

GLOBAL WAVE CLIMATE TRENDS: WHAT DO THE SOUTHERN HEMISPHERE WAVE BUOYS TELL US?

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INTRODUCTION

Australia's national wave data network presently consists of around 35 directional wave buoys distributed across the Australian coastline, with 11 of these buoys have been in operation since the mid-seventies. South Africa is home to 4 offshore wave buoys which have operating since the early eighties. New Zealand wave buoy network is relatively younger, with 3 wave buoys in operation since the early 2000s.

All of these buoys have been providing invaluable long-term historical wave data which have allowed the offshore and coastal scientific community to better assess extreme wave climates and their impact on the coastline. Additionally, these data records of wave observations are key for model validation and to better understand the effects of climate change on the local and regional wave climate.

STUDY

Recent studies on the global wave climate (Reguero *et al.*, 2019; Young and Ribal, 2019; Meucci *et al.*, 2020) point towards a marked redistribution and increase in global wave energy worldwide, particularly in the Southern Ocean. These studies have based their findings on remote sensing data (satellite altimetry) and wave model reanalyses, whereas an additional evaluation of the long-term wave measurement records up to the recent past has not been undertaken. This is especially the case for the Southern Hemisphere, where data is often stored on internal repositories by buoy operators.

This paper presents results of long-term wave climate trends collated from an unprecedented number of observational wave buoys across the Southern Hemisphere. A total of 32 wave buoys were analysed for the study, spanning from the 10th to the 45th parallel south (Figure 1) and totaling over 850 years of data. The work focused primarily at the yearly and seasonal averages of significant wave height, peak wave period and associated wave power, as well as higher exceedances (10% and 1%) to provide insight on the trends to more extreme wave climates.

The results to be presented at ICCE 2022 provide a vital additional perspective on the extent to which the measured wave records in the Southern Hemisphere concur with recent global wave analysis findings and have implications for coastal design as well as long-term projections of coastline change.

REFERENCES

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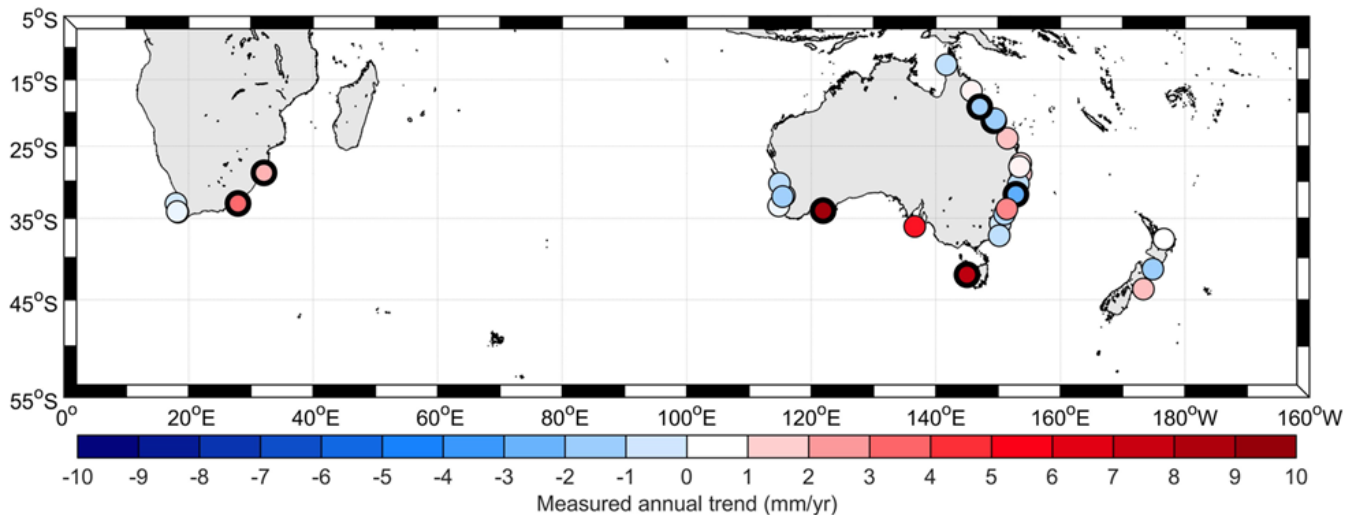


Figure 1 - Annual trends of average monthly significant wave height from each of the 32 Southern hemisphere wave buoys analysed. Solid circles represent statistically significant trends.