# Storms Assignment

* 12 December , 1978 MS Munchen sent a distress signal after midnight when crossing the North Atlantic en route to Savannah Georgia
* MS Munchen was a modern carriers at the time , can withstand 10-15 m high waves. So the fierce storm that has been going at the time since September is not worrying
* One lifeboat that was normally hung 20m above the waterline by steel pins, The waves have enough force to bend this steel pin and tear the lifeboat.
* Seamen tales of extreme waves, mathematical models at the time didn’t account for such anomalies. So incidents were blamed on technical defects/human error
* Draupner platform has sensors that track frequency and height of waves. At the night of 1 January 1995, It recorded a wave of height 26m from crest to trough. More than twice the height of any other wave recorded in the hours and minutes after and 6 meters higher than max wave thought possible. This first rogue wave is recognized as Draupner wave
* Scientific definition of Rogue waves, exceed the average height of largest third of the waves at least two fold
* Rogue waves have great steepness, that is short wavelength with higher height
* Unstable in shallow water, but killers in the sea
* 3 categories of Rogue Waves:
  + Single giant storm waves collapse after a few second
  + Walls of water, lasts much longer, travelling 6 miles or 10km
  + Three sisters, three large waves in succession
* If a wave hits the side: large surface area of ship can cause the ship to capsize
* If bow is hit, wave slams into it, when the bow exits the wave, it puts it under enormous amount of stress. And it may break
* Height may damage vulnerable superstructure of ships (such as the bridge), destroying electronics, losing maneuverability.
* Energy from waves exceed any ship building standards
* Caused by constructive interference, may be caused by
  + Wind
  + Ocean currents
  + topography
* In South Africa, waters from southern Atlantic travelling northeast, propagate into the opposing Agulhas current, over 1500 waves from 1998 to 2003, over twice the rogue waves
* Quantum physics can explained
* Instability, waves suck all energy from other waves
* Rogue holes, extreme troughs.

## Part 1

* MS Munchen disappeared in which ocean?

North Atlantic

* Based on mathematical models used to predict wave height, rogue waves were not considered possible up until the end of the 20th century. This changed with the building of a new oil platform called  the Draupner in  1995 (year) in the North Sea
* The Queen Elizabeth II was hit by a wave of 27m in 1995 on route to New York.This was the size of a  9 story build
* For a wave to be regarded a rogue wave it must be at least twice times higher than the average height of the largest third of the surrounding waves at the
* More conservative estimate: 4.5 m, less conservative : 5m
* In both cases, 5 / 1.5 = 3.33 > 2.2 and 4.5/1.5 = 3 > 2.2
* Minimum stable wavelength using less conservative wave height,
  + Want 5 / L <= 1/7 , L >= 35 m

Second one:

* More conservative: 13 m, Less conservative : 13.5 m
* 13 / 7 = 1.86 < 2.2 and 13.5 /7 = 1.93 < 2.2, NOT a rogue wave
* L = 100 . D >= 100 / 2 = 50 , 50m
* Speed = 1.25 \* sqrt ( 100) = 12.5 m /s

## Part 2

Not suggested as a possible cause of sinking:

Collision with submerged rocks

Which of the following not associated with sudden submersion in cold water?

Paralysis

How many times faster do humans lose heat in water than on land?

25 to 30 times faster

Main purpose of reading:

Provide News for the general public

What kinds of data was used:

“The boat, which had been lying parallel to the water, started to shift, and sink, stern first, its bow rising  above the water line.”

Information that was observed

“The wind was blowing at 5.8 knots, with waves hitting 1.7m”

A quantity that was measured with instruments of some sort

“The unpredictable weather, combined with the North Pacific’s craggy shores, have created a dangerous patch of  sea known by generations of mariners as the Graveyard of the Pacific.

Information collected from people

How did the article describe the formation of rogue waves:

The addition of many waves from different directions to form one large wave

How many people reported seeing the waves:

2

True or False

Only took seconds for Leviathan to capsize True

Passengers were wearing life jackets false

Most passengers were below deck false

Survivors were rescued by coastguard false

Rogue waves have previously happened along Vancouver Island’s west coast true

## Part 3

What kind of data:

“The probability of such an event occurring is once in 1,300 years.”

Data that was simulated, modelled or calculated

“As tools for monitoring rogue waves improve, scientists are optimistic they’ll learn more about the mysterious  phenomenon.”

Not really data

The main purpose of reading:

explain some scientific matters to the general public

In what ways are rogue waves and tsunamis similar

Both can be detected from pressure sensors on the ocean floor

If a wave height was 13.3 m and the surrounding waves were 5.8 m, this wave would be

More extreme than Norway, but less extreme than Ucluelet

How do scientists think that climate change has influenced the intensity and frequency of rogue waves

5 – 15 %

Record breaking because it was the highest rogue weave recorded false

False A rogue wave of this magnitude will not happen again for 1300 years