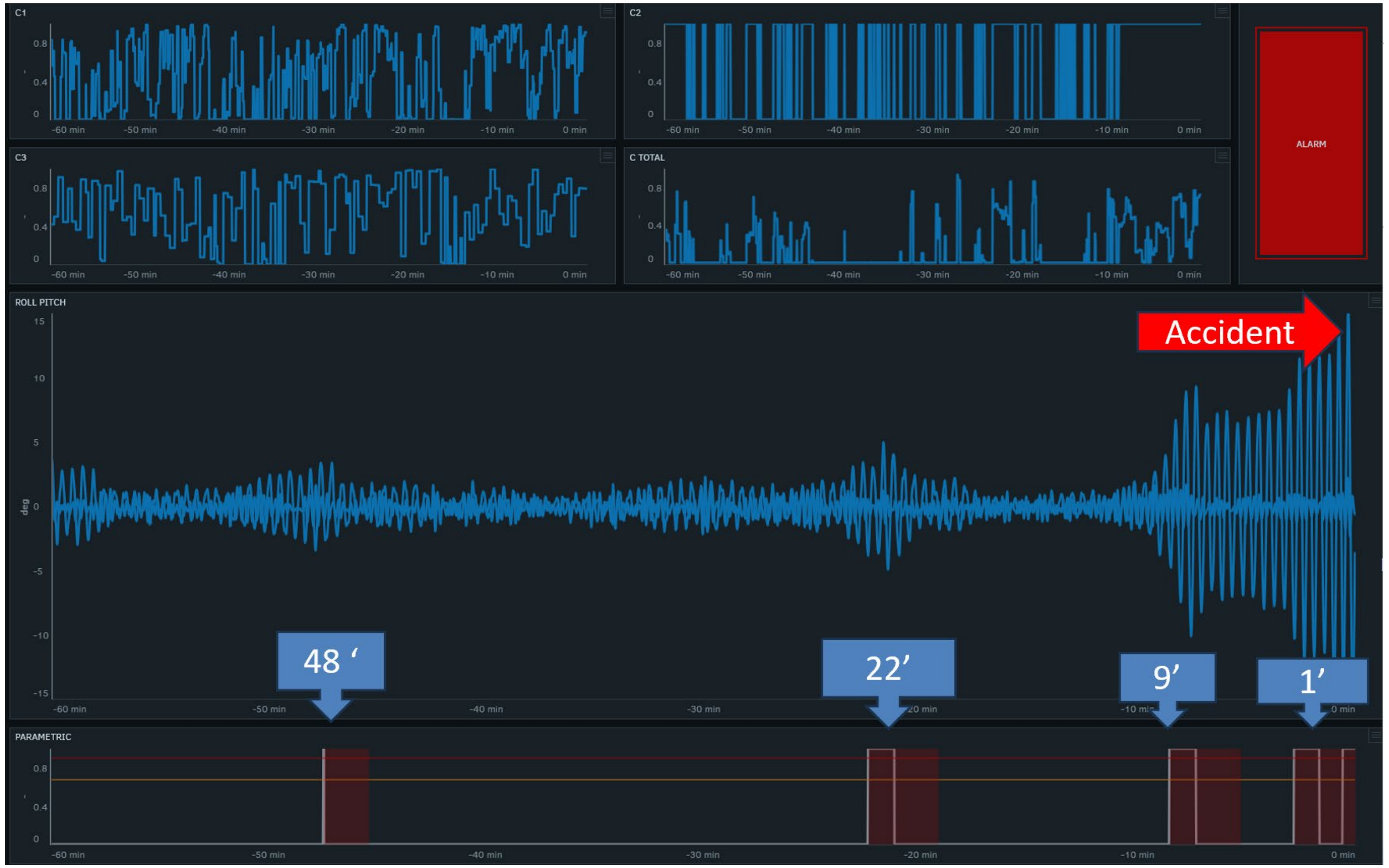
- **Detection of parametric roll by monitoring realtime ship motions**
- **Alerting crew for risk when (small) parametric roll is detected**
- **Active guidance for preventing extreme parametric roll motion**





Replay of a REAL CASE HAPPENED IN OUR FLEET

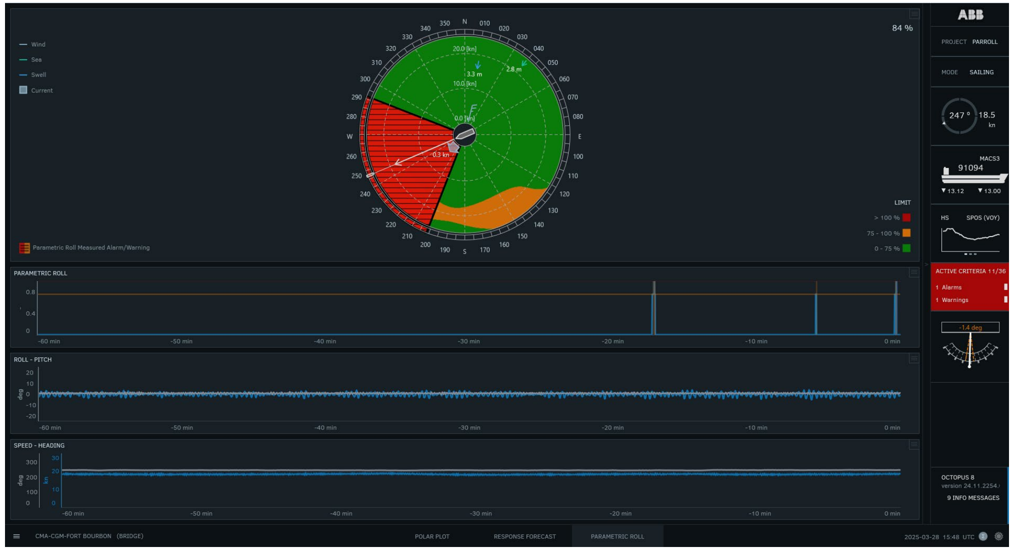
- 48 minutes before event, the first short alarm has would have been raised. With roll below 4 degrees.
- 22 minutes before the event, the second longer alarm would have been raised. With below 5 degrees.
- 9 minutes before the event, the third alarm would have been raised. With below 5 degrees.
- 1 minute before the event, the fourth alarm would have been raised with roll around 10 degrees.
- **With this new version of Octopus, the crew could have seen below screenshot**.



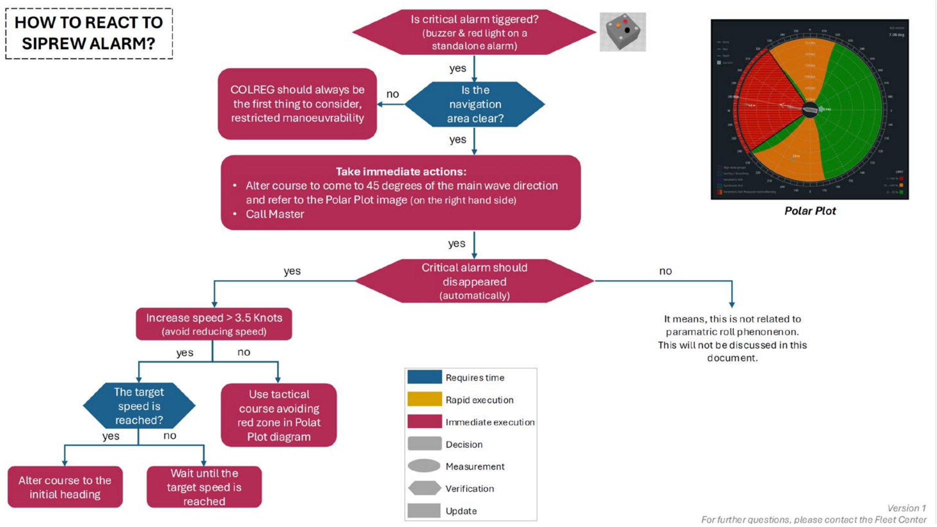
Latest Event end of March 2025

Event Happenned last Week in North Atlantic

- A first short alarm has would have been raised. With roll below 4 degrees.
- The Vessel was fitted two week ago with the lates version on Board .



- Following the Flow Chart delivered with the CMA CGM TRAINING , the Captain & the Crew applied the recommandations
- **With this new version of Octopus, the crew was able to manage this event without any damage to the crew , the vessel and Cargo**.
- What the data on board showed , **Parametric roll is not a frequent event but it is not Rare** !



CMA CGM FLEET CENTER

Smart Integrated Parametric Roll Early Warning System Decision Tool (SIPREW®)

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