

EXTREME WAVE CLIMATE OF THE NEW SOUTH WALES COAST

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ABSTRACT

The NSW coast is subject to a relatively moderate wave climate that is periodically affected by large coastal storm events arising from a range of synoptic weather systems. Extreme wave events may cause coastal inundation, beach erosion, damage to property and marine structures, and risks to public safety.

This paper describes the statistical analysis of the extreme directional wave climate along the NSW coast based on historical wave buoy data extending back to 1974. From the analysis, long-term trends in the extreme wave climate (storm peaks, storm duration and peak directions) are also identified.

The work is largely an extension of the analysis completed by Shand et al (2011), that incorporates an additional 13 years of wave data up to 2022. During that 13 year period a number of coastal storms were experienced along the NSW coast, with the most noteworthy being an east coast low system that impacted the NSW coast in June 2016. The directionality of the 2016 event resulted in some of the largest wave conditions recorded from the north-easterly sector, causing widespread damage along a coastline that is typically exposed to wave conditions from the south and south-east sectors.

Wave data has been collected under the NSW Coastal Data Network Program managed by the Biodiversity and Conservation Division of the NSW Department of Planning and Environment (DPE BCD) by the Manly Hydraulics Laboratory (MHL).

MHL collects offshore wave data at seven continuously recording sites off the NSW coast. The ocean wave monitoring sites are based on the Waverider buoy system developed by the Dutch company, Datawell. Waverider buoys are located off Byron Bay, Coffs Harbour, Crowdy Head, Sydney, Port Kembla, Batemans Bay and Eden. To provide deepwater wave data, the buoys are typically moored in water depths between 70 and 100 metres, between 6 and 12 kilometres from the shoreline (MHL, 2022). Extending back to the early 1970's at some locations, the wave buoy data network provides one of the most comprehensive wave data archives available.

The extreme wave climate along the NSW coast is generated by a range of synoptic systems of varying origin, including Tropical Cyclones, Tropical Lows, Anticyclone Intensifications, Easterly Trough Lows, Continental Low, Inland Trough Lows, Southern Tasman Lows and Southern Secondary Lows (following the storm classification used in Shand et. al., 2010 and Speer, 2021). The frequency and occurrence of these systems

is explored with identification of the storm types most likely to generate extreme waves at various locations on the NSW coast.

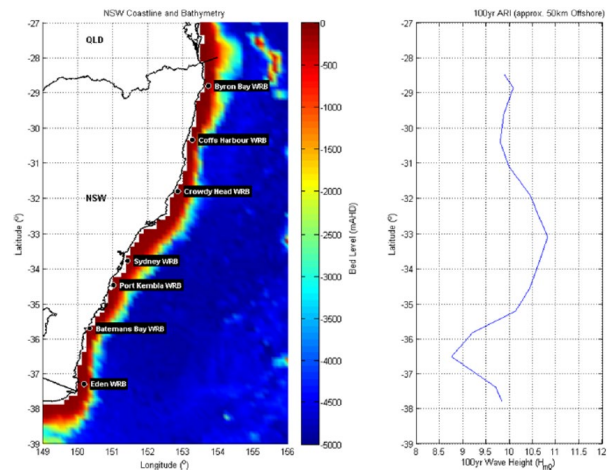


Figure 1 - 100-year ARI deep-water significant wave height (Hm0) values by latitude along the NSW coastline

Commissioned by the NSW Department of Planning and Environment, the analysis aims to update and improve the understanding of the extreme wave climate for NSW for the benefit of the coastal engineering and management communities in NSW. A key objective of the analysis is to enable inshore extreme wave conditions to be developed using the offshore extreme wave statistics as boundary conditions to the nearshore wave modelling application for the NSW coast (DPE, 2021).

REFERENCES

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