

The wave climate of the seas

It is common to hear weather forecasts and talk of the climate these days everywhere. Most of these forecasts, especially the ones made available to the public are rainfall and temperature measurements. And they most of the time concern the atmosphere. But can these be extended to the sea? Can we study the climate of the Sea? The answer is yes. The climate of the sea can also be described using the height, period, and direction of its waves.

The main aim of this study was to come up with a simple and easy-to-use model that calculates wave heights and periods. The models tested in the study were relatively simple and use wind speed, wind directions, the depth of the sea and the fetch length (the maximum distance over which a wind blows) as inputs.

The necessary data used for testing the models were collected from Swedish meteorological and hydrologic institute (SMHI) wave and wind stations over the Baltic Sea. The data contained several years of wind speed and wind direction measurements. Moreover wave heights, periods and wave direction were all obtained from these stations.

One of the models tested was the Hanson-Larson model, named after the researchers who came up with it. The model assumes exponential growth or decay of wave heights to a particular equilibrium condition, which is determined by the existing wind conditions. The model performed satisfactorily as to accurately predict the wave conditions over the sea. Even if there were some instances where there were disagreements between model-calculated and observed wave heights and periods, for most part, the agreements were fair.

There were also other variations to the Hanson-Larson model, which were tested for their prediction of the wave climate of the sea. These variations, instead of the wave heights, assume the growth and decay of wave energy. The model results were in agreement with observed values, but only with a lesser degree than the Hanson-Larson model.

The Hanson-Larson model can be used in conjunction with other sophisticated models to simulate complex conditions. However the advantage of this simplified model will be in calculating wave heights and wave periods over an extended time period within a short time, which would have taken a long time using other models,