

# STATISTICAL ANALYSIS OF EXTREME OCEAN WAVES IN SRI LANKA

**T.Theiventhiram**

Postgraduate Institute of Science, University of Peradeniya, Peradeniya, Sri Lanka

Study of extreme wave heights is vital for design of coastal structures. These structures are designed to withstand waves of a selected return period. The purpose of this study is to estimate the wave heights for several return periods in order to use them in coastal construction.

Wave height measurements collected from Galle and Colombo stations were analyzed. Analysis was separately performed for sea, swell and overall waves, for both stations season wise. Peak over threshold method (POT) was used for the sample selection. The possible range of threshold values were identified by using the mean residual life plot and the specific threshold value was selected using the Generalized Pareto Distribution. Using the POT method the Generalized Pareto Distribution (GPD) was fitted for the sampled data. Further diagnostic plots were obtained for assessing the model fit. Return levels were estimated for several return periods and the confidence intervals were constructed for the return levels.

For Galle station, exponential distributions were fitted for south-west and 1<sup>st</sup> inter monsoon for sea wave heights, while wave heights were fitted with beta distribution for swell wave heights. Pareto distribution fitted for south-west monsoon for overall wave heights, while wave heights were fitted with Beta distribution for 1<sup>st</sup> and 2<sup>nd</sup> intermonsoons. Analysis was omitted for 2<sup>nd</sup> inter monsoon and north-east monsoon for sea and swell waves, while north-east monsoon was omitted for overall waves as they did not have extreme values. For Colombo station, in south-west monsoon, sea and overall wave heights were fitted with exponential distribution, while those were fitted with beta distribution for swell waves. Other seasons were omitted from the analysis, because there were no wave heights obtained significantly.

It was found that, the return levels for sea wave heights were comparatively higher than the swell wave heights. When designing the coastal construction, the return levels of extreme wave heights in south-west monsoon season should be considered than the other seasons, and also comparatively the return levels of sea waves have significant impact than the swell waves. Moreover, return levels of overall wave heights also have to be considered in designing coastal structures.