



Wave climate and trends in the Pacific region off Mexico and Central America

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Proper planning of maritime activities strongly depends on the prior knowledge of wave characteristics. In particular, knowledge of wave climate and its variability is essential for offshore and coastal operations and engineering projects. This work describes the wave climate and its variability in the Pacific region off Mexico and Central America (PMCA) based on a 19 years wave hindcast.

It is found that the variability of the wave height is dominated by changes of the swell arriving from the North Pacific and of the waves generated in the Gulfs of Tehuantepec and Papagayo. The highest waves in PMCA region are associated with the occurrence of tropical storms however; tropical storms are so sparse in time and space that have little influence in the long-term mean.

An analysis of the correlation of the monthly anomaly of wave height with several climate indices suggests that the major source of variability in PMCA region is El Niño Southern Oscillation (ENSO). It is also suggested that, through the Pacific–North America teleconnection, ENSO modifies the storms characteristics over the North Pacific and causes changes in the waves arriving into PMCA region.

In PMCA region wave height exhibits a negative trend almost everywhere. Notwithstanding, trends are only statistically significant in regions dominated by swell from the North Pacific, with decreasing rates between -1 to -3 cm.yr⁻¹. This study suggests that the variability of the waves conditions over the North Pacific are related to changes of the strength and position of the Aleutian Low which are evidenced by the behaviour of the Pacific Decadal Oscillation. If this is the case, the observed negative trends are expected to be part of a multi-decadal oscillation rather than a long-term behaviour.