

# SIGNIFICANT WAVE HEIGHT STUDY

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Study Undertaken on behalf of  
Malta Maritime Authority

# Background

- EU Directive 98/18/EC was introduced following the sinking of the Herald of Free Enterprise, Estonia etc.
- Aim was to improve safety of maritime passenger transport
- Directive applies to
  - new passenger ships
  - existing passenger ships of 24m length and above
  - High-speed passenger craft

# Requirements of Directive

- Passenger ships are divided into 4 classes: A, B, C and D according to the **sea area** and distance from the coast of their operating area
  - Class A: all
  - Class B: no more than 20 miles from coast
  - Class C: within 5 miles of coast and 15 miles of place of refuge,  $SWH_{10} < 2.5m$
  - Class D: within 3 miles of coast and 6 miles of place of refuge,  $SWH_{10} < 1.5m$

# Details of Sea Area Classification

- SWH<sub>10</sub><2.5m: Areas where probability of exceeding 2.5m wave height is smaller than 10% for annual and/or summer periods
- SWH<1.5m: Areas where probability of exceeding 1.5m wave height is smaller than 10% for annual and/or summer periods

# Terms of Reference

- Produce wind statistics
- Assess wave conditions in sea areas around Malta out to 20 nautical miles
- Produce contour plots of 10%ile wave heights at intervals of 1.5, 2.0 and 2.5m
- Produce for summer and annual conditions

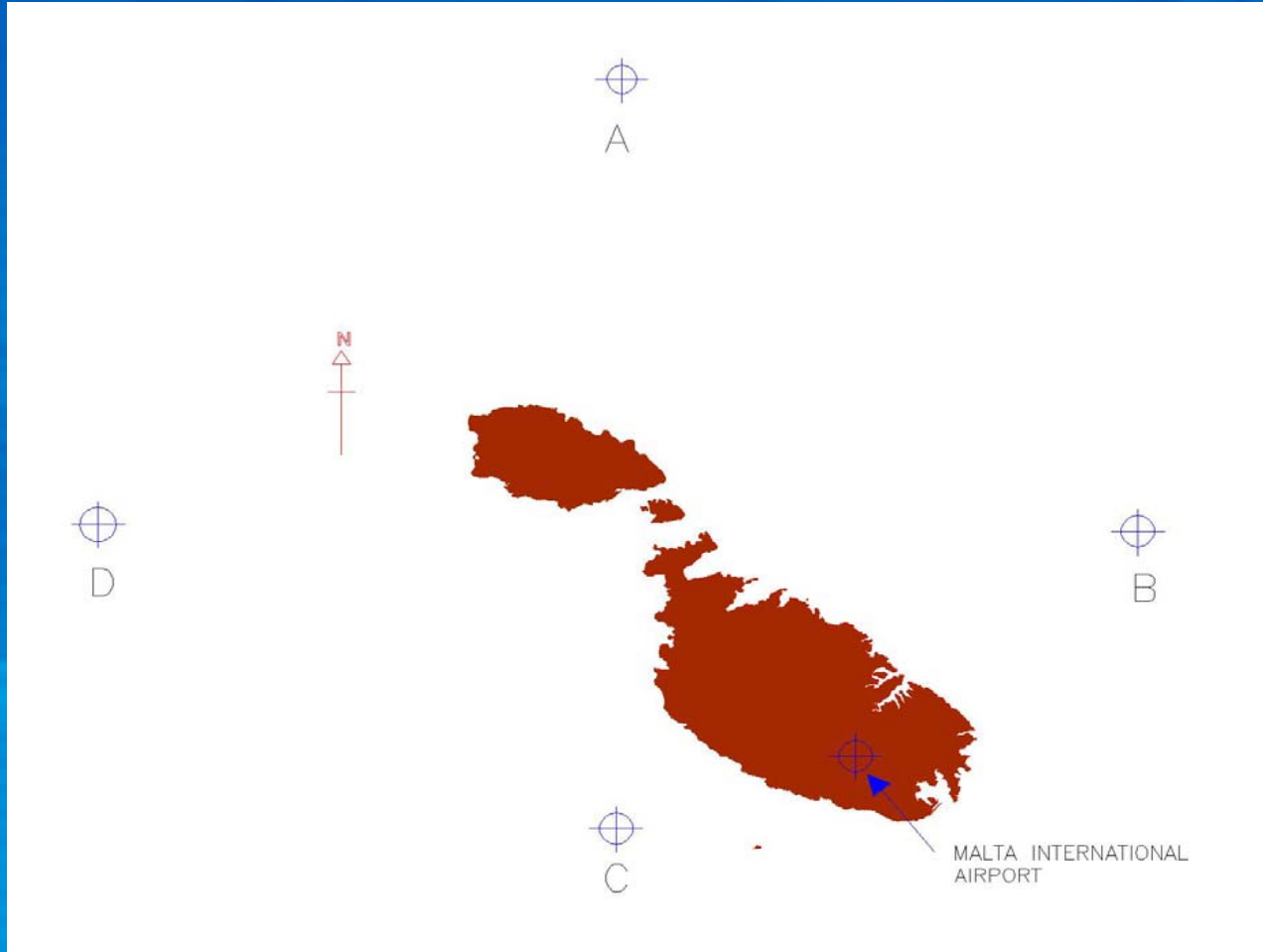
# Methodology

- Collection of information
- Review of datasets and reports
- Data analysis
- Significant Wave Height modelling
- Production of contour maps

# Datasets and Sources

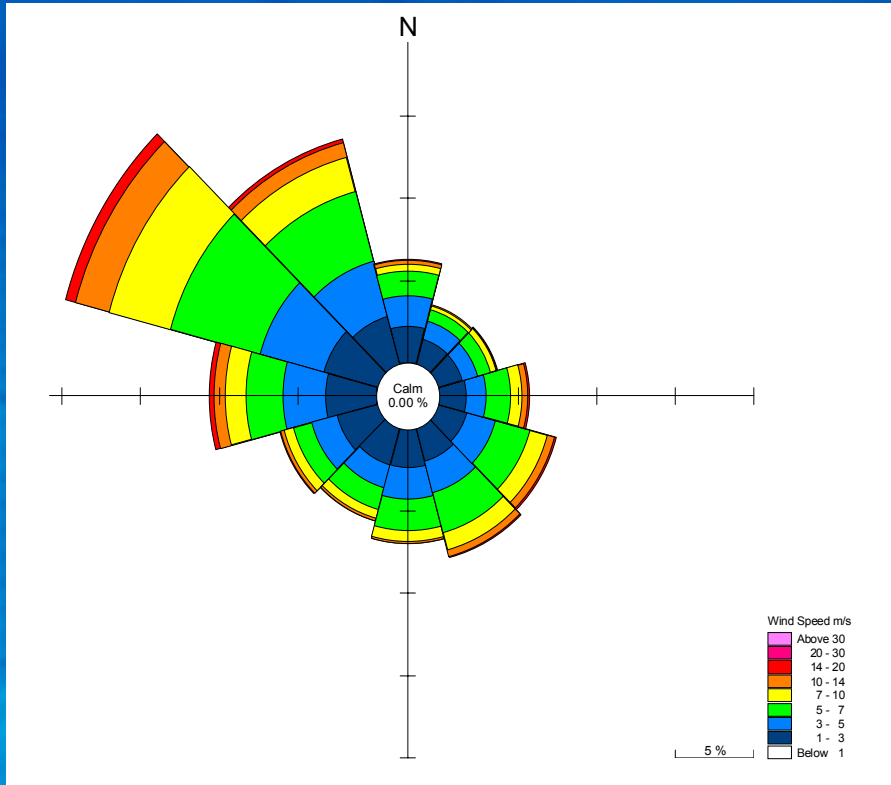
- UK Meteorological Office (UKMO)
- Malta International Airport (MIA) Meteorological Office
- UK Admiralty Charts

# Location of wind/wave data points

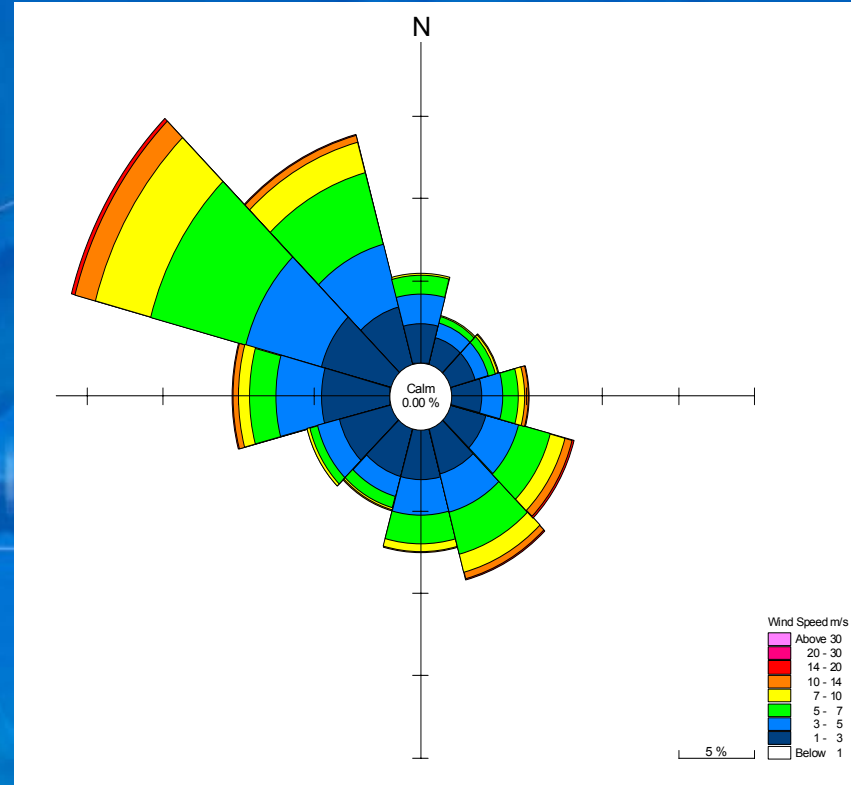




# Offshore Wind Roses

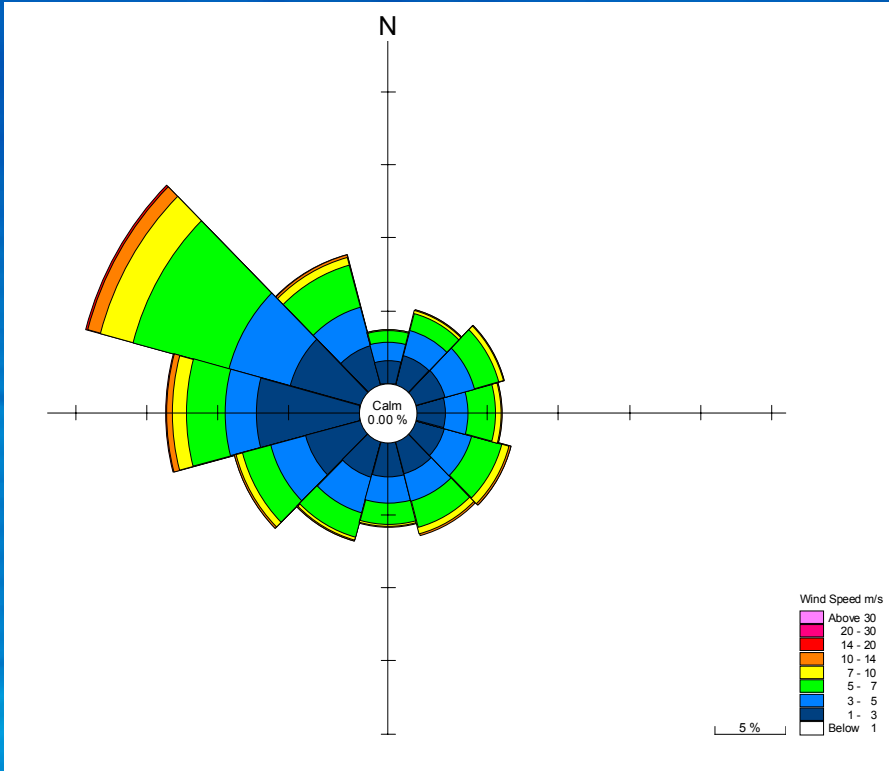


Point D annual results

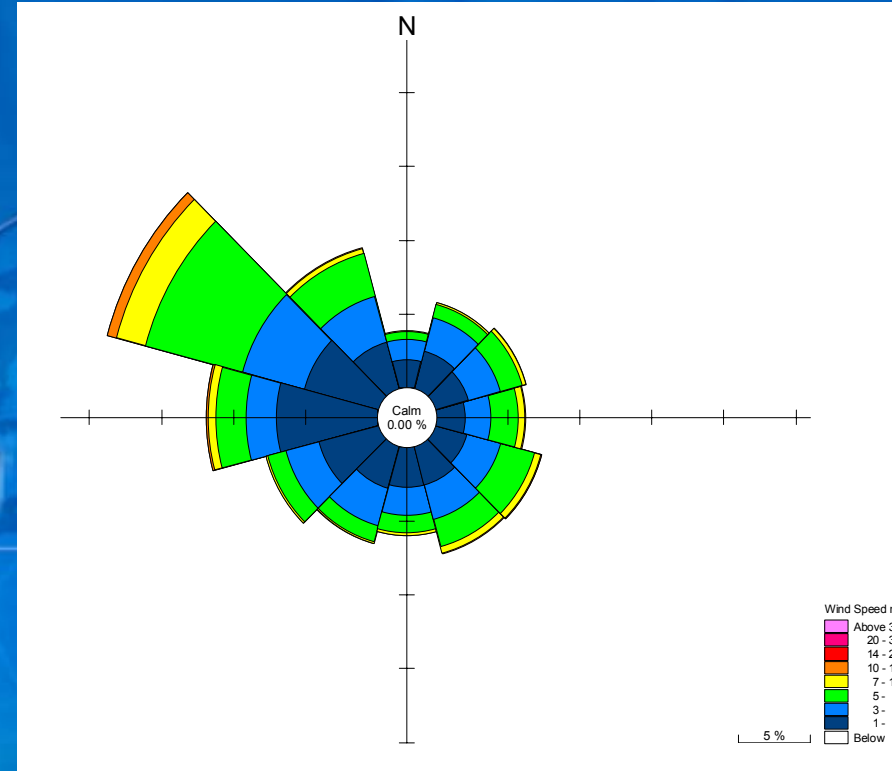


Point D summer period results

# Airport Wind Roses

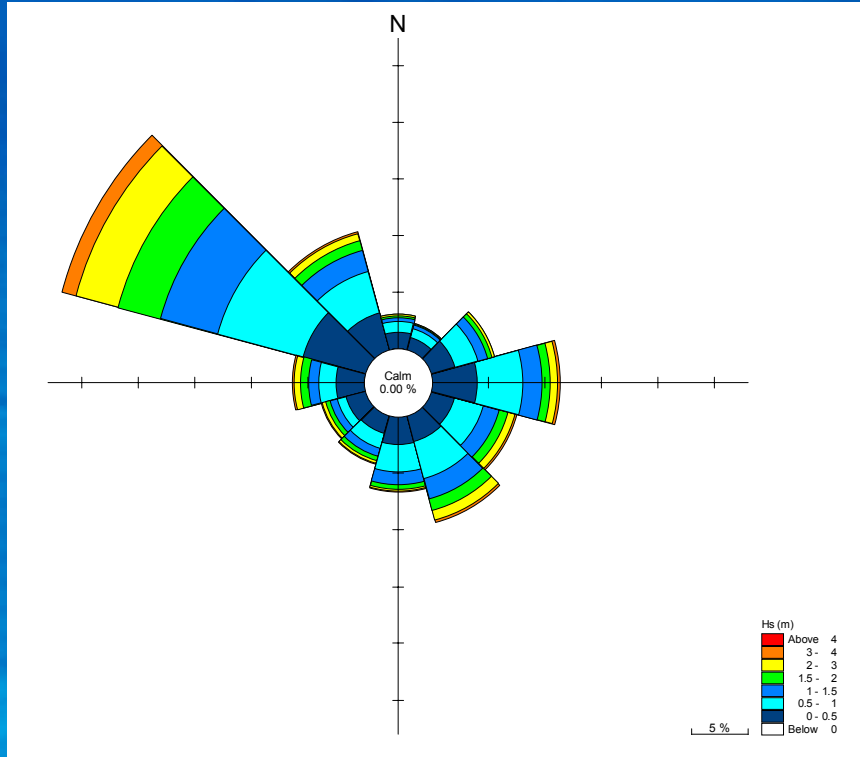


Malta International Airport  
annual results

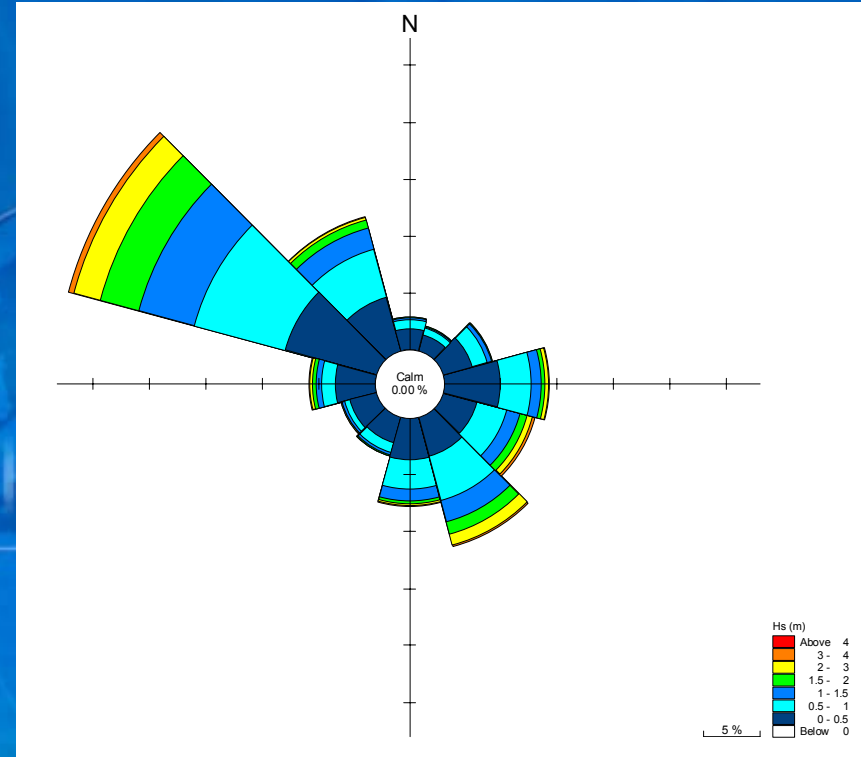


Malta International Airport  
summer period results

# Offshore Wave Roses

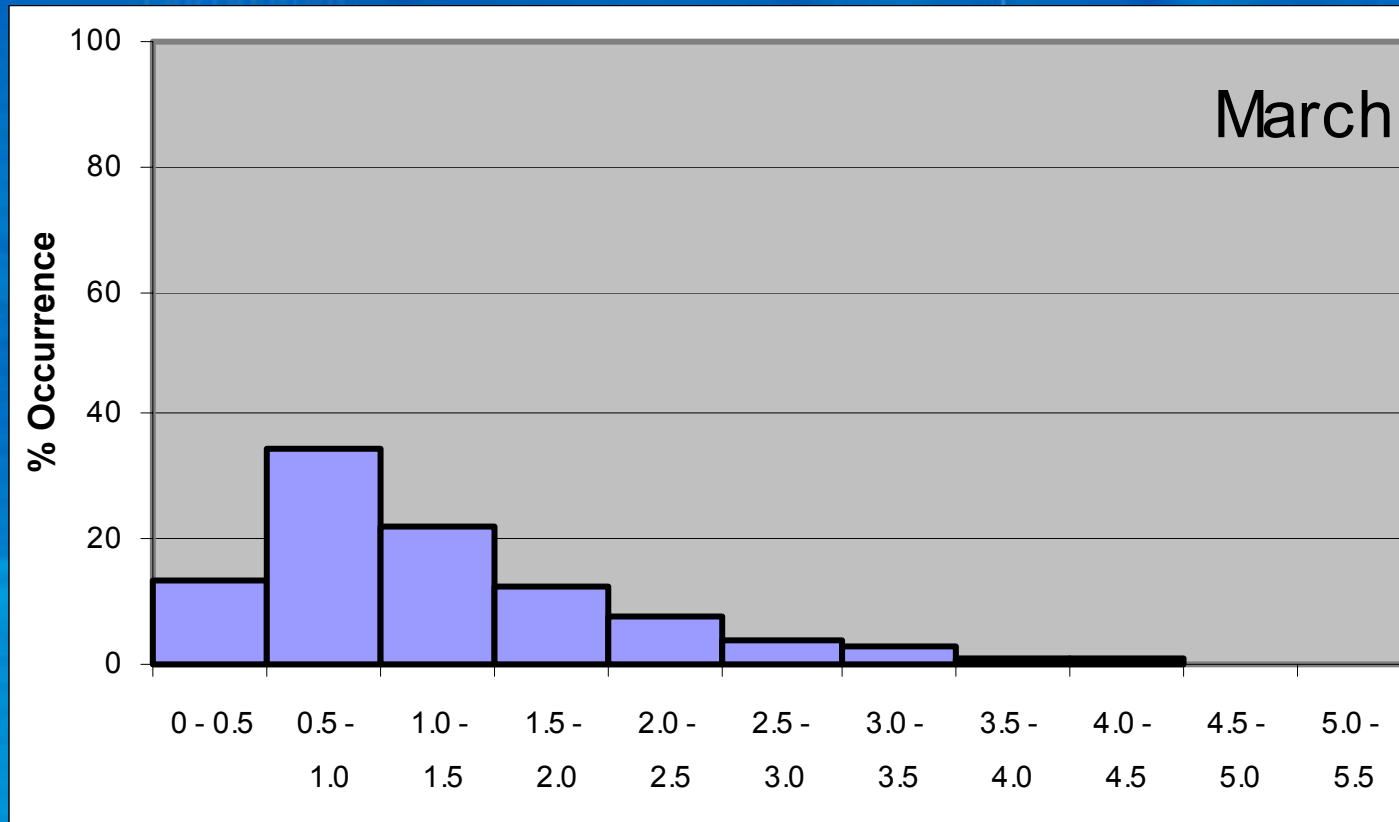


Point D annual results

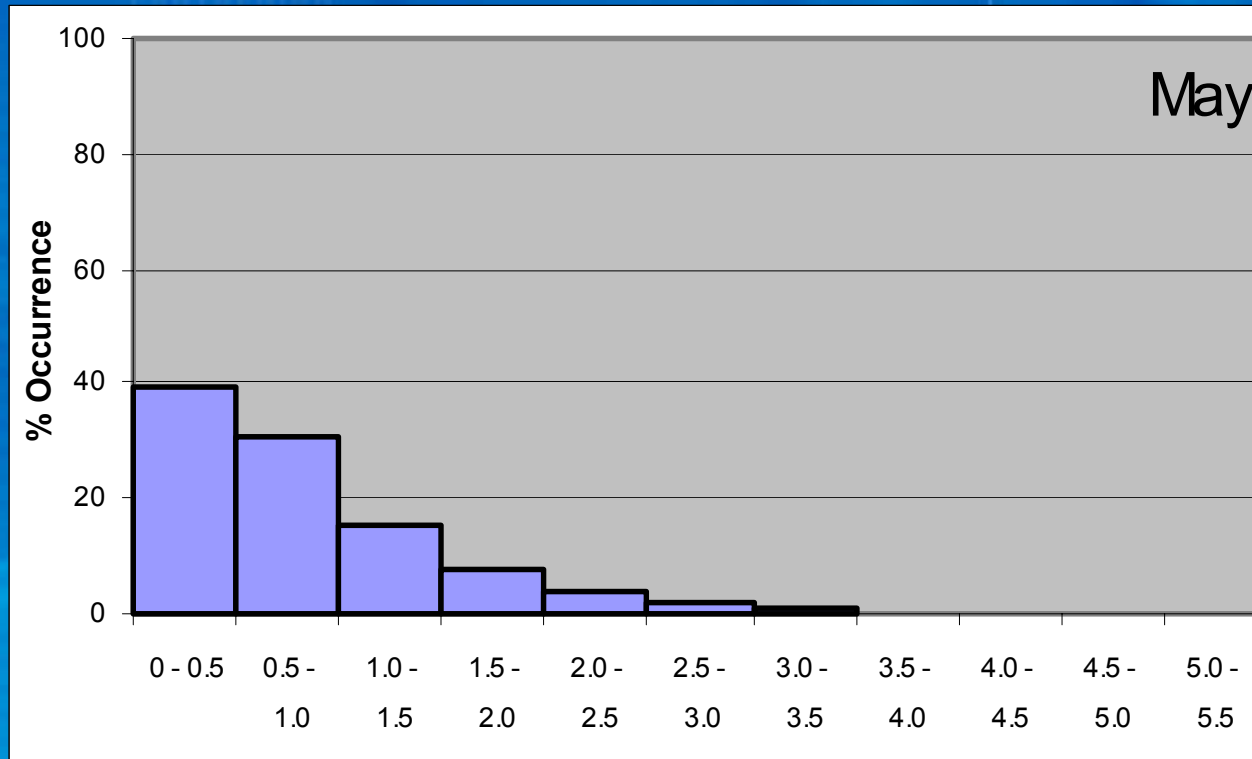


Point D summer period results

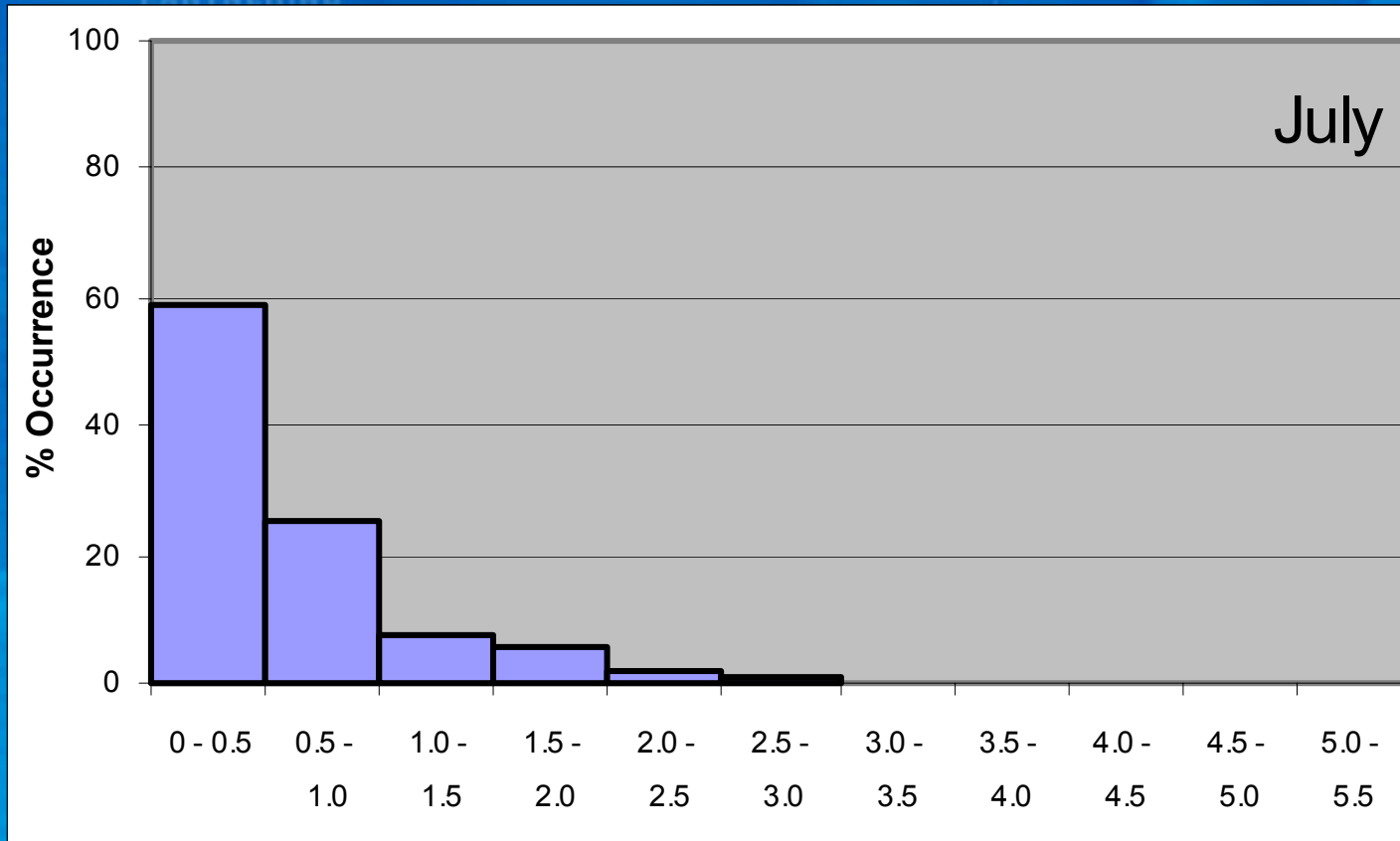
# Wave Height Distribution - March



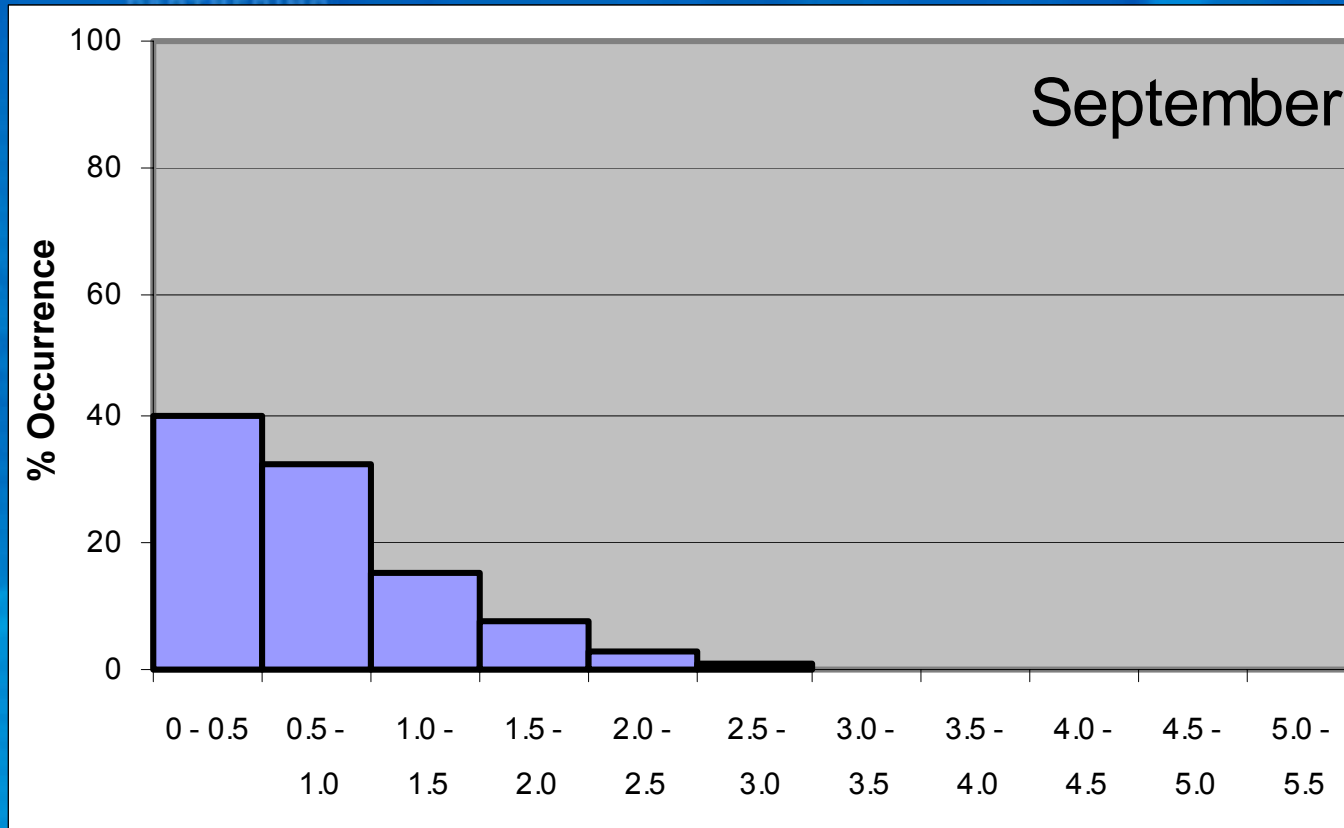
# Wave Height Distribution - May



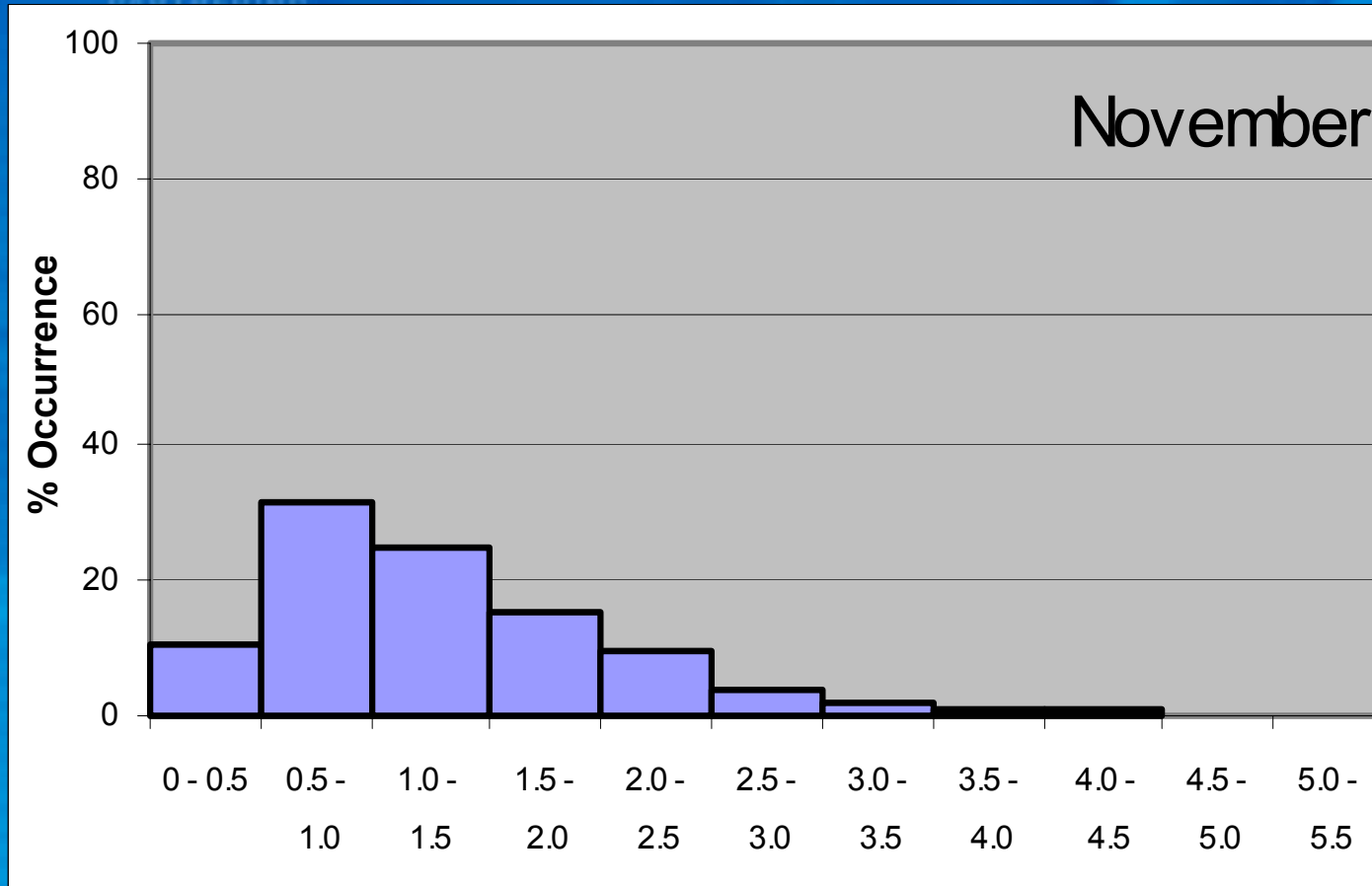
# Wave Height Distribution - July



# Wave Height Distribution - Sept.

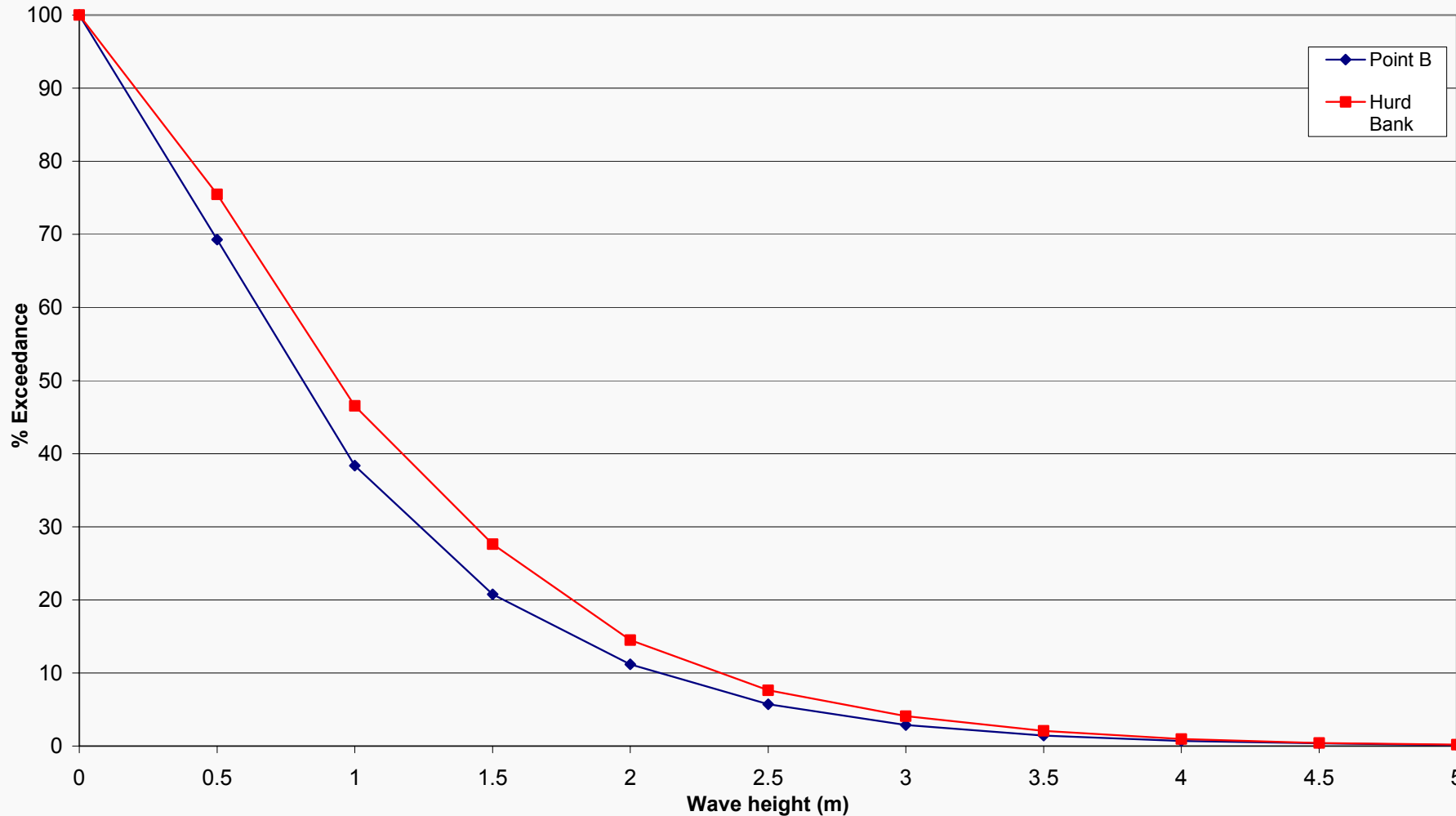


# Wave Height Distribution - Nov





# Comparison of Hurd Bank buoy and UKMO Point B



# Modelling

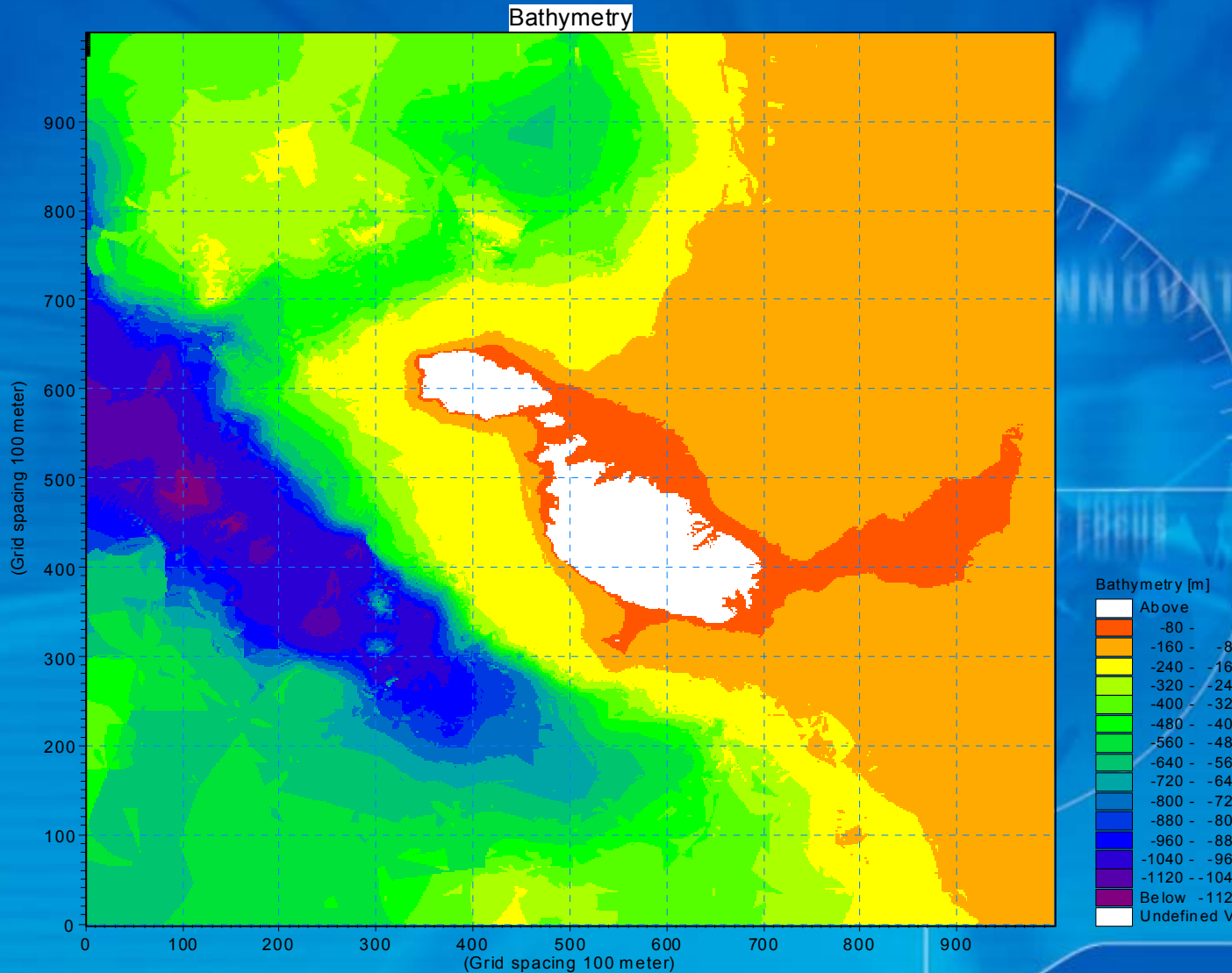
## ■ Approach

- Numerical model used to transfer offshore wave climate to inshore
- Model extent is 100 km by 100km
- Model has a grid spacing of approx. 100m
- Model run for 300 combinations of wave height, period and direction representing annual climate
- Wave heights extracted from model and 10%ile height calculated and contoured

## ■ Note

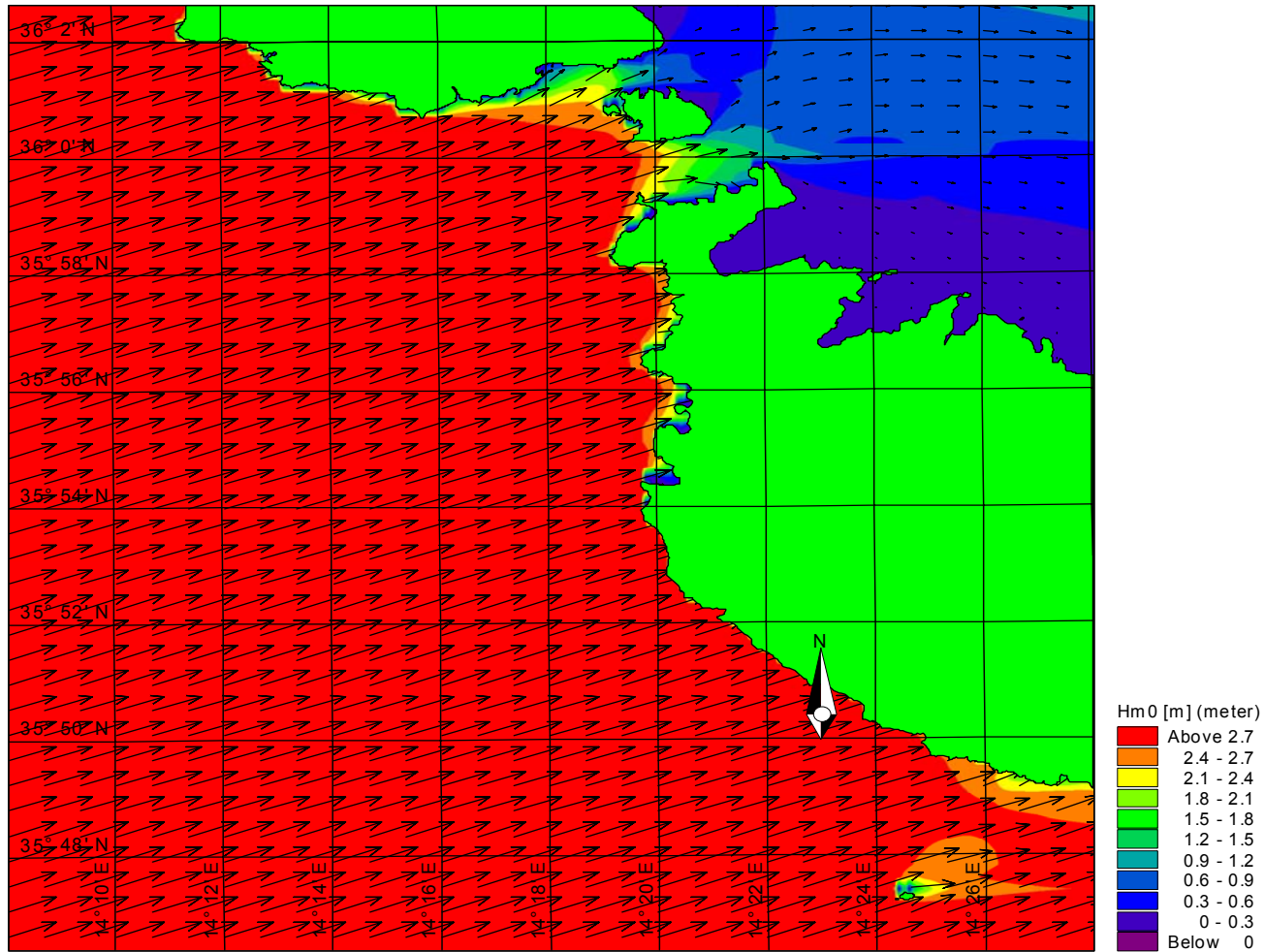
- Model doesn't include reflection and results are representative of sea areas rather than specific locations
- Results are not the worst cases that can occur – will be exceeded 10% of the time

# NSW Model Bathymetry

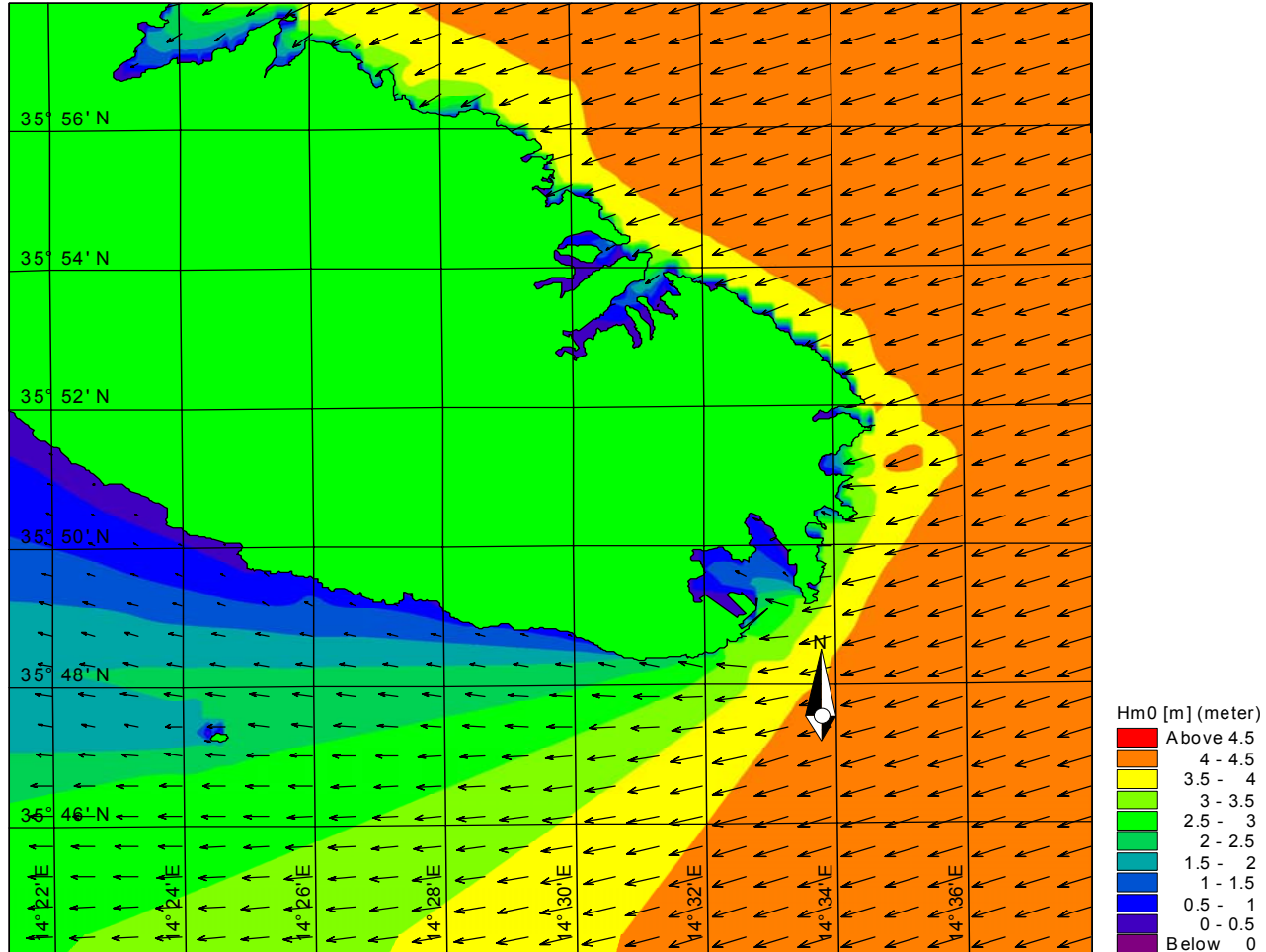


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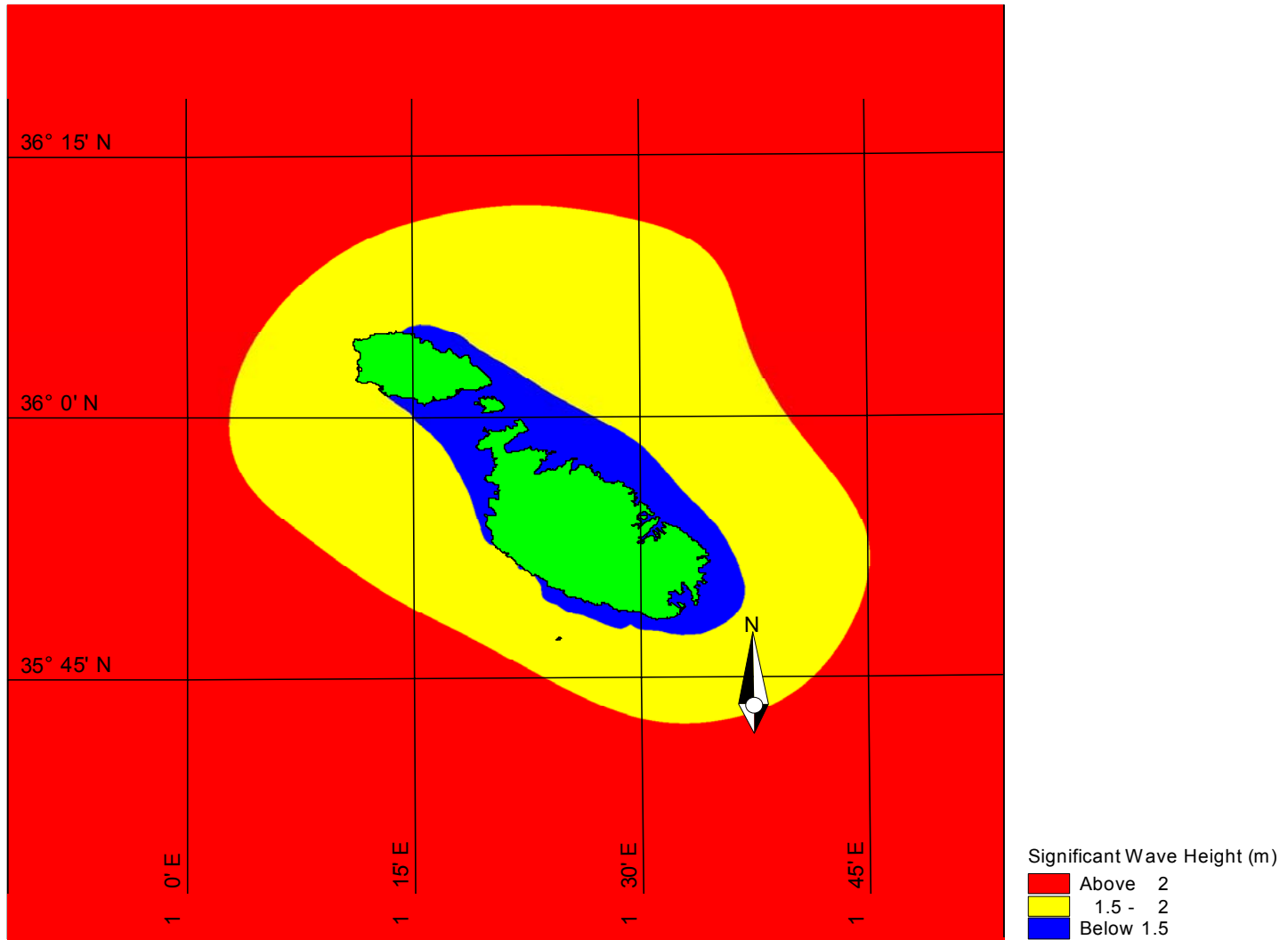
# Verification Run 1



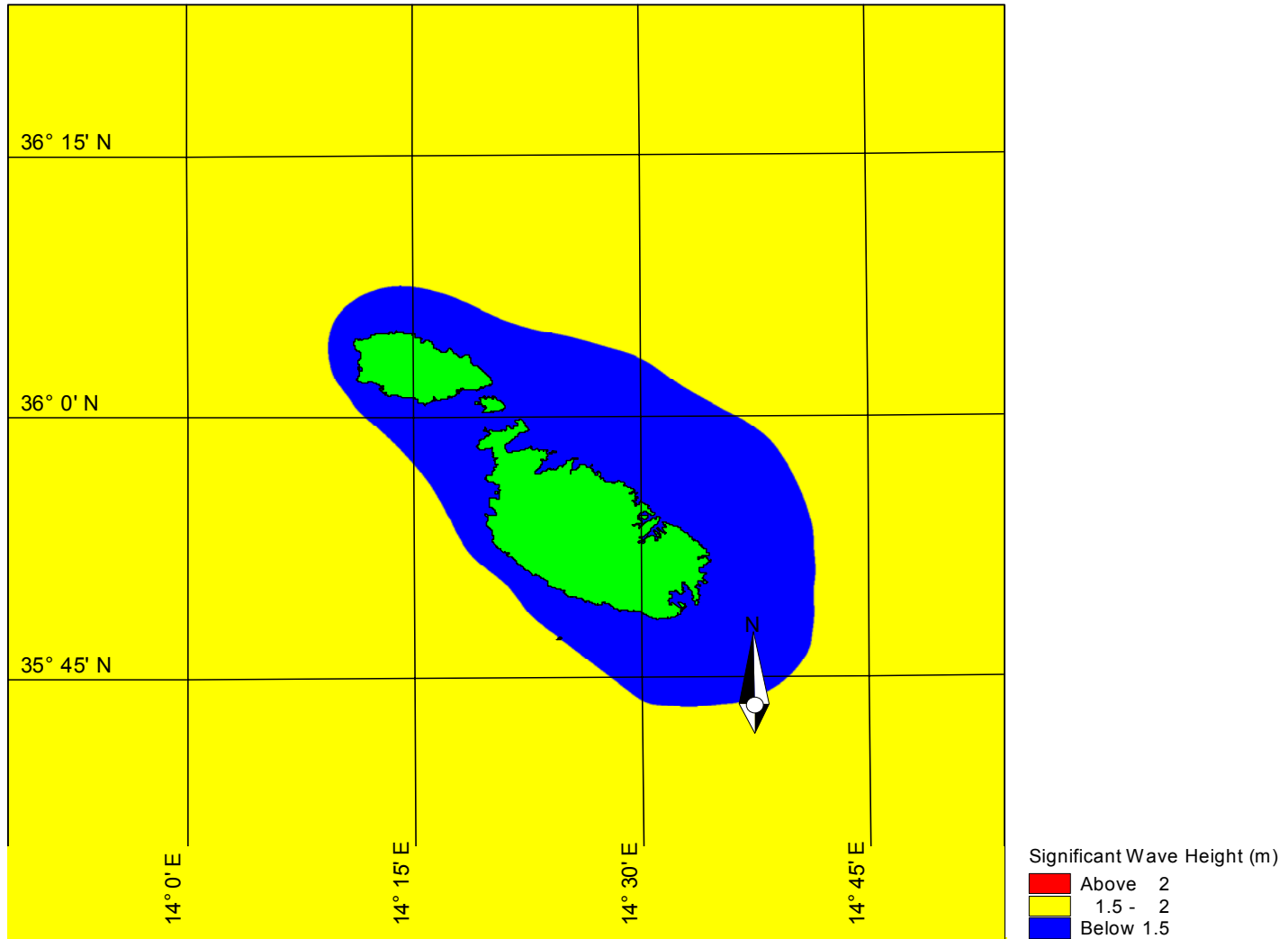
# Verification Run 2



# Annual Results



# Summer Results



# Conclusions

- Annual 10%ile exceedance has a maximum value of about 2.4m – below the 2.5m threshold
- Annual 10%ile exceedance is above 1.5m for round-Malta passenger vessels; but
- Summer 10%ile exceedance of less than 1.5m is relevant to round-Malta passenger vessels