



**STATISTICAL ANALYSIS OF GLOBAL ESTIMATES OF
EXTREME WIND SPEED AND WAVE HEIGHT**

by

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*If you wait to do everything until you're sure it's right,
You'll probably never do much of anything*

-Win Borden

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Abstract

Satellite altimeters provide the potential for global measurements of wind speed and wave height which can be potentially used to determine 50 and 100 year return period conditions. A number of studies have used data sets of relatively short duration to show that such approaches are feasible. However, the relatively short data sets have limited the quality of such analyses. In the present study has been developed a combined data base covering 23 years of altimeter data from 7 separate platforms. This data has been consistently calibrated and cross-validated to ensure that it represents a stable data set over this extended period. In addition , an analysis of this database investigated global estimates of 50 and 100 year return period wind speed and significant wave height. The analysis will assess the accuracy of the altimeter-derived extreme values by comparison with deep-water buoy data. A variety of different probability distributions and analysis techniques will be applied to the data and an optimal approach for use with altimeter data will be presented. The analysis clearly shows that the extended data set used for the analysis results in predictions in far better agreement with buoy data than previous studies. It is also clear that such a long term altimeter data set can provide estimates of extreme wind and wave conditions on a global scale. Clearly, such results are of significant importance to both offshore and coastal engineering applications.

Key words; Extreme value, return period, goodness of fit, significant wave height, wind speed, offshore design, wave climate.

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Declaration by candidate

I, Jayaratnam Vinoth hereby declare that this submission is entirely my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due reference is made in the text.

05 May 2011

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